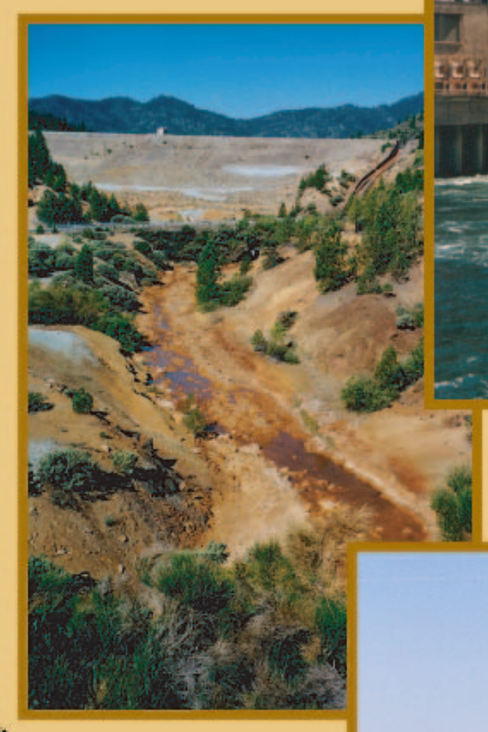
Metals Transport in the Sacramento River, California, 1996–1997

Volume 1: Methods and Data

U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the
Sacramento Regional County Sanitation District
California State Water Resources Control Board
U.S. Environmental Protection Agency
U.S. Department of Commerce, National Marine Fisheries Service

Water-Resources Investigations Report 99-4286



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Volume 1: Methods and Data

Charles N. Alpers, Howard E. Taylor, *and*
Joseph L. Domagalski, editors

U.S. GEOLOGICAL SURVEY

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U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

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For additional information write to:

District Chief
U.S. Geological Survey
Water Resources Division
Placer Hall
6000 J Street
Sacramento, California 95819-6129

Copies of this report can be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
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FOREWORD

The mission of the U.S. Geological Survey (USGS) is to assess the quantity and quality of the earth resources of the Nation and to provide information that will assist resource managers and policymakers at Federal, State, and local levels in making sound decisions. Assessment of water-quality conditions and trends is an important part of this overall mission.

One of the greatest challenges faced by water-resources scientists is acquiring reliable information that will guide the use and protection of the Nation's water resources. That challenge is being addressed by Federal, State, interstate, and local water-resource agencies and by many academic institutions. These organizations are collecting water-quality data for a host of purposes that include: compliance with permits and water-supply standards; development of remediation plans for specific contamination problems; operational decisions on industrial, wastewater, or water-supply facilities; and research on factors that affect water quality. An additional need for water-quality information is to provide a basis on which regional- and national-level policy decisions can be based. Wise decisions must be based on sound information. As a society we need to know whether certain types of water-quality problems are isolated or ubiquitous, whether there are significant differences in conditions among regions, whether the conditions are changing over time, and why these conditions change from place to place and over time. The information can be used to help determine the efficacy of existing water-quality policies and to help analysts determine the need for and likely consequences of new policies.

To address these needs, the U.S. Congress appropriated funds in 1986 for the USGS to begin a pilot program in seven project areas to develop and refine the National Water-Quality Assessment (NAWQA) Program. In 1991, the USGS began full implementation of the program. The NAWQA Program builds upon an existing base of water-quality studies of the USGS, as well as those of other Federal, State, and local agencies. The objectives of the NAWQA Program are to:

- Describe current water-quality conditions for a large part of the Nation's freshwater streams, rivers, and aquifers.
- Describe how water quality is changing over time.
- Improve understanding of the primary natural and human factors that affect water-quality conditions.

This information will help support the development and evaluation of management, regulatory, and monitoring decisions by other Federal, State, and local agencies to protect, use, and enhance water resources.

The goals of the NAWQA Program are being achieved through ongoing and proposed investigations of 59 of the Nation's most important river basins and aquifer systems, which are referred to as study units. These study units are distributed throughout the Nation and cover a diversity of hydrogeologic settings. More than two-thirds of the Nation's freshwater use occurs within the 59 study units and more than two-thirds of the people served by public water-supply systems live within their boundaries.

National synthesis of data analysis, based on aggregation of comparable information obtained from the study units, is a major component of the program. This effort focuses on selected water-quality topics using nationally consistent information. Comparative studies will explain differences and similarities in observed water-quality conditions among study areas and will identify changes and trends and their causes. The first topics addressed by the national synthesis are pesticides, nutrients, volatile organic compounds, and aquatic biology. Discussions on these and other water-quality topics will be published in periodic summaries of the quality of the Nation's ground and surface water as the information becomes available.

This report is an element of the comprehensive body of information developed as part of the NAWQA Program. The program depends heavily on the advice, cooperation, and information from many Federal, State, interstate, Tribal, and local agencies and the public. The assistance and suggestions of all are greatly appreciated.

Robert M. Hirsch
Chief Hydrologist

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CONVERSION FACTORS, VERTICAL DATUM, ACRONYMS and ABBREVIATIONS, and CHEMICAL NOTATION

Conversion Factors

Multiply	By	Obtain
acre-foot (acre-ft)	1,233	kiloliter
foot per second (ft/s)	0.3048	meter per second
cubic foot per second (ft^3/s)	28.32	cubic liter per second
inch (in.)	2.54	centimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
cubic yard (yd^3)	0.7646	cubic meter

Temperature is given in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by the following equation:

$$°F=1.8(°C)+32.$$

Vertical Datum

Sea level: In this paper, "sea level refers to the National Geodetic Vertical Datum of 1929—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Acronyms and Abbreviations

(Additional information given in parenthesis)

µg, microgram
µg/g, microgram per gram
µg/L, microgram per liter
µm, micrometer
µS/cm, microsiemens per centimeter at 25° Celsius
MΩ-cm, megohm centimeter
σ, sigma

cm, centimeter
cm^2, square centimeter
cP, centipoise
g, gram
g, gravitational constant
g/L, gram per liter
in./yr, inch per year
km, kilometer
km^2, square kilometer
L, liter
L/min, liter per minute
kHz, kilohertz
m, meter
mg, milligram

mg/g, milligram per gram
mg/L, milligram per liter
mL, milliliter
mm, millimeter
mW, milliwatt
ng, nanogram
ng/L, nanogram per liter
nm, nanometer

Ax, axial
BOR, Bureau of Reclamation
BTD&Q, Branch of Technical Development and Quality Systems
CDEC, California Data Exchange Center
CV–AFS, cold vapor-atomic fluorescence spectrometer
DIFF, diffraction
DL, detection limit
DOC, dissolved organic carbon
EPA, U.S. Environmental Protection Agency
F, fractionation factor
HDPE, high density polyethylene
IC, iron chromatography
ICP–AES, inductively coupled plasma–atomic emission spectrometry
ICP–MS, inductively coupled plasma–mass spectrometry
M, Molar
MPV, most probable value
n, number of observations, number of duplicate samples
N, Normal
NAWQA, National Water-Quality Assessment (Program)
NIST, National Institute of Standards and Technology
NMWL, nominal molecular weight limit
NRP, National Research Program
NWQL, National Water Quality Laboratory
PFA, perfluoroalkoxy
PTFE, polytetrafluoroethylene
PUB, published concentration value for standard reference material
PVC, polyvinyl chloride
QAPP, Quality Assurance Project Plan
QAQC, quality assurance and quality control
REC, percentage recovery
rms, root mean squared
RPD, relative percentage difference
RSD, Relative Standard Deviation
SCDD, Spring Creek Debris Dam
SCPP, Spring Creek Power Plant
SD, standard deviation
SOC, suspended organic carbon
SRM, standard reference material
SWRS, standard reference water sample
TDS, total dissolved solids
USGS, U.S. Geological Survey
UV–vis, ultraviolet–visible spectroscopy
WPPES, Water Pollution Performance Evaluation Study
WSPES, Water Supply Performance Evaluation Study
wt, weight

Chemical Notation

Elements

Ag, silver
Al, aluminum
Ar, argon
As, arsenic
Au, gold
B, boron
Ba, barium
Be, beryllium
Bi, bismuth
Br, bromine
C, carbon
Ca, calcium
Cd, cadmium
Ce, cerium
Cl, chlorine
Co, cobalt
Cr, chromium
Cs, cesium
Cu, copper
Dy, dysprosium
Er, erbium
Eu, europium
F, fluorine
Fe, iron
Fe(II), ferrous iron
Fe(III), ferric iron
Gd, gadolinium
H, hydrogen
Hg, mercury
In, indium
Ir, iridium
Ho, holmium
K, potassium
La, lanthanum
Li, lithium
Lu, lutetium
Mg, magnesium
Mn, manganese
Mo, molybdenum
N, nitrogen
Na, sodium
Nd, neodymium
Ni, nickel
O, oxygen
P, phosphorous
Pb, lead
Pr, praseodymium
Rb, rubidium
Re, rhenium
Rh, rhodium

S, sulfur
Sb, antimony
Se, selenium
Si, silicon
Sm, samarium
Sn, tin
Sr, strontium
Tb, terbium
Te, tellurium
Th, thorium
Ti, titanium
Tl, thallium
Tm, thulium
U, uranium
V, vanadium
W, tungsten
Y, yttrium
Yb, ytterbium
Zn, zinc
Zr, zirconium

Compounds, Ions, and Minerals

Cl, chloride
$CaCO_3$, calcium carbonate; calcite (or aragonite)
CO_2, carbon dioxide
$CuFeS_2$, chalcopyrite
F^-, fluoride
FeS_2, pyrite
HBr, hydrobromic acid
HCl, hydrochloric acid
HF, hydrofluoric acid
$HgCl_2$, mercuric chloride
HNO_3, nitric acid
H_2SO_4, sulfuric acid
$K_2Cr_2O_7$, potassium dichromate
MMHg, monomethylmercury (CH_3Hg^+)
N_2, nitrogen gas
NaN_3, sodium azide
$NH_2(CHOH)_3$ HCl, tris hydrochloride
NH_3, ammonia
NO_2^-, nitrite
NO_3^-, nitrate
SiO_2, silica (or quartz)
$SnCl_2$, stannous chloride
SO_4^{2-}, sulfate
(Zn,Fe,Cd)S, sphalerite

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Metals Transport in the Sacramento River, California, 1996–1997. Volume 1: Methods and Data

Charles N. Alpers, Howard E. Taylor, *and* Joseph L. Domagalski, editors

Executive Summary

The overall goal of this study was to determine the significance of contamination from metal sources into the Sacramento River, during a variety of river flow conditions. The main sources investigated were historic mining areas in addition to areas with other land uses including agricultural and urban. Parts of the Sacramento River watershed have been severely affected by historic mining activities. Hard-rock mining of copper, zinc, and lead was done primarily in the vicinity of Shasta Lake, whereas mercury was predominantly mined in the Coast Ranges. Mercury (quicksilver) was used extensively in gold mining and recovery operations, especially at hydraulic placer mines in the Sierra Nevada foothills and the Klamath Mountains but also at mills associated with hardrock mines in both of these areas. This project was funded primarily by the Sacramento Regional County Sanitation District with assistance from a grant administered by the State Water Resources Control Board. Additional funding for the study was made available by the U.S. Environmental Protection Agency, the National Marine Fisheries Service, and the U.S. Geological Survey's Federal–State Cooperative Hydrology Program.

The distribution, fate, and transport of metals in the Sacramento River were studied using a multidisciplinary approach that included water, sediment, and biological sampling. Although the focus of this study was on seven trace metals (aluminum, cadmium, copper, iron, lead, mercury, and zinc), more than 40 additional elements were analyzed in water and sediment samples. Water samples were collected on six occasions during the period July 1996 through June 1997 at up to 19 sites categorized as follows: 11 sites were on the reach of the mainstem Sacramento River between Shasta Dam and Free port; 7 different tributary sites were sampled; and one distributary site, the Yolo Bypass, was sampled during high-flow conditions. Samples of caddisfly (*Hydropsyche californica*) larvae were collected during October 1996 at 5 mainstem sites between Redding and Tehama, and at 1 tributary stream. Streambed sediment samples were collected during October and November 1996 from 9 sites, including each of the 6 sites where caddisfly larvae samples were taken. Water samples were collected and processed using ultraclean techniques necessary for accurate and precise determination of trace metals with concentrations as low as 0.0004 micrograms per liter. Concentrations of metals from an extremely fine filtering technique called "tangential flow ultrafiltration" (0.005 micrometer equivalent pore size) were compared with concentrations from conventional filtration (0.45- and 0.40-micrometer pore sizes) and unfiltered (whole-water) samples. The tangential-flow filtrates, hereinafter referred to as "ultrafiltrates," are a better approximation of truly dissolved metal concentrations than conventional filtrates because they exclude colloidal particles in the size range of about 0.005 to 0.40 (or 0.45) micrometers that pass through conventional filters.

Colloid concentrates were prepared using the solids that were retained from tangential-flow

ultrafiltration of large (100 liter) water samples. The water samples were taken during six sampling periods between July 1996 and June 1997 from the following seven sites: below Shasta Dam, below Keswick Dam, at Bend Bridge, at Colusa, at Verona, and at Freeport, all located on the mainstem of the Sacramento River; and the Yolo Bypass at Interstate 80 located near West Sacramento. The Yolo Bypass is part of a flood-control system and carries water only when the channel capacity of the mainstem of the Sacramento River exceeds, or is expected to exceed, its capacity. All colloid concentrates were analyzed for total metals using a complete dissolution procedure. Some colloid concentrates also were subjected to a sequence of partial dissolution steps to determine the concentrations of metals in three operationally defined parts or fractions: (1) reducible (including hydrous iron and manganese oxides), (2) oxidizable (including organic material and sulfides), and (3) residual (remaining after the previous two steps).

Generally, it was found that using the sum of dissolved and colloidal concentrations from ultrafiltrates and retentate (colloid concentrate) samples, rather than using total recoverable analyses of whole-water samples, provided a more definitive way to estimate total water-column concentrations. The total recoverable analyses were affected by more sources of variation than were the analysis of the dissolved plus colloidal concentrations.

Most of the trace metals transported in the Sacramento River between Shasta Dam and Freeport occurred as colloids (operationally defined as particles with grain size between about 0.005 and 1.0 micrometer). In the water column, colloids appeared to be the dominant form of aluminum, iron, lead, and mercury, and are important in the distribution of other trace metals. The percentage of the load that is colloidal compared with the percentage that is dissolved (operationally defined by concentrations in ultrafiltrates as less than about 0.005 micrometer diameter) was higher for copper than it was for zinc and cadmium. This distinction is significant because the relative amounts of colloidal and dissolved metals may influence the rates and mechanisms of metal bioaccumulation (the accumulation of an environmental compound into an organism).

The influence of metal-laden acidic drainage from the Iron Mountain mine site (via Spring Creek and the Spring Creek arm of Keswick Reservoir) is apparent in water samples from the site below Keswick Dam. Historically, California's Basin Plan water-quality standards have been exceeded with respect to copper concentrations at this site (the Basin Plan standard for copper in this area is 5.6 micrograms per liter, which is based on a hardness of 40 milligrams per liter). Occasional exceedances of copper concentration standards in the Basin Plan continued during January 1997 despite the ongoing operation of a lime neutralization plant at Iron Mountain, which has removed about 80 percent of copper loads and about 90 percent of zinc and cadmium loads from Spring Creek since July 1994. In mid-December 1996, conventionally filtered samples had copper concentrations that ranged from 4.6 to 5.1 micrograms per liter and zinc concentrations that ranged from 6 to 9 micrograms per liter. During flood conditions in early January 1997, conventional filtered copper concentrations were 4 to 9 micrograms per liter and zinc concentrations were 9 to 16 micrograms per liter. With regard to transport of the these metals below Keswick Dam, copper concentrations in ultrafiltrates were about 40 to 70 percent lower than conventional filtrates (0.40- and 0.45-micrometer) and zinc concentrations were 10 to 50 percent lower, indicating that both copper and zinc are transported as both colloidal and dissolved forms.

Lead isotope data in colloid concentrates and streambed sediments provide a useful fingerprint or natural tracer for lead contamination from Iron Mountain mine drainage via Spring Creek and Keswick Reservoir. Lead isotope data for streambed sediments and suspended colloid samples taken during 1996 and 1997 indicate that contamination from Iron Mountain was (1) a relatively major component of the total lead found at Sacramento River sites at Rodeo Park (in

Redding) and above Churn Creek (near Anderson), (2) less of a component of the lead found at Balls Ferry, and (3) a relatively minor component of the lead in colloids and streambed sediment at Bend Bridge (near Red Bluff) and at sites farther downstream.

The geochemical forms of metals in colloid concentrates from the Sacramento River were evaluated using a sequence of partial dissolution steps. During May–June 1997, cadmium was predominantly associated with the reducible (or iron–manganese oxide) fraction at all mainstem sampling sites, whereas copper and zinc were more or less evenly distributed between reducible and residual (or refractory) fractions at all sites with a small amount present in the oxidizable (or organic plus sulfide) fraction. These results are consistent with the data on caddisfly bioaccumulation, which indicate that cadmium is likely more bioavailable on a relative basis than copper or zinc in the Sacramento River between Redding and Tehama.

In addition to water and sediment concentrations, selected trace elements were examined in relation to their bioavailability. Bioaccumulation of metals in caddisfly larvae was assessed at five sites in the Sacramento River between Redding and Tehama and at one site less impacted by mining (Cottonwood Creek near Cottonwood). Samples were taken in October 1996. Cadmium concentrations in caddisfly larvae at Sacramento River sites were 5 to 36 times greater than concentrations at the Cottonwood Creek site. Cadmium concentrations of the whole body ranged from 0.7 to 2.2 micrograms per gram, dry weight. Of this total, approximately 60 percent (0.4 to 1.3 micrograms cadmium per gram, dry weight) was associated with the cell cytosol, an intracellular fraction that is indicative of metal bioavailability. Concentrations of cadmium in caddisfly larvae from the Sacramento River are comparable with other areas severely impacted by mining. Concentrations of copper and zinc also showed some enrichment in caddisfly whole-body samples and cytosol fractions; copper and zinc concentrations at Sacramento River sites were 1.4 to 3.0 times greater than concentrations at Cottonwood Creek near Cottonwood. The caddisfly data indicate that bioavailable forms of cadmium persist in the Sacramento River downstream of Tehama.

Exceedances of levels of mercury—with respect to the U.S. Environmental Protection Agency (EPA) water-quality criterion (12 nanograms per liter)—are common in northern California during the winter and especially following significant rainfall. The concentrations of total mercury in the Sacramento River increased during storm water runoff and were above the EPA water-quality criterion during high flows in December 1996 and January 1997, from the Bend Bridge site (located near Red Bluff) downstream to Freeport. Dissolved mercury concentrations were low and relatively constant under different flow conditions, but combined concentrations of dissolved and colloidal mercury were found to increase with discharge and with suspended sediment transport. This implies that most mercury transported in the Sacramento River is colloidal in form. Using a sequence of dissolution steps with specific chemical reagents, it was shown that most of the colloidal mercury was in the oxidizable and residual fractions, whereas only a minor component was found in the reducible colloid fraction. The implications of the occurrence of mercury in predominantly oxidizable and colloidal forms are currently unknown and warrant further investigation in the context of mercury methylation processes.

Abstract

Metals transport in the Sacramento River, northern California, was evaluated on the basis of samples of water, suspended colloids, streambed sediment, and caddisfly larvae that were collected on one to six occasions at 19 sites in the Sacramento River Basin from July 1996 to June 1997. Four of the sampling periods (July, September, and November 1996; and May–June 1997) took place during relatively low-flow conditions and two sampling periods (December 1996 and January 1997) took place during high-flow and

flooding conditions; respectively. Tangential-flow ultrafiltration with 10,000 nominal molecular weight limit, or daltons (0.005 micrometer equivalent), pore-size membranes was used to separate metals in streamwater into ultrafiltrate (operationally defined dissolved fraction) and retentate (colloidal fraction) components, respectively. Conventional filtration with capsule filters (0.45 micrometer pore-size) and membrane filters (0.40 micrometer pore-size) and total-recoverable analysis of unfiltered (whole-body) samples were done for comparison at all sites. Because the total-recoverable analysis involves an incomplete digestion of particulate matter, a more reliable measurement of whole-water concentrations is derived from the sum of the dissolved component that is based on the ultrafiltrate plus the suspended component that is based on a total digestion of colloid concentrates from the ultrafiltration retentate. Metals in caddisfly larvae were determined for whole-body samples and cytosol extracts, which are intercellular solutions that provide a more sensitive indication of the metals that have been bioaccumulated.

Trace metals in acidic, metal-rich drainage from abandoned and inactive sulfide mines were observed to enter the Sacramento River system (specifically, into both Shasta Lake and Keswick Reservoir) in predominantly dissolved form, as operationally defined using ultrafiltrates. The predominant source of acid mine drainage to Keswick Reservoir is Spring Creek, which drains the Iron Mountain mine area. Copper concentrations in filtered samples from Spring Creek taken during December 1996, January 1997, and May 1997 ranged from 420 to 560 micrograms per liter. Below Keswick Dam, copper concentrations in conventionally filtered samples ranged from 0.5 micrograms per liter during September 1996 to 9.4 micrograms per liter during January 1997; the latter concentration exceeded the applicable water-quality standard. The proportion of trace metals that was dissolved (versus colloidal) in samples collected at Shasta and Keswick dams decreased in the order cadmium $\approx$ zinc > copper > aluminum $\approx$ iron $\approx$ lead $\approx$ mercury. At four sampling sites on the Sacramento River at various distances downstream of Keswick Dam (Bend Bridge, 71 kilometers; Colusa, 256 kilometers; Verona, 360 kilometers; and Freeport, 412 kilometers) concentrations of these seven metals were predominantly colloidal during both high- and low-flow conditions.

Because copper compounds are used extensively as algaecides in rice farming, agricultural drainage at the Colusa Basin Drain was sampled in June 1997 during a period shortly after copper applications to newly planted rice fields. Copper concentrations ranged from 1.3 to 3.0 micrograms per liter in filtered samples and from 12 to 13 micrograms per liter in whole-water samples (total recoverable analysis). These results are consistent with earlier work by the U.S. Geological Survey indicating that copper in rice-field drainage likely represents a detectable, but relatively minor source of copper to the Sacramento River.

Lead isotope data from suspended colloids and streambed sediments collected during October and November 1996 indicate that lead from acid mine drainage sources became a relatively minor component of the total lead at the site located 71 kilometers downstream of Keswick Dam and beyond. Cadmium, copper, and zinc concentrations in caddisfly larvae were elevated at several sites downstream of Keswick Dam, but concentrations of aluminum, iron, lead, and mercury were relatively low, especially in the cytosol extracts. Cadmium showed the highest degree of bioaccumulation in whole-body and cytosol analyses, relative to an unmineralized control site (Cottonwood Creek). Cadmium bioaccumulation persisted in samples collected as far as 118 kilometers downstream of Keswick Dam, consistent with transport in a form more bioavailable than lead.

Introduction

Charles N. Alpers

Contamination of surface waters by metals can cause harmful effects to aquatic ecosystems and human health. In the Sacramento River drainage basin

of northern California (fig. 1), metal contamination is a major concern, yet the sources, transport, and fate of metals in this basin remain poorly known. Water-quality problems with copper (Cu), cadmium (Cd), and zinc (Zn) have been known for many years near Redding, where large amounts of these metals flow into the Sacramento River system from acid mine drainage associated with inactive mines at Iron Mountain and other sources in the area (U.S. Environmental Protection Agency, 1992). Copper, cadmium, and zinc are also of concern in the San Francisco Bay and Sacramento–San Joaquin Delta (hereinafter referred to as the Bay–Delta), yet the proportion of metals transported to the Bay–Delta by way of the Sacramento River that comes from Iron Mountain Mine and other mineralized areas in the East Shasta and West Shasta mining districts has not been demonstrated. Mercury (Hg) concentrations in water and biota, particularly fish, are major environmental and human health concerns in the lower reaches of the Sacramento River and in the Bay–Delta, however the sources and chemical forms of mercury transported in the Sacramento River remain largely undetermined.

This report presents the results of a U.S. Geological Survey (USGS) study of metals transport in the reach of the Sacramento River between Shasta Dam and Freeport (fig. 1). The study was designed to complement ongoing studies of water quality in the Sacramento River Basin being carried out by the USGS's National Water-Quality Assessment (NAWQA) Program. The overall goals and conceptual design of the NAWQA Program were described by Hirsch and others (1988). Detailed description of the NAWQA Sacramento River Basin study unit is given in the next section of this report. Results of the NAWQA Sacramento River Basin study will be published separately from this report, which is designed to document the results of additional studies of metals transport that were beyond the original scope of the NAWQA investigation.

Routine protocols for sampling and sample processing in the NAWQA Program, and routine laboratory analysis for trace metals at the USGS's National Water Quality Laboratory (NWQL) are designed for a reporting limit of 1 mg/L for most metals. The advent of the USGS "part per billion" protocol for water sampling (Horowitz and others, 1994) represented a significant improvement over previous approaches, however, it was deemed inadequate in addressing critical trace metal issues in the Sacramento Basin. For this study, a more rigorous set of ultratrace protocols were adopted largely on the basis of methods developed by USGS researchers involved with a comprehensive study of trace metal transport in the Mississippi River (Taylor and Shiller, 1995; Taylor and others, 1995; Meade, 1996). Similar protocols also have been used in USGS studies of metals transport in the Arkansas River (Kimball and others, 1995) and elsewhere. Using triple-distilled acids, double-deionized water, precleaned sampling containers, and other precautions combined with state-of-the-art laboratory equipment such as a new generation of inductively coupled plasma–mass spectrometry (ICP–MS) instruments, reporting limits of less than 0.05 mg/L were achieved for many trace metals.

The overall objectives of the Sacramento River metals transport study were to determine the distribution and fate of metals from a known source, namely base-metal mines in the upper part of the watershed near Keswick Dam, and to determine if other sources such as agricultural and urban runoff were major contributors to base-metal loading under different flow conditions. The approach taken was multidisciplinary, involving collection and analysis of water, sediment, and biota. Water samples were taken at 6 to 11 sites during six sampling periods between July 1996 and June 1997, spanning a range of hydrologic conditions. Sample sites were chosen at or near active gaging stations so that discharge data would be available for calculation of metal loads. Streambed sediment and biota (caddisfly larvae) were sampled once at nine and six sites, respectively. To evaluate the importance of colloidal transport of metals, concentrations and loadings of metals were determined from the total recoverable analysis of whole-water samples and the various filtrates and ultrafiltrates of the water. Colloid concentrates were prepared using ultrafiltration and were analyzed for total metals as well as metal speciation using sequential extraction procedures that differentiated three operationally defined geochemical fractions: reducible (iron–manganese oxides), oxidizable (sulfides and organics), and residual (refractory).

This report is organized into several sections, each of which describes a critical aspect of the study. Following this Introduction, the second section contains a description of the Sacramento River Basin, with an overview of surface hydrology, physiography, and land use, plus a summary of the study unit design of the NAWQA Sacramento River Basin investigation. The third section describes the design of the metals

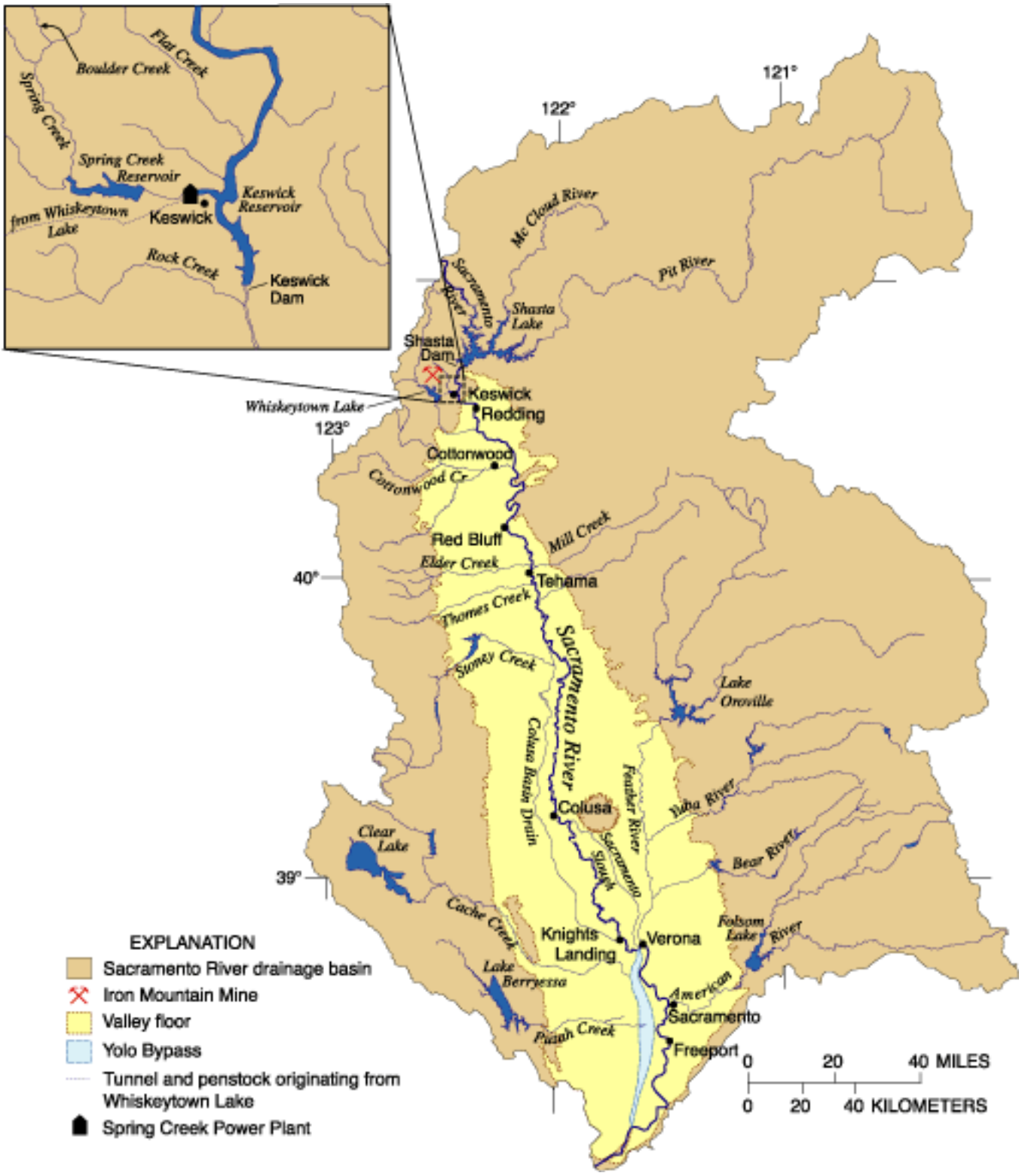


Figure 1. Map of the Sacramento River Basin, California.

transport study, including descriptions of sampling methods, analytical procedures, quality assurance and quality control procedures, and data analysis techniques. The fourth section presents a summary of the results of quality assurance and quality control procedures with reference to data quality objectives as described in the Quality Assurance Project Plan, which is included as Appendix 1. The fifth section includes a description of the results of the study, divided into analysis of water, sediment, and biological samples, with emphasis on concentrations of the trace metals of principal concern: cadmium, copper, mercury, lead (Pb), and zinc. The final section of the report presents conclusions based on the results of this study. Metal loadings, sources, and implications of the results of this study to future water-quality management in the Sacramento River Basin are discussed in a companion report (Alpers and others, 2000). The distribution, transport, and loads of mercury in the Sacramento River Basin are discussed in a manuscript by David A. Roth and others (U.S. Geological Survey, written commun., 1999). Results from caddisfly sampling and analysis are described in detail by Cain and others (2000).

Other appendixes to this report include extensive tables of data, including analytical results and supporting quality assurance information. Appendixes 2 through 7 contain tables with the basic data resulting from this study. Appendix 2 contains tables of data relating to quality assurance and quality control for the chemical analyses in this study, including results of analysis of standard reference materials and blanks. Appendix 3 contains tables of data for unstable water-quality indices measured in the field, plus analytical data for major anions, nutrients, and organic carbon and information on sample site locations. Appendix 4 contains tables of metal concentrations in filtered and unfiltered (whole) water samples collected at study sites from July 1996 to June 1997. Appendix 5 presents tables of metal concentrations in sediment and colloids. Appendix 6 contains tables of data showing particulate size distribution in colloid concentrates and streambed sediment samples. Appendix 7 presents tables of trace-element data for caddisfly larvae collected in October 1996. Appendix 8 contains plots of dissolved and colloidal metal concentrations.

The authors thank the numerous individuals at USGS and other agencies who made this study possible through their hard work and cooperation. USGS hydrologic technicians and other field personnel included: Steve Gallanthine, Michael Hunerlach, Mark Johnson, Willie Kinsey, Frank Moseanko, Cathy Munday, and Darnella Murphy. We also appreciate several other USGS employees who helped contribute to the project: in Tucson, Arizona, David Graham; in Sacramento, California: D'An Brent, Susan Davis, Yvonne Gobert, Glenn Schwegmann, and David Uyematsu; in Boulder, Colorado: George Aiken, D. Kirk Nordstrom, Dale Peart, and Robert Stallard; in Menlo Park, California: James Carter, Steven Fend, and Samuel Luoma; and in Bethesda, Maryland, Michael Koterba. In the Redding and Shasta areas, several employees of the Bureau of Reclamation provided assistance during sample collection, including Stuart Angerer, Sean Duffy, and Janet Martin. We thank Rosemary Clark, Mary James, Robert Seyfried, Jerry Troyan, and their colleagues at the Sacramento Regional County Sanitation District for help in securing funds for this effort and for useful suggestions during its execution, and Greg Frantz at the California State Water Resources Control Board for his administrative assistance on the 205(j) grant. We also thank Nicolas Iadanza at the National Marine Fisheries Service (Department of Commerce) for his assistance with funding for the caddisfly work, and Richard Sugarek at the U.S. Environmental Protection Agency (EPA) for arranging funding though the EPA Superfund Program to add sampling sites in the Spring Creek area. We also thank the members of the Project's Technical Advisory Committee who provided comments on the report: Ronald Churchill of the California Department of Conservation, Division of Mines and Geology, and Dennis Heiman of the Regional Water Quality Control Board, Central Valley Region.

Description of the Sacramento River Basin and Ongoing Studies

Joseph L. Domagalski, Peter D. Dileanis, Donna L. Knifong, *and* Charles N. Alpers

This section provides an overview of the geographic setting in the Sacramento River Basin and a brief description of other ongoing studies in the area. The geographic setting of the basin is described in

terms of its surface-water hydrology, physiography, and land use patterns.

Surface-Water Hydrology

The Sacramento River drainage basin (fig. 1) covers approximately 27,000 mi^2 (70,000 km^2) in northern California. The total length of the Sacramento River is 327 mi (526 km). The annual runoff averages 16,960,000 acre-ft/yr (Anderson and others, 1997) making it the largest river in the state of California. The river is of utmost importance to the economy of California, providing irrigation water to farms in the Sacramento and San Joaquin Valleys, drinking water to cities in northern and southern California, and most of the freshwater flow to the San Francisco Bay. The annual discharge of the Sacramento River is partly dependent on the amount of snowpack in the mountainous regions of the basin and stormwater runoff throughout the basin. Because of the variable amounts of snowpack and the destruction caused by floods in low-lying areas, reservoirs have been constructed to store water. These reservoirs were built with the intention of providing a more stable source of water for various uses and for flood control. The largest of these, Shasta Lake (fig. 1), was constructed between 1938 and 1944 by the federal government. The capacity of Shasta Lake is 4,552,000 acre-ft. Lake Oroville (fig. 1) is the second largest reservoir in California with a capacity of 3,537,600 acre-ft. Lake Oroville is on the Feather River and was completed in 1968 by the state of California. Reservoirs have also been constructed on many of the other tributaries to the Sacramento or Feather Rivers, especially within the Sierra Nevada drainage. Nearly all of the major rivers draining the Sierra Nevada and the Coast Ranges on the west side of the basin are regulated by some type of dam or control structure.

Flow on the Sacramento River is affected by reservoir releases, runoff, irrigation drainage, and flood control. Reservoir releases are set by resource managers who need to balance the capacity of reservoirs for flood control and to supply water for irrigation, urban, and environmental needs. The amount of water allocated to irrigation, urban, environmental needs, and other uses is determined in part by reservoir storage. The principal environmental needs involve controlling salinity in the Bay–Delta, meeting temperature requirements for migratory fishes, and controlling metals concentrations below Keswick Dam (fig. 1), which was completed by the federal government in 1950. The principal environmental use of water for wildlife habitat requirements is the discharge of sufficient fresh water to meet salinity criteria within the lower Sacramento River and parts of the San Francisco Bay–Delta estuary. Another important environmental constraint is to provide sufficient water at the proper temperatures for migratory fishes. As an example of the importance of this factor, the Bureau of Reclamation recently completed (in May 1997) construction of a temperature control device on Shasta Dam, at a cost of about $83,000,000, that allows water to be released from different elevations in Shasta Lake (California Department of Water Resources, 1998c).

The principal known input of metals downstream of Shasta Dam is Spring Creek (fig. 1), which receives metal-laden acidic drainage from the inactive copper–zinc mines at Iron Mountain. The Spring Creek Debris Dam (SCDD) was constructed in 1963 by the Bureau of Reclamation for the joint purpose of controlling metal pollution from Spring Creek and to prevent sediment and debris from interfering with the tailrace from the Spring Creek Power Plant (U.S. Environmental Protection Agency, 1992). Water is released from the SCDD in one or two locations depending on the amount of discharge. Discharge less than about 700 ft^3/s is made from gates within the dam; discharge above this amount is made either entirely over the SCDD spillway or in some combination of flow from the gates and over the spillway. The amount of discharge is controlled by the Bureau of Reclamation so that, below Keswick Dam, certain water-quality objectives for metals are met according to a 1980 Memorandum of Understanding between the Bureau of Reclamation (then the U.S. Water and Power Resources Services), the California Department of Fish and Game, and the California State Water Resources Control Board (U.S. Environmental Protection Agency, 1992). When the amount of water in Spring Creek Reservoir exceeds 5,000 acre-ft (or about 86 percent of capacity), there is the potential for an uncontrolled spill. Under those conditions, water may be needed from Shasta Lake or Whiskeytown Lake to dilute metal concentrations. Water from Whiskeytown Lake is supplied through the Spring Creek Power Plant.

The maximum probable impact scenario, insofar as impact on fresh-water resources, is when a wet year follows a dry year. For example, in 1992–1993, dilution water was needed for an early season storm

that caused an uncontrolled spill from Spring Creek Reservoir at a time when Shasta Lake was relatively empty. During January 1993, approximately 100,000 acre-ft of water was released from Shasta Lake at a time of year when this water could not be recaptured downstream during a year when farmers did not receive their full allotment of irrigation water (Richard Sugarek, U.S. Environmental Protection Agency, oral commun., 1994). Metal-laden, acidic water from Spring Creek mixes with dilute water from Whiskeytown Lake (released from the Spring Creek Power Plant) in the Spring Creek arm of Keswick Reservoir (fig. 1). Neutralization of the acidic water upon dilution in this mixing zone has caused extensive precipitation of hydrous iron and aluminum oxides, some of which flocculate and settle in the Spring Creek arm (Nordstrom and others, 1999) and some of which remain in suspension and are transported into the main channel of Keswick Reservoir. From Keswick Reservoir, these metals may be transported downstream of Keswick Dam in the Sacramento River.

Agricultural use of water is the highest single category of use in the Sacramento River Basin. In 1990, for example, agriculture accounted for 58 percent of the water use in the basin and environmental needs accounted for 32 percent (California Department of Water Resources, 1993). Urban and other uses accounted for the remaining 10 percent of the allocations. Stormwater runoff or snowmelt takes place in late fall through spring in response to rain in the lowland areas and snowmelt in the mountains. Irrigation water is supplied by reservoir releases or ground water pumping from late March to September. Irrigation runoff is an important component of flow in the summertime. Two drains that discharge a considerable volume of irrigation runoff are the Colusa Basin Drain and the Sacramento Slough (fig. 1).

Flood control efforts have significantly changed the channel morphology and flow characteristics of the Sacramento River. Because of recurring flooding, especially in urbanized areas such as Sacramento, the Sacramento River channel has been modified to accommodate high flow or to divert water out of the main channel. Channel modifications include artificial levees. Flow control is partly accomplished by a series of weirs that remove water from the main channel and divert that flow onto agricultural land. The flow is routed to a region called the Yolo Bypass, at a point just upstream of the Sacramento River at Verona (fig. 1). Water discharges to the Fremont Weir when flow exceeds 55,000 ft^3/s on the Sacramento River at Verona. It is necessary to take water out of the river at that location because of decreasing channel capacity downstream. That water is then diverted to the San Francisco Bay–Delta Estuary. Water may also be taken out of the Sacramento River at Sacramento and diverted to the Yolo Bypass.

In the upper part of the basin, the mean annual discharge of the Sacramento River above Bend Bridge near Red Bluff is 12,790 ft^3/s for the period of record from 1964 to 1996 (Anderson and others, 1997). The mean annual discharge of the Sacramento River at Colusa is 11,460 ft^3/s for the period of record from 1946 to 1996 (Anderson and others, 1997). The mean annual discharge for the Sacramento River at Verona increases to 19,620 ft^3/s for the same period of record. The mean annual discharge of the Sacramento River at Freeport, in the lower part of the basin, is 23,410 ft^3/s for the period of record from 1949 to 1996 (Anderson and others, 1997). The Feather River is the largest tributary to the Sacramento River. The mean annual discharge of the Feather River near Gridley, which is located downstream of Lake Oroville, is 4,852 ft^3/s for the period of record from 1969 to 1996 (after the completion of the dam on Lake Oroville). The Yuba River is the largest tributary to the Feather River and has a mean annual discharge of 2,372 ft^3/s for the site at Marysville for the period of record from 1970 to 1996. The other large tributary to the Sacramento River is the American River, which has a mean annual discharge of 3,715 ft^3/s (just below Folsom Lake) for the period of record from 1956 to 1996. The dam on Folsom Lake was completed in 1955.

Hydrographs during the study period (July 1996–June 1997) for several of the sampling sites used in this study are shown in figure 2*A* through 2*I*. The 1996–1997 water year was characterized by a major flooding event in late December 1996 and early January 1997 that severely affected the Central Valley of California, particularly along the Yuba, Feather, Cosumnes, and Mokelumne Rivers, which experienced numerous (approximately 30) failed levees (Hunrichs and others, 1998). Several feet of snowfall in the Sierra Nevada in mid-to-late December was followed by several inches of warm rain that melted the previously accumulated snow, causing torrential runoff in some areas that experienced events in excess of the "100-year flood." In the northern end of the Sacramento Valley, the rainfall and streamflow patterns were less anomalous. For example, during

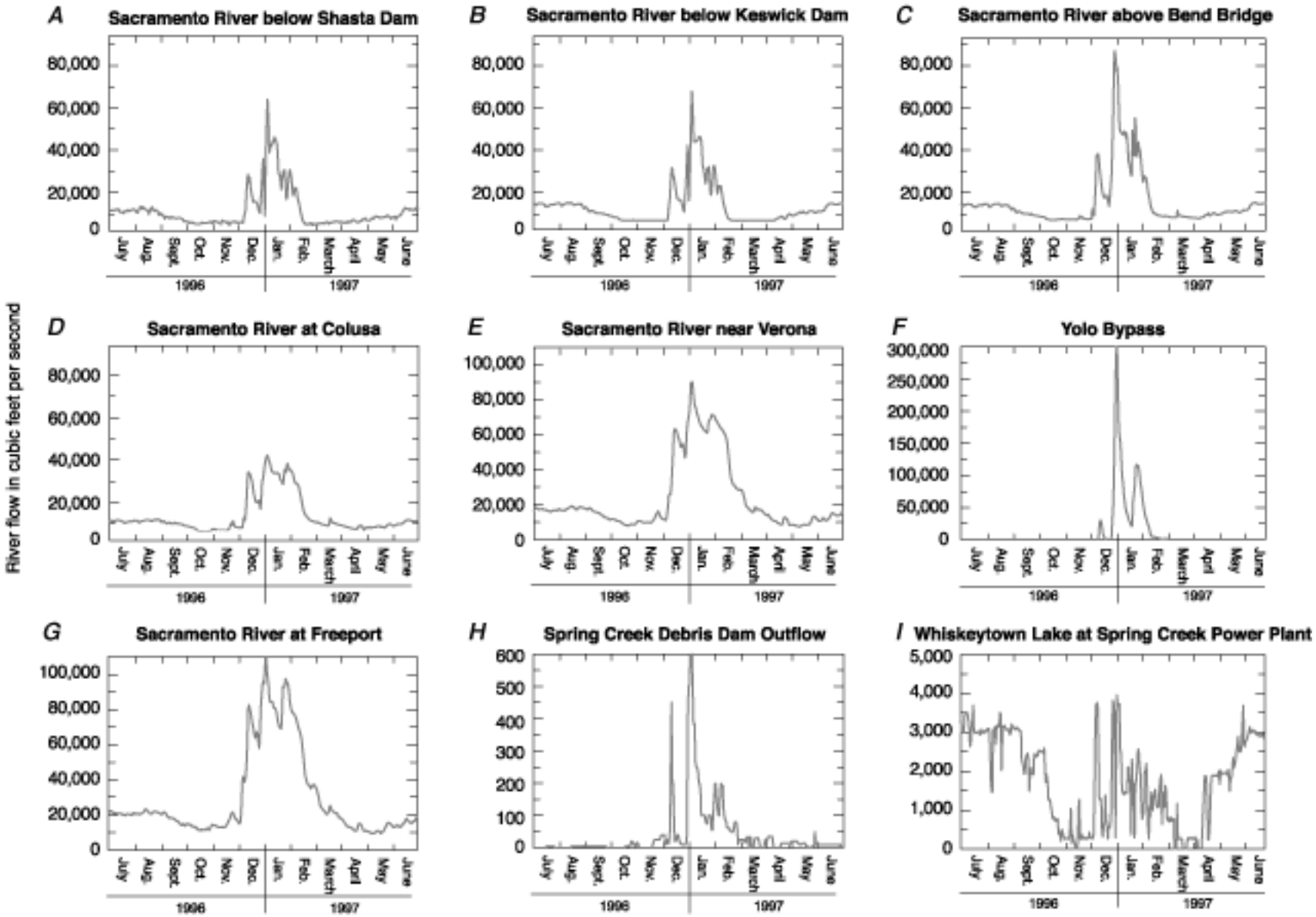


Figure 2. Hydrographs showing daily mean discharge for the period July 1, 1996 to June 30, 1997, for nine sites in the Sacramento River Basin, California. California Department of Water Resources (1998a) for *A*; California Department of Water Resources (1998b) for *B*; U.S. Geological Survey (1998) for *C*, *D*, *E*, *F*, and *G*; and Bureau of Reclamation (1998, written communication) for *H* and *I*.

early January 1997, peak flows at 17 gaged stations on streams in Shasta County and Tehama County had recurrence intervals ranging from 2 to 61 years with a median of 21 years (Hunrichs and others, 1998). In contrast, numerous streams in the southern part of the study area had peak flows corresponding to 1-in-100 year events or more (Hunrichs and others, 1998). For example, 18 gaged streams in El Dorado County (in the American River watershed) had peak flows with recurrence intervals that ranged from 3 to 270 years with a median of 98 years. Flows from Shasta and Keswick dams were held back markedly in early January to minimize downstream flooding.

Discharge data from several gaging stations and dams in the study area are plotted as daily mean discharges in figure 2. The data from Shasta and Keswick dams are from the Bureau of Reclamation, or BOR (California Department of Water Resources, 1998a,b). Hydrographs for the Sacramento River gaging stations at Bend Bridge, Colusa, Verona, and Freeport, and for the Yolo Bypass are based on published data from the USGS (U.S. Geological Survey, 1998). The data for the Spring Creek Debris Dam outflow and the Whiskeytown Lake discharge through the Spring Creek Power Plant were provided by the BOR (Valerie Ungvari, Bureau of Reclamation, written commun., March 12, 1998).

Monthly rainfall data during 1996-1997 at Shasta Dam, Redding, and Sacramento are compared with long-term monthly average rainfall data in figure 3 (National Oceanic and Atmospheric Administration, 1996, 1997a–f). Despite their proximity, there is generally higher annual rainfall at Shasta Dam (61 in./yr) compared with Redding (33.5 in./yr). This difference was even greater in the data from the 1996–1997 water year. For example, in December 1996, Shasta Dam had about three times as much rainfall as Redding. The rainfall data (fig. 3) show that the 1996-1997 water year was characterized by much higher than normal rainfall in the early part of the wet season (December and January), followed by much lower than normal rainfall during February through April. Despite the extensive flooding in many parts of the Sacramento River Basin, the 1996–1997 water year ended up close to average with regard to total precipitation in many areas because there was very little if any rain from mid-January to May, during what is normally a very wet period.

Physiography

The Sacramento River drainage basin can be divided into seven regions that are based on physiography (fig. 4). These physiographic provinces are largely based on geologic factors, including rock types and tectonic setting. The provinces are the Sacramento Valley, the Klamath Mountains, the Coast Ranges, the Modoc Plateau, the Cascade Mountains, the Sierra Nevada, and the Sacramento–San Joaquin Delta. The Sacramento Valley and the Sacramento–San Joaquin Delta are the low-lying parts of the basin. For a more complete description of the geology of these zones, the reader is referred to reports by Bailey (1966) and by Norris and Webb (1990).

Land Use

The major land uses in the Sacramento River Basin are agriculture, forestry, urban development, and mining. Mining is discussed in greatest detail in this report because of the potential for water quality degradation from acid-mine drainage and the potential for mercury transport from mercury and gold (Au) mines.

Mining

Metals have been mined from locations in the Klamath Mountains, the Sierra Nevada, and the Coast Ranges provinces. The West Shasta mining district, located in the Klamath Mountains near Shasta Lake, contains several massive sulfide copper–zinc deposits with historic production. The massive sulfide deposits consist of millions of tons of the minerals chalcopyrite ($CuFeS_2$), sphalerite [(Zn,Fe,Cd)S], and pyrite (FeS_2) hosted by hydrothermally altered volcanic rocks with minimal capacity for neutralization of sulfuric acid (H_2SO_4) solutions formed during weathering. These metal deposits formed during the Devonian Period (approximately 400 million years ago) when sulfide minerals were deposited from sea-floor vents presumably analogous to active “black smokers” found at mid-ocean ridges and in back-arc basins (Morton and others, 1994; Barrie and Hannington, 1999). Mine wastes and acid discharges from historic mining of these massive sulfide deposits has resulted in acid mine drainage that has caused extreme metal contamination in several northern California streams, including Boulder Creek, Slickrock Creek, Spring

Creek, Little Backbone Creek, and West Squaw Creek (Nordstrom and others, 1977).

Gold was also mined in the Klamath Mountains; this province is second only to the Sierra Nevada for gold production in California (Norris and Webb, 1990). Placer gold was recovered from modern and ancient stream deposits both in the Klamath Mountains and the Sierra Nevada. "Lode" gold (or hardrock) also was mined both in the Klamath Mountains and in the Sierra Nevada foothills region, known as the Mother Lode. At least 107 million ounces of gold have been recovered from the Mother Lode (Norris and Webb, 1990). From the 1849 gold rush until the early 1900s, the dominant process used for gold recovery was mercury amalgamation (Bradley, 1918). The mercury used for gold processing was mined in the Coast Ranges of California. Residual mercury from gold processing operations has contaminated streambed sediments within the Sierra Nevada and downstream locations (Hunerlach and others, 1999). Elevated mercury concentrations in benthic invertebrates and fish have been shown in some Sierra Nevada streams (Slotton and others, 1997a) and in the Cache Creek watershed, which is heavily impacted by mercury mining and processing activities (Slotton and others, 1997b).

The location of mines in these different physiographic zones relates to the potential for trace metal transport from past or present mining operations, or from natural sources, such as springs, associated with the mineralized areas. The locations of historic copper, lead, and zinc mines are shown in figure 5, and the locations of gold and mercury mines are shown in figure 6.

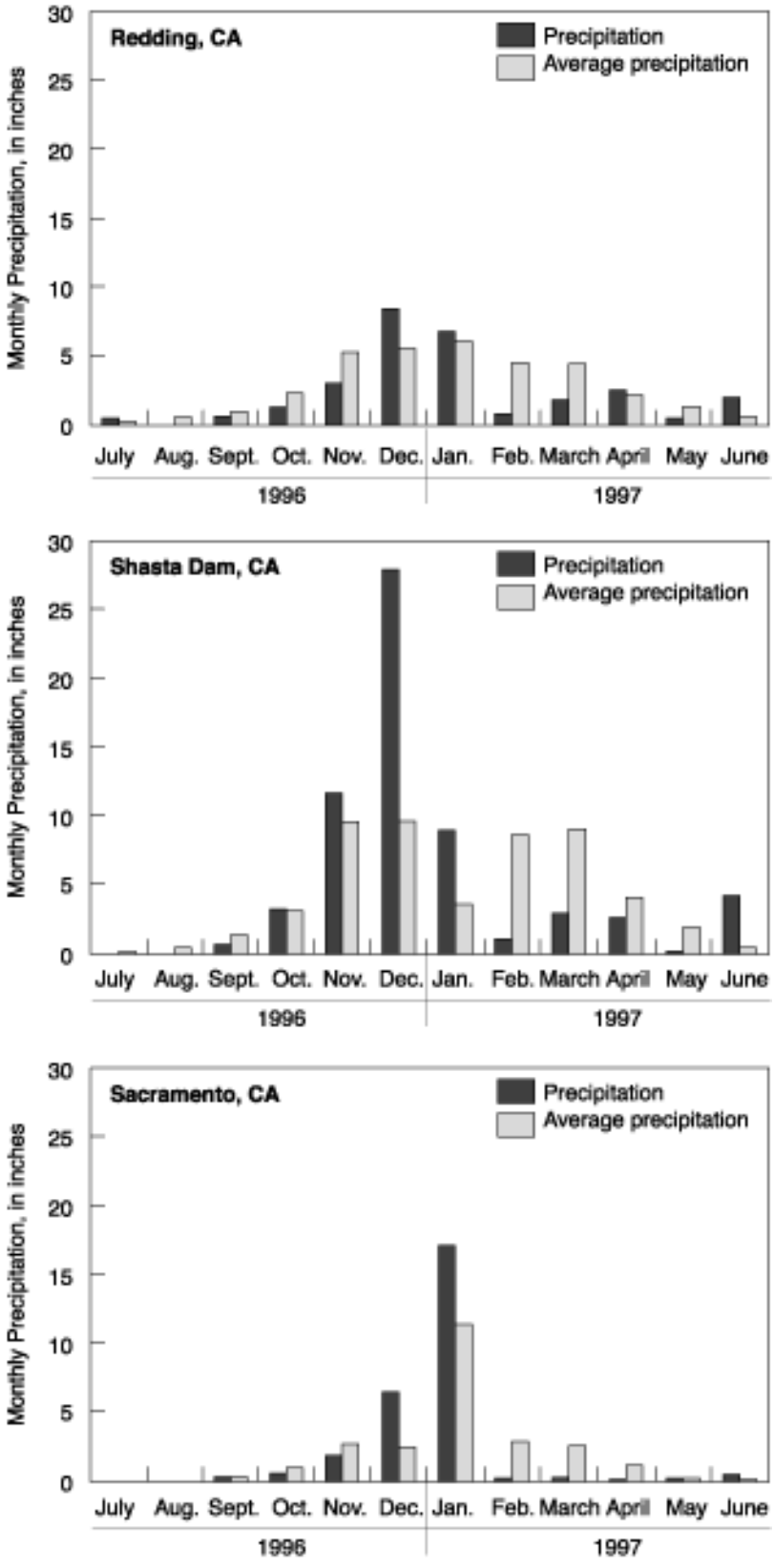


Figure 3. Histograms showing monthly precipitation for the period July 1996 to June 1997 and long-term monthly averages for three sites in the Sacrmento River Basin, California.

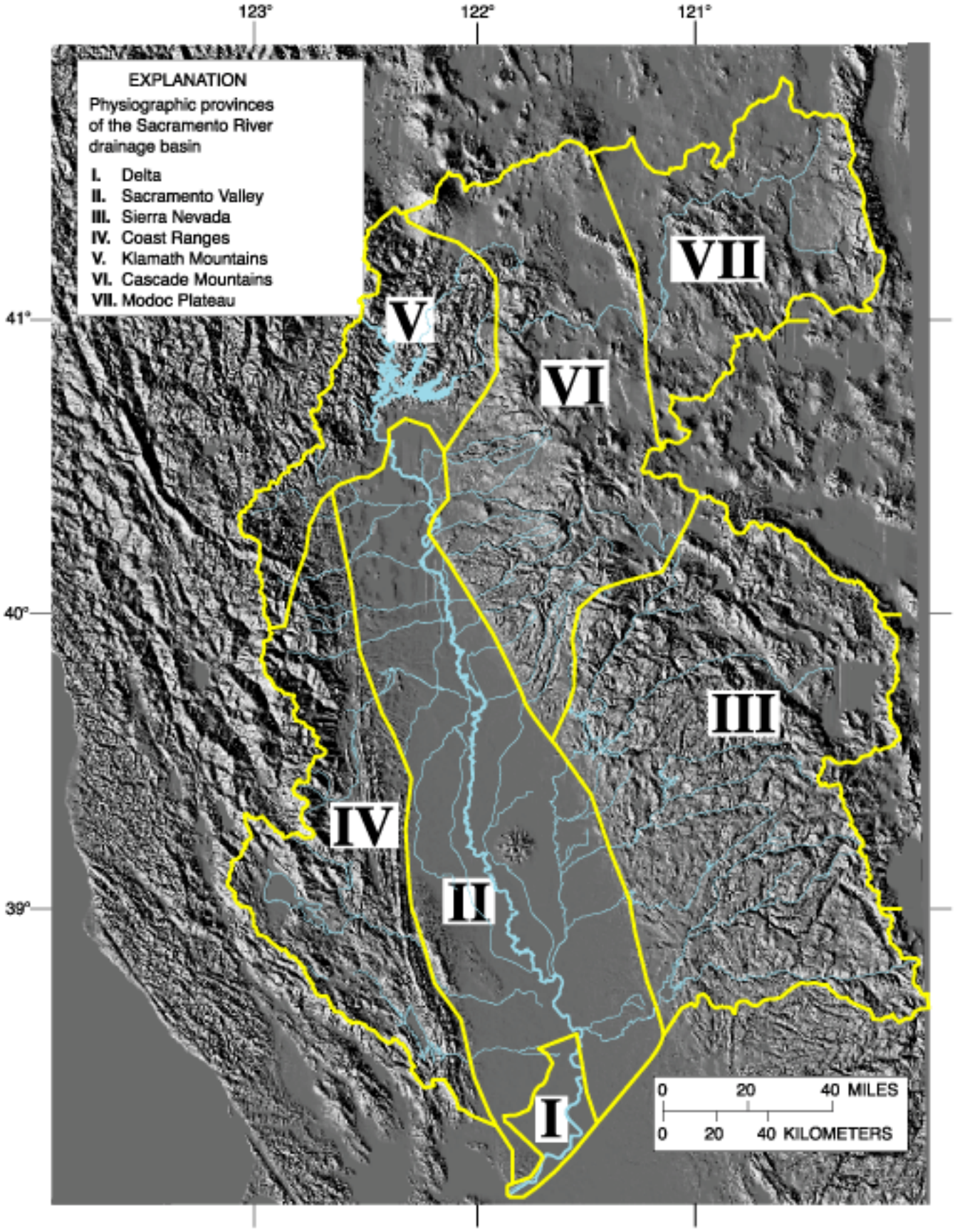


Figure 4. Map of physiographic provinces for the Sacramento River Basin, California.

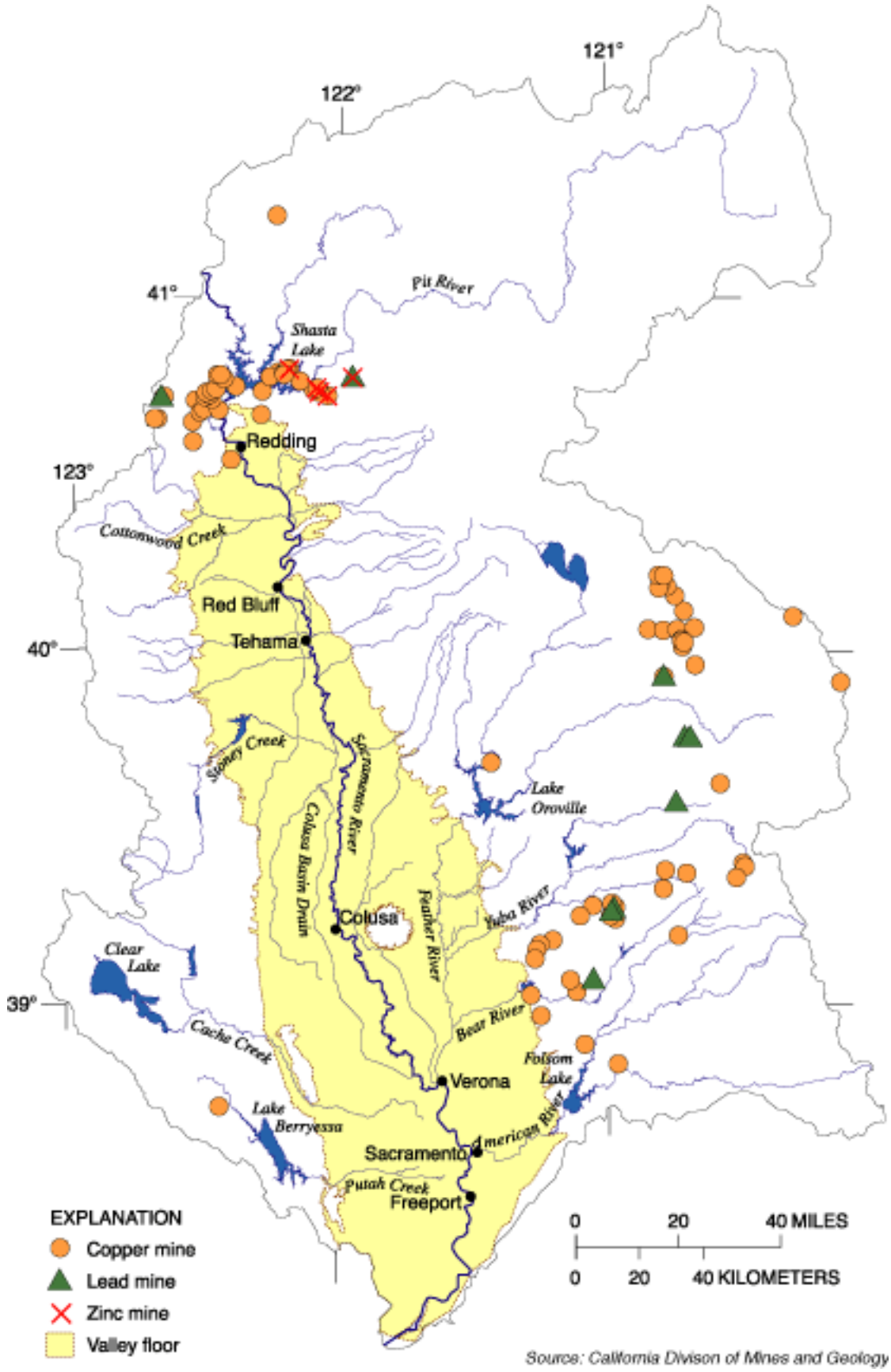


Figure 5. Map showing historic copper, lead, and zinc mines in relation to other selected features in the Sacramento River Basin, California.

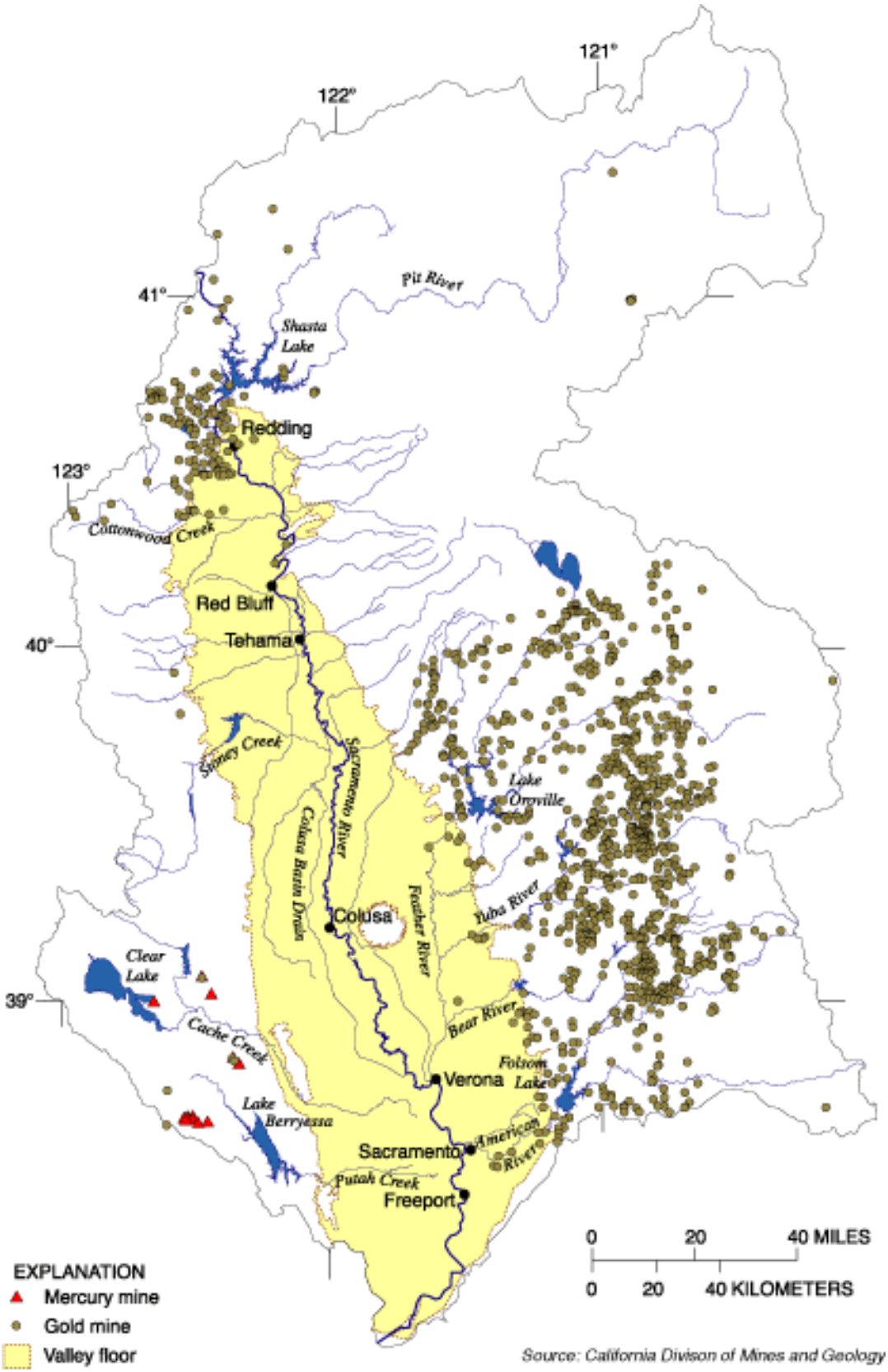


Figure 6. Map of historic gold and mercury mines in relation to other selected features in the Sacramento River Basin, California.

Other Land Uses

Other (nonmining) land uses of the Sacramento River Basin are shown in figure 7. The Sacramento Valley floor (figs. 1, 4, and 7) is the major agricultural region of the basin. Row crops are predominant in the southern Sacramento Valley and grazing is an important activity in the northern valley. Rice is one of the most important crops of the Sacramento Valley. Rice production involves the creation of temporary wetlands. Pest control in these temporary wetlands includes the use of cooper compounds, such as copper sulfate, for the control of algae. Land cover in most of the mountainous areas of the basin is principally forest. The types of forests in the various locations were described in detail by Schoenherr (1992).

Ongoing Studies—NAWQA Program

One of the goals of the NAWQA Program is to investigate and describe the status of, and trends in, the water quality of the nation's streams and ground water. Conceptual details of the program were given by Hirsch and others (1988). A total of 59 NAWQA study units throughout the United States are assessing water quality in basins representing more than 75 percent of the nation's water use. The environmental setting and study design of the NAWQA study unit in the Sacramento River Basin are described by Domagalski and others (1998). The study design includes a network of basic fixed sites that are monitored monthly for water quality and a network of sites where streambed sediment and biological tissues are sampled on a less frequent, synoptic basis. The sites selected for these monitoring activities are described in more detail below.

The NAWQA Program is designed to provide continuing documentation of the quality of the rivers and ground water in major basins throughout the United States. Investigations at individual basins are designed for a 10-year cycle. As part of the NAWQA Program, rivers are sampled for a period of 2 years during part of that 10-year cycle. The sampling takes place at predetermined monthly intervals and in response to hydrological conditions such as storm-water runoff. Water-quality samples collected at NAWQA sites are analyzed for a suite of constituents, including major cations and anions, nutrients, dissolved organic carbon, and general water-quality parameters such as pH, dissolved oxygen, specific conductance, temperature, and alkalinity. At a subset of sites, samples are collected for pesticide or volatile organic chemical analyses, or both. Additional samples, such as those for trace metals, are collected if additional funding has been appropriated. Data is aggregated at the national level, where attention is currently directed to the concentrations and trends detected in nutrients, pesticides, ecology, volatile organic chemicals, and trace elements. In the NAWQA Program, sampling sites on rivers are selected on the basis of natural features of the environment, such as physiography, and of anthropogenic factors such as land use. Consideration in sampling site selection also is given to the subsequent data interpretation, including the capability to provide a mass balance for various constituents in the watershed and to complete biological assessments at or near the water-quality sampling sites.

Basic fixed sites

Twelve river sites were chosen as basic fixed sites in the Sacramento River Basin for the NAWQA project. Four sites were chosen on the Sacramento River: the Sacramento River above Bend Bridge near Red Bluff, the Sacramento River at Colusa, the Sacramento River at Verona, and the Sacramento River at Freeport (fig. 8). The Bend Bridge site was selected because it is the northernmost location, below Shasta Lake, that met applicable national NAWQA criteria. It was suspected that impacts of acid mine drainage from Iron Mountain Mine, via Spring Creek, might be detectable at this site. The Colusa site was chosen because it is centrally located in the basin, it is sufficiently downstream of Spring Creek, such that the effects of acid mine drainage are less likely to be detected, and it is upstream of both drainage from the Sierra Nevada and most of the agricultural drainage of the Sacramento Valley. The Verona site is just downstream of the confluence with the Feather River, one of the major streams draining the Sierra Nevada. The site is also just downstream of the location where much of the agricultural drainage of the Sacramento Valley drains to the Sacramento River. The Freeport site was chosen as a basic fixed site because of its downstream location. Water-quality samples at that site provide an overall indication of multiple sources of constituents to the Sacramento River and also provide an indication of the quality of water entering the San Francisco Bay–Delta Estuary.

Three streams draining the Sierra Nevada were selected as basic fixed sites for the NAWQA study

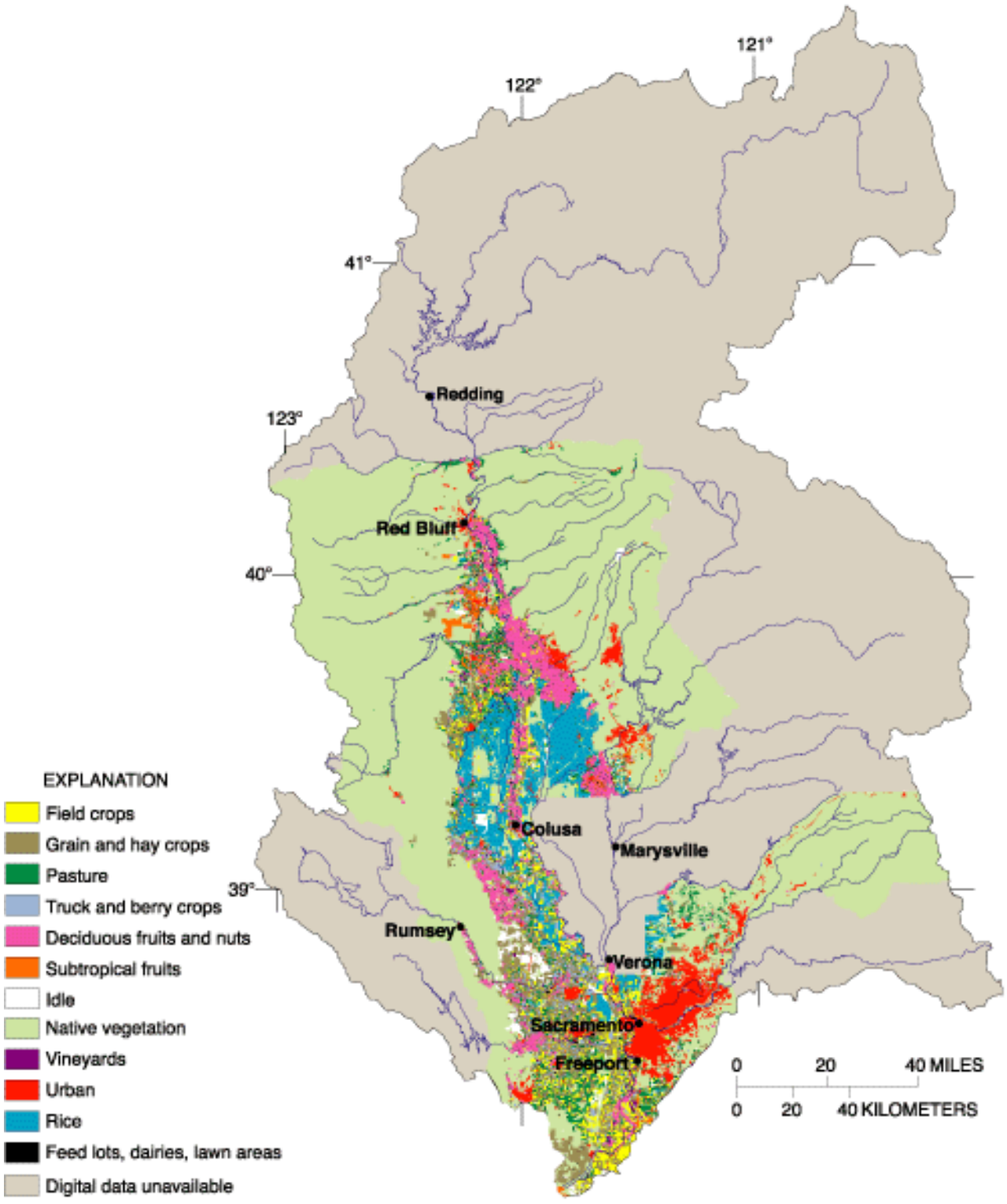


Figure 7. Map showing agricultural and other nonmining land uses in the Sacramento River Basin, California.

unit: the Feather River near Nicolaus, the Yuba River near Marysville, and the American River in Sacramento (Domagalski and others, 1998). The chosen locations on these streams are either near the confluence with the Sacramento River, or in the case of the Yuba River, near the confluence with the Feather River. Two NAWQA basic fixed sites were chosen on streams draining agricultural regions in the Sacramento Valley: the Colusa Basin Drain and the Sacramento Slough. Two additional streams were

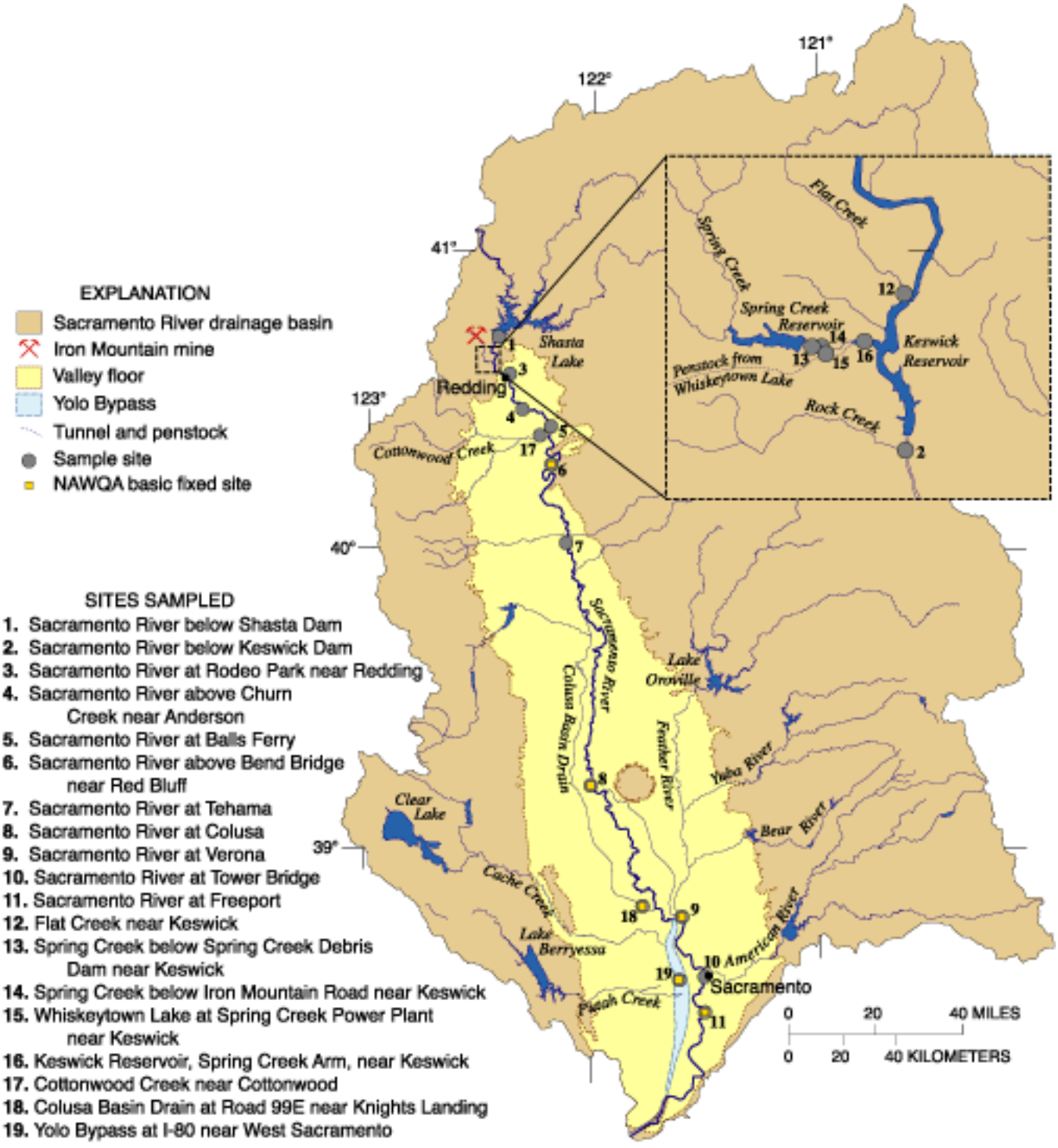


Figure 8. Map showing sampling sites in Sacramento River Basin, California.

selected: Cache Creek, which drains a part of the Coast Ranges with considerable mercury mining, and Arcade Creek near Del Paso Heights, an urban stream.

One distributary site, the Yolo Bypass at Interstate 80 near West Sacramento, also was selected. As discussed previously, water flows in the Yolo Bypass only during wet years and primarily during the winter months. It is necessary to sample the Yolo Bypass at Interstate 80 near West Sacramento to understand the transport of metals and other constituents from the Sacramento River to the Bay–Delta.

Streambed Sediment and Tissue Sites

In addition to the twelve basic fixed sites selected for monthly monitoring of water quality, an additional set of six sites was selected for the sampling of streambed sediment and tissue of aquatic organisms as part of the NAWQA Program. The aquatic organisms collected for tissue analyses were the Asian clam, *Corbicula fluminea,* and bottom feeding fish such as the common carp, *Cyprinus carpio*. The Yolo Bypass at Interstate 80 near West Sacramento (a basic fixed site) was not sampled for streambed sediment or tissue of aquatic organisms because it was dry at the time of sampling. The other 11 basic fixed sites were sampled for streambed sediment and tissue, making a total of 17 sites. These additional sites are the McCloud River, the Cottonwood Creek near Cottonwood, the Deer Creek near Vina, the Jack Slough near Jack Slough Road, and the Stony Creek below Black Butte Dam (Domagalski and others, 1998). Samples of streambed sediment and tissue of select aquatic organisms were collected initially in October 1995 for the determination of trace elements and hydrophobic organic contaminants (MacCoy and Domagalski, 1999). Results of follow-up sampling during 1997 and 1998 will be presented in a subsequent report.

Study design: Field and Laboratory Methods

Charles N. Alpers, Howard E. Taylor, David A. Roth, Daniel J. Cain, James W. Ball, Daniel M. Unruh, and Peter D. Dileanis

This section describes the design of the Sacramento River metals transport study and the field and laboratory methods used. The site selection and sampling schedule are discussed, including methods used for the collection and processing of water, sediment, and biological samples. The analytical procedures that were used in the field and the laboratory are also discussed.

Site Selection and Sampling Schedule

Samples of water, colloids, streambed sediment, and caddisfly larvae were taken at 19 different sites for this study (fig. 8), though each type of sample was not necessarily taken at each site. Table 1 shows the dates of sampling for each type of sample at the various sample sites, along with distance from the river mouth.

Water Sampling

Water sampling sites for this study included six principal sites along the mainstem Sacramento River, plus the Yolo Bypass, a distributary site that receives water from mainstem Sacramento River for flood control during high-flow conditions (fig. 8). On one sampling trip during extreme high-flow conditions, an alternate site was chosen at one of the mainstem locations for logistics reasons. Six tributaries to the Sacramento River also were sampled, focusing on the Spring Creek area near Keswick Reservoir. The individual water sampling sites and the rationale for their selection are discussed in the following sections.

Sacramento River and Yolo Bypass Sites

One of the principal objectives of this study was to assess metal loads along the mainstem of the Sacramento River from Shasta Dam to Freeport (fig. 1). The four mainstem basic fixed sites from the NAWQA study—Sacramento River above Bend Bridge near Red Bluff, at Colusa, at Verona, and at Freeport (fig. 8, table 1, sites 6, 8, 9, and 11, respectively)—were selected for detailed trace-metal analysis. In addition, two other mainstem sites on the Sacramento River upstream from the Bend Bridge site were chosen for detailed sampling of water and colloids: the Sacramento River below Shasta Dam and below Keswick Dam (fig. 8, table 1, sites 1 and 2). All six of these mainstem sites were sampled during five of the six sampling periods (July, September, November, and December 1996, and May–June 1997).

Water samples also were taken from mainstem Sacramento River sites below Keswick Dam, above Bend Bridge, and at Colusa during the sixth (fifth chronologically) sampling period, which corresponded

Table 1. Sampling sites along the Sacramento River showing distance from river mouth and dates of sampling for various media

[Dist., distance from river mouth. DD, Debris Dam; PP Power Plant; Jan., May, and June samples taken in 1997; all other months in 1996. **Bold** denotes field replicate samples taken and analyzed; *italics* denote sequential extraction analysis for speciation of colloids; blank cells indicate no samples taken]

	Dist. River Mile (kilometer)	Media Sampled			
		Water	Colloids (speciation in italics)	Streambed Sediment	Hydropsyche Larvae
SACRAMENTO RIVER SITES					
1. Sacramento River below Shasta Dam	311 (500)	**July, Sept., Nov., Dec., May**	July, Nov., Dec., *May*		
2. Sacramento River below Keswick Dam	302 (486)	**July, Sept., Nov., Dec., Jan., May**	July, Nov., Dec., *Jan., May*		
3. Sacramento River at Rodeo Park near Redding	298 (479)			Oct.	Oct.
4. Sacramento River above Churn Creek near Anderson	285 (459)			Oct.	Oct.
5. Sacramento River at Balls Ferry	276 (444)			Oct.	Oct.
6. Sacramento River above Bend Bridge near Red Bluff	258 (415)	**July, Sept., Nov., Dec., Jan., May**	July, Sept., Nov., Dec., *Jan., May*	Oct.	Oct.
7. Sacramento River at Tehama	229 (368)			Oct.	Oct.
8. Sacramento River at Colusa	143 (230)	**July, Sept., Nov., Dec., Jan., June**	July, Sept., Nov., Dec., *Jan., June*	Nov.	
9. Sacramento River at Verona	78 (126)	**July, Sept., Nov., Dec., June**	July, Sept., Nov., Dec., *June*	Nov.	
10. Sacramento River at Tower Bridge	59 (95)	**Jan.**	Jan.		
11. Sacramento River at Freeport	46 (74)	**July, Sept., Nov., Dec., June**	July, Sept., Nov., Dec., *June*	Nov.	
TRIBUTARY SITES					
12. Flat Creek near Keswick	304 (489)	**Dec., May**			
13. Spring Creek below Spring Creek DD near Keswick	303 (488)	**Dec., May**	Dec., *May*		
14. Spring Creek below Iron Mountain Road near Keswick	303 (488)	**Jan.**	Jan.		
15. Whiskeytown Lake at Spring Creek PP near Keswick	303 (488)	**Dec., May**			
16. Keswick Reservoir, Spring Creek arm, near Keswick	303 (488)	**July, Sept., Nov., Dec., May**	July, Nov., Dec., *May*		
17. Cottonwood Creek near Cottonwood	273 (439)			Oct., June	Oct.
18. Colusa Basin Drain at Road 99E near Knights Landing	90 (145)	**June**	*June*		
DISTRIBUTARY SITE					
19. Yolo Bypass at I-80 near West Sacramento	83 (134)	**Jan.**	Jan.		

to extremely high flows associated with the New Year's flood event of early January 1997. No extreme high-flow samples were taken at the sites below Shasta Dam, at Verona, or at Freeport for logistic reasons, such as limited boat access and unsafe river conditions.

During the flood conditions of early January 1997, the flow regime of the Sacramento River near Sacramento was sufficiently different that sampling in the lower part of the river was done at different locations. Because of the magnitude of the flow, a large part of the river flow was diverted to the Yolo Bypass by way of the Fremont weir (fig. 8). Therefore, a composite sample consisting of thirty vertical intervals was collected from the Yolo Bypass at Interstate 80 (fig. 8, table 1, site 19). Also during this extremely high-flow period, the Sacramento River, south of its confluence with the American River, consisted mainly of water from the American River because most of the flow from the mainstem Sacramento River was diverted to the Yolo Bypass. During these conditions, boat access to certain parts of the Sacramento River was limited or deemed unsafe. In lower-flow conditions, the Freeport site is routinely sampled by boat; the nearby bridge has been deemed unsafe for bridge-based sampling because of narrow traffic and pedestrian lanes. In January 1997, boat access at Freeport was not possible; therefore, the mainstem Sacramento River was sampled at Tower Bridge, near downtown Sacramento, located 21 km (13 mi) upstream (fig. 8, table 1, site 10).

Tributary Sites

The tributary best known as a source of metals to the Sacramento River is Spring Creek (figs. 1 and 8). During five of the six sampling periods for this study (all except January 1997), a sample was taken in the Spring Creek arm of Keswick Reservoir (fig. 8, table 1, site 16). The sampling point for site 16 was approximately 100 m downstream of the mixing zone of Spring Creek and the tailrace from the Spring Creek Power Plant (SCPP) (water from Whiskeytown Lake) (figs. 1 and 8). At this site, the flow from these tributaries was relatively well mixed horizontally, in a constricted part of the Spring Creek arm where the influence from water released at Shasta Dam was extremely unlikely. It was assumed that the dissolved and colloidal fractions of the water column were well mixed vertically at this location.

Spring Creek was sampled on three occasions (December 1996, January 1997, and May 1997) between the SCDD and the discharge point to the Spring Creek arm of Keswick Reservoir. The site named "Spring Creek below Spring Creek Debris Dam near Keswick" (fig. 8, table 1, site 13) corresponds to the concrete weir that receives water from the outlet works of SCDD. This was the sampling location in December 1996 and May 1997. During January 1997, the Spring Creek samples were taken at the site named "Spring Creek below Iron Mountain Road near Keswick" (fig. 8, table 1, site 14) so that the discharge from the SCDD spillway and other runoff from areas near the SCDD would be included.

Samples were taken of Whiskeytown Lake water from the SCPP near Keswick in December 1996 and May 1997. Under some conditions, the discharge from the SCPP represents most of the flow in the Spring Creek arm of Keswick Reservoir. The water samples were taken from a spigot off a turbine housing on the lowest level of the power plant. No sample was taken during early January 1997 because discharge through the SCPP was minimal at that time.

The Flat Creek near Keswick site is located near the confluence of Flat Creek and Keswick Reservoir. Flat Creek is a tributary to Keswick Reservoir approximately 1.5 km upstream from the Spring Creek arm of Keswick Reservoir (fig. 8, table 1, site 12). Construction of a diversion of upper Spring Creek into Flat Creek was completed in December 1990 (U.S. Environmental Protection Agency, 1992). This diversion carries up to 600 ft^3/s of relatively uncontaminated water from upper Spring Creek to reduce the flow into Spring Creek Reservoir. It is known that metals contaminate upper Spring Creek because of the Stowell Mine, a copper-zinc mine similar in geology to Iron Mountain; but because the mine is considerably smaller in terms of deposit size and production, the contamination is relatively insignificant (Kinkel and others, 1956).

The Flat Creek drainage also includes the Minnesota Flats site, which was a disposal area for high-pyrite mill tailings from the Minnesota copper flotation mill, which operated from about 1914 to 1942 (U.S. Environmental Protection Agency, 1992). During 1988, the tailings (approximately 28,000 yd^3) were excavated and deposited in the Brick Flat Pit near the top of Iron Mountain, effectively eliminating this source of pollution (U.S. Environmental Protection Agency, 1992). Also, since 1994, a lime neutralization

plant has been located at the Minnesota Flats site. This plant treats drainage from the Richmond and Lawson portals on the Boulder Creek side of Iron Mountain, as well as water pumped from the Old mine and Number 8 mine workings on the Slickrock Creek side of Iron Mountain. The treated water is discharged to Spring Creek so that, under normal operating conditions, there is no metal loading to Flat Creek associated with operation of the treatment plant. Nevertheless, Flat Creek carries the second largest metal loading to Keswick Reservoir, behind Spring Creek (John Spitzley, CH2M Hill, Redding, California, written commun. to Richard Sugarek, U.S. Environmental Protection Agency, 1997).

Flat Creek was sampled near its confluence with Keswick Reservoir during December 1996 and May 1997 (table 1). During early January 1997, flood conditions had caused scouring of a bridge where Iron Mountain Road crosses Flat Creek. The upper Spring Creek Diversion was temporarily shut down while the bridge was repaired. Although there was some flow in Flat Creek associated with its original watershed, the metal loadings were probably much lower than would have been the case if the diversion had been operating. Therefore, Flat Creek was not sampled during the January 1997 sampling period.

The Colusa Basin Drain was sampled to represent agricultural drainage from an area with active rice production. Substantial amounts of copper sulfate are added to rice fields periodically to suppress algae and other pests. This site was sampled monthly during 1996 as a basic fixed site in the NAWQA Program, and showed elevated copper concentrations during June of that year, a period when the rice fields were draining. The Colusa Basin Drain site was sampled with the additional trace metal protocols for this study in June 1997 to evaluate the potential occurrence of metals and their manner of transport at this location during drainage of the rice fields.

Streambed Sediment and Caddisfly Larvae Sampling

Streambed sediment was sampled (table 1) at each of the four basic fixed sites on the Sacramento River (Bend Bridge, Colusa, Verona, and Freeport). Four additional sites on the mainstem Sacramento River between Redding and Tehama (Rodeo Park, Churn Creek, Balls Ferry, and Tehama; fig. 8, sites 3, 4, 5, and 7) and one tributary (Cottonwood Creek, fig. 8, site 17) also were sampled for streambed sediment in conjunction with sampling for caddisfly larvae (table 1). The purpose of sediment sampling was to investigate possible correlations of trace metal chemistry between sediment, water, and biota at selected sites.

Additional suitable sites for caddisfly larvae collection could not be found between Keswick Dam and Shasta Dam (namely, in Keswick Reservoir) or in the Sacramento River downstream of Tehama because of the lack of a suitable habitat, such as riffle zones. In addition, an attempt to collect additional caddisfly samples in June 1997 was unsuccessful in the mainstem Sacramento River at the sites sampled previously in October 1996 because of relatively high-flow conditions.

Methods for Sample Collection and Field Measurements

This section describes the methods of collection for samples of water, sediment, and caddisfly larvae. Also discussed are methods used for field measurements, including pH, specific conductance, and dissolved oxygen.

Water Sampling

The Sacramento River metals transport study and the concurrent NAWQA study used somewhat different procedures for the collection and processing of water samples. The metals transport study used protocols developed by the USGS's National Research Program (NRP) in water resources, under the direction of Dr. Howard E. Taylor. Both the NAWQA and the NRP procedures are described in this report, although much of the NAWQA data will be reported elsewhere. The water sampling collection methods are described in this section, and the processing methods are described in a later section.

NAWQA Protocols

At the four basic fixed sites on the mainstem Sacramento River (Bend Bridge, Colusa, Verona, and Freeport), the NAWQA Program collected monthly samples using a D-77 depth-integrating sampler (Horowitz and others, 1994) with the equal-width-increment method (Edwards and Glysson, 1988). The D-77 sampler (see sketch in fig. 3 in Appendix 1) is suspended from a boat or bridge using a pulley and winch with hand crank. The sampler consists of a 3-L polytetrafluoroethylene (PTFE, a variety of Teflon)

bottle with a PTFE nozzle that is designed to transmit water in an isokinetic manner. (Note that two varieties of Teflon were used in this study, PTFE and perfluoroalkoxy, or PFA.) In isokinetic sampling, the water enters the sampler at the same velocity as the water flowing near the sampler to ensure that concentrations of suspended sediment particles are representative of concentrations in the water sampled. The 3-L bottle is housed in the bronze body of the D-77; the bronze is coated with epoxy paint to eliminate potential contamination. The D-77 is considered to be rated as isokinetic to a depth of 15 ft, and to a maximum river velocity of about 4 ft/s (Shelton, 1994).

The D-77 sampler was raised and lowered at a constant rate, sufficiently fast to ensure that the 3-L bottle did not completely fill. Several equally spaced locations were sampled in a cross-section of the river and the volume collected in each vertical pass was recorded. For the purposes of the NAWQA Program, a total volume of about 9 L was generally collected in three separate 3-L PTFE bottles, which were processed using a PTFE cone splitter, as described in the following section on Sample Processing.

The NAWQA project used a grab method for the collection of water samples for mercury, dissolved organic carbon, and suspended organic carbon analyses. A single 3-L PTFE bottle and D-77 nozzle was dedicated to collection of the grab samples, which were taken generally from a single depth-integrated vertical interval located near the center of the river. The mercury grab samples were transferred immediately to acid-cleaned PTFE bottles, preserved with approximately 5 mL of 50 percent hydrochloric acid (HCl), and then closed tightly with a wrench, chilled, and shipped to a USGS laboratory in Madison, Wisconsin for analysis of total mercury. In some cases, water samples for monomethylmercury (MMHg) were taken also. Results for mercury and monomethyl-mercury from the NAWQA project will be presented in a separate report.

Measurements were made of field water-quality parameters according to NAWQA protocols (Shelton, 1994). Temperature was measured in place using an ASTM-calibrated thermometer (Cole Parmer model number 90201-10) that was placed about 10 cm below the water surface; temperature readings are considered accurate to within 0.2°C. Dissolved oxygen was determined in place using a probe with a thin permeable membrane. The dissolved oxygen meter (YSI model number 57) was calibrated at 100 percent saturation using the air-calibration-in-water method (Shelton, 1994). Barometric pressure was measured with a hand-held barometer at the time of each dissolved oxygen measurement so that the saturation value could be computed. Field values of specific conductance and pH were determined using raw (unfiltered) subsamples from the cone splitter. Specific conductance was determined using a Cole Parmer conductivity meter (model number 1481-60). Field values of pH were measured using an Orion meter (model number 250A) with a liquid-filled Triode electrode. Specific conductance and pH standards in the range of the unknown samples were used to calibrate the meters (Shelton, 1994). Laboratory determinations of specific conductance and pH were also made by similar methods on separate raw subsamples. Alkalinity determinations made on 50-mL subsamples of filtered (0.45-mm capsule filter) water from the cone splitter were based on titrations performed with a digital titrator and 0.16 Normal (*N*) sulfuric acid. In general, two separate alkalinity titrations were done for each sample, each using 50 mL of filtered water. The titration results were computed using the Gran titration method (Butler, 1982).

USGS's NRP Ultratrace Element Protocol

At the four basic fixed NAWQA sites on the Sacramento River, water sample collection for the concurrent metal transport study was also performed using equal-width increment methods. In cases where the D-77 sampler was used, either from a boat or a bridge, the additional samples were taken in a similar manner as in the NAWQA study. During July 1996, a modified D-77 sampler was used, in which a collapsible PTFE bag was inserted into a perforated 3-L polyethylene bottle (Kelly and Taylor, 1996). During the July 1996 sampling period, trace metal samples were composited in acid-washed 8-L PTFE-lined stainless-steel churns. Details of the water (composite water and grab water) and colloid sample collection for each sample taken in this study are given in tables 2–4. For all other sampling periods (September 1996 through May–June 1997), water samples for the metal transport study were collected by using either the standard D-77 sampler or PTFE tubing with a peristaltic pump.

Samples taken from September 1996 to June 1997 generally were composited in an acid-washed 20-L PTFE-lined stainless-steel churn. At the four basic fixed NAWQA sites, the pumping was done at

the same equal-width stations at which concurrent NAWQA samples were taken. Volumes yielded by the D-77 sampler during the NAWQA sampling were used to determine the volume needed from each station to achieve a width-integrated sample. At the Spring Creek arm site, horizontal integration was achieved by moving the boat from side to side across the full width of the flow channel (about 10 m). Some degree of vertical integration for pumped samples was achieved in the upper 0.2 to 2.5 m of the river by placing the PTFE tubing inside a 3-m length of 5-cm-diameter rigid polyvinyl chloride (PVC) pipe. The PTFE tubing was taped in place using nonmetallic, white duct tape so that it protruded about 30 cm beyond the end of the PVC pipe. The tubing-pipe assembly was moved vertically in the river from the bow of the boat with the tubing pointed upstream, so that the water collected had minimal (if any) contact with the PVC pipe. Field and equipment blanks were performed on these materials; results are described in the section on Quality Assurance and Quality Control.

At most other sites, water samples were also collected by pumping with PTFE tubing. At sites where boat access was not available or deemed unsafe, pumping through PTFE tubing with a peristaltic pump was done from the shoreline. Three such sites were located immediately downstream of dams (Shasta Dam, Keswick Dam, and Spring Creek Debris Dam), where the flow was considered to be well mixed and width-integrated sampling was considered unnecessary.

At the sampling site below Shasta Dam, lateral differences in water quality are possible under certain flow conditions, such as when water is drawn from more than one depth in Shasta Lake and is partly diverted through the turbines and partly through the spillway. During July 1996, a horizontal traverse of the river was performed from a bridge using a Hydrolab instrument to determine lateral heterogeneities with respect to pH, temperature, and specific conductance. No such heterogeneity was found, and samples were taken from the right bank (facing downstream), about 30 m downstream from the bridge (a sampling point used on occasion by other agencies). This shoreline sampling point was also used in September and November 1996; however, the water level was higher in December 1996, and for safety reasons, a width-integrated sample was collected from the bridge using a D-77 sampler. In May 1997, the sample from below Shasta Dam was also taken from the bridge using a D-77 sampler (table 2).

The sampling point for the site below Keswick Dam also was on the right bank at a point about 100 m from the dam, a location that is also used routinely for sample collection by the BOR. During January 1997, the USGS sample was taken concurrently with one by the BOR for comparative purposes.

The sampling from Spring Creek also was accomplished using PTFE tubing from the shoreline. At the site "below SCDD," samples were pumped from a point on the right bank, about 10 m upstream from the concrete V-notch weir. At the Spring Creek site "below Iron Mountain Road," samples were pumped from a point on the right bank about 50 m downstream from the culvert that passes under Iron Mountain Road.

The water sample taken from the Yolo Bypass at Interstate 80 in January 1997 was collected using a D-77 sampler. The extreme width of this water body (about 5 km) and its potential lateral heterogeneity required that 30 separate width increments be taken, spaced at an interval of about 150 m. A composite sample using a 20-L churn was taken concurrently with a NAWQA Program sample that was split with the cone splitter. Flow measurements were taken at each of the sampling stations along the Yolo Bypass to derive an estimate of total discharge.

In addition to the composite (churn) sample taken at all sampling sites in the study, a separate grab sample also was taken at each site (table 3), specifically for the analysis of lead in whole water and various filtrates. A grab sample is defined as a sample taken from a single location in a water body; it is preferred in some studies of ultratrace elements because of lower potential for contamination. A single 3-L PTFE bottle was dedicated to collection of the grab samples. At sites where multiple vertical intervals were sampled, the grab sample was taken from the centermost station, similar to the NAWQA mercury grab samples. At sites where water was pumped from the shoreline, the grab sample represents a replicate sample of the composite; this situation is indicated in tables 2 and 3 as sites with one collection point for both "composite" and grab samples.

Streambed Sediment Sampling

Streambed sediment samples were collected using NAWQA protocols (Shelton and Capel, 1994). Relatively fine-grained sediment from three to six

Table 2. Sampling methods used for composite water samples

[Site numbers correspond to figure 8 and table 1 (no composite water samples were taken at sites 3, 4, 5, 7, and 17); DD, Debris Dam; PP, Power Plant; NS, no sample taken; initial number in cells (1–30) denotes number of sampling points composited (parentheses denote estimate); *, composited from samples collected continuously while passing boat horizontally across water body; Bo, boat; Br, bridge; Sh, shoreline; Sp, spigot in power plant; D-77M, D-77 sampler modified with Teflon bag; PPTT, peristaltic pump with Teflon tubing; Dip-1L, dipped 1-liter Teflon bottle near surface; Dip-2L, dipped 2-liter Teflon bottle near surface; 8L, 8-liter Teflon-lined churn; 20L, 20-liter Teflon-lined churn; JC, 13-liter Teflon-lined high-density polyethylene jerrican; CS, Teflon cone splitter used to split sample for USGS's National Water-Quality Assessment Program. L, liter]

	Sampling Period					
	July 1966	September 1996	November 1996	December 1996	January 1997	May/June 1997
SACRAMENTO RIVER SITES						
1. Sacramento River below Shasta Dam	1, Sh, PPTT, 8L	1, Sh, PPTT, 20L	1, Sh, PPTT, 20L	3, Br, D-77, 20L	NS	4, Br, D-77, 20L
2. Sacramento River below Keswick Dam	1, Sh, PPTT 8L	1, Sh, PPTT, 20L	1, Sh, PPTT, 20L	1, Sh, PPTT, 20L	1, Sh, PPTT, 20L	1, Sh, PPTT, 20L
6. Sacramento River above Bend Bridge near Red Bluff	5, Br, D-77M, 8L	5, Bo, PPTT, 20L	4, Bo, PPTT, 20L	1, Sh, PPTT, 20L	5, Bo, PPTT, 20L	5, Bo, PPTT, 20L
8. Sacramento River at Colusa	5, Bo, D-77M, 8L	5, Bo, Dip-2L, 20L	(4), Bo, PPTT, 20L	4, Bo, PPTT, 20L	5, Bo, PPTT, 20L	5, Bo, PPTT, 20L
9. Sacramento River at Verona	6, Bo, D-77M, 8L	6, Bo, PPTT, 20L	(6), Bo, PPTT, 20L	8, Bo, PPTT, 20L	NS	5, Bo, PPTT, 20L
10. Sacramento River at Tower Bridge	NS	NS	NS	NS	(4), Br, D-77, 20L	NS
11. Sacramento River at Freeport	5, Bo, D-77M, 8L	5, Bo, PPTT, 20L	(5), Bo, PPTT, 20L	4, Bo, PPTT, 20L	NS	5, Bo, PPTT, 20L
TRIBUTARY SITES						
12. Flat Creek near Keswick	NS	NS	NS	1, Sh, 20L	NS	1, Sh, Dip-1L, JC
13. Spring Creek below Spring Creek DD near Keswick	NS	NS	NS	1, Sh, PPTT, 20L	NS	1, Sh, PPTT, 20L
14. Spring Creek below Iron Mountain Road near Keswick	NS	NS	NS	NS	1, Sh, PPTT, 20L	NS
15. Whiskeytown Lake at Spring Creek PP near Keswick	NS	NS	NS	1,Sp, 20L	NS	1,Sp, 20L
16. Keswick Reservoir, Spring Creek arm, near Keswick	*, Bo, PPTT, 8L	*, Bo, PPTT	*, Bo, PPTT	*, Bo, PPTT	NS	*, Bo, PPTT
18. Colusa Basin Drain at Road 99E near Knights Landing	NS	NS	NS	NS	NS	Br, 20L
DISTRIBUTARY SITE						
19. Yolo Bypass at I-80 Near West Sacramento	NS	NS	NS	NS	30, Br, D-77, CS, 20L	NS

Table 3. Sampling methods used for grab water samples

[Site numbers correspond to figure 8 and table 1 (no grab water samples were taken at sites 3, 4, 5, 7, and 17); DD, Debris Dam; PP, Power Plant; NS, no sample taken; initial number in cells (1) denotes number of samling points composited; *, composited from samples collected continuously while passing boat horizontally across water body; Bo, boat; Br, bridge; Sh, shoreline; Sp, spigot in power plant; D-77M, D-77 sampler modified with Teflon bag; PPTT, peristaltic pump with Teflon tubing; Dip-2 L, dipped 2-liter Teflon bottle near surface; Dip-1L, dipped 1-liter Teflon bottle near surface; 3L, 3-liter Teflon bottle; L, liter]

	July 1966	September 1996	November 1996	December 1996	January 1997	May/June 1997
SACRAMENTO RIVER SITES						
1. Sacramento River below Shasta Dam	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L	1, Br, D-77, 3L	NS	1, Br, D-77, 3L
2. Sacramento River below Keswick Dam	1, Sh, PPTT 3L	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L	1, Sh, PPTT, 3L
6. Sacramento River above Bend Bridge near Red Bluff	1, Br, D-77M, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	1, Sh, PPTT, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L
8. Sacramento River at Colusa	1, Bo, D-77M, 3L	1, Bo, Dip-2L, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L
9. Sacramento River at Verona	1, Bo, D-77M, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	NS	1, Bo, PPTT, 3L
10. Sacramento River at Tower Bridge	NS	NS	NS	NS	1, Bo, PPTT, 3L	NS
11. Sacramento River at Freeport	1, Bo, D-77M, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	1, Bo, PPTT, 3L	NS	1, Bo, PPTT, 3L
TRIBUTARY SITES						
12. Flat Creek near Keswick	NS	NS	NS	1, Sh, 3L	NS	1, Sh, Dip-1L, 3L
13. Spring Creek below Spring Creek DD near Keswick	NS	NS	NS	1, Sh, PPTT, 3L	NS	1, Sh, PPTT, 3L
14. Spring Creek below Iron Mountain Road near Keswick	NS	NS	NS	NS	1, Sh, PPTT, 20L	NS
15. Whiskeytown Lake at Spring Creek PP near Keswick	NS	NS	NS	1, Sp, 3L	NS	1, Sp, 3L
16. Keswick Reservoir, Spring Creek arm, near Keswick	*, Bo, PPTT 3L	*, Bo, PPTT, 3L	*, Bo, PPTT, 3L	*, Bo, PPTT, 3L	NS	*, Bo, PPTT 3L
18. Colusa Basin Drain at Road 99E near Knights Landing	NS	NS	NS	NS	NS	Br, 20L
DISTRIBUTARY SITE						
19. Yolo Bypass at I-80 Near West Sacramento	NS	NS	NS	NS	1, Br, D-77, 3L	NS

locations within 100 m of the water sampling site was collected from shallow-water areas with acid-washed, plastic spoons and spatulas, and composited in an acid-cleaned, 8-L glass container. The sediment and associated river water was homogenized, and a split (about 100 mL, or roughly 200 g) of the whole sediment was taken for grain-size analysis. The remaining sample was then screened through a 62-μm nylon mesh; the coarse fraction was discarded. The fine-grained material (clay plus silt size fractions) was placed in acid-washed plastic jars and chilled.

Caddisfly Sampling

Samples of *Hydropsyche* larvae were collected at five stations (fig. 8, table 1, sites 3, 4, 5, 6, and 7) in the Sacramento River between Redding and Tehama during October 21–23, 1996, a period of low-flow conditions. In addition, a sample was collected from Cottonwood Creek (fig. 8, table 1, site 17); this sample was used for comparison with metal levels in samples from the Sacramento River. Caddisfly samples were not collected upstream of Keswick Reservoir, nor downstream of Tehama, nor during other times of the year because of the scarcity of habitat that could be sampled using the methods employed. *Hydropsyche* larvae were collected with large kick nets, and by hand, from a single, wadeable (approximately 0.3-m deep) riffle at each site. Specimens were picked from the net with nylon forceps and placed into plastic trays with stream water (forceps and trays were previously acid washed). Water in the trays was freshened every few minutes. Specimens were transferred from the trays to sealed, plastic bags and then frozen on dry ice in a small volume of river water within 1 hour of collection. The samples were moved to the laboratory where they were stored at –70°C until analysis. Specimens for taxonomic identification were preserved in 10 percent formalin in the field and transferred to 75 percent ethanol in the laboratory.

Sample Processing Methods

This section contains descriptions of methods used for sample processing in this study. The types of samples include water, sediment, and biological samples.

Water Sample Processing

Two approaches for the processing of water samples were used in this study. The "part-per-billion" protocol adopted by the NAWQA Program (Horowitz and others, 1994) was used for subsamples analyzed for anions, nutrients, and organic carbon at the basic fixed sites. For the second approach, subsamples analyzed for cations, trace elements, and iron redox speciation were processed using a protocol for ultra-trace constituents developed by the USGS's NRP in water resources, under the direction of Dr. Howard E. Taylor. Both processing approaches are described in this subsection.

NAWQA Protocols

Water samples collected for the NAWQA study were processed to make subsamples using a Teflon (PTFE) cone splitter (see sketch in fig. 4 in Appendix 1). The use and precision of the cone splitter have been described by Ward and Harr (1990) and Capel and others (1995). Raw subsamples from the cone splitter were collected for analysis of suspended sediment concentration and certain nutrient constituents. A raw subsample was used for measurement of pH and specific conductance. Additional raw subsamples from the cone splitter were used as input to filtration processes. A disposable 0.45-μm capsule filter (Gelman 12175) was used to filter samples for major and trace element analyses. The capsule filters were preconditioned by passing 1 L of deionized water through, prior to any sample. A minimum of 50 mL of sample was passed through the capsule filter prior to rinsing and filling the sample bottles with filtrate.

A raw subsample of 100 mL, taken from the 3-L PTFE bottle used to collect the grab sample for mercury, was processed for dissolved and suspended organic carbon analysis. It was filtered through a 47-mm-diameter silver membrane filter (pore diameter of 0.45-μm, manufactured by the Poretics Products Division of Osmonics). The silver filters were heated to 300°C for 4 hours and then mounted in a multistage PTFE filter holder. A clean amber glass bottle was placed in a sealed PTFE canister. The canister is equipped with a fitting that allows for an airtight connection, using PTFE tubing, between the PTFE filter holder and the amber glass bottle. Water was drawn through the filter under a vacuum, with an oil-free vacuum pump attached to the PTFE canister. The filtrate samples were collected in the precleaned 100-mL amber glass bottles and immediately chilled.

The silver filters were retained in plastic petri dishes for analysis of suspended organic matter.

Both raw (unfiltered) and filtered water subsamples were taken for analysis of nutrients. Filtration was done using the same 0.45-μm capsule filter (manufactured by Gelman) as used for the major and trace element subsample. The unfiltered subsamples that were used for nutrient analysis were acidified with sulfuric acid, whereas the filtered samples were not preserved other than chilling on ice immediately after collection and processing and keeping refrigerated until analyzed. Samples for analysis of nutrients and organic carbon were shipped on ice within 24 hours of collection to the USGS's NWQL in Arvada, Colorado.

USGS's NRP Ultratrace Element Protocol

After compositing streamwater in PTFE-lined churns, the composite raw water samples were mixed using conventional churn-splitting techniques (Leenheer and others, 1989) and processed as necessary to obtain representative subsamples for whole-water analysis, subsequent filtration, and suspended sediment concentration determinations (see table 5, which has been modified from the Quality Assurance Project Plan, table 4 in Appendix 1). Whole-water and filtered subsamples for analysis of cations and trace metals were collected in acid-soaked, screw-cap 250-mL polyethylene bottles and were immediately preserved with high-purity nitric acid (HNO_3) (table 5). The nitric acid was purified in the laboratory using a distillation procedure described by Kuehner and others (1972).

Whole-water samples intended for analysis of major cations and trace metals were preserved in the field using 2 mL of concentrated, distilled nitric acid per 250-mL subsample, and were then subjected to an in-bottle digestion using 5 mL of concentrated hydrochloric acid per 200 mL of sample in a water bath at near-boiling conditions (see method I-3485-85 in Fishman and Friedman, 1989). Results from this method are considered "total" if greater than 95 percent of a substance is solubilized and are considered "total recoverable" if less than 95 percent of a substance is solubilized (Fishman and Friedman, 1989). The addition of nitric acid in the field was necessary to avoid metal precipitation in iron-bearing samples. The net result was a more rigorous digestion than that which would be obtained using only hydrochloric acid.

The whole-water samples intended for iron redox analysis were preserved in the field using 2 mL of concentrated, distilled hydrochloric acid per 250-mL subsample. Nitric acid, a weak oxidant, was not added to these samples because it likely would have changed the proportion of ferrous iron [Fe(II)] and ferric iron [Fe(III)]. Because bacteria were not excluded from these unfiltered samples, and some iron-oxidizing bacteria are known to survive in extremely acid conditions (Nordstrom and Southam, 1997), some oxidation of Fe(II) to Fe(III) may have occurred after sample preservation. This effect is less likely to have occurred in the filtered subsamples preserved in a similar manner for iron redox determinations.

Filtration for analysis of cations (including trace metals), mercury, anions, iron redox, and nutrients was performed in a mobile laboratory using a 0.45-μm capsule filter (Gelman) and peristaltic pump. Subsamples for replicate analysis, and in-bottle spikes, if required, were taken from the churn and processed in a manner similar to that described earlier. Containers and preservatives were used in accordance with quality assurance protocols (see table 5 and Appendix 1). A diagram showing the procedure for the processing of composite samples is shown in figure 9.

A subsample of the 3-L grab sample was also filtered (in the mobile lab) using a separate 0.45-μm capsule filter (Gelman) for lead analysis (fig. 10). With the exception of PTFE bottles, which were used in place of polyethylene bottles, the handling procedures for the grab samples were the same as those used for the composite samples and related subsamples that were prepared for analysis of cations and trace elements.

Water remaining in the churn and in the grab sample bottle, as well as the 100-L sample for colloid isolation, were transported to a processing laboratory as quickly as logistics permitted (generally within 2 to 24 hours). There, subsamples from the composited sample and the grab sample were filtered using a Nuclepore 0.40-μm membrane in an all-PTFE filter holder, under vacuum (Kelly and Taylor, 1996). Replicate filtered subsamples were obtained in this manner for the analyses of cations and mercury (see second column of table 5; fig. 9).

In the laboratory, another portion (about 3 L) of the composited sample was filtered with a Minitan (Millipore Corporation) tangential-flow ultrafiltration procedure to remove suspended particulate matter,

Table 4. Sampling methods used for colloid samples

[Site numbers correspond to figure 8 and table 1 (no colloid samples were taken at sites 3, 4, 5, 7, and 17); DD, Debris Dam; PP, Power Plant; NS, no sample taken; initial number in cells (1–30) denotes number of samling points composited (parentheses denote estimate); *, composited from samples collected continuously while passing boat horizontally across water body; Bo, boat; Br, bridge; Sh, shoreline; Sp, spigot in power plant; D-77M, D-77 sampler modified with Teflon bag; PPTT, peristaltic pump with Teflon tubing; Dip-1L, dipped 1-liter Teflon bottle near surface; Dip-2L, dipped 2-liter Teflon bottle near surface; volumes (for example, 92.1 L) denote total volume of water processed through Pellicon tangential-flow ultrafilter; samples colllected in 25-liter high-density polyethylene carboys; *italics* indicate duplicate sample; CS, Teflon cone splitter used to split sample for USGS's National Water-Quality Assessment Program. L, liter]

	July 1966	September 1996	November 1996	December 1996	January 1997	May/June 1997
SACRAMENTO RIVER SITES						
1. Sacramento River below Shasta Dam	1, Sh, PPTT, 92.1 L	1, Sh, PPTT, 99.9 L	1, Sh, PPTT, 98.4 L	3, Br, D-77, 72.7 L	NS	4, Br, D-77, 98.6 L
2. Sacramento River below Keswick Dam	1, Sh, PPTT 46.8 L	1, Sh, PPTT, 93.8 L	1, Sh, PPTT, 100.5 L	1, Sh, PPTT, 90.8 L	1, Sh, PPTT, 93.2 L	1, Sh, PPTT, 96.9 L
6. Sacramento River above Bend Bridge near Red Bluff	5, Br, D-77M, 46.6 L	5, Bo, PPTT, 95.5 L	4, Bo, PPTT, 96.0 L	1, Sh, PPTT, 90.9 L	5, Bo, PPTT, 102.2 L	5, Bo, PPTT, 98.2 L, *98.2 L*
8. Sacramento River at Colusa	5, Bo, D-77M, 94.5 L	5, Bo, Dip-2L, 93.8 L	(4), Bo, PPTT, 104.3 L	4, Bo, PPTT, 93.8 L	5, Bo, PPTT, 45.4 L	5, Bo, PPTT, 98.0 L
9. Sacramento River at Verona	6, Bo, D-77M, 100.5 L	6, Bo, PPTT, 98.3 L	(6), Bo, PPTT, 102.0 L	8, Bo, PPTT, 95.2 L	NS	5, Bo, PPTT, 101.8 L
10. Sacramento River at Tower Bridge	NS	NS	NS	NS	(4), Br, D-77, 49.1 L, 49.1 L	NS
11. Sacramento River at Freeport	5, Bo, D-77M, 101.4 L	5, Bo, PPTT, 98.0 L	(5), Bo, PPTT, 95.3 L	4, Bo, PPTT, 94.5 L	NS	5, Bo, PPTT, 76.8 L, *74.5 L*
TRIBUTARY SITES						
12. Flat Creek near Keswick	NS	NS	NS	NS	NS	NS
13. Spring Creek below Spring Creek DD near Keswick	NS	NS	NS	1, Sh, PPTT, 72.9 L	NS	1, Sh, PPTT, 93.7 L
14. Spring Creek below Iron Mountain Road near Keswick	NS	NS	NS	NS	1, Sh, PPTT, 77.6 L	NS
15. Whiskeytown Lake at Spring Creek PP near Keswick	NS	NS	NS	NS	NS	NS
16. Keswick Reservoir, Spring Creek arm, near Keswick	*, Bo, PPTT 95.3 L	*, Bo, PPTT, 97.5 L	*, Bo, PPTT, 99.6 L	*, Bo, PPTT, 96.3 L	NS	*, Bo, PPTT 95.6 L
18. Colusa Basin Drain at Road 99E near Knights Landing	NS	NS	NS	NS	NS	(4), Br, 80.9 L
DISTRIBUTARY SITE						
19. Yolo Bypass at I-80 Near West Sacramento	NS	NS	NS	NS	30, Br, D-77, CS, 49.7 L	NS

Table 5. Subsamples of water and quality assurance protocols for sample preservation for various analyses

[$K_2Cr_2O_7$, potassium dichromate; HNO_3, nitric acid; HCl, hydrochloric acid. *, triple-distilled HNO_3 for ultratrace element preservation; (a), split sample held for archive purposes; CA, California; CO, Colorado; conc., concentration; poly, polyethylene or polypropylene; PTFE, polytetrafluoroethylene (Teflon); USGS, U.S. Geological Survey; μm, micrometer; mL, milliliter]

Matrix / Filtration	Analysis	Preservation	Bottle Type, Volume	Laboratory
Whole water	Mercury	$K_2Cr_2O_7$, HNO_3*	Glass, 125 mL (a)	USGS–Boulder, CO
	Major & trace elements (cations)	Acidify (HNO_3)*	Poly, 250 mL (a)	USGS–Boulder, CO
	Iron, redox speciation	Acidify (HCl)	Poly, amber, 125 mL	USGS–Boulder, CO
	Nutrients	Chill	Poly, amber, 125 mL	USGS–Arvada, CO
	Suspended sediment conc.	None	Poly, 1,000 mL	USGS–Salinas, CA
0.45 μm filtrate (silver filter)	Organic carbon, dissolved	Chill	Glass, amber, 125 mL	USGS–Arvada, CO
Silver filter retentate	Organic carbon suspended	Chill	petri dish	USGS–Arvada, CO
0.45 μm filtrate (capsule filter)	Mercury	$K_2Cr_2O_7$, HNO_3*	Glass, 125 mL (a)	USGS–Boulder, CO
	Major & trace elements (cations)	Acidify (HNO_3)*	Poly, 250 mL (a)	USGS–Boulder, CO
	Major elements (anions)	Chill	Poly, 250 mL (a)	USGS–Arvada, CO
	Iron, redox speciation	Acidify (HCl)	Poly, amber, 125 mL	USGS–Boulder, CO
	Nutrients	Chill	Poly, amber, 125 mL	USGS–Arvada, CO
0.45 μm filtrate (membrane filter)	Mercury	$K_2Cr_2O_7$, HNO_3*	Glass, 125 mL (a)	USGS–Boulder, CO
	Major & trace elements (cations)	Acidify (HNO_3)*	Poly, 250 mL (a)	USGS–Boulder, CO
	Iron, redox speciation	Acidify (HCl)	Poly, amber, 125 mL	USGS–Boulder, CO
10,000 daltons ultrafiltrate (tangential-flow, 0.005 μm equivalent)	Mercury	$K_2Cr_2O_7$, HNO_3*	Glass, 125 mL (a)	USGS–Boulder, CO
	Major & trace elements (cations)	Acidify (HNO_3)*	Poly, 250 mL (a)	USGS–Boulder, CO
	Iron, redox speciation	Acidify (HCl), chill	Poly, 250 mL	USGS–Boulder, CO
Colloid concentrate, 10,000 daltons ultrafiltrate (tangential-flow, 0.005 μm equivalent)	Major & trace elements (cations) –total digestion and sequential-extractions	Chill, freeze dry	PTFE, 500 mL or 1,000 mL	USGS–Boulder, CO
	Lead isotopes	Chill, freeze dry	PTFE, 30 mL	USGS–Denver, CO
	Particle size distribution (photon correlation spectrometry)	Chill, freeze dry	Poly, 100 mL	USGS–Boulder, CO

including most of the colloidal material, from the water. A separate set of four (in a stack) 10,000 nominal molecular weight limit (NMWL), or daltons, low-binding, regenerated cellulose tangential-flow membranes were used for each sampling site to reduce cross-contamination problems. The 10,000 NMWL regenerated cellulose membranes retain particles in the range of 0.0035 to 0.0055 μm (Millipore Corporation, 1993). In this report, we refer to the pore size of these membranes as "0.005-μm equivalent

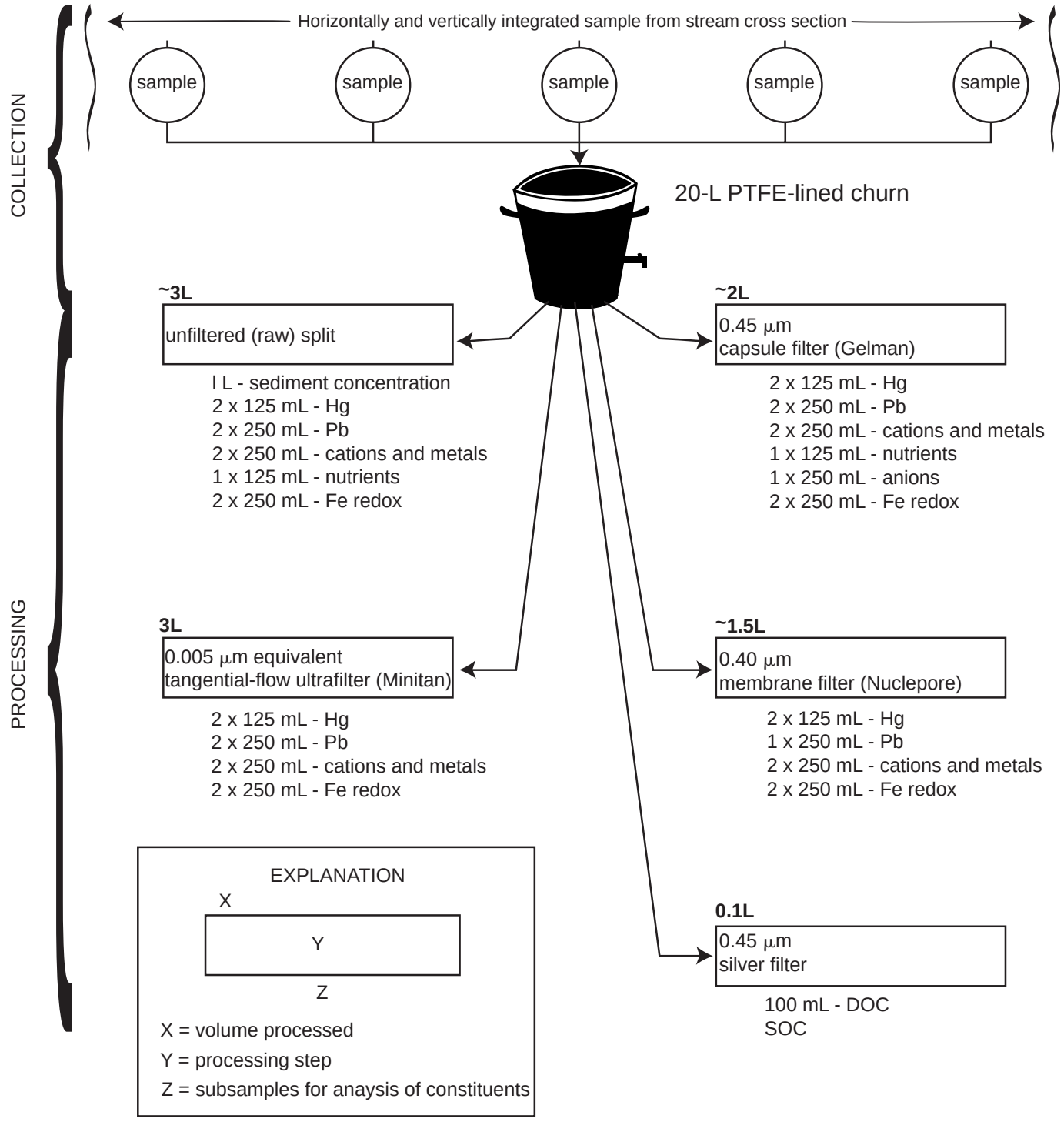


Figure 9. Diagram showing the procedure for the collection and processing of composite water samples in the Sacramento River Basin, California. DOC, dissolved organic carbon; SOC, suspended organic carbon. PTFE, polytetrafluoroethylene; Hg, Mercury; Pb, lead; Fe, iron; ~, approximately; μm micrometer; mL, milliliter; L, liter.

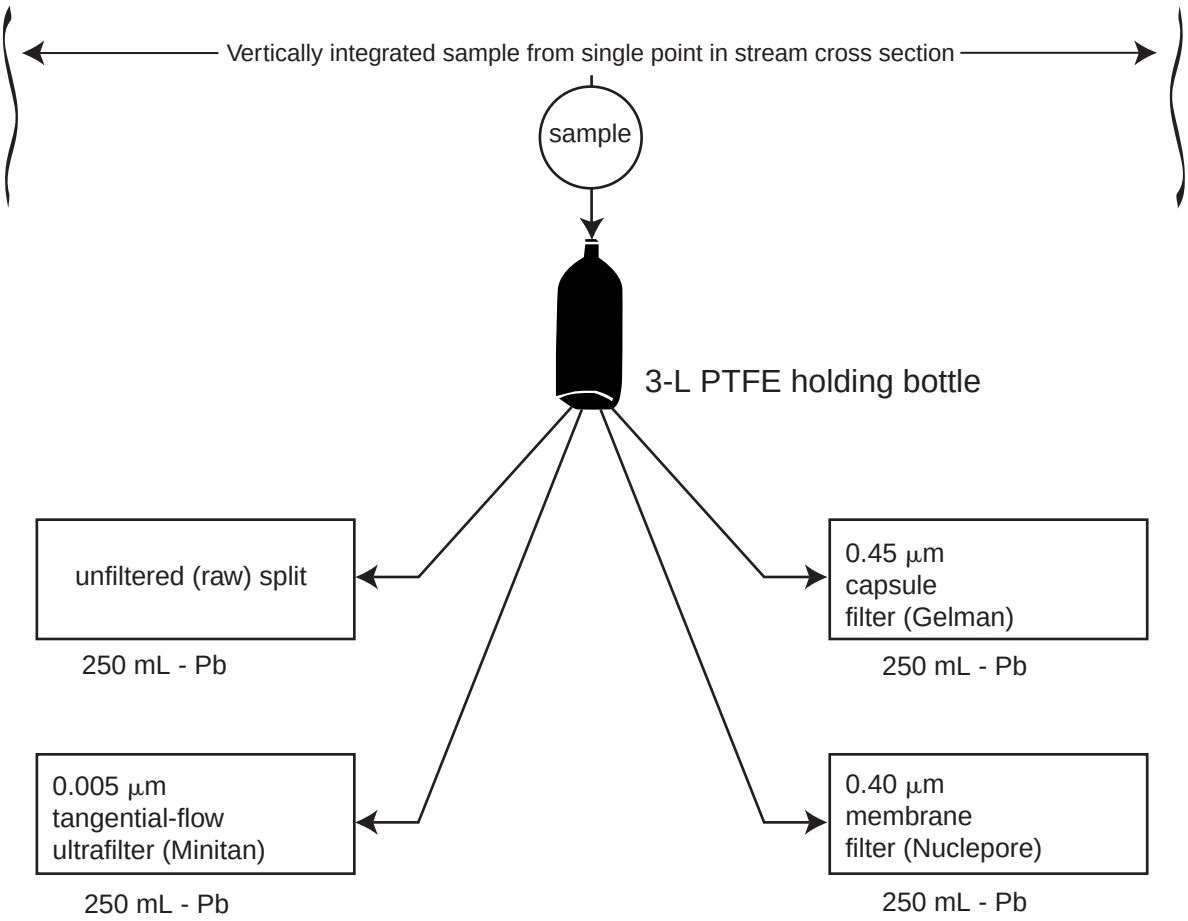


Figure 10. Diagram showing the procedure for the collection and processing of grab water samples in the Sacramento River Basin, California. PTFE, polytetrafluoroethylene; Pb, lead; μm micrometer; mL, milliliter; L, liter.

pore-size diameter." Ultrafiltrates produced by tangential-flow ultrafiltration with 10,000 NMWL membranes are the best available approximation to truly dissolved concentrations. Prior to filtration, the membranes and filter apparatus were acid-rinsed with a 1 percent (by volume) solution of high-purity, distilled nitric acid (Kuehner and others, 1972) to remove potential metal contamination on the filters, followed by a thorough rinsing with deionized water (type 1, 18 MΩ-cm).

Whole-water and filtered subsamples for total mercury analysis were collected in duplicate as 125-mL sample aliquots in acid-cleaned borosilicate glass bottles. All water subsamples for mercury analysis were preserved by the addition of 5 mL of a 1:100 mixture of high-purity potassium dichromate and nitric acid (w:v,g $K_2Cr_2O_7$:mL HNO_3) (table 5).

Large water samples totalling approximately 100 L were collected than split in four acid-cleaned 25-L high density polyethylene (HDPE) carboys for the recovery of suspended colloids (fig. 11). The water contents, undisturbed in the original carboys, were allowed to settle for 1 hour at room temperature to separate the material greater than about 1 μm in diameter. After settling, the supernatant phase was filtered with a Pellicon, model OM-141, tangential-flow ultrafilter (Millipore Corporation) using a stack of 8 individual 10,000 NMWL (0.005-μm equivalent pore-size diameter) regenerated cellulose membrane filters. The Pellicon, rather than the Minitan, was used to isolate a concentrate of colloidal-size particulate material because of the larger surface area of the filters (7,440 cm^2 for the Pellicon as opposed to 240 cm^2 for the Minitan). This larger surface area (30:1) greatly increased the efficiency of processing the 100-L sample. Pellicon filter membranes were rinsed with dilute nitric acid and then rinsed with deionized water prior to filtration as described previously for the Minitan membranes. During sample processing with the Pellicon unit, most of the ultrafiltrate was discarded and the "retentate," or residual solids, were retained. After the original volume of approximately

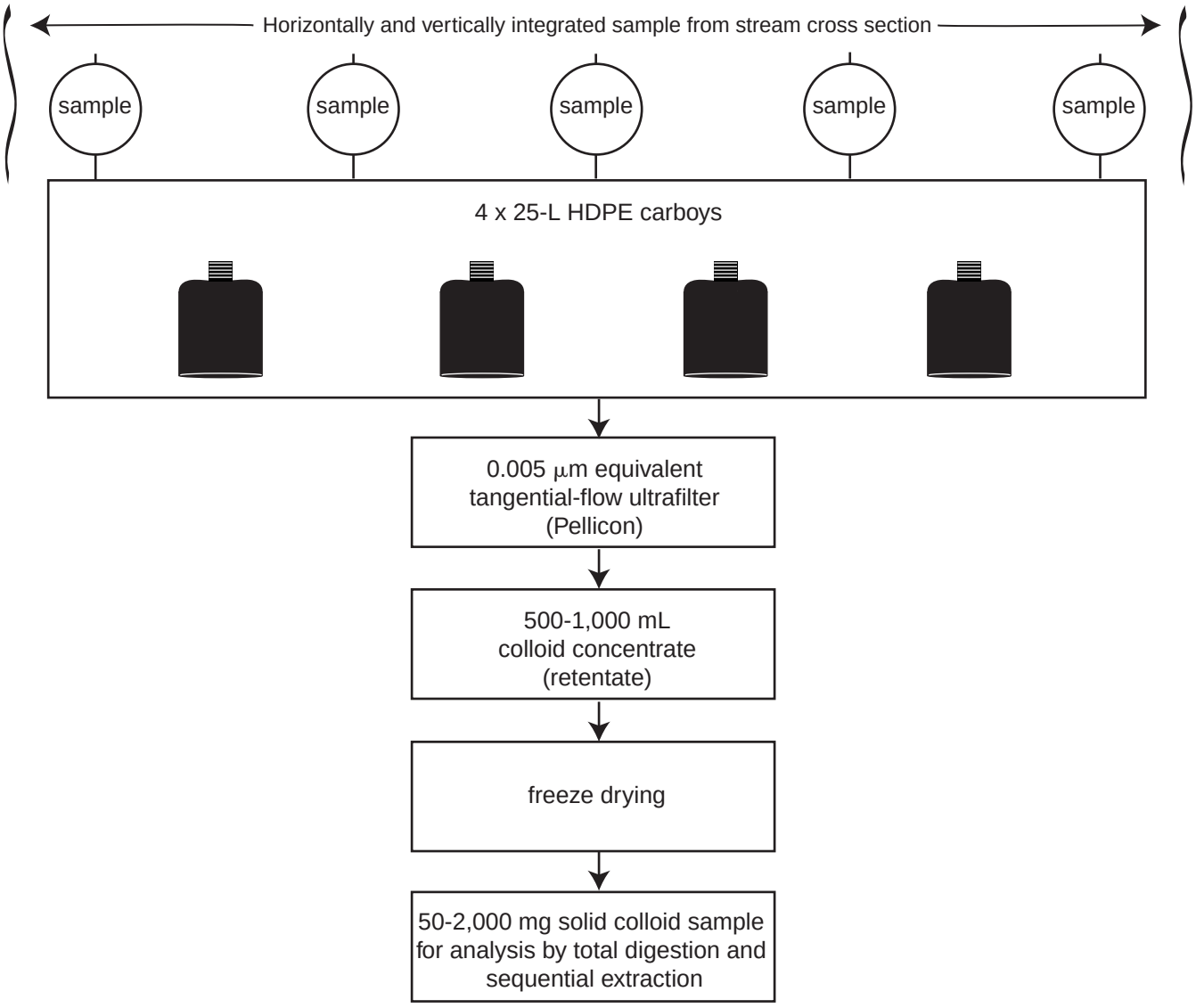


Figure 11. Diagram showing the procedure for the collection and processing of colloid samples in the Sacramento River Basin, California. HDPE, high density polyethylene; μm, micrometer; mL, milliliter; mg, milligram; L, liter.

100 L was reduced to about 0.5 L, the Pellicon filter unit was disassembled and the residual solids on the filter plates were recovered into a Teflon bag using a squeeze bottle filled with ultrafiltrate. The final colloid concentrate was stored in a 1 L PTFE bottle and refrigerated.

The colloid concentrate was dewatered by spinning successive 50-mL quantities in a polycarbonate centrifuge tube at 12,000 revolutions per minute and 10°C using a Sorval model RC-5B refrigerated centrifuge. As each aliquot was centrifuged, the supernatant liquid was carefully decanted to waste. When dewatering by centrifugation was completed, the residue was freeze-dried for 24 hours to remove the residual moisture. Subsamples of the freeze-dried material were microwave digested (Milestone, Model mls 1200 "mega" microwave oven) using a combination of distilled nitric acid, hydrochloric acid, and hydrofluoric acid (HF) in PTFE closed-digestion vessels (Hayes, 1993). Following the digestion and before the analysis, boric acid was added to the solutions to reduce the activity of the excess fluoride, thereby reducing deleterious impact on glassware and plasma torches. The digested samples were diluted to an appropriate concentration and stabilized with the same preservative solutions used for the preservation of similar water samples (table 5); namely, nitric acid was added to subsamples intended for analysis of

cations and trace metals, and potassium dichromate ($K_2Cr_2O_7$) plus nitric acid were added to subsamples intended for analysis of mercury. Subsamples of freeze-dried colloid solids for particulate size distribution were preserved with sodium azide (NaN_3, to a final concentration of 0.01 percent) to inhibit bacterial growth, then refrigerated until analyzed.

Sequential chemical extractions (Hayes, 1993) were performed on the colloid samples that had a sufficient amount of material, approximately greater than 200 mg. A 100-mg sample was first extracted in a 30-mL PTFE screw-capped tube in a reducing environment with acidified hydroxylamine hydrochloride to remove metals weakly bound to the sediment and those associated with any iron or manganese oxide coatings. This fraction is referred to as the "reducible" phase. The residue from this extraction was treated with a potassium persulfate solution to oxidize any organic coatings or organic and sulfide particles. This fraction is referred to as the "oxidizable" phase. Finally, an HCl–HNO_3–HF acid microwave digestion, identical to that used for total digestions, was performed on the residue from the oxidizable phase extraction. This fraction is termed the "residual" phase. All chemical extractions were carried out in closed containers, and sample aliquots were preserved immediately (as with water samples in table 5) to minimize contamination or loss of volatile constituents such as mercury.

Streambed Sediment Sample Preparation

Streambed sediment samples were chilled on ice immediately after collection and stored at 5°C until further processing. A subsample for particulate size distribution was chilled until analysis. The remaining sediment samples were freeze dried for 24 hours to remove the residual moisture.

Dissolution of subsamples of streambed sediments was performed using a total HCl–HNO_3–HF acid microwave digestion procedure identical to that used for suspended sediments (Hayes, 1993). The digested samples were diluted to an appropriate concentration range for analysis by inductively coupled plasma methods and stabilized with the same reagents used for the preservation of the water samples (table 5).

Caddisfly Sample Preparation

Specimens were partially thawed in batches, rinsed with cold deionized water (type 1, 18 MΩ-cm) to remove sediment and detritus, and then transferred to a glass sorting dish that was placed on a bed of ice. Individual animals were immersed using tweezers in a small amount of water and viewed under a stereomicroscope for identification and further cleaning. Instars of *Hydropsyche californica* were not sorted, although smaller specimens that could not be clearly identified were discarded. Identified and cleaned specimens then were transferred to a second container and put on ice. When the sample had been sorted and cleaned, the animals were blotted dry with tissue paper, pooled into replicate subsamples of caddisfly larvae of approximately the same wet weight, and temporarily refrigerated.

Cold 0.05 Molar (*M*) Tris-hydrochloride buffer [pH 7.4, previously degassed to remove carbon dioxide (CO_2) with nitrogen gas (N_2)] was added to each subsample at a ratio of 8:1 (mL Tris-hydrochloride:g wet sample). Subsamples were homogenized with a stainless-steel, high-speed tissue homogenizer under a nitrogen (N_2) atmosphere for 1 minute. The homogenate was split into two fractions: one for the whole-body metal analysis and the other for the cytosolic metals. The cytosol was isolated by centrifuging the homogenate at 100,000 *g* for 1 hour at 5°C. The supernatant (cytosol) and pellet were collected and transferred to separate screw-cap glass vials. Samples were kept cold throughout the procedure. Sample fractions were frozen at –20°C as they were prepared. Later, they were freeze dried, weighed, digested by reflux in hot, isopiestically distilled (Kuehner and others, 1972) 16 *N* nitric acid. When the digestion was complete, the sample residues were evaporated to dryness. Before analysis, sample residues were reconstituted by the addition of 10 mL of 1 percent distilled nitric acid. For the trace metal analysis, 5 mL of this solution was diluted to 50 mL.

All plastic and glassware used for the preparation and digestion were cleaned by soaking overnight in a Micro-90 solution (available from International Products Corp., Burlington, New Jersey), rinsed with deionized water, then washed in 5 percent hydrochloric acid and rinsed with deionized water. The tissue homogenizer was cleaned by soaking it overnight in a solution of RBS 35 detergent (available from Pierce, Rockford, Illinois) and rinsing it in deionized water.

Analytical Procedures

This section presents information on analytical procedures used in this study. In cases where USGS-approved methods are used, such as the determinations made by the USGS's NWQL, relatively little information is given and the reader is referred to published sources. More detailed information is given in this section for research methods that are not officially approved by the USGS as "production methods."

Major Cations and Trace Elements

Inductively Coupled Plasma Spectrometry

Major elements that were present in samples at high concentration levels, including calcium (Ca), magnesium (Mg), sodium (Na), and silica (Si, reported as SiO_2), respectively, were determined by inductively coupled plasma-atomic emission spectrometry (ICP–AES) techniques utilizing a Jarrell–Ash Atomcomp 975, multichannel emission spectrometer. A description of the analysis conditions and procedures was reported by Garbarino and Taylor (1979). Potassium (K) also was determined by ICP–AES using a Varian Liberty 150AX Turbo axial-view sequential spectrometer. A modified flow-injection, pneumatic-nebulization sample introduction technique (Varian SPS5 Sample Prep Station) was employed to perform this determination (Antweiler and Taylor, 1998).

Except for mercury, trace-element determinations were performed by inductively coupled plasma-mass spectrometry (ICP-MS), using a Perkin Elmer Elan Model 5000. Aerosols of acidified aqueous samples were introduced into the spectrometer with a cone-spray pneumatic nebulizer. Multiple internal standards (indium [In], iridium [Ir], rhodium [Rh], and thorium [Th], respectively), which covered the mass range, were used to normalize the system for drift. Details of the specific analysis techniques, procedures, and instrumental settings were described by Garbarino and Taylor (1995).

Multielement instrument calibration standards for ICP–AES determinations were matrix-matched with comparable concentrations of reagents used in the digestion procedure. This was simulated by the composition of the digest, which reduced interelement suppression interference effects. Because of the higher sensitivity of ICP–MS relative to ICP–AES, 10:1 dilutions of the digest solutions were used for ICP–MS determinations to avoid interelement interferences.

Atomic Fluorescence Spectrometry

Mercury stock and standard solutions were made from Puratronic grade (99.9995 percent) mercuric chloride ($HgCl_2$) salt (Johnson Mathey) and preserved in a solution of high-purity nitric acid and primary-standard grade potassium dichromate using the same reagents and concentrations as those used to preserve samples (table 5). Deionized water (type 1, 18 MΩ-cm) was used for preparing all standards and reagent solutions. A 2 percent stannous chloride ($SnCl_2$) solution (wt:volume, stannous chloride:3 percent hydrochloric acid) in 3 percent hydrochloric acid (volume:volume, hydrochloric acid:type 1, 18 MΩ-cm deionized water) was used for the reduction of mercury to its elemental form in the cold vapor reactor.

Trace concentration levels of mercury were measured using an automated, cold vapor-atomic fluorescence spectrometer or CV–AFS (PS Analytical) using methods described previously by Roth (1994) and by David A. Roth and others (U.S. Geological Survey, written commun., 1999). Instrumental parameters for the atomic fluorescence mercury analysis are listed in table 6.

The procedure involves reduction of mercury in the sample with excess stannous chloride to produce elemental mercury vapor. The vapor is transported to the detector with a stream of argon gas. Peak height intensities of unknown samples are compared to a six-point calibration curve prepared from aqueous

Table 6. Operational settings for analysis of mercury with the cold vapor–atomic fluorescence spectrometer

[s, second]

Characteristics	Settings
Cold-vapor reactor timing	
Delay	15 s
Rise	30 s
Analysis	30 s
Memory	60 s
Argon flow rates	
Sample	0.30 liter per minute
Shield	0.25 liter per minute
Backflow	2.7 liter per minute
Fluorescence spectrometer settings	
Coarse gain	1,000
Fine gain	optimized
Integration time	0.25 s
Damping	32 readings (8 s)

standards ranging in concentration from 0 to 50 ng/L, preserved with potassium dichromate and nitric acid in a similar manner as with the samples.

Iron Redox Speciation

Total iron (Fe) and Fe(II) were determined using a modification of the FerroZine colorimetric technique proposed by Stookey (1970). For Fe(II) determination, an adequate volume of acidified sample (as much as 20 mL) to give 0.1–40 μg iron per 25 mL, was transferred by pipet into a 25-mL volumetric flask. Then, 0.5 mL FerroZine reagent was added and the contents of the flask were mixed. Next, 1.25 mL of an ammonium-acetate buffer solution was added, the flask was shaken, and at least 5 minutes were allowed for full color development. The solution in each flask was then diluted to the mark and shaken well. Absorbance was measured within 2 hours at 562 nm using an ultraviolet–visible (UV–vis) spectrometer.

For total iron, the same procedure was used as for Fe(II), except for the addition of 0.25 mL hydroxylamine hydrochloride, a reducing agent, to the samples before the addition of 0.5 mL of FerroZine reagent. The procedure for all blanks and standards was similar to that described for total iron analysis, including the hydroxylamine hydrochloride step. A linear regression of absorbance versus iron concentration was developed on the basis of at least five standards.

Double-distilled water was used in the preparation of all solutions. Ammonium acetate buffer solution was prepared by mixing appropriate volumes of high-purity acetic acid and ammonium hydroxide. Traces of iron were removed from a solution of reagent grade hydroxylamine hydrochloride by solvent extraction with isoamyl alcohol.

Lead Isotopic Analysis

Isotopic compositions of lead from selected freeze-dried samples of suspended colloids and streambed sediments were determined by chemical separation of lead followed by thermal-ionization mass spectrometry. Samples weighing 3 to 10 mg (containing 80 to 100 ng of lead) were decomposed overnight in a 4:1 mixture of 24*M* hydrofluoric acid and 16*M* nitric acid in screw-cap PFA-Teflon vials at 50°C. Lead was separated using anion exchange with analytical grade Dowex-1 X8 resin in 1.2*M* hydrobromic acid (HBr) medium and was eluted from the anion-exchange columns with 1.0*M* nitric acid, following the procedures of Unruh (1982). The purified lead separate was loaded onto a rhenium filament for mass spectrometry analyses using the conventional phosphoric acid–silica gel method (Cameron and others, 1969). Lead blanks for the chemical procedure were less than 0.1 ng.

Lead isotopic data were initially measured using a VG Elemental model Sector 54 seven-collector mass spectrometer operated in "static" mode. However, during the course of this work, an electrical malfunction in this mass spectrometer made it necessary to complete the analyses using a VG Elemental model 54R single-collector mass spectrometer. Mass fractionation during analyses with both mass spectrometers was monitored by analyses of National Institute of Standards and Technology (NIST) lead isotope standard SRM-981, using the values for this standard reported by Todt and others (1993). Analytical uncertainties in the fractionation-corrected data were calculated in the manner prescribed by Ludwig (1979) and reflect both the internal precision of each individual run, as well as the uncertainties induced by the mass-fractionation corrections.

Anions

The determination of major anions in water, including chloride (Cl^-), fluoride (F^-), and sulfate (SO_4^{2-}), was done on filtered samples by ion-exchange chromatography following procedures described by Fishman and Friedman (1989). The anion determinations were made at the USGS's NWQL in Arvada, Colorado.

Nutrients

A standard suite of nutrient analyses was done for each water sample taken in this study, using both raw (unfiltered) and filtered samples. Samples that required filtration were filtered with a 0.45-μm capsule filter (Gelman) in accordance with standard NAWQA protocols (Shelton, 1994) and analyzed at the USGS's NWQL.

A total of eight nutrient determinations are reported for each water sample—three analyses of phosphorus (P) forms and five analyses of nitrogen (N) forms (table 7). The phosphorus determinations included orthophosphate in filtered water, plus total phosphorus in both raw and filtered water. Orthophosphate was determined using an automated,

colorimetric, phosphomolybdate blue procedure with antimony (Sb) added to increase the reduction rate (Patton and Truitt, 1992; Fishman, 1993). Total phosphorus was determined colorimetrically as orthophosphate after Kjeldahl digestion (Patton and Truitt, 1992).

Filtered water samples were analyzed for nitrogen in the following forms: (1) nitrite (NO_2^-), (2) nitrite plus nitrate (NO_3^-), (3) ammonia (NH_3), and (4) ammonia plus organic nitrogen. Ammonia plus organic nitrogen was also determined in raw water samples. The method used for nitrite determination was diazotization using sulfanilamide and N-1-naphthylethylenediamine under acidic conditions to form a red compound, the absorbance of which was determined colorimetrically using an automated-segment flow procedure (Fishman, 1993). Nitrite plus nitrate determinations were made by reducing nitrate to nitrite using cadmium metal, followed by nitrite analysis by diazotization (Fishman, 1993). Ammonia determinations were performed using a salicylate-hypochlorite method, in the presence of ferricyanide ions, that produces the salicylic acid analog of indophenol blue, which was analyzed colorimetrically using an automated-segmented flow procedure (Fishman, 1993). The determinations of ammonia plus organic nitrogen in raw and filtered samples were made using the same Kjeldahl digestion as that used for total phosphorus, in which the organic nitrogen is reduced to the ammonium ion, followed by determination of the ammonium ion by the colorimetric salicylate-hypochlorite method (Fishman and Friedman, 1989; Patton and Truitt, 1992).

Organic Carbon

Dissolved organic carbon (DOC) concentrations were determined on 100-mL filtered water samples (0.45-µm silver membrane filter). The filtrates were first acidified to remove dissolved and colloidal carbonates and bicarbonates, then the organic carbon was oxidized to carbon dioxide with persulfate and ultraviolet light. The carbon dioxide was then measured by infrared spectrometry using a Dorhmann carbon analyzer (Brenton and Arnett, 1993).

Suspended organic carbon (SOC) concentrations were determined with the residual material that was collected on the silver membrane filters used to prepare DOC samples. The silver membrane filters were treated with acid to dissolve inorganic forms of carbon, then were reacted with potassium persulfate in glass ampules for 4 hours at 116° to 130°C. The ampules were then broken in the carbon analyzer, releasing carbon dioxide which was measured by infrared spectrometry using an Oceanography International carbon analyzer (Wershaw and others, 1987).

Particulate Size Distribution

Colloids

The size distribution of colloids was determined from subsamples of the residual colloid concentrates collected from tangential-flow ultrafiltration procedure (Pellicon, discussed earlier in this report). Samples for colloid particulate size distribution analysis were subsampled from the colloid concentrate and preserved to inhibit bacterial growth with sodium azide, to a final concentration of 0.01 percent, and refrigerated until analyzed. Before analysis, samples were warmed to room temperature and were shaken to homogenize the contents, and a few milligrams were removed by Pasteur pipette. Three drops of a nonionic surfactant, FL-70 (Fisher Scientific) at a concentration of 2.5 percent (volume:volume, FL-70 type 1

Table 7. Types of nutrient analyses and analytical methods

Nutrient	Sample type		Analytical Method
	Unfiltered	Filtered	
Phosphorous			
Orthophosphate	No	Yes	Phosphomolybdate blue
Total phosphorous	Yes	Yes	Kjeldahl digestion with phosphomolybdate blue
Nitrogen			
Nitrite	No	Yes	Diazotization
Nitrite plus nitrate	No	Yes	Reduction using cadmium with diazotization
Ammonia	No	Yes	Salicylate–hypochlorite
Ammonia plus organic nitrogen	Yes	Yes	Kjeldahl digestion with salicylate–hypochlorite

deionized water, 18 MΩ-cm) were added to the sample cuvette followed by three drops of sample. The sample-surfactant mixture was diluted (5 mL of type 1 deionized water, 18 MΩ-cm, prefiltered through a 0.45-μm Gelman capsule filter) and mixed, and suspended particulates were dispersed by ultrasonication (with a Horiba Ultrasonic Disrupter, model HA40) at 20 watts and 20 kHz for at least 60 seconds.

Sample transmittance, at 632.8 nm, was measured with a Milton-Roy, Spectronic Mini20 spectrophotometer, to confirm it was in a suitable range for analysis (60 to 90 percent). The sample was placed in the cell holder of a Brookhaven Photon Correlation Spectrometer and particle size determinations were performed at goniometer angles of 45°, 90°, and 120° measured parallel to an incident laser beam. Particle distributions were calculated using an exponential sampling routine. Instrumentation and calculation parameters used in the colloid particulate size distribution analysis are listed in table 8.

The scattering source of the photon correlation spectrometer used a 10 mW helium-neon laser at a wavelength of 632.8 nm. Slit widths ranging from 100 to 200 μm were used with an optical filter designed for 632.8 nm. Voltage bias on the detector was –1,800 volts (direct current). Toluene (98.8 percent, HPLC grade, Sigma Aldrich) was used as the index matching liquid in the cell holding device to reduce scattered light originating from the liquid-glass interfaces. Temperature of the sample and index matching solutions were maintained at 20.0 °C with a recirculating cooler.

Streambed Sediments

Particulate size distribution in streambed sediment samples was determined by wet sieve and X-ray adsorption methods. Wet sieve methods were used to determine the percentage of the mass of each sample less than standard sieve openings of 16, 8, 4, 2, 1, 0.5, 0.25, 0.125, and 0.062 mm (Allen, 1990). The SediGraph 5100 X-ray absorption analyzer manufactured by Micrometrics (Syvitski, 1991) was used to determine the percentage of mass finer than the following sizes in millimeters: 0.031, 0.016, 0.008, 0.004, 0.002, 0.001, 0.00050, and 0.00025.

Quality Assurance and Quality Control

Howard E. Taylor, Ronald C. Antweiler, Charles N. Alpers, David A. Roth, Terry I. Brinton, Daniel J. Cain, James W. Ball, Daniel M. Unruh, *and* Peter D. Dileanis

A variety of measurements and analyses were used to determine the quality of the data produced in this study. Precision and accuracy criteria were evaluated by the analysis of numerous field and laboratory blank samples, standard reference materials, spike recoveries, and replicate samples. Data quality objectives, as described in the Quality Assurance Project Plan (QAPP, Appendix 1), were met in nearly all respects for dissolved data (ultrafilter effluent), whole-water data (unfiltered samples), colloids, total sediment, and sequential extraction sediment analyses. Quantitative analysis for data quality was not made for capsule filter and membrane filter effluents because these data were not used in quantitative interpretations outlined in a companion report by Alpers and others (2000).

Data Quality Objectives

Accuracy is defined in this study as the measure of the degree of conformance of values generated by a specific method with the true or expected value of that measurement. The accuracy of field measurements

Table 8. Instrumentation and calculation parameters used in the colloid particulate size-distribution analysis

[cP, centipoise; I_m, imaginary part of the measurement calculation of the refractive index; R_c, real part of the measurement calculation of the refractive index; nm, nanometer; °C, degree Celsius]

Parameter	Setting	Parameter	Setting
Prescale (gain)	0	Viscosity	1.002 Cp
Sampling time	30–250 milliseconds (optimized)	Wavelength	632.8 nm
Sample duration	6 seconds	Refractive index	
Acquisition angle	45°, 90°, and 120°C	of liquid	1.4903
First channel used	Channel 2[1]	of particle (R_c)	1.59
Temperature	20°C	of particle (I_m)	0

[1]Channel 1 was omitted because it had excessive errors.

was established by the use of standard methods of analysis with the appropriate calibration standards. The accuracy of laboratory analytical data for trace metals and major cations was assessed by analyzing standard reference materials (SRM) and the recovery of known concentrations of analytes in spiked samples. For the SRMs, the percentage recovery (REC) was computed as:

$$REC_{SRM} = \frac{\text{measured value}}{\text{certified or most probable value}} \times 100 \quad (1)$$

For the spiked samples, the REC was computed as:

$$REC_{SPIKE} = \frac{\text{measured value}}{\text{expected value}} \times 100 \quad (2)$$

For all analytes discussed in the QAPP, the data quality objective with regard to accuracy was to have REC values equal to 100 ± 25 percent for concentrations greater than 10 times the detection limit, and 100 ± 50 percent for concentrations less than 10 times the detection limit.

Precision (or variability) is defined in this study as the degree of similarity among independent measurements of the same quantity. The precision of laboratory analytical data was evaluated by randomly submitted split samples and evaluated in terms of relative percentage difference (RPD), where

$$RPD = \frac{\text{difference between reported values}}{\text{average reported value}} \times 100 \quad (3)$$

For all analytes discussed in the QAPP, data were considered sufficiently precise when the RPD values were less than 25 percent for concentrations greater than 10 times the detection limit, or less than 50 percent for concentrations less than 10 times the detection limit. Concentrations in water and solid samples were determined for numerous additional elements not specifically mentioned in the QAPP, such as rare earth elements and other trace elements. For these analytes, precision was evaluated using percentage Relative Standard Deviation (RSD), defined in a later section of this report.

Completeness (a term specified by the EPA to conform to their preferred QAPP) was considered in this study as the percentage of analyses meeting the accuracy and precision objectives. In all, 48 water samples were taken at various sites during six sampling periods (table 1). Therefore, to achieve the goal of 90 percent completeness described in the QAPP (Appendix 1), 44 of 48 samples needed to meet the data quality objectives. Colloid concentrates were prepared from 41 water samples of which 37 samples needed to meet the accuracy and precision objectives to satisfy the 90 percent completeness goal. Speciation analysis was carried out on 17 of the colloid concentrates of which 16 needed to meet data quality objectives to exceed 90 percent completeness. Accuracy, precision, and completeness are discussed in turn for each of the analytical procedures, if appropriate, in the remainder of this section.

Major Cations and Trace Elements

Accuracy

The levels of accuracy for the determinations of major cations and trace element concentrations performed in this study were evaluated by three specific techniques: (1) measurement of natural-matrix SRMs, (2) determination of spike recovery information for selected elements, and (3) measurement of blanks, both in the field and in the laboratory. These approaches provide information regarding the proximity of reported analytical results to the best known values of various analytes in the measured samples. This information was used during data interpretation to evaluate bias or systematic error in the measured concentrations of major cations and trace elements in the samples collected during the study.

Standard Reference Materials

Two types of SRMs were used for evaluation in this study: (1) natural-matrix certified SRMs produced by the NIST, and (2) natural-matrix noncertified standard reference water samples (SRWS) produced by the USGS. SRMs were analyzed with each group of water samples analyzed in the laboratory at a frequency of about 30 percent of the total number. For sediment analysis, about 15 percent of the total samples analyzed consisted of reference materials.

The NIST standards used in this study included: SRM 1643a Trace Elements in Water, SRM 1643b Trace Elements in Water, SRM 1643d Trace Elements in Water, SRM 1645 River Sediment, and SRM 2704 Buffalo River Sediment. NIST standards SRM 1643a, b, and d, were also diluted 1:10 to approximate the concentration range anticipated in the samples from this study. USGS standards used in this study included: SRWSs T-99, T-101, T-103, T-105, T-107, T-111, T-113, T-117, T-119, T-125, T-129, T-131,

T-133, T-135, T-137, T-143, and T-145 for trace elements, and Hg7, Hg10, Hg12, Hg15 and Hg24 (diluted 1:100 to approximate the concentration range for study samples) for trace mercury determinations. Certified values, or "most probable values" (MPV), for selected elements in each of these standards are tabulated elsewhere (Peart and others, 1998). Results of repeated analysis of these standards are tabulated in Appendix 2 of this report.

Summary data obtained from the analysis of dissolved constituent SRMs (table 9), which were processed with every suite of samples throughout the study, demonstrate conformance to the criteria specified in the QAPP (Appendix 1) for the specified "critical" elements. Namely, for each constituent listed, at least 90 percent of the observed values (n) occurred within 25 percent of the certified value or MPV, depending on the SRM (table 1 in Appendix 1). Calculation of REC equals the observed (measured) value divided by either the certified value or MPV (depending on the SRM) multiplied by 100 (to convert to percentage). Table 9 uses a frequency calculation, expressing the percentage of observations at various intervals of various percentage REC levels. Table 9 shows that all determinations of the specified elements for the SRMs were within the stated data quality objective criteria in QAPP (table 1 in Appendix 1). Note that two entries are provided for mercury in table 9: (1) accumulated data for all mercury standards included in the study, and (2) only those standards whose values exceeded the detection limit for mercury by a factor of 10. By definition, when the reported value of the determination approaches the detection limit, the precision deteriorates accordingly (see the section on Precision).

Similar data on accuracy were developed for all other elements that we report (table 10), but that were not specified in the QAPP. For elements that do not have a certified value or MPV in the SRMs, we compare our observations to data reported by NIST as "for informational purposes." These data are provided to assist in the interpretation of other determinations included in this study. Nevertheless, 21 of 24 elements satisfy the criterion that at least 90 percent of analyses are within 25 percent of the certified or most probable values. Only silver (Ag), boron (B), and tellurium (Te) do not meet this criterion.

Several figures summarize the results of the analyses of SRMs and SRWSs. Figures 12 through 16 consist of correlation plots of SRMs for dissolved determinations. Figure 12 shows the correlation between MPV and observed (measured) values for four major elements in the concentration range of 2 mg/L to about 300 mg/L. Figures 13 and 14 show elements in the range of greater than 1.5 μg/L to 3,000 μg/L. Figures 15 and 16 display data for elements with concentrations in the range of 0.6 μg/L to 60 μg/L. Each plot includes a dotted line demonstrating perfect agreement (not a regression line) and lines representing 99 percent confidence bands.

For the establishment of accuracy in sediment analysis, tables are presented showing the data for the determination of NIST SRM 2704–Buffalo River Sediment, which was analyzed with each laboratory analysis group of suspended and streambed sediment samples. A listing of REC data is shown in table 11 for

Table 9. Percentage of determinations for critical elements within the stated percentage recovery for the certified or most probable value for the National Institute of Standard and Technology's standard reference materials (waters) or the U.S. Geological Survey's standard reference water samples

[REC_{SRM}, percentage recovery with respect to standard reference materials; n, number of observations. %, percent]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125[1]	85–115	90–110	95–105
Aluminum	1,917	100	100	99	97	93	72
Cadmium	2,275	99	98	95	88	81	62
Copper	2,275	100	99	97	89	78	59
Iron	881	100	98	90	76	65	41
Lead	1,984	100	100	99	97	92	74
Mercury[2]	605	100	98	81	70	58	38
Mercury[3]	303	100	100	94	88	79	53
Zinc	2,275	100	100	93	89	83	64

[1]Data quality objective was at least 90% completeness in the 75–125% range of REC_{SRM}.

[2]All mercury standards.

[3]Mercury standards with concentrations greater than 10 times the detection limit.

Table 10. Percentage of determinations of noncritical elements within the stated percentage recovery for the certified or most probable value for the National Institute of Standards and Technology's standard reference materials (waters) or the U.S. Geological Survey's standard reference water samples

[REC_{SRM}, percentage recovery with respect to standard reference material; n, number of observations. *, "for informational purposes" value]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125	85–115	90–110	95–105
Antimony	886	100	100	99	97	85	66
Arsenic	1,187	100	100	98	96	85	56
Barium	1,221	100	100	98	96	92	71
Beryllium	1,087	100	99	98	95	89	65
Bismuth	419	100	99	94	93	90	74
Boron	1,021	100	99	89	78	63	41
Calcium	1,025	100	100	99	91	81	55
Chromium	1,258	100	98	92	84	72	47
Cobalt	1,626	100	100	99	95	90	74
Lithium	1,360	100	99	97	96	90	70
Magnesium	1,025	100	100	99	94	88	68
Manganese	1,655	100	100	98	89	82	64
Molybdenum	1,263	100	100	98	91	80	54
Nickel	1,891	100	100	98	94	84	64
Rubidium*	260	100	97	95	93	93	83
Selenium	1,839	100	98	90	76	64	45
Silica[1]	1,007	100	100	98	92	85	65
Silver	1,183	98	83	69	55	44	30
Sodium	1,025	100	100	96	82	71	51
Strontium	1,222	100	100	98	96	93	79
Tellurium*	235	100	95	73	49	37	18
Thallium	508	100	100	96	95	93	78
Uranium	101	100	100	100	100	97	76
Vanadium	1,243	100	100	98	95	80	66

[1]Silica was the only substance reported as an oxide.

the total determination of elements specified in the QAPP (table 2 in Appendix 1); and table 12 is a tabulation of all other major and trace elements determined on a total basis, but not mentioned specifically in the QAPP. For the elements listed in the QAPP, the REC data in table 11 indicate that accuracy was within the specified data quality objectives. Table 12 includes REC data for 28 elements not listed in the QAPP. For the 16 elements listed in table 12 for which certified values are available for SRM 2704, 11 elements met the criterion of at least 90 percent of SRM analyses in the range of 75–125 percent REC. Three of the other elements (magnesium, nickel [Ni], and silica [SiO_2]) had 89 percent of REC values in this range and 2 of the 16 elements (sodium and potassium) had only 58 percent of REC values in the 75–125 percent range.

Figures 17 through 21 show correlation plots for the analysis of NIST SRM 2704 with regard to total digestions and the sum of sequential digestions. Figure 17 is for five major elements at concentrations within the range from about 2 to 32 percent by weight (wt percent). Figure 18 shows five elements at concentrations within the range of 100 to 30,000 μg/g. Figures 19 and 20 show elements in the range of 3 to 800 μg/g. Finally, figure 21 shows concentration data for trace element standards that range from about 1 to 3 μg/g. On figures 17 through 21, dotted lines represent perfect agreement between observed and certified, or MPV, concentrations, and lines represent 95 percent confidence bands. Because no SRMs are available for sequential extraction data, the sum of the three components (oxidizable, reducible, and residual) are compared with the total values certified in the respective SRM. The data points for these determinations are noted in the legends. Figure 21 shows that the mercury value for NIST SRM 2704 falls at the edge of the 95 percent confidence band on the low side. This is expected, because the procedure for sequential extraction involves several steps that could result in loss of mercury because of its volatility.

Spike Addition Recovery

Selected water samples ($36 \leq n \leq 50$) were spiked in the field, immediately after processing, for elements: Ag, arsenic (As), Cd, cobalt (Co), chromium (Cr), Cu, Hg, Ni, Pb, selenium (Se), uranium (U), and Zn. For each of these elements in each sample, the REC_{SPIKE} was calculated, as indicated earlier in this report, using the theoretical value (calculated from known amount of spike added) as the basis for recovery. The expected concentration for each spiked element is listed along with the number of spiked samples and a frequency distribution (percentage of observations within a range of percentage recoveries) of REC_{SPIKE} in table 13. Specific quantities of the spike addition will vary slightly from sample to sample depending on its final volume; however, this variation is well within the experimental error of the measurements. Similar to the SRMs, REC_{SPIKE} is calculated by dividing the measured value of the spike by the expected recovered value, multiplied by 100 to convert to percentage recovery. Beryllium was added to the spike solution to serve as an internal standard to compensate for volume variations in samples. All trace elements listed in table 13 that are specified in the QAPP (table 1 in Appendix 1) are within the listed data quality objectives. No spiked additions were performed on sediment samples.

Figure 22 shows a distribution diagram of the REC_{SPIKE} of spiked additions for cadmium, copper, mercury, lead, and zinc versus the percentage of

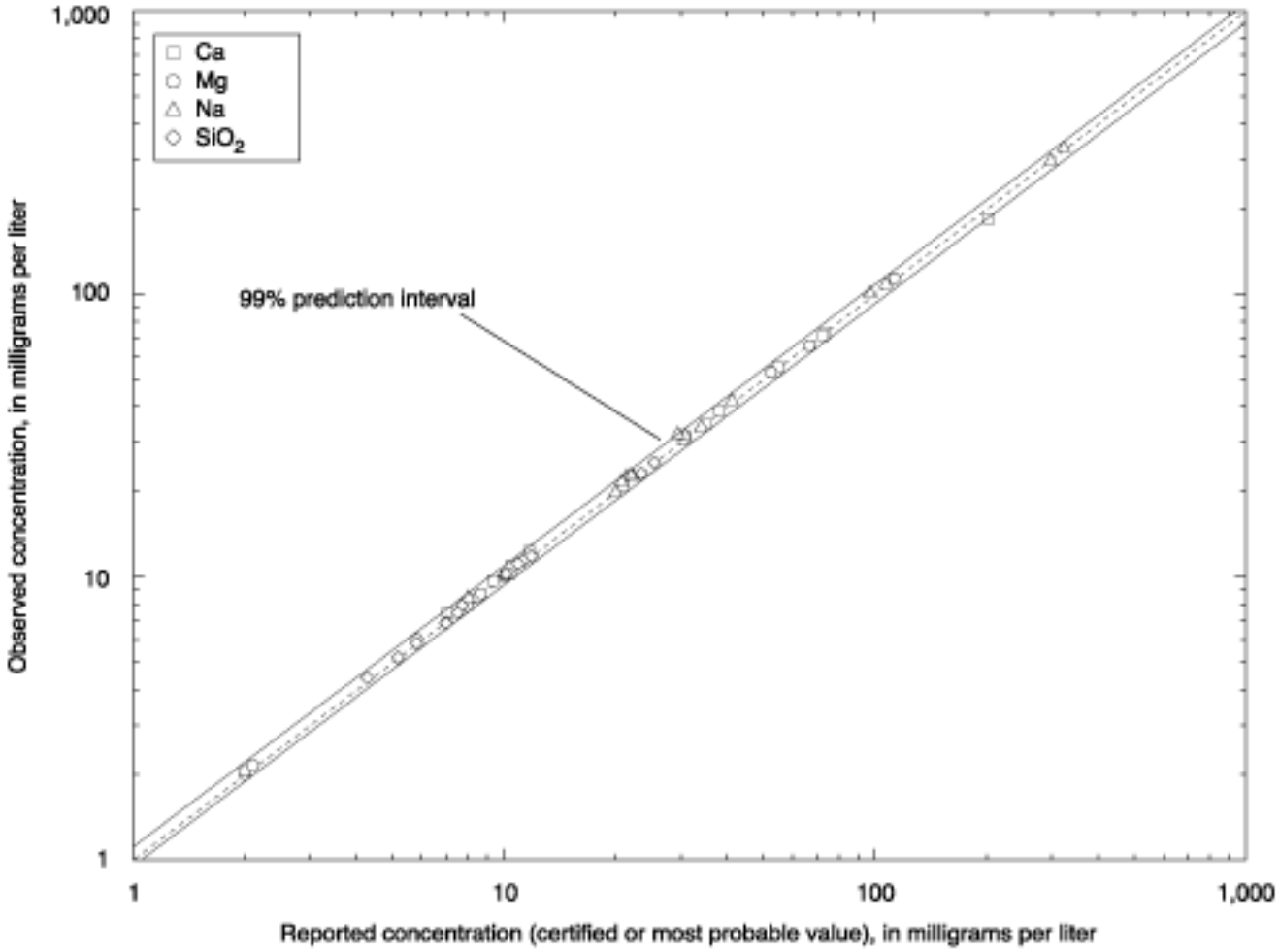


Figure 12. Correlation plot of observed versus reported (certified or most probable value) dissolved concentration values of calcium (Ca), magnesium (Mg), sodium (Na), and silica (SiO_2) in standard reference materials. Standard reference materials tested were National Institute of Standards and Technology's standard reference material 1643b and U.S. Geological Survey's standard reference water samples T99, T101, T103, T105, T107, T117, T125, T131, T133, T135, T137, T143, and T145. Error band represents the 99 percent (%) prediction interval.

samples observed. Dashed lines specifying limits of compliance (from the QAPP) are shown on the diagram.

Because no SRMs are available for the evaluation of sequential chemical extraction of sediments, the only determination of accuracy is the comparison of the sum of each phase of the extraction to the total certified values for a sediment reference material. This approach provides indirect information regarding the confidence in the sequential extraction process. Table 14 shows the REC_{SRM} values for the sum of the sequential extraction of multiple aliquots of NIST SRM 2704–Buffalo River Sediment, for all elements specified in the QAPP (table 2 in Appendix 1). Similarly, table 15 shows the REC_{SRM} sediment data for all other elements not mentioned in the QAPP that were determined in the sequential extraction of multiple aliquots of NIST SRM 2704–Buffalo River Sediment, compared with the total certified or "informational purposes" values in the reference material. The data in table 15 shows good conformance to the QAPP criteria for all elements except aluminum (Al).

Blanks

Analytical laboratory reagent blank and deionized water blank data were used to correct analyte determinations in concurrently measured samples. Reagent blanks were analyzed at a minimum

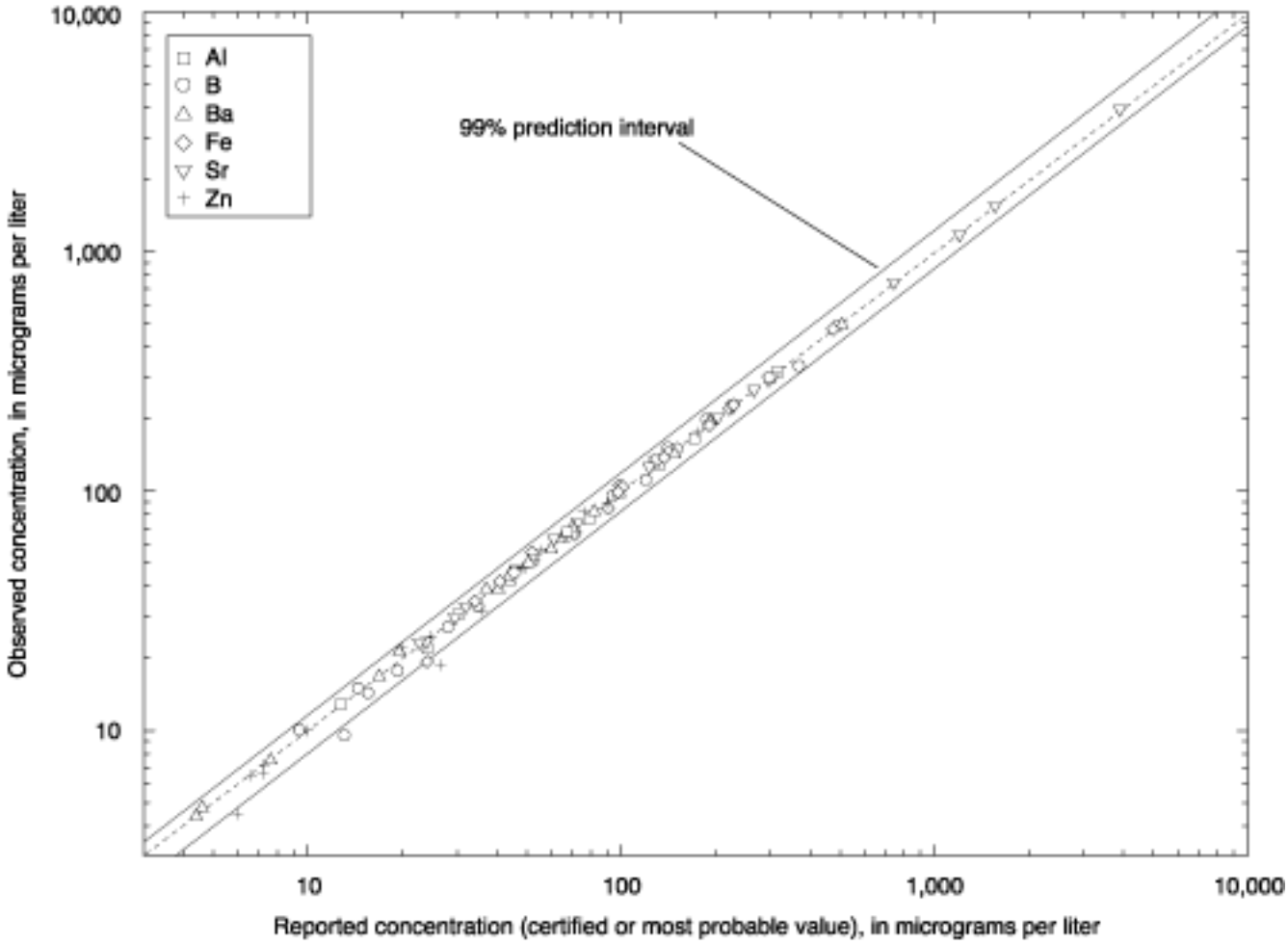


Figure 13. Correlation plot of observed versus reported (certified or most probable value) dissolved concentration values of aluminum (Al), boron (B), barium (Ba), iron (Fe), strontium (Sr), and zinc (Zn) in standard reference materials. Standard reference materials tested were National Institute of Standards and Technology's standard reference materials 1643a, 1643b, and 1643d; and U.S. Geological Survey's standard reference water samples T99, T101, T103, T105, T107, T113, T117, T119, T125, T131, T133, T135, T137, T143, and T145. Error band represents the 99 percent (%) prediction interval.

of 10 percent frequency of total samples with each group of laboratory analyses performed. Field process blanks for each step of sampling and processing of samples were analyzed at a minimum of 10 percent frequency of all samples collected (dissolved and sediment analyses). The purpose of the field and process blanks was to monitor potential contamination of sample collection and handling processes. No analytical data corrections were made for positive concentration values observed for field or process blanks. Because the dissolved concentrations of trace metals, for interpretation purposes, was focused on data collected by tangential-flow filtration, only blank data related to this process were evaluated. These included tangential-flow filter blanks, deionized water blanks, and churn blanks.

Analytical results of all blank determinations (with appropriate error terms) are tabulated in Appendix 2 (table A2-2). Blank data obtained to evaluate contamination problems are element specific and are focused on the trace elements of primary interest (critical elements) in this study. Results of blank data for these elements are evaluated individually.

Figures 23 through 28 show box plots comparing different types of blank sample concentration data with Sacramento River mainstem dissolved (ultrafiltrate) concentration data for the elements Al, Cd, Cu, Fe, Pb and Zn, respectively. No apparent significant blank problems for the elements aluminum, cadmium, and copper are shown in figures 23–25, respectively. With the exception of an occasional

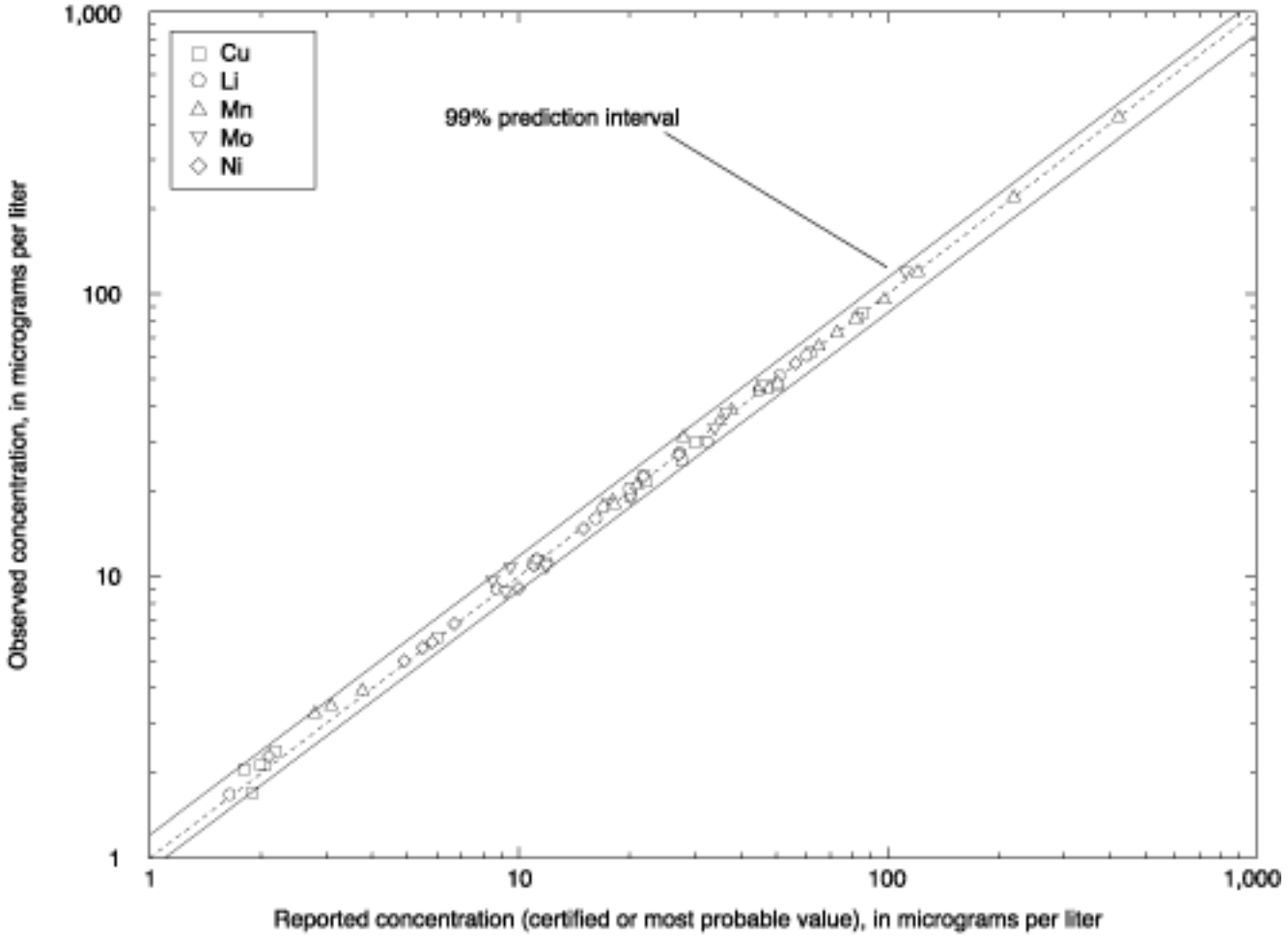


Figure 14. Correlation plot of observed versus reported (certified or most probable value) dissolved concentration values of copper (Cu), lithium (Li), mangenese (Mn), molybdenum (Mo), and nickel (Ni) in standard reference materials. Standard reference materials tested were National Institute of Standards and Technology's standard reference materials 1643a, 1643b, and 1643d; and U.S. Geological Survey's standard reference water samples T101, T103, T105, T107, T113, T117, T119, T125, T131, T133, T135, T137, T143, T144, and T145. Error band represents the 99 percent (%) prediction interval.

outlier, the mean and median of the blanks for these three elements are significantly smaller than the values observed in the mainstem of the river, which are used for the study and interpretation of the distribution of these elements in the hydrologic system.

Blank concentration data for zinc may demonstrate a minor problem on the basis of the apparent marginal overlap of box plots with concentration data shown for the mainstem of the Sacramento River (fig. 28). Two specific deionized water blank outliers, which were known to be contaminated (independently from the deionized water system), were removed from the data set. From this plot it is clear that the source of the overlap is most prevalent from blank samples taken from the churns. In evaluating these data, one must consider the procedure that was used to collect and process the blank samples—namely, the deionized water from the deionizer column was sampled (without filtration) and immediately transferred to the precleaned churn. A subsample from the churn was collected (without filtration) and the remainder was processed through the tangential-flow filtration system, where (after ultrafiltration) a sample was taken for blank analysis ("filter" blank). The only logical explanation for churn blank samples being higher in trace element concentration than either the original deionized water or the tangential flow ultrafiltrate is that particulate matter containing trace elements, from a poorly cleaned churn, was analyzed in these churn blank samples. These constituents would necessarily be removed from the filter blank samples by the nature of the filtration process. In summary, this situation

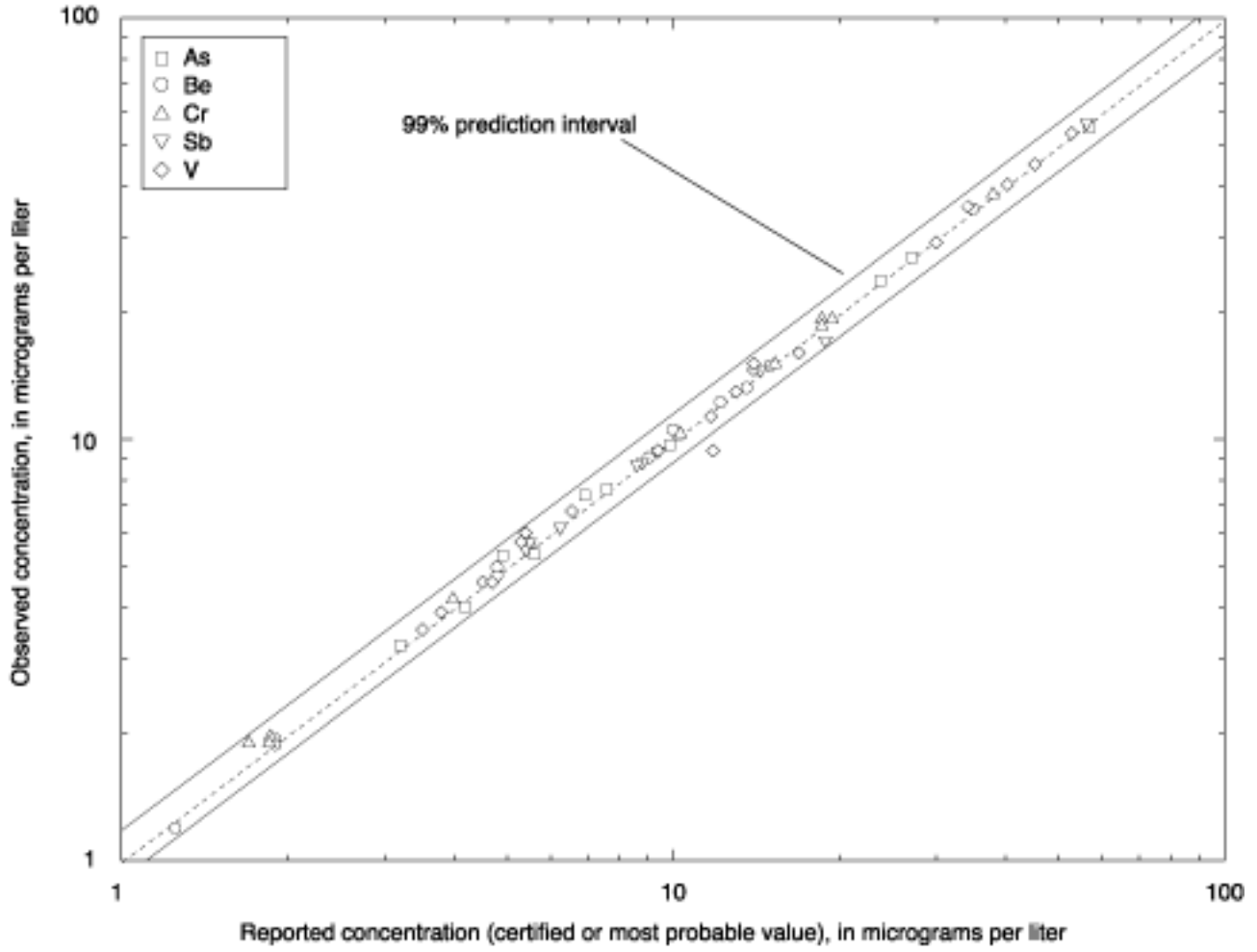


Figure 15. Correlation plot of observed versus reported (certified or most probable value) dissolved concentration values of arsenic (As), beryllium (Be), chromium (Cr), antimony (Sb), and vanadium (V) in standard reference materials. Standard reference materials tested were National Institute of Standards and Technology's standard reference materials 1643a, 1643b, and 1643d; and U.S. Geological Survey's standard reference water samples T99, T101, T103, T105, T107, T113, T117, T119, T125, T131, T133, T135, T137, T143, and T145. Error band represents the 99 percent (%) prediction interval.

does not reflect a problem that will impact sample determinations for zinc in ultrafiltrates or hinder the interpretation of such data for zinc.

The filter blanks from Minitan ultrafilters (U1 and U2 in table A2-2, Appendix 2) have zinc concentration values ranging from the detection limit (usually <0.3 μg/L) to 0.57 μg/L. The highest filter blanks for zinc were collected during the first sampling trip. Remedial action was taken (field processing facilities were moved to a more suitable location) to ameliorate these high blanks. The mainstem river samples have a median dissolved zinc value of 0.8 μg/L, and less than 25 percent of the mainstem river samples have concentrations less than 0.4 μg/L; indeed less than 5 percent of the mainstem river samples have lower concentrations than that of the median filter blank samples. These considerations lead to the conclusion that in the samples, zinc data are at most only marginally affected by contamination, and contamination is insignificant in the interpretation of dissolved zinc concentrations in river water samples.

The data for lead concentrations in blank samples show some overlap with ultrafiltrate concentrations in mainstem Sacramento River samples (fig, 27). As with zinc, the most commonly observed blanks with elevated lead concentrations were the churn blanks, which had a mean value of 5 ng/L. The mean and median concentration values of the mainstem

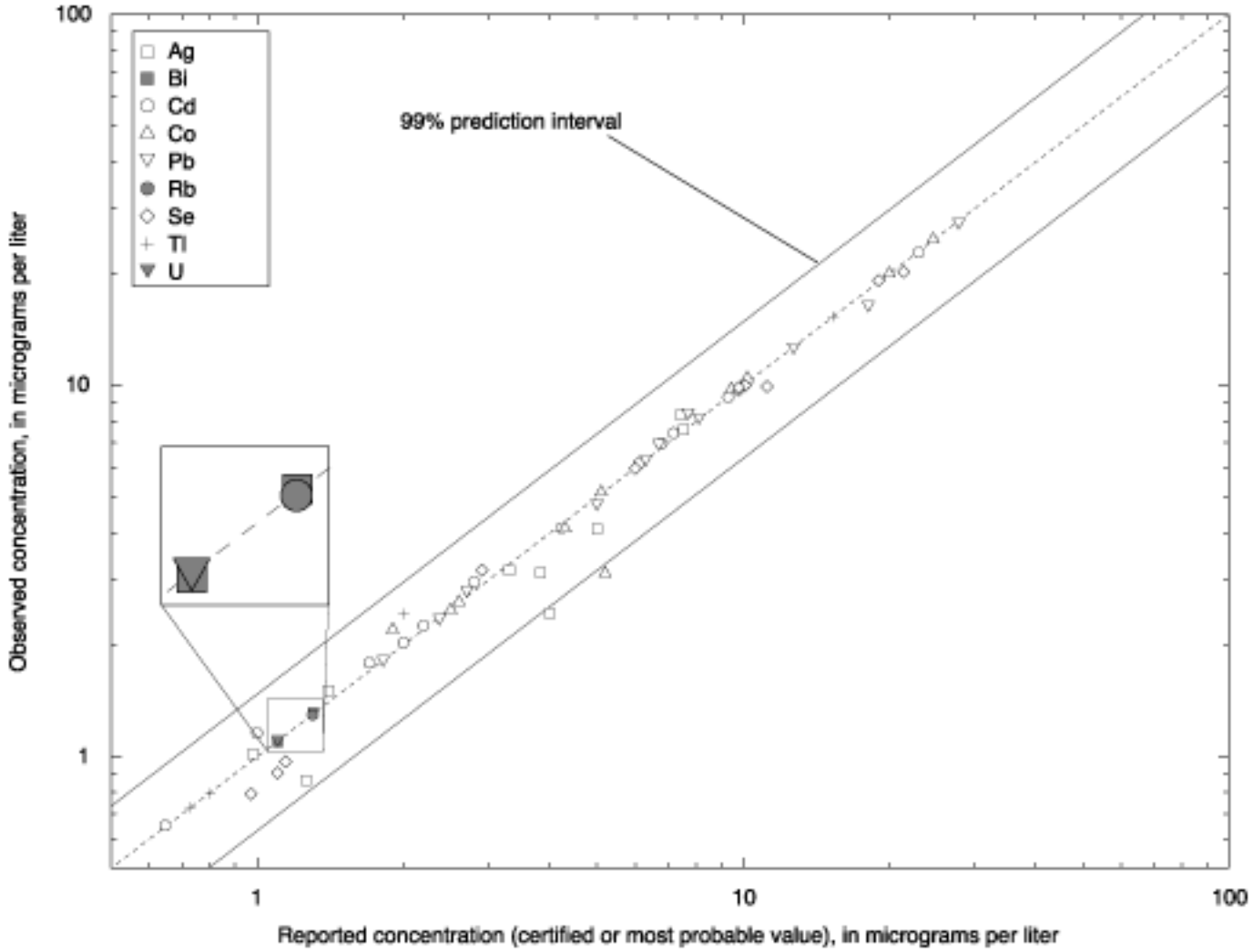


Figure 16. Correlation plot of observed versus reported (certified or most probable value) dissolved concentration values of silver (Ag), bismuth (Bi), cadmium (Cd), cobolt (Co), lead (Pb), rubidium (Rb), selenium (Se), thallium (Ti), and uranium (U) in standard reference materials. Standard reference materials tested were National Institute of Standards and Technology's standard reference materials 1643a, 1643b, and 1643d; and U.S. Geological Survey's standard reference water samples T103, T113, T117, T119, T125, T131, T133, T137, and T145. Error band represents the 99 percent (%) prediction interval.

samples are also about 5 ng/L. In addition, a few concentration values greater than 5 ng/L were observed for deionized water and the filter blanks, suggesting that 5 ng/L is a reasonable reporting limit for dissolved lead for this study.

The data for iron concentrations in blanks show significant overlap with the iron data obtained for the Sacramento River mainstem samples (fig. 26). Therefore, the dissolved iron data for the Sacramento River samples cannot be distinguished from the blank

Table 11. Percentage of determinations for critical elements within the stated percentage recovery for the certified value for the National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment

[REC_{SRM}, percentage recovery with respect to standard reference materials; n, number of observations. %, percent]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125[1]	85–115	90–110	95–105
Aluminum	19	100	100	100	95	68	32
Cadmium	19	100	100	100	95	84	42
Copper	19	100	100	95	89	68	37
Iron	19	100	100	100	100	100	89
Lead	19	100	100	100	100	100	26
Mercury	18	100	100	100	83	83	39
Zinc	19	100	100	100	100	100	89

[1]Data quality objective was at least 90% completeness in the 75–125% range of REC_{SRM}.

Table 12. Percentage of determinations of noncritical elements within the stated relative percentage recovery for the certified or "informational purposes" value for the National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment

[REC_{SRM}, percentage recovery with respect to standard reference materials; n, number of observations. *, "informational purposes" value]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125	85–115	90–110	95–105
Antimony	19	100	100	100	89	84	74
Barium	19	100	100	100	79	63	53
Calcium	19	100	100	100	100	100	89
Cerium*	19	100	100	53	26	11	0
Cesium*	19	100	100	100	84	68	53
Chromium	19	100	100	100	100	79	79
Cobalt	19	100	100	100	100	100	37
Dysprosium*	19	100	100	58	0	0	0
Europium*	19	100	100	84	26	26	11
Lanthanum*	19	100	100	58	42	21	5
Lithium	19	100	100	100	100	89	11
Lutetium*	19	100	100	11	0	0	0
Magnesium	19	100	100	89	63	63	32
Manganese	19	100	100	100	100	100	79
Nickel	19	100	100	89	84	58	37
Potassium	19	100	100	58	5	0	0
Rubidium*	19	100	58	5	5	5	5
Samarium	19	100	100	79	58	37	5
Silica[1]	19	100	100	89	84	74	47
Sodium	19	89	89	58	53	42	21
Strontium*	19	100	100	100	74	74	32
Thallium	19	100	100	100	100	89	16
Thulium*	19	100	100	84	58	47	16
Titanium	19	100	100	100	100	100	100
Uranium	19	100	100	100	100	100	68
Vanadium	19	100	100	100	100	89	32
Ytterbium*	19	100	100	100	95	58	47
Zirconium*	19	100	95	79	42	37	21

[1]Silica was the only substance reported as an oxide.

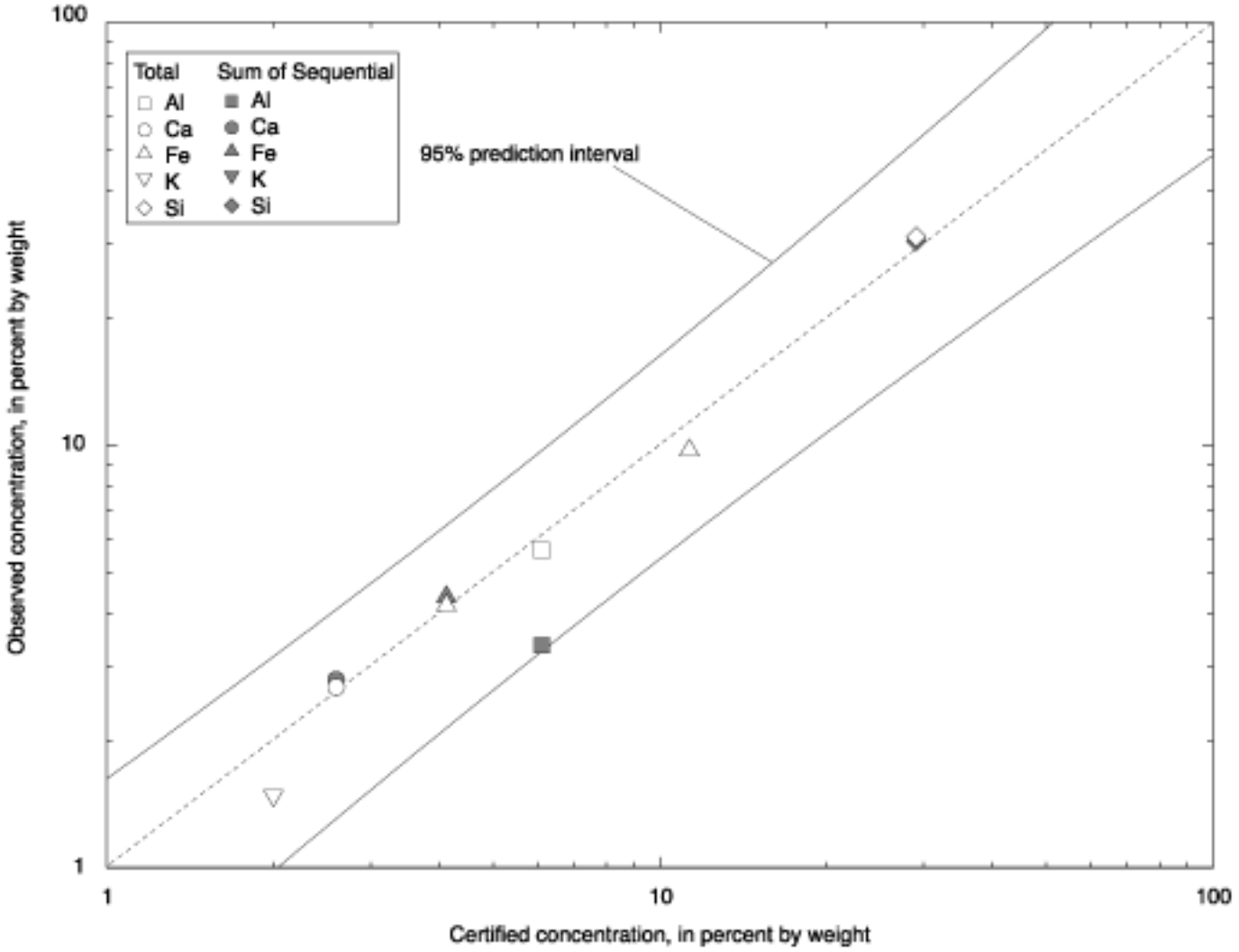


Figure 17. Correlation plot of observed concentration values in total digestions and in the sum of sequential digestions versus certified concentrations of aluminum (Al), calcium (Ca), iron (Fe), potassium (K), and silicon (Si) in standard reference material. The standard reference material tested was National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment. Error band represents the 95 percent (%) prediction interval.

data resulting in an inability to interpret low level, dissolved iron concentrations.

Precision

Each duplicate sample for dissolved constituents (ultrafilter effluent) was analyzed three times. Because of the limited quantities of the freeze-dried colloidal material that were available, single digestions were performed. The solutions from the colloid total digestions, however, were also analyzed in triplicate. Results (for the trace elements listed in table 1 of the QAPP, Appendix 1) for the analyses of field duplicate dissolved samples, expressed as the percentage of sample values whose RPD was below the specified value, are shown in table 16. This table uses the calculation of RPD as specified in the QAPP, which is the difference between the measured value (mean of triplicate determinations) of each of the field duplicates, divided by the mean value of the two duplicates, multiplied by 100 to convert to percentage (as follows):

$$\mathrm{RPD} = \frac{X_{\mathrm{D1}} - X_{\mathrm{D2}}}{X(\mathrm{D}_1 + \mathrm{D}_2)} \times 100 \qquad (4)$$

where, X_{D1} and X_{D2} are the mean values of the triplicate laboratory analysis of each of the field duplicates and $X(_{\mathrm{D1}}+_{\mathrm{D2}})$ is the mean of X_{D1} and X_{D2}.

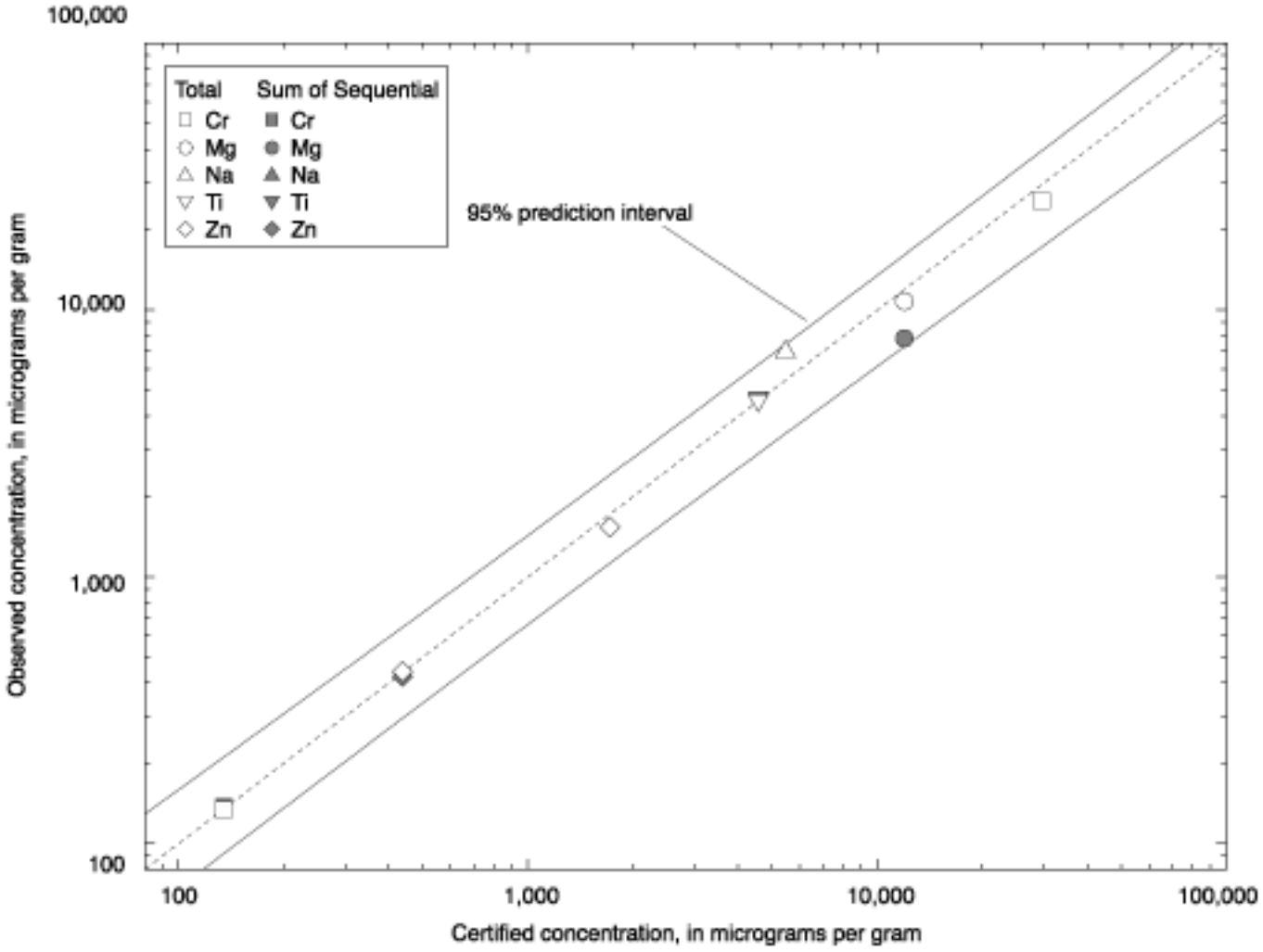


Figure 18. Correlation plot of observed concentration values in total digestions and in the sum of sequential digestions versus certified concentrations of chromium (Cr), magnesium (Mg), sodium (Na), titanium (Ti), and zinc (Zn) in standard reference material. The standard reference material tested was National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment. Error band represents the 95 percent (%) prediction interval.

Field duplicate agreement specifies the worst-case situation for repeatability of determinations because it incorporates all sources of variance, including sampling precision, processing precision, and laboratory analysis precision. Figure 29 provides correlation plots between field replicate samples for six elements: Al, Cd, Cu, Fe, Pb and Zn. Error bars on the correlation plots represent the standard deviation of multiple laboratory determinations on each of the replicates. The range of concentration varies significantly from element to element on the plots. The dotted lines are not regression fits, but the theoretical lines of perfect agreement.

As observed concentrations approach the detection limit for specific elements, the precision of determination decreases. Figures 30 through 33 show how the percentage relative standard deviation increases as dissolved (ultrafiltrate) concentrations decrease for aluminum, cadmium, copper, and mercury, respectively. The RSD is calculated as follows: (1) the overall standard deviation is calculated by pooling the standard deviations of the individual determinations (analysis precisions); (2) the mean of the individual determinations is computed; and finally, (3) the RSD is calculated by dividing the standard deviation by the mean value and multiplying by 100.

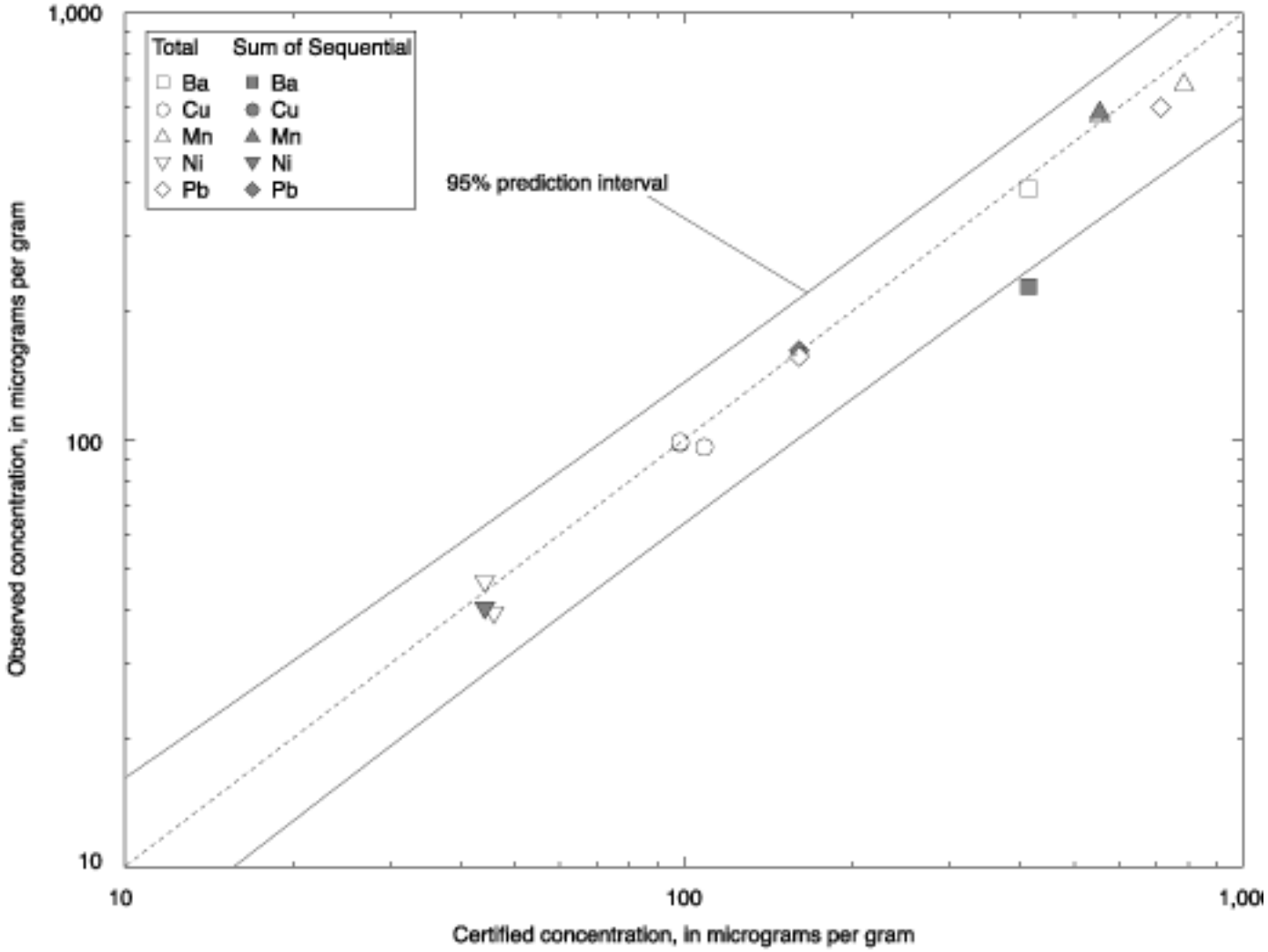


Figure 19. Correlation plot of observed concentration values in total digestions and in the sum of sequential digestions versus certified concentrations of barium (Ba), copper (Cu), manganese (Mn), nickel (Ni), and lead (Pb) in standard reference material. The standard reference material tested was National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment. Error band represents the 95 percent (%) prediction interval.

This calculation provides a more definitive evaluation of the overall precision than the RPD specified in the QAPP. Figures 30 through 33 show vertical lines that represent both the detection limit and 10 times the detection limit. For aluminum and cadmium (figs. 30 and 31), the RSD increases exponentially with the decrease in concentration. For copper (fig. 32), an exponential relationship is suggested for the data in the range of 0.3 to 9 μg/L, although somewhat higher values of RSD were observed for two of three samples from Spring Creek, with copper concentrations in the range of 429 to 535 μg/L. A similar relationship is not clear in figure 33 for mercury, probably because all observed values are very low compared with a value of 10 times the detection limit.

Table 16 provides a summary of the precision of field duplicate dissolved samples. The information is presented in terms of the percentage of samples for which the RPD was less than the specified values. Data quality objectives for this study (QAPP, Appendix 1) were that RPD values for at least 90 percent of the samples should be less than 25 percent. The data in table 16 indicate that this objective was achieved for all of the critical elements in this study with the exception of mercury (74 percent completeness at RPD less than 25 percent) and zinc (78 percent completeness at RPD less than 25 percent).

Table 17 summarizes the percentage of replicate dissolved samples whose percentage RSD occurred below the specified values listed. Table 17 presents

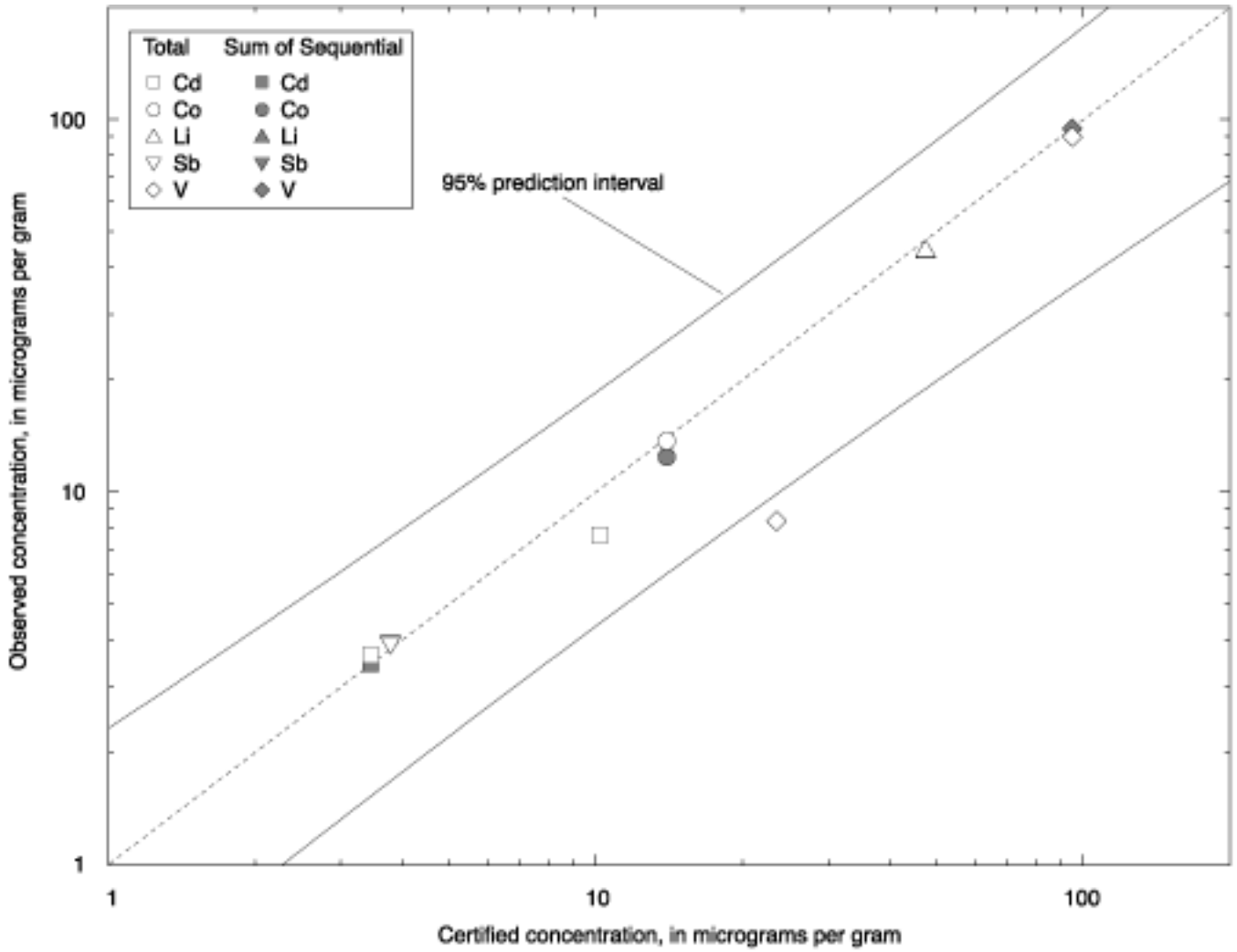


Figure 20. Correlation plot of observed concentration values in total digestions and in the sum of sequential digestions versus certified concentrations of cadmium (Cd), cobalt (Co), lithium (Li), antimony (Sb), and vanadium (V) in standard reference material. The standard reference material tested was National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment. Error band represents the 95 percent (%) prediction interval.

data for all elements determined in this study. Also, table 17 provides average detection limit data computed from the actual analytical determinations, rather than the estimated values presented in the QAPP (tables 1 and 2 in Appendix 1).

For colloid samples, table 18 summarizes the RPD of the elements listed in the QAPP (table 2 in Appendix 1). The table shows the percentage of field duplicate samples for which the RPD value was below the designated levels for each of the critical elements. Field duplicate agreement specifies the worst case situation for repeatability of determinations because it incorporates all sources of variance, including sampling precision, processing precision, and laboratory analysis precision. Since limited field duplicate samples were analyzed because of the limited amount of colloid material recovered, the samples (n=4) for tables 18 and 19 are relatively low.

Table 19 summarizes the percentage of replicate colloid sediment samples whose percentage RSDs (see section on dissolved constituents) are below the specified values listed. This table presents data for all elements determined in this study.

Data for the RPD of sequential extraction determinations on colloidal suspended sediments for the critical elements are presented in table 20. Finally, table 21 summarizes the percentage of duplicate sequential extraction determinations on colloid sediment samples whose RSDs are below the specified

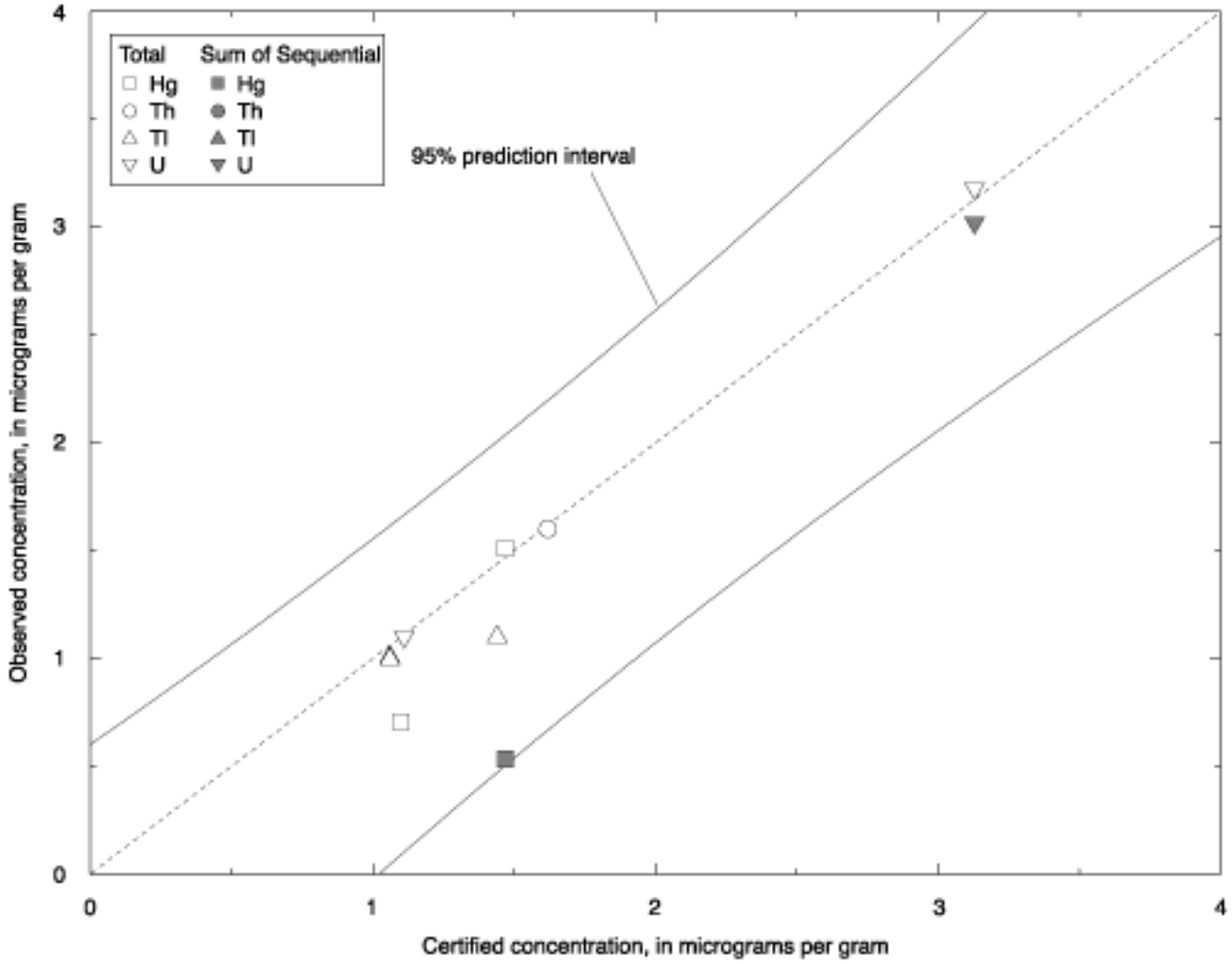


Figure 21. Correlation plot of observed concentration values in total digestions and in the sum of sequential digestions versus certified concentrations of mercury (Hg), thorium (Th), thallium (Tl), and uranium (U) in standard reference material. The standard reference material tested was National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment. Error band represents the 95 percent (%) prediction interval.

values listed. This table presents data for all elements determined in this study.

Trace Elements in Caddisfly Larvae

Standard Reference Materials

Two SRMs were digested along with caddisfly larvae: NIST SRM 1566a oyster tissue, and SRM 50 albacore tuna. No certified values for aluminum, cadmium, copper, or iron were available for SRM 50; only lead and zinc are reported (table 22). With the exception of aluminum, observed values are within 10 percent of certified values.

Spike addition recovery

Spike additions on caddisfly larvae extracts were done on 14 subsamples from 4 sampling sites. Spike recovery percentages for cadmium, copper, lead, and zinc are shown in table 23. The overall range for cadmium was 95–102 percent, for copper was 82–100 percent, for lead was 87–98 percent, and for zinc was 93–108 percent.

Iron Redox

No SRMs exist for iron redox species because of the poor long-term stability of Fe(II) and Fe(III) in

Table 13. Percentage of determinations for each selected element that fell within the specified range of the percentage recovery for the calculated theoretical value of the spike addition in water samples

[REC_{SPIKE}, percentage recovery with respect to spiked samples; n, number of observations; Conc., spiked concentration; QAPP, Quality Assurance Project Plan. %, percent; μg/L, microgram per liter]

REC_{SPIKE} Range (%)	Percentage of spiked samples within the specified REC_{SPIKE} range											
	Arsenic	Cadmium[1]	Chromium	Cobalt	Copper[1]	Lead[1]	Mercury[1]	Nickel	Selenium	Silver	Uranium	Zinc[1]
0–200	100	100	100	100	100	100	100	100	100	98	100	100
50–150	100	100	100	100	100	98	100	100	100	92	100	98
75–125	98	100	98	100	98	98	100	100	100	78	98	98
85–115	92	94	98	100	98	96	89	100	98	58	80	91
90–110	78	88	88	98	85	82	69	96	94	44	62	83
95–105	58	69	52	69	60	56	44	70	70	16	42	55
n	50	48	50	49	47	50	36	50	50	50	50	47
Conc. (μg/L)	10	1	50	5	10	50	0.004	10	20	10	10	10

[1]Data quality objective was at least 90 percent completeness in the 75–125 range of REC_{SPIKE} for indicated elements listed in the QAPP (Appendix 1).

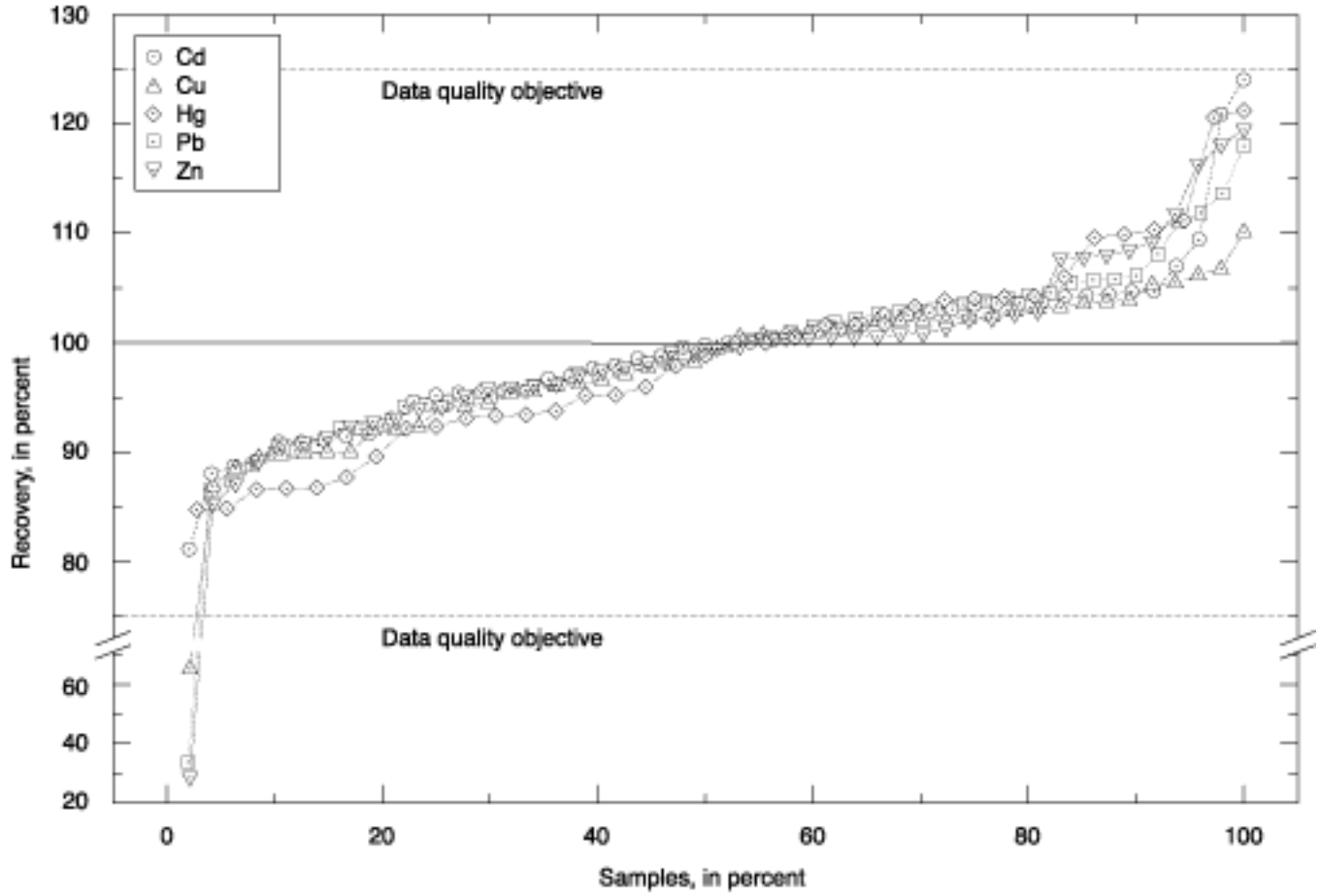


Figure 22. Distribution diagram of the percentage recovery of dissolved spike addition determinations for cadmium (Cd), copper (Cu), mercury (Hg), lead (Pb), and zinc (Zn) versus the percentage of samples observed in the Sacramento River Basin, California, including the data quality objective (represented by horizontal lines).

Table 14. Percentage of determinations of critical elements within the stated percentage recovery for the certified or critical value compared with the sum of the sequential extraction phases of the National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment

[REC_{SRM}, percentage recovery with respect to standard reference materials; n, number of observations]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125	85–115	90–110	95–105
Aluminum	5	100	80	0	0	0	0
Cadmium	5	100	100	100	100	80	60
Copper	5	100	100	100	80	60	40
Iron	5	100	100	100	100	80	40
Lead	5	100	100	100	100	80	80
Mercury	5	100	100	100	100	100	80
Zinc	5	100	100	100	100	100	40

Table 15. Percentage determinations of noncritical elements within the stated percentage recovery for the certified or "informational purposes" value compared with the sum of the sequential extraction phases of the National Institute of Standards and Technology's standard reference material SRM 2704–Buffalo River Sediment

[REC_{SRM}, percentage recovery with respect to standard reference materials; n, number of observations. *, "informational purposes" value]

Element	n	Range REC_{SRM} (percent)					
		0–200	50–150	75–125	85–115	90–110	95–105
Antimony	5	100	100	100	80	80	60
Barium	5	100	80	20	0	0	0
Calcium	5	100	100	100	80	80	40
Cerium*	5	100	0	0	0	0	0
Cesium*	5	100	100	100	80	60	40
Chromium	5	100	100	100	100	60	40
Cobalt	5	100	100	100	60	40	20
Dysprosium*	5	100	40	0	0	0	0
Europium*	5	100	80	0	0	0	0
Lanthanum*	5	100	0	0	0	0	0
Lithium	5	100	100	100	80	80	40
Lutetium*	5	100	0	0	0	0	0
Magnesium	5	100	100	0	0	0	0
Manganese	5	100	100	100	100	80	60
Nickel	5	100	100	80	20	20	20
Rubidium*	5	100	0	0	0	0	0
Samarium	5	100	60	0	0	0	0
Silica[1]	5	100	100	100	100	80	20
Strontium	5	100	100	20	20	0	0
Titanium	5	100	100	100	100	80	80
Thallium	5	100	100	100	80	80	60
Thorium*	5	100	40	0	0	0	0
Uranium	5	100	100	100	100	100	40
Vanadium	5	100	100	100	100	100	100
Ytterbium*	5	100	40	0	0	0	0
Zirconium*	5	100	100	80	80	80	60

[1]Silica was the only substance reported as an oxide.

aqueous solution. Therefore, the quality of analytical results for iron redox determinations by ultraviolet–visible (UV–vis) spectroscopy using FerroZine as the complexing agent were evaluated by replicate analysis, by comparison of total iron determinations to those made by another method (ICP–AES), and by comparing the proximity of a given analytical result with the method detection limit. At the method detection limit, by definition the precision of the analytical result is ± 100 percent. Precision improves exponentially with increasing concentration until it is ± 5 percent or less at about

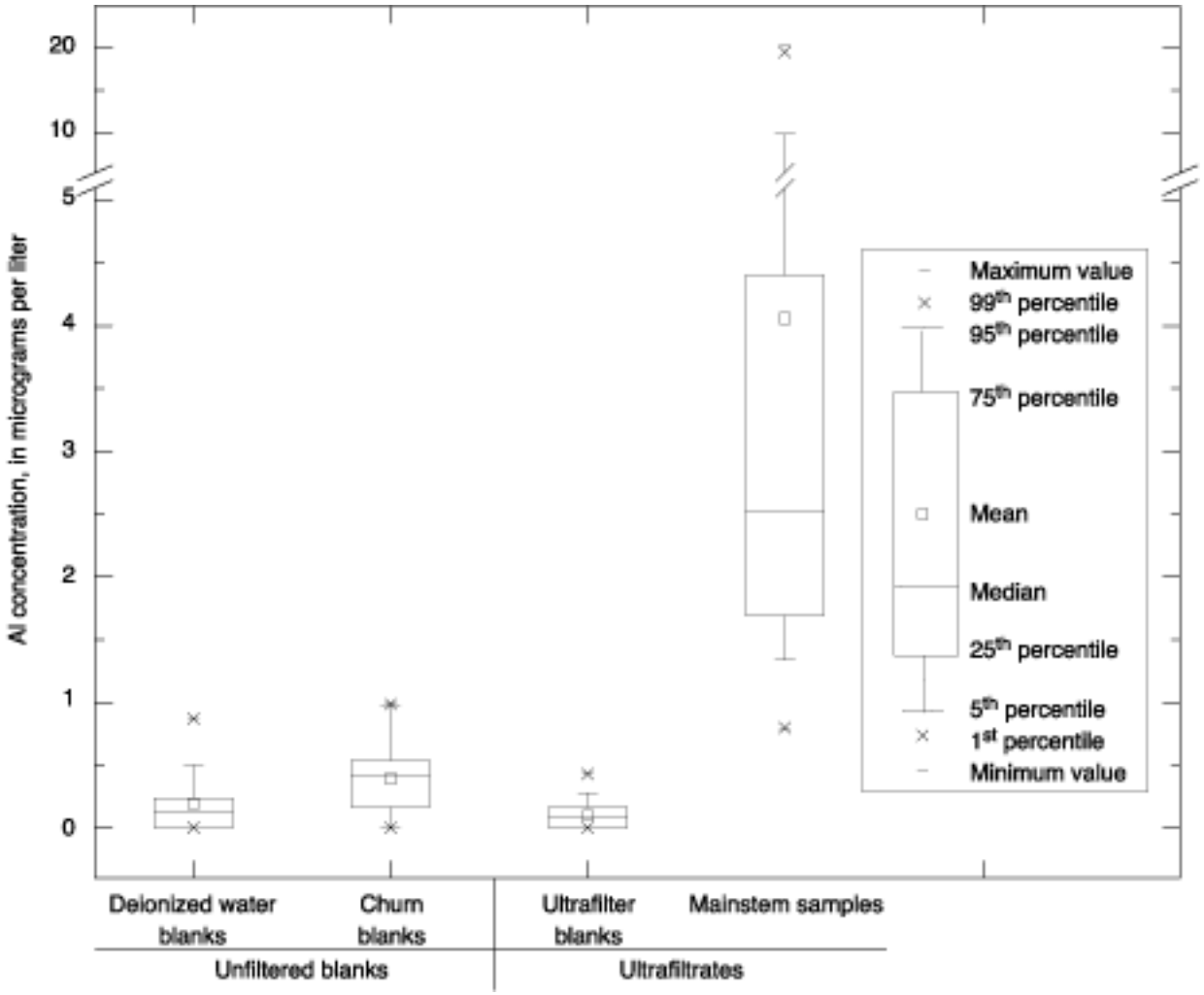


Figure 23. Box plots showing concentration ranges for aluminum (Al) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

10 to 20 times the detection limit. Iron redox samples were analyzed routinely in duplicate, with additional analyses performed for instances where precision between replicates was judged poorer than that expected for the concentration range represented by the analyses.

Concentrations of total iron in filtered water samples determined by UV–vis spectroscopy can be compared with total iron determined by ICP–AES on split subsamples. Comparing results from all six sampling events (table A4-1) indicates a slight bias toward higher iron concentrations with UV–vis spectroscopy than with ICP–AES, especially in the concentration range of about 8 to 80 µg/L. Blanks for the iron redox subsplits for the July and September 1996 sampling trips showed elevated iron in this approximate concentration range (table A2-2), indicating a probable laboratory contamination problem. The source of the iron contamination could have been the bottle washing procedure, the hydrochloric acid used for sample preservation, the pipette used to transfer the acid, or perhaps the environmental conditions in the laboratory used to process and preserve these samples. Sample processing was relocated from the BOR laboratory near Keswick Dam to the USGS laboratory in Sacramento beginning in November 1996. Significantly lower blank levels were observed beginning in November 1996, and the agreement between the data from the two methods of iron determination was also improved beginning with samples from that time. The agreement between the two methods for total iron is especially good above concentrations of 10 µg/L, a value less than 10 times the detection limit of both methods.

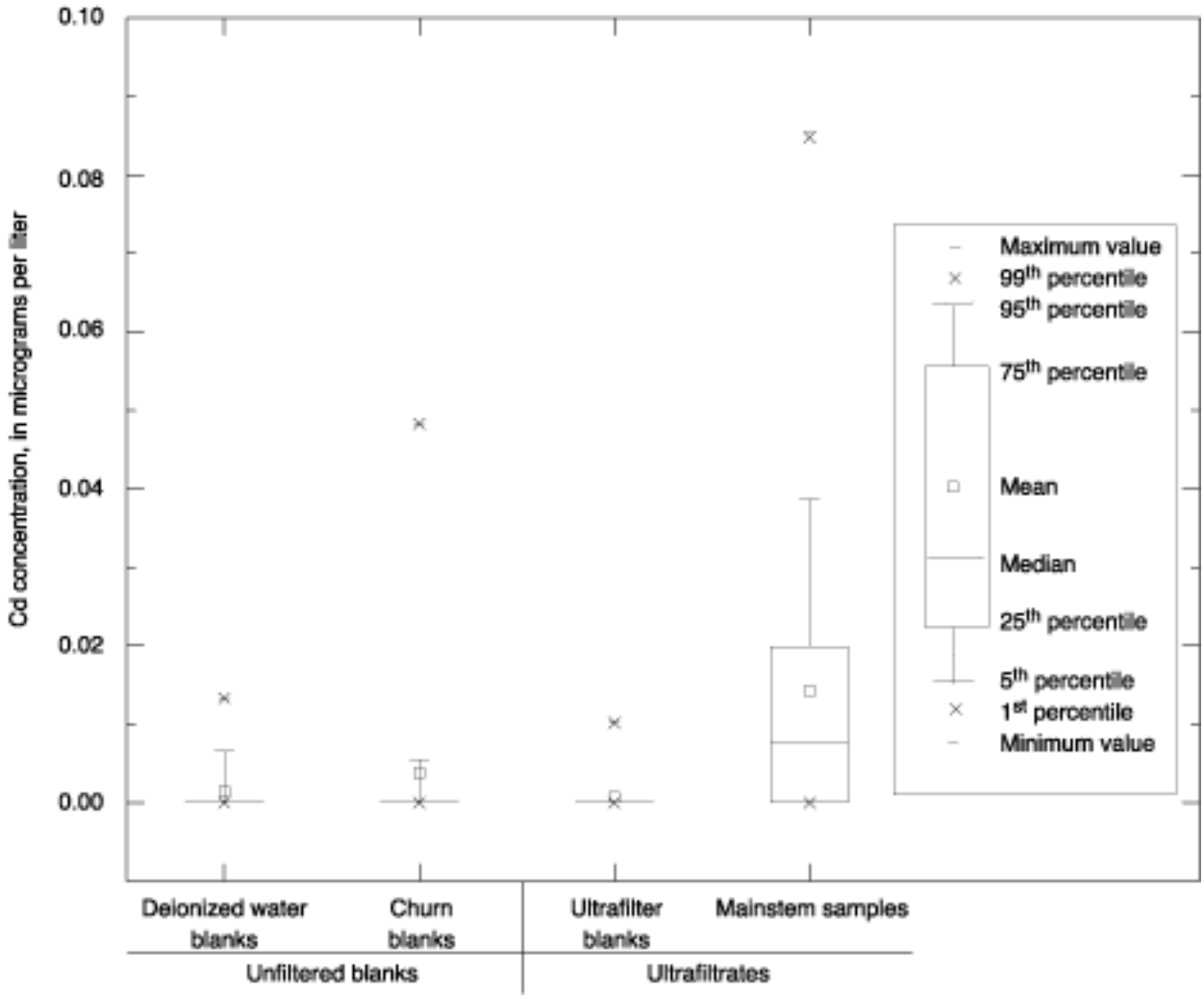


Figure 24. Box plots showing concentration ranges for cadmium (Cd) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

Lead Isotopes

The total chemistry lead blank for the lead procedure is approximately 0.1 ng. In the worst case scenario (83 ng of lead in the sample) the blank contributes 0.12 percent of the total lead. However, because the isotopic composition of the lead blank ($^{206}Pb/^{204}Pb = 18.9$) is similar to that of the samples ($^{206}Pb/^{204}Pb = 18.1–19.1$), the blank effect on the isotopic composition of the sample is less than 0.006 percent. This contribution is insignificant relative to the precision of the mass spectrometric analyses (0.05–0.1 percent).

Mass spectrometric data for lead were collected from at least three blocks of 10 ratio sets. When the VG Sector 54 seven-collector mass spectrometer was used in static mode, all lead isotopes were measured simultaneously. Differences in collector efficiencies were routinely measured and corrected mathematically as a part of the general operating software. When lead was measured on the VG 54R single-collector mass spectrometer, data were measured as pairs using peak switching and ^{206}Pb as the reference isotope. Data are considered to be of acceptable quality if the internal precision for a given run is better than 0.1 percent for $^{206}Pb/^{204}Pb$ and better than 0.05 percent for $^{207}Pb/^{206}Pb$ and $^{207}Pb/^{208}Pb$.

The principal cause of uncertainty in mass spectrometric analyses for lead is mass-dependent fractionation induced during thermal ionization of the sample. The level of accuracy for the mass spectrometric determinations performed in this study was

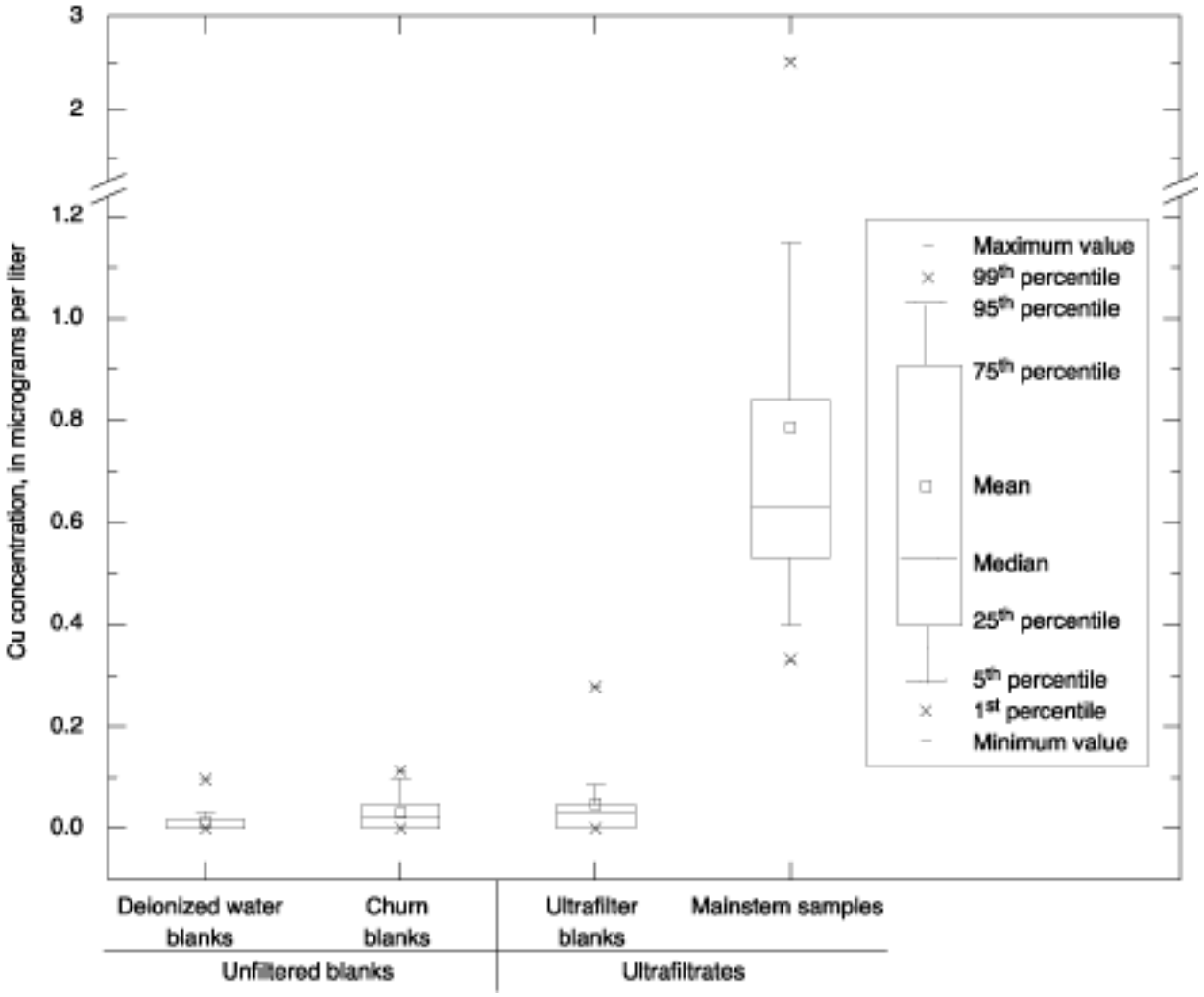


Figure 25. Box plots showing concentration ranges for copper (Cu) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

evaluated by performing concurrent analyses of NIST lead isotopic standard SRM-981 (Todt and others, 1993). One standard analysis was performed for every 10 or fewer sample analyses. A fractionation factor (F) that is calculated from the standard data represents the correction in percentage per atomic mass unit that must be applied to a given isotopic ratio as follows:

$$\frac{^{206}Pb}{^{204}Pb_C} = \frac{^{206}Pb}{^{204}Pb_M}(1 + 0.02F) \quad (5)$$

$$\frac{^{207}Pb}{^{206}Pb_C} = \frac{^{207}Pb}{^{206}Pb_M}(1 + 0.01F) \quad (6)$$

$$\frac{^{208}Pb}{^{206}Pb_C} = \frac{^{208}Pb}{^{206}Pb_M}(1 + 0.02F) \quad (7)$$

$$\frac{^{207}Pb}{^{204}Pb_C} = \frac{^{207}Pb}{^{204}Pb_M}(1 + 0.03F) \quad (8)$$

$$\frac{^{208}Pb}{^{204}Pb_C} = \frac{^{208}Pb}{^{204}Pb_M}(1 + 0.04F) \quad (9)$$

where the subscripts C and M refer to the corrected and measured isotopic ratios, respectively.

Lead isotopic data were measured at filament temperatures ranging from approximately 1,200° to 1,300°C. There is a small but measurable effect of filament temperature on mass fractionation as outlined in table 24. Fractionation corrections were applied to the data for individual samples on the basis of the mass spectrometer used and the filament temperature. The uncertainties are calculated after the manner in

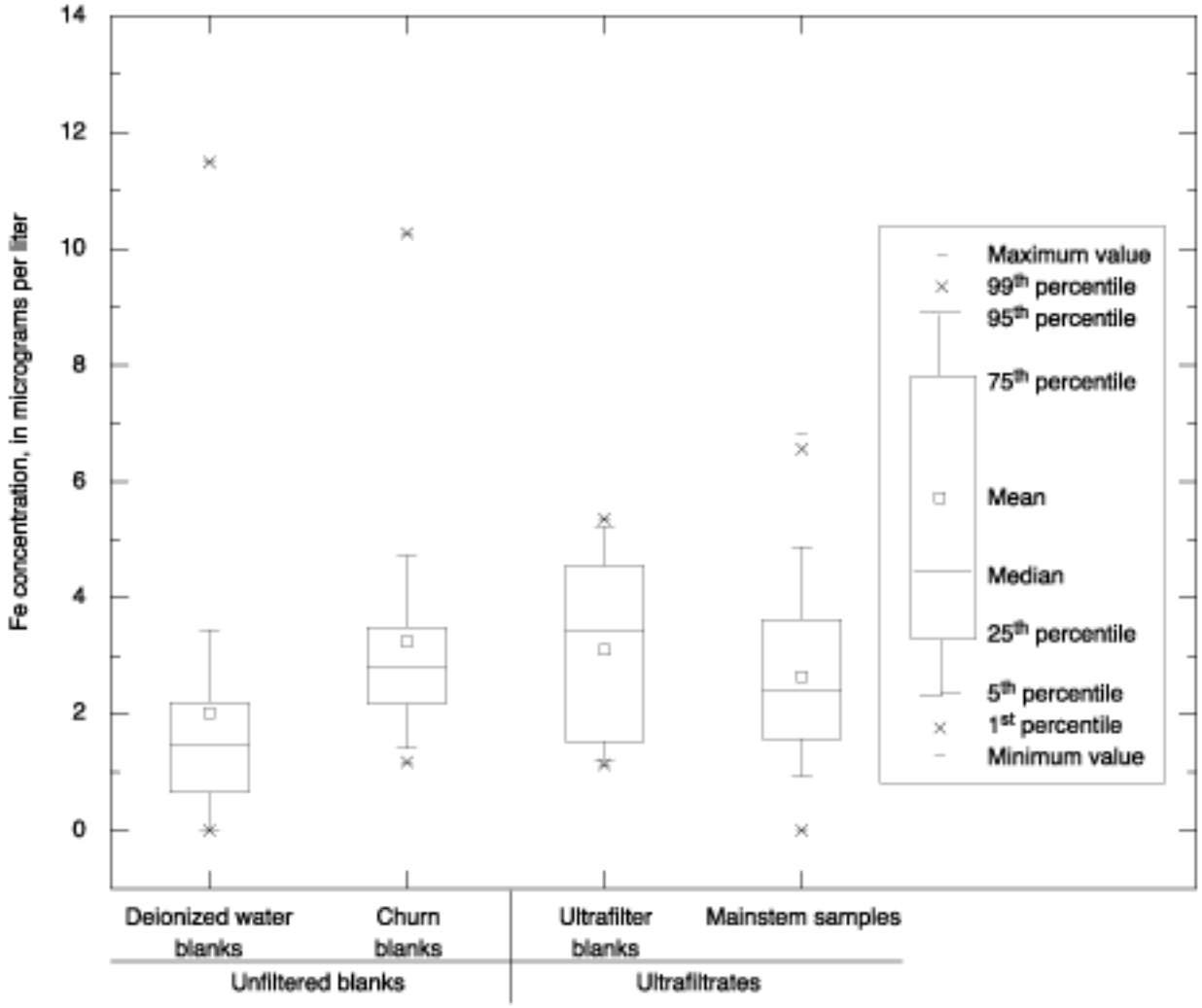


Figure 26. Box plots showing concentration ranges for iron (Fe) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

Ludwig (1979) and are at the 95 percent confidence interval, or 2 sigma (2σ).

As an independent check of the mass spectrometric procedures used in this study, one of the colloid samples (below Shasta Dam) was analyzed on both mass spectrometers. The fractionation-corrected data on this comparison are presented in table 25, showing essentially identical agreement between both mass spectrometers.

Anions, Nutrients, and Organic Carbon

Analyses of anions, nutrients, and organic carbon were done by USGS personnel at the NWQL in Arvada, Colorado. Quality assurance and quality control (QAQC) activities at the NWQL are documented in reports by Friedman and Erdmann (1982) and by Pritt and Raese (1995). Method performance evaluations were based on the analysis of SRMs, laboratory replicates, and analysis of blank samples. A minimum of 10 percent of analyzed samples were reference materials.

In addition to internal QAQC assessments, NWQL participates in numerous external performance evaluation programs, including the EPA's Water Pollution Performance Evaluation Study (WPPES) and its Water Supply Performance Evaluation Study (WSPES). These studies are made by the EPA's Environmental Monitoring Systems Laboratory and are used to evaluate the performances of EPA, state, and other selected laboratories for 80 water pollution constituents. The NWQL also participates in the

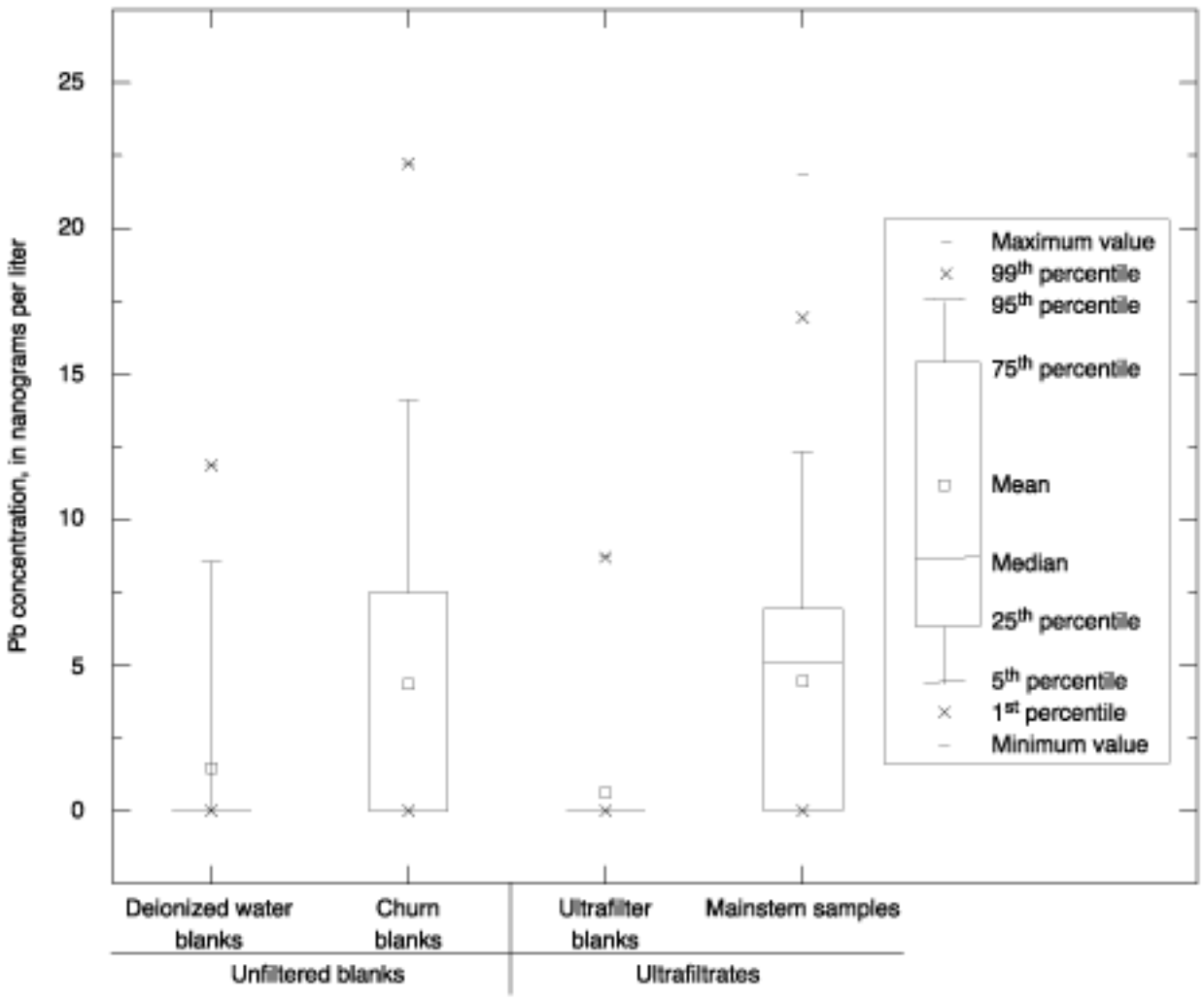


Figure 27. Box plots showing concentration ranges for lead (Pb) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

spring Canadian Federal–Provincial water performance evaluation study. This study includes low-ionic strength, trace metals, and major ion determinations. Additionally, the NWQL participates in the USGS Water Resources Division, Branch of Technical Development and Quality Systems (BTD&QS) round-robin performance evaluation program, which biannually sends standard reference water samples to more than 150 laboratories for comparative analysis. The NWQL also takes part in the BTD&QS blind sample program on an ongoing basis.

Satisfactory results of the three WPPES evaluations (WP036, WP037, and WP038) that were completed during the time period of this study are included in Appendix 2 (tables A2-1a, A2-1b, and A2-1c). The acceptance limits defined by the EPA (Appendix 2) are the 99 percent confidence interval or, effectively, ± 3 standard deviations (3σ). Warning limits are defined as the 95 percent confidence interval, or ± 2σ. The number of decimal places reported in the EPA performance evaluations (Appendix 2) is not necessarily reflective of the precision of the analytical method.

Particulate Size Determinations

Replicate split samples were analyzed for size distribution of both suspended colloid and streambed sediment but are not reported. Similar size distributions were observed in replicate samples analyzed by either of the methods described earlier in this report;

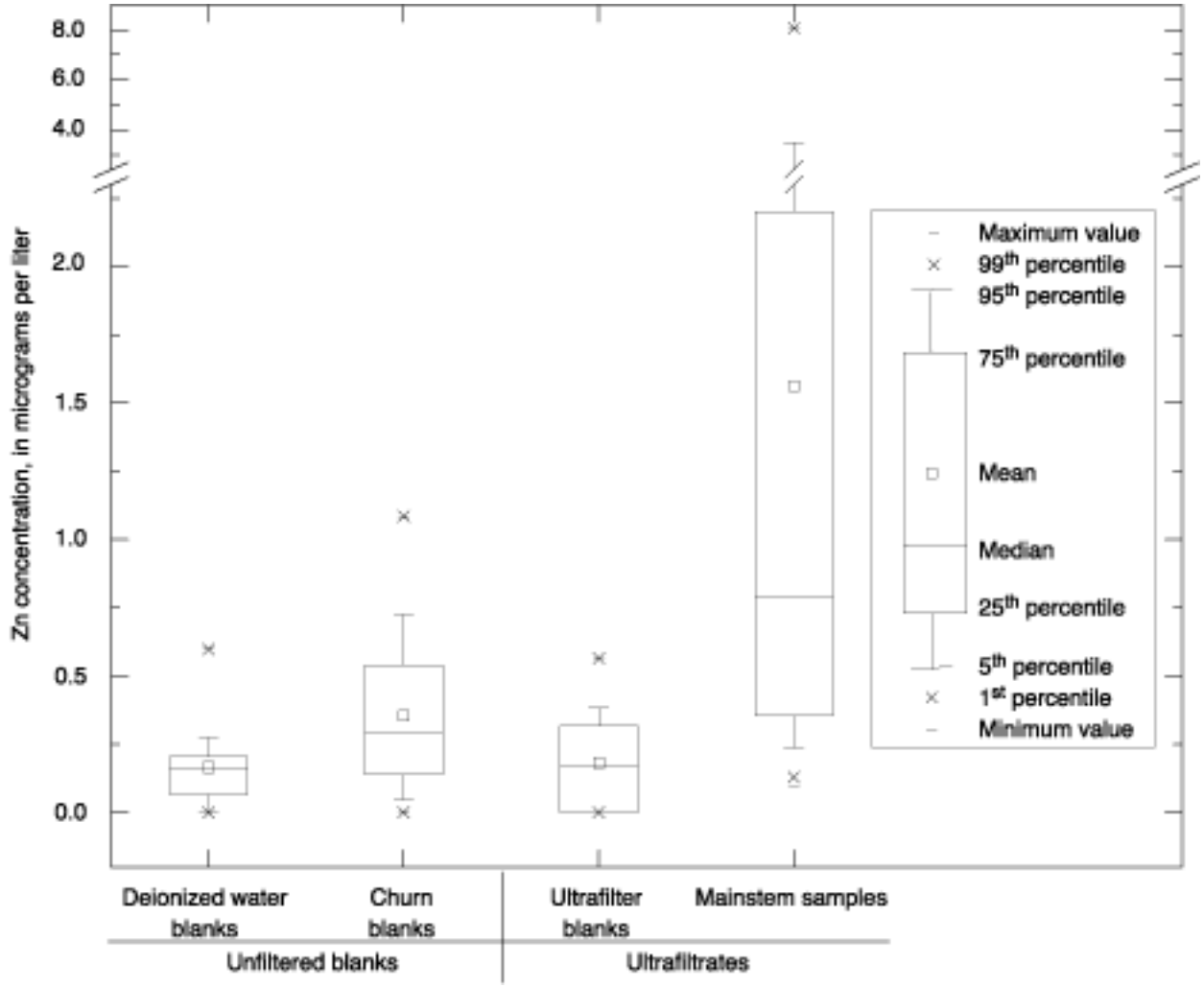


Figure 28. Box plots showing concentration ranges for zinc (Zn) in selected blank water samples and dissolved (ultrafiltrate) subsamples from the mainstem Sacramento River, California.

Table 16. Percentage of field duplicate dissolved samples whose relative percentage difference was below specified values for critical elements

[RPD, relative percentage difference; DL, detection limit; values in table represent the total of those less than detection limit and those which meet the criteria; n, number of duplicate samples. %, percent; <, less than; >, greater than]

RPD	Percentage of duplicate sample results whose RPD fell below the given value						
	Aluminum	Cadmium	Copper	Iron	Lead	Mercury	Zinc
% < 100%	100	100	98	100	100	100	98
% < 50%	100	100	98	100	100	100	96
% < 25%[1]	98	100	98	91	100	74	78
% < 15%	96	100	96	91	100	57	57
% < 10%	85	96	85	91	100	49	46
% < 5%	63	96	59	89	100	28	30
n > Dl	46	9	46	8	3	37	46
Total n	46	46	46	46	46	47	46

[1]Data quality objective was at least 90% completeness for RPD values < 25%.

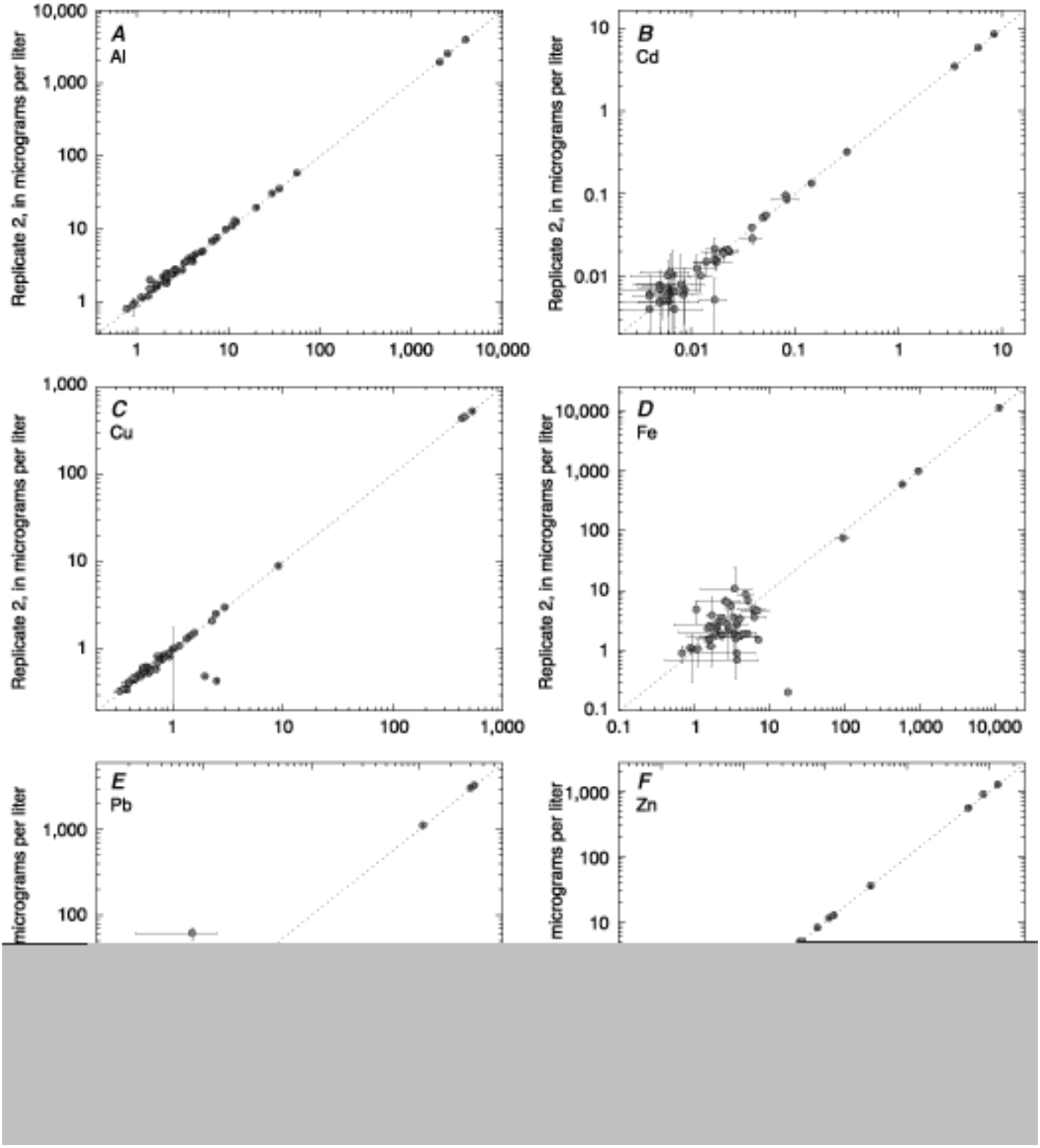


Figure 29. Correlation plots of field replicates for dissolved *A.* aluminum (Al), *B.* cadmium (Cd), *C.* copper (Cu), *D.* iron (Fe), *E.* lead (Pb), and *F.* zinc (Zn) in the Sacramento River Basin, California, with error bars representing laboratory analytical precision.

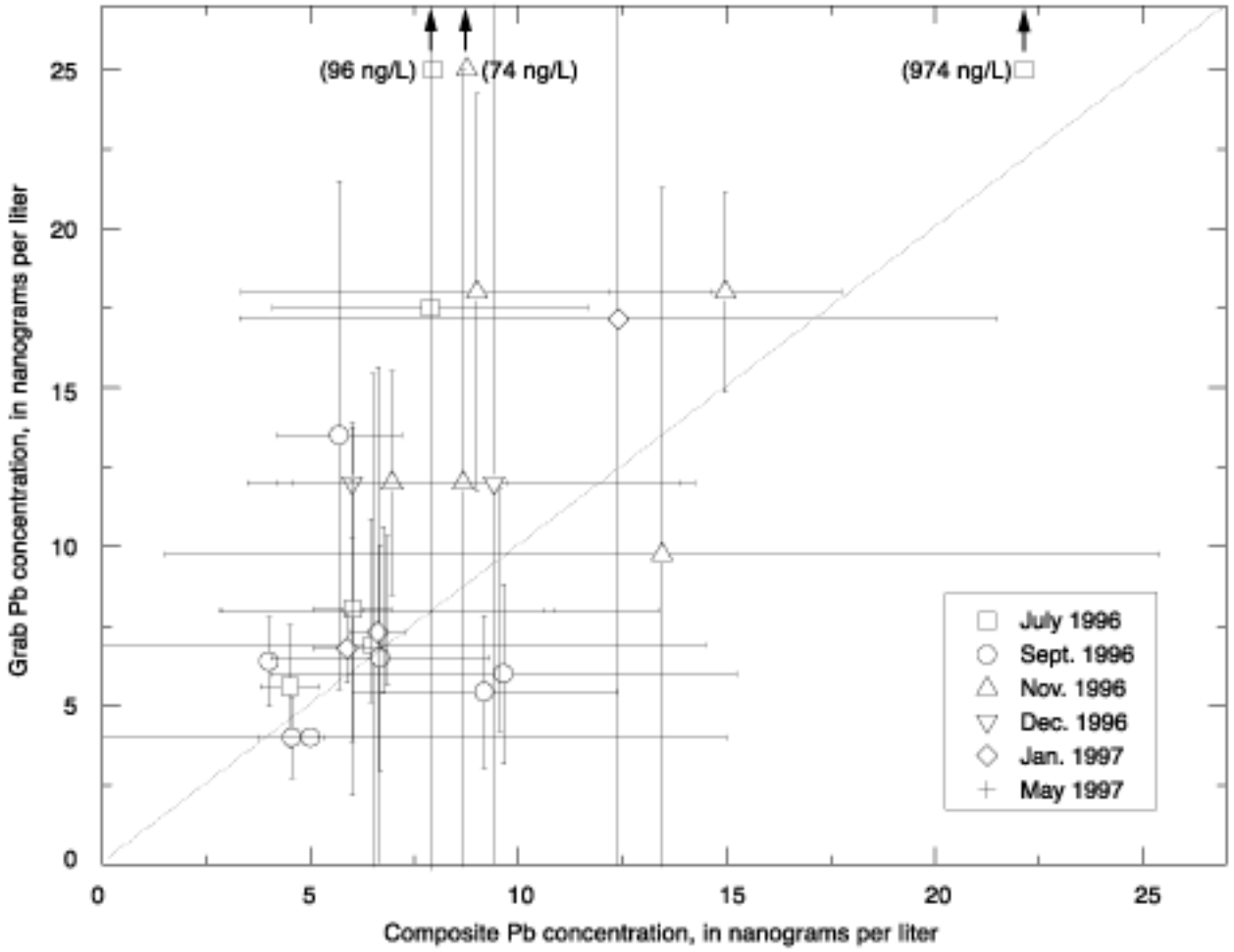


Figure 42. Plot of dissolved (ultrafiltrate) lead (Pb) concentration in composite water samples compared with dissolved (ultrafiltrate) lead concentration in concurrent grab water samples in the Sacramento River Basin, California. Vertical and horizontal lines represent standard deviation based on three to six determinations. Dotted line represents theoretical line of perfect agreement; error bars represent precision based on triplicate (or hextuplicate) analyses. ng/L, nanogram per liter.

elevated concentrations in the streambed sediment at sites downstream of Keswick Reservoir. For many trace elements, higher absolute concentrations are associated with the suspended colloids than with the bed sediments. This effect could possibly be related to the generally smaller grain size and larger surface area of the suspended colloidal sediment, resulting in a greater adsorption of metals.

Metal Concentrations in Caddisfly Larvae

Caddisfly (*H. californica*) larvae samples were collected as described in the previous section of this report. The results of the analyses of these samples are presented in Appendix 7 (tables A7-1 and A7-2) and indicate that *H. californica* in the Sacramento River were exposed to elevated concentrations of bioavailable cadmium, copper, lead, and zinc, with cadmium showing the greatest enrichment. Distribution patterns of cadmium, copper, and lead were consistent with an upstream source at or upstream of Redding. Although all metals were attenuated downstream, the transport of bioavailable metals appears to extend downstream of Tehama (fig. 8). A detailed discussion of the caddisfly data is presented separately (Cain and others, 2000).

Lead Isotopes in Colloid Concentrates and Streambed Sediments

Table 26 contains the lead isotope data for both colloid concentrates and streambed sediment samples

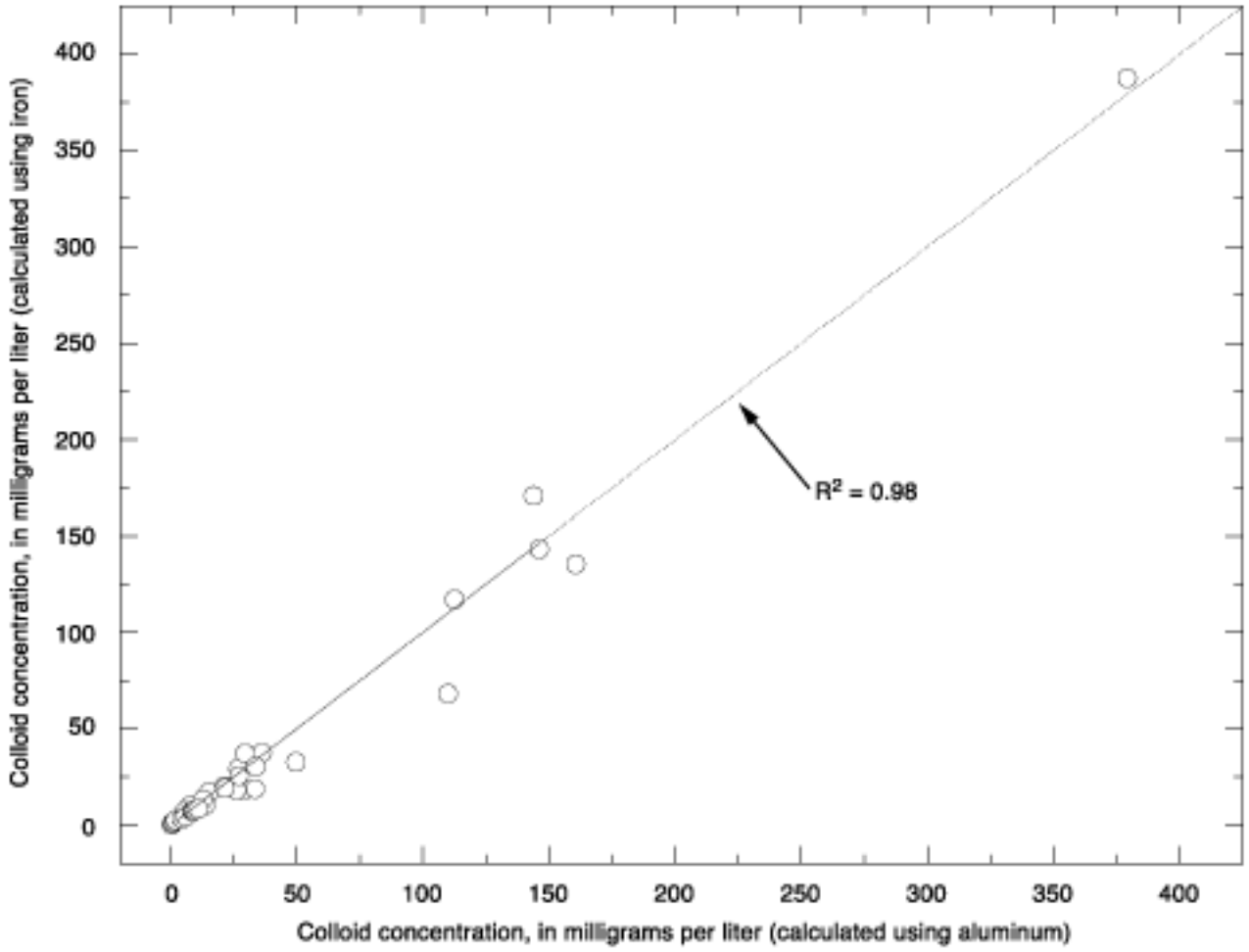


Figure 43. Plot of equivalent colloid concentration in river water computed using aluminum data compared with colloid concentration in river water computed using iron data in the Sacramento River Basin, California. R^2 value is based on linear least-squared regression.

for selected sites in the Sacramento River Basin. Lead isotope data can be used as a tracer to elucidate the possible sources of sediment and are particularly well suited to trace lead from massive sulfide deposits (Church and others, 1993, 1997). Figure 52 is a three-paneled plot of $^{206}Pb/^{204}Pb$, $^{207}Pb/^{206}Pb$, and $^{208}Pb/^{206}Pb$ versus distance from river mouth (broken scale). These plots show the influence of the massive sulfides at Iron Mountain as a source of lead to down-river sites, both in the suspended colloid sediments and in the streambed sediments. At the Bend Bridge site, 71 km downstream of Keswick Dam, the lead isotope signature from the Iron Mountain massive sulfide deposits seems to have been attenuated by more radiogenic lead from other sources such as the granitic rocks of the northern Sierra Nevada.

Figure 53 is another plot of $^{206}Pb/^{204}Pb$ versus river kilometer (continuous distance scale) that shows consistently higher values of $^{206}Pb/^{204}Pb$ in suspended colloids collected in January 1997 compared with those collected in December 1996. Values of $^{206}Pb/^{204}Pb$ in streambed sediments tend to fall between the December 1996 and January 1997 colloid values. These differences could be caused by a shift to more radiogenic (that is, granitic) source rocks from the eastern side of the Sacramento Valley during extreme flooding that took place in January 1997.

The distinctly nonradiogenic lead isotope signature of the massive sulfide deposits at Iron Mountain (Doe and others, 1985) is shown clearly on a plot of $^{206}Pb/^{204}Pb$ versus $^{208}Pb/^{207}Pb$ (fig. 54). Lead isotope ratios in the colloid samples collected below Shasta Dam and Keswick Dam plot on a linear trend with the

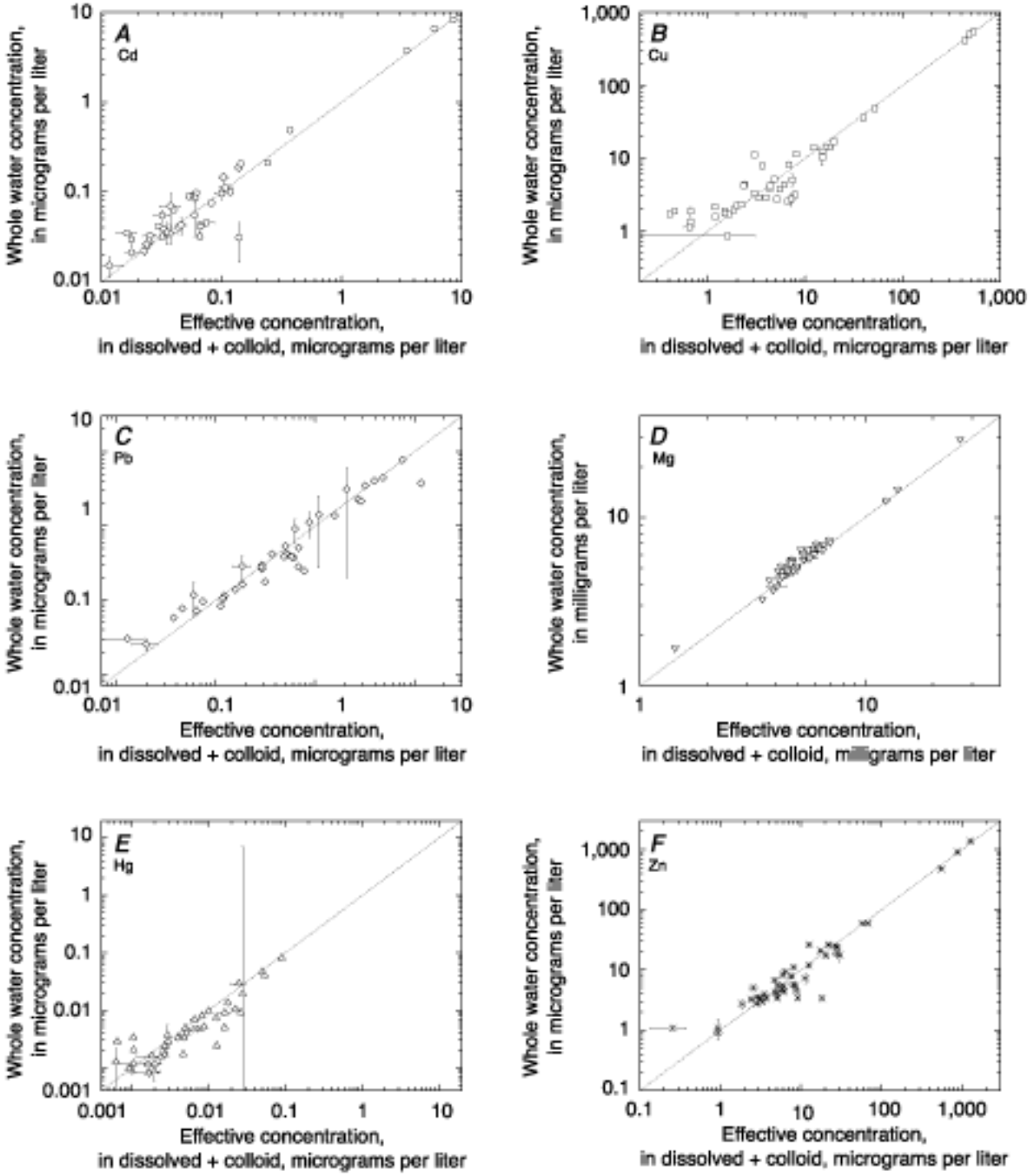


Figure 44. Plots of effective concentration (dissolved plus colloid) compared with total recoverable (whole water) concentration in the Sacramento River Basin, California, for *A*. Cadmium (Cd), *B*. Copper (Cu), *C*. Lead (Pb), *D*. Magnesium (Mg), *E*. Mercury (Hg), *F*. Zinc (Zn). Dotted line represents theoretical line of perfect agreement; error bars represent precision based on triplicate (or hextuplicate) analyses.

data from the Iron Mountain massive sulfide deposit (fig. 54). This linear pattern is consistent with an interpretation that the lead in suspended colloids at Keswick Dam represents a mixture of lead from tributaries to Shasta Lake with lead from Iron Mountain mine and Spring Creek. Mainstem Sacramento River sites downstream from Keswick Dam plot on a different linear trend in figure 54, indicating a different mix of source rocks and(or) other possible contaminant sources such as urban runoff or soils with lead from historic automobile emissions. The suspended colloid sample collected at Tower Bridge during January 1997 represents primarily the American River watershed because of the hydrology of the river during flood conditions and the operation of the Yolo Bypass (as discussed earlier in this report). Therefore, it is not surprising that this point has a much more radiogenic lead signature than other samples from this study, reflecting sources of lead in the Sierra Nevada granitic rocks and other source rocks dominated by continental crust.

The distribution of lead concentrations in streambed sediment and suspended colloids for different sites along the Sacramento River (fig. 55) illustrates the input of lead to the Sacramento River system from Spring Creek. Lead concentrations in both streambed sediment and suspended colloids reach minimum values in the samples collected from the Sacramento River at Colusa. Downstream from Colusa, lead concentrations increase in both sediment and colloids, indicating additional sources of lead either from tributary streams or, more likely, from urban runoff as the more densely populated Sacramento metropolitan area is approached. The ratio $^{206}Pb/^{204}Pb$ versus lead concentration in sediments and colloids (fig. 56) indicates a fairly strong correlation between elevated lead concentrations and non-radiogenic lead. This trend helps to confirm that the source of lead in the upper part of the watershed is most likely from the massive sulfide deposits hosted in oceanic crust (igneous rocks that originally formed in an oceanic environment, with relatively nonradiogenic lead). Also the colloid sample from the Tower Bridge in January 1997 falls off the aforementioned trend (fig. 56), which is consistent with more radiogenic sources of lead in drainage from the American River watershed.

Anions, Nutrients, Organic Carbon, and Field Parameters

Data for anions, nutrients, organic carbon, and field parameters collected during the study are contained in Appendix 3 (table A3-1). Anions included in this report are chloride, sulfate, and fluoride analyzed in filtered (0.45-μm capsule filter) water samples split from composite samples collected for metal analysis or collected as part of the NAWQA Program. Chloride concentrations ranged from 0.14 mg/L to 5.9 mg/L, with a median value of 2.2 mg/L in the Sacramento River sites. The highest chloride concentration measured was 37 mg/L in a sample from the Colusa Basin Drain, a channel containing mostly agricultural return flows at the time the sample was collected. Sulfate concentrations ranged from 1.7 to 6.0 mg/L in the Sacramento River sites. Higher concentrations were detected in Spring Creek (15–230 mg/L), Flat Creek (9.2–55 mg/L), and the Colusa Basin Drain (92 mg/L). Despite the high sulfate concentrations in these streams, their contribution to the total sulfate load of the Sacramento River is small, and concentrations downstream of these inputs did nor appear significantly elevated with respect to other sites on the Sacramento River. Fluoride concentrations were very near or below the reporting limit of 0.10 mg/L at all sites except for the Colusa Basin Drain (0.4 mg/L).

Nitrogen in the form of nitrite and nitrate ranged from below reporting limits of 0.05 mg/L to a high of 0.25 mg/L in the Sacramento River. The highest ammonia concentration was 0.11 mg/L and the highest combined, unfiltered organic plus ammonia nitrogen concentration was 0.5 mg/L. Thirty-eight of the 41 samples analyzed for organic plus ammonia forms of nitrogen were less than the reporting limit of 0.02 mg/L as nitrogen. Organic carbon concentrations in filtered water samples from all sites ranged from 0.4 to 4.8 mg/L as carbon with a median value of 1.4. The highest value was detected in a sample from the Colusa Basin Drain. Suspended organic carbon concentrations had a median value of 0.30 mg/L and tended to be less than corresponding dissolved organic carbon concentrations.

Water temperatures, specific conductance, and pH values varied in the Sacramento River system both temporally and spatially (table A3-1). Water temperatures changes seasonally from a wintertime low of 8.5°C to a summertime high of 25.5°C. Specific conductance in the Sacramento River ranged from

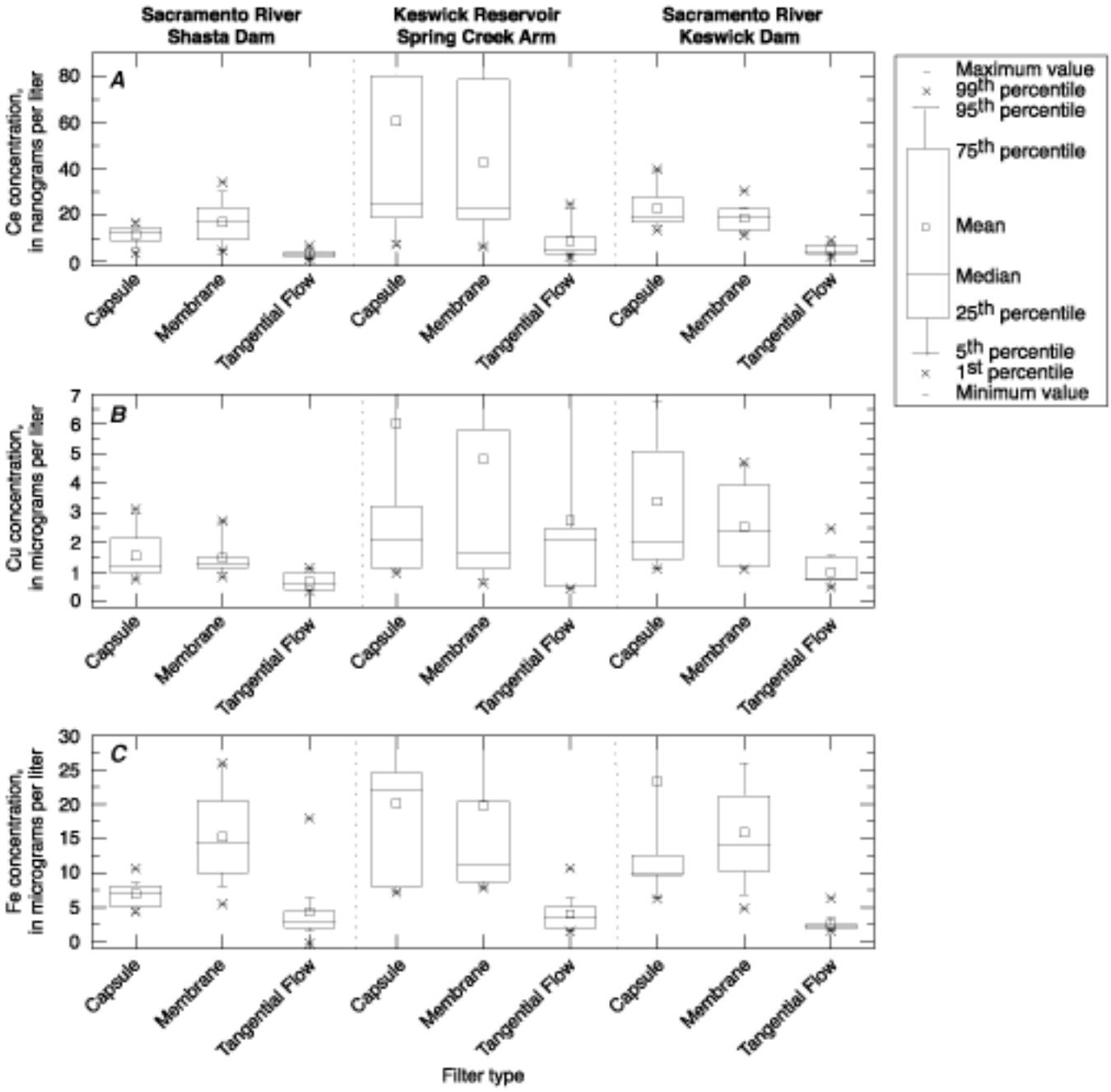


Figure 45. Box plots showing comparison of concentrations from three types of filtered samples at three sites in the upper Sacramento River Basin, California, for *A*. Cerium (Ce), *B*. copper (Cu), *C*. Iron (Fe).

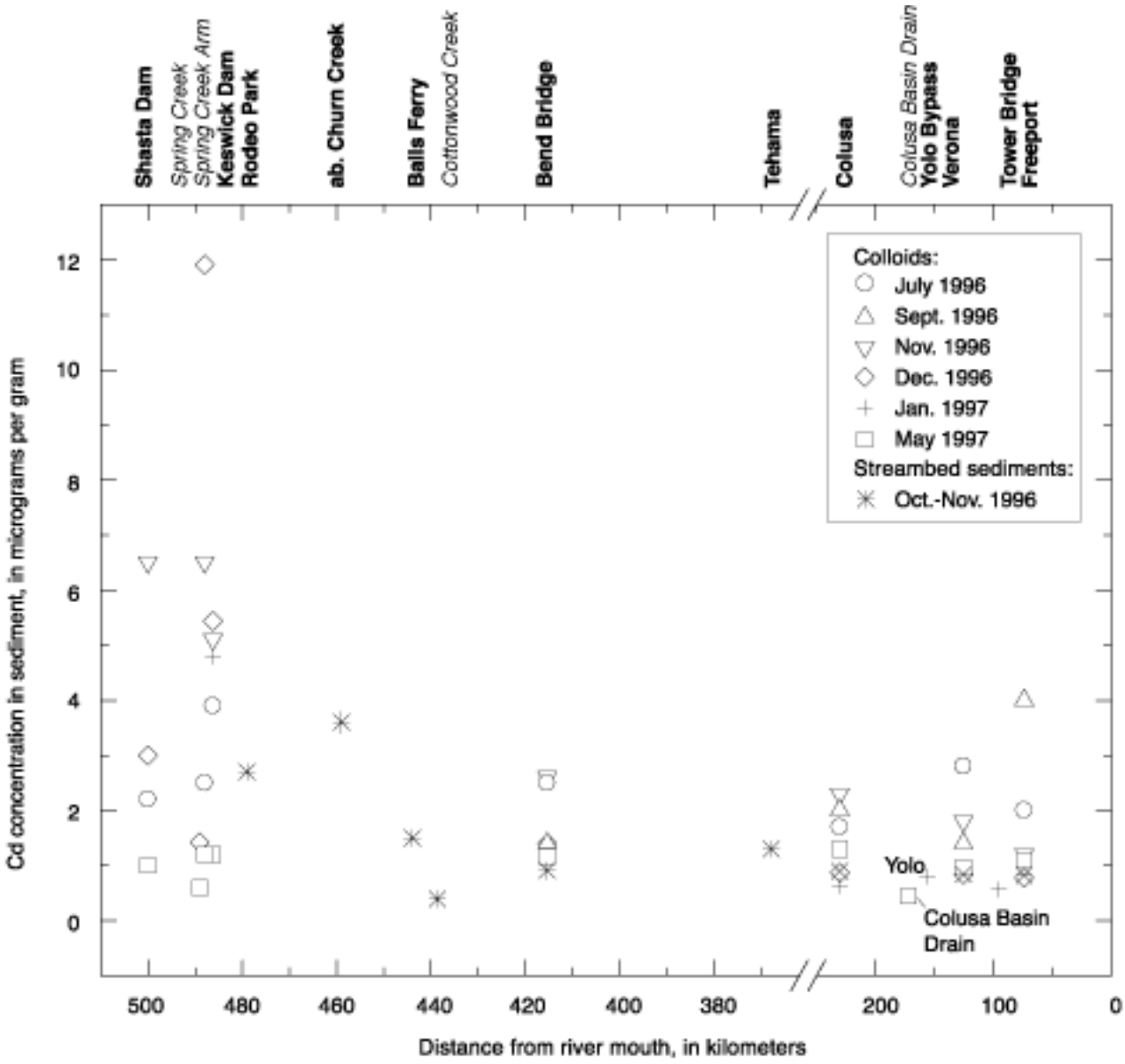


Figure 46. Plot of cadmium (Cd) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

51 to 149 μS/cm, but some tributaries were notably higher. Spring Creek ranged from 129 to 495 μS/cm and the measurement at Colusa Basin Drain on June 6, 1997, was 712 μS/cm. Measurements of pH at mainstem Sacramento River sites ranged from 7.0 to 8.1. The lowest pH measured was 3.7 at the Spring Creek site. Immediately downstream of Spring Creek, in the Spring Creek arm of Keswick Reservoir, the pH ranged from 7.3 to 7.6, which was similar to pH values (7.3 to 7.8) measured in the Sacramento River below Shasta Dam.

Particulate Size Distribution

Suspended Colloids

As discussed in a previous section of this report, all of the colloidal samples were subjected to a

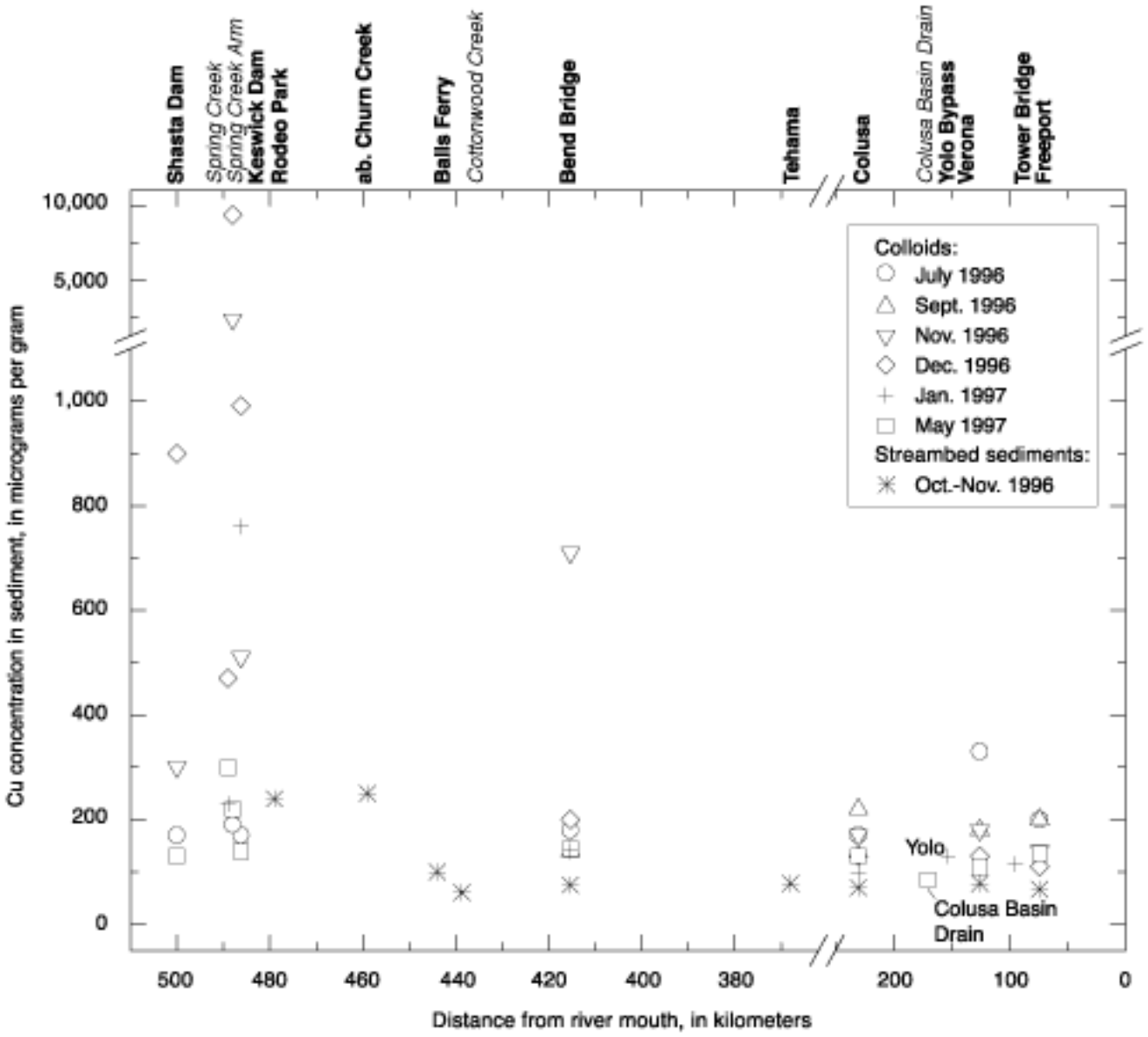


Figure 47. Plot of copper (Cu) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

particulate size distribution analysis. The results of these analyses are presented in Appendix 6 (table A6-1). Figure 57 shows a selected sample of those data, the particle size distribution for colloids collected during September 1996. The particulate size distribution from below Shasta Dam, Keswick Reservoir in Spring Creek arm and below Keswick Dam seem to be unimodal, whereas the three most downstream sampling sites (Colusa, Verona, and Freeport) show definite traces of bimodal distributions. Similar patterns were obtained for sampling periods other than September 1996 as well.

Streambed Sediments

The particulate size distributions for eight streambed sediment samples from the mainstem Sacramento River and for one sample from a tributary

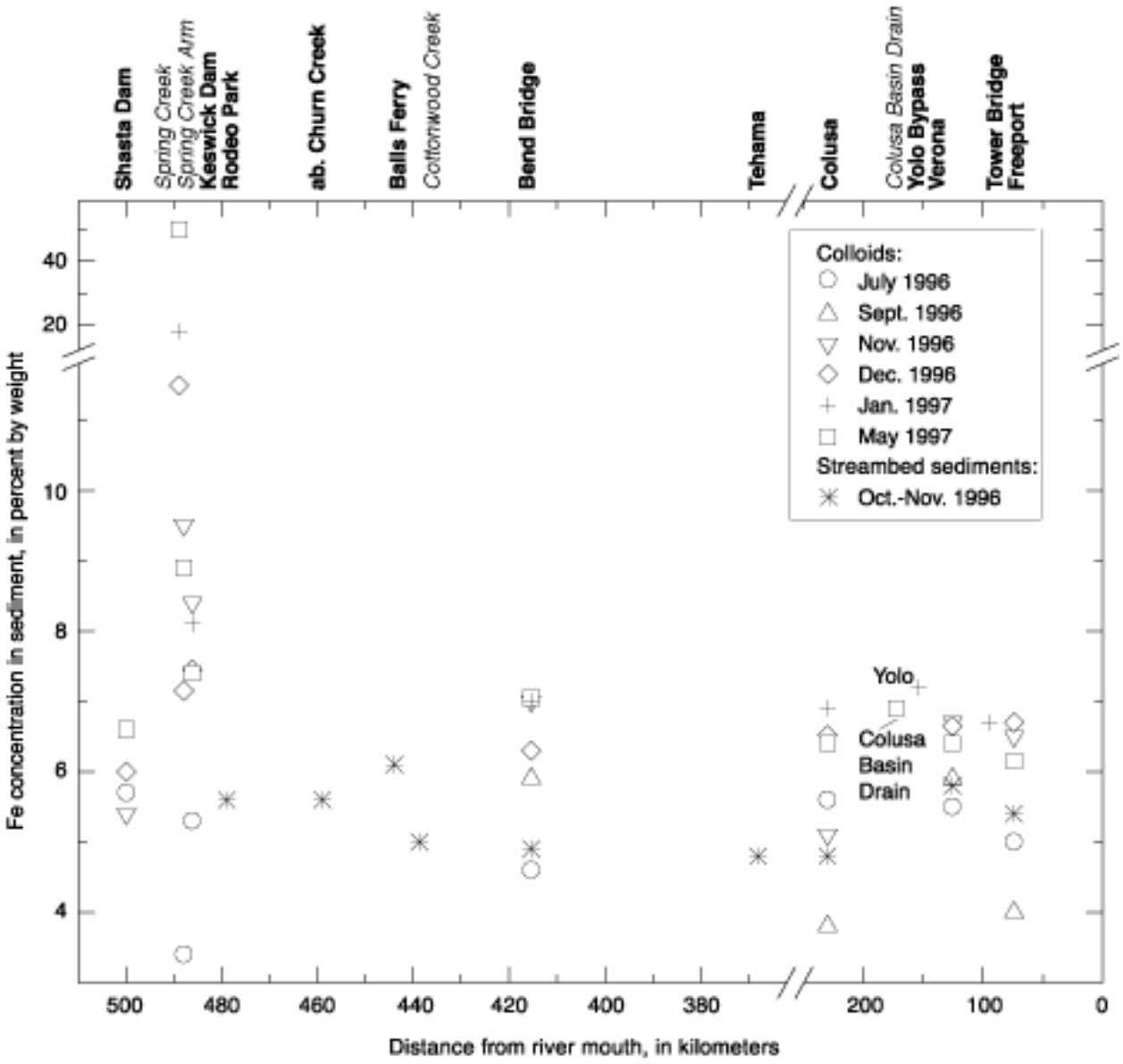


Figure 48. Plot of iron (Fe) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

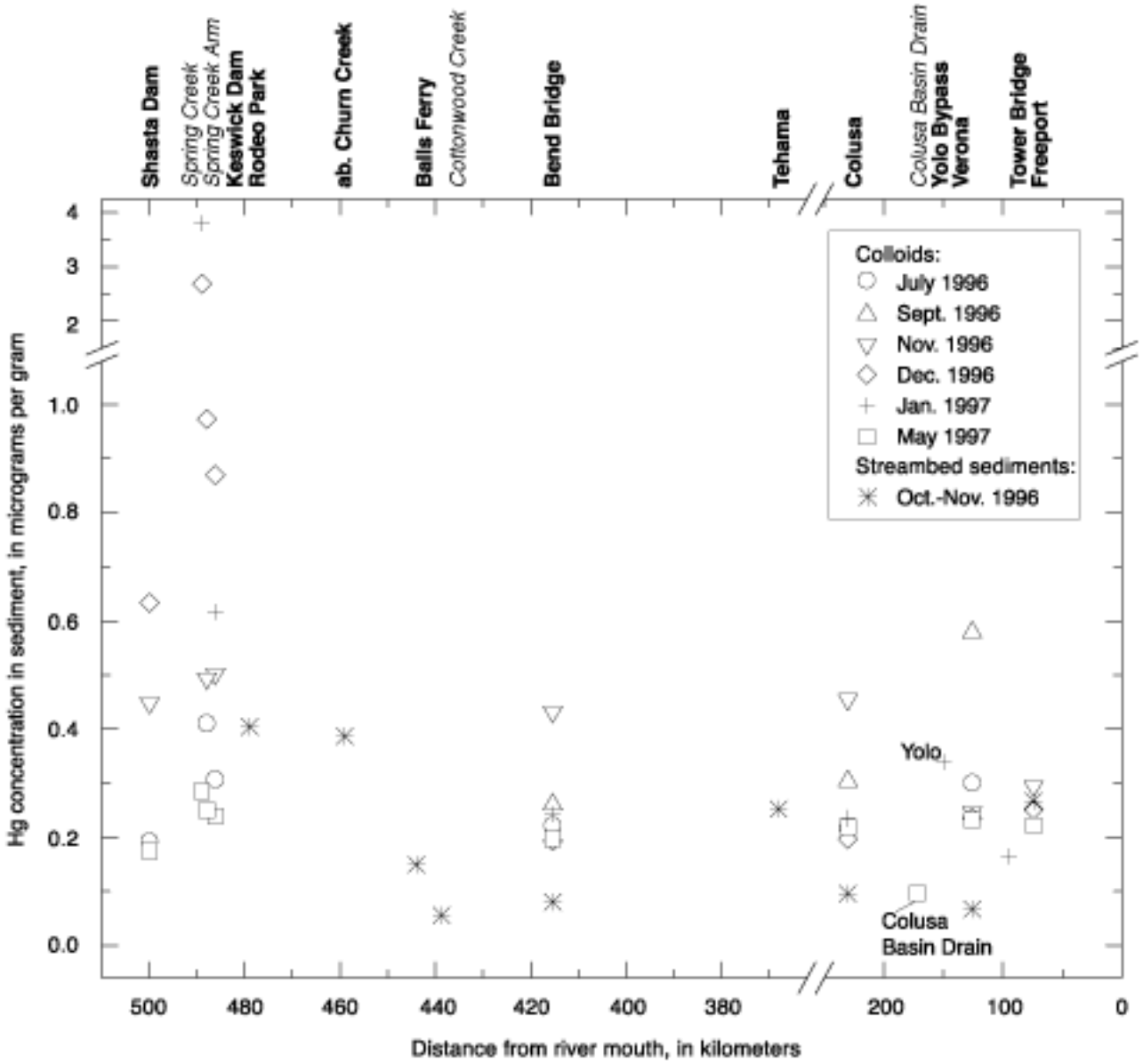


Figure 49. Plot of mercury (Hg) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

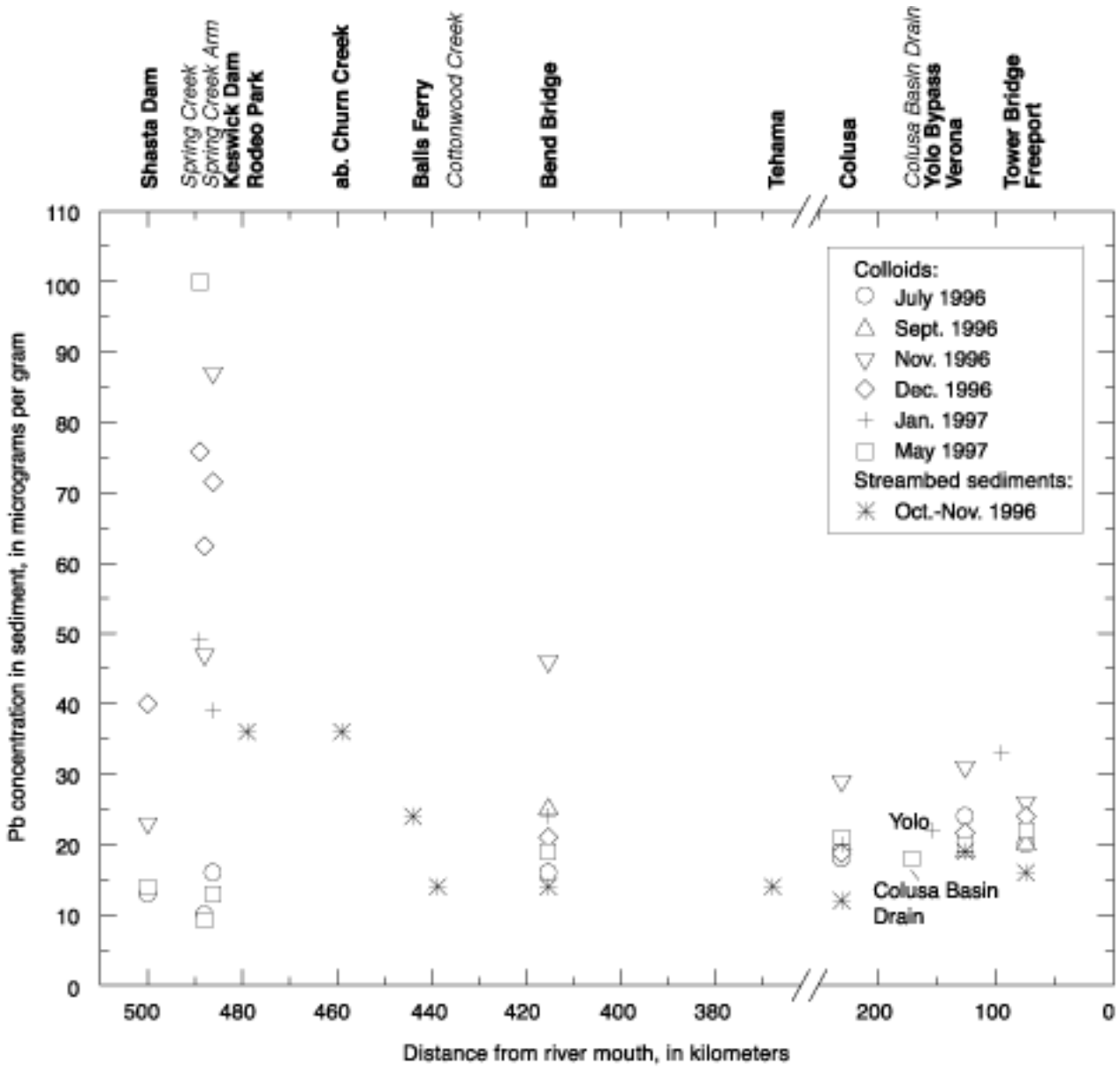


Figure 50. Plot of lead (Pb) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

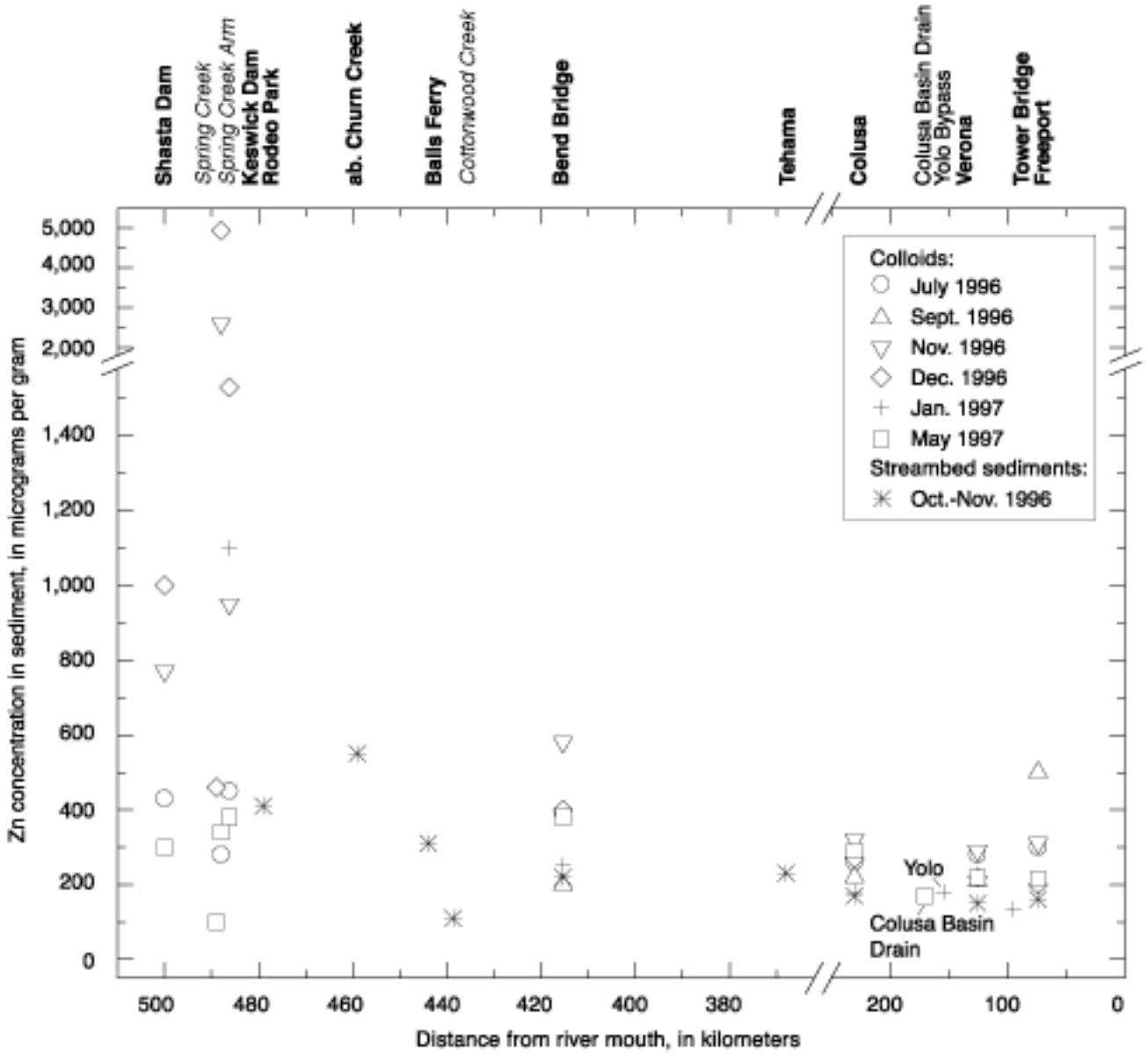


Figure 51. Plot of zinc (Zn) concentrations in suspended colloids and streambed sediment in relation to distance (broken scale) from Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.

Table 26. Lead isotopic data for suspended colloids and streambed sediments from the Sacramento River and some of its tributaries

[Data are corrected for mass fractionation during mass spectrometry of 0.11% ± 0.03% to 0.14% ± 0.02% per atomic mass unit based on analyses of NIST's standard reference material SRM-981. Uncertainties are absolute values at the 95% confidence interval; NIST, National Institute of Standards and Technology; Pb, lead; mm/dd/yy, month/day/year; %, percent]

Location	Date (mm/dd/yy)	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$	$^{207}Pb/^{206}Pb$	$^{208}Pb/^{206}Pb$
Suspended Colloid Samples						
Sacramento River Sites						
Sacramento River below Shasta Dam	12/12/96	18.661 ± .015	15.593 ± .014	38.117 ± .040	0.83561 ± .00018	2.0426 ± .0008
Sacramento River below Keswick Dam	12/11/96	18.185 ± .017	15.506 ± .016	37.697 ± .045	0.85269 ± .00019	2.0731 ± .0009
Sacramento River below Keswick Dam	1/02/97	18.344 ± .014	15.521 ± .014	37.791 ± .039	0.84609 ± .00018	2.0602 ± .0008
Sacramento River above Bend Bridge	12/12/96	18.785 ± .014	15.602 ± .013	38.452 ± .039	0.83053 ± .00017	2.0469 ± .0008
Sacramento River above Bend Bridge	1/03/97	18.866 ± .009	15.620 ± .010	38.554 ± .032	0.82799 ± .00017	2.0436 ± .0008
Sacramento River at Colusa	12/16/97	18.792 ± .011	15.605 ± .012	38.474 ± .035	0.83040 ± .00017	2.0473 ± .0008
Sacramento River at Colusa	1/04/97	18.905 ± .008	15.629 ± .010	38.631 ± .032	0.82668 ± .00017	2.0434 ± .0008
Sacramento River at Verona	12/18/96	18.808 ± .012	15.619 ± .012	38.536 ± .036	0.83043 ± .00017	2.0489 ± .0008
Sacramento River at Freeport	12/17/97	18.844 ± .011	15.639 ± .011	38.629 ± .034	0.82993 ± .00017	2.0499 ± .0008
Sacramento River at Tower Bridge	1/06/97	19.115 ± .011	15.699 ± .011	39.223 ± .035	0.82130 ± .00017	2.0520 ± .0008
Tributary Sites						
Spring Creek below Debris Dam near Keswick	12/11/96	18.103 ± .010	15.493 ± .011	37.620 ± .034	0.85586 ± .00018	2.0782 ± .0008
Spring Creek below Iron Mountain Road	1/02/97	18.079 ± .009	15.508 ± .010	37.649 ± .032	0.85782 ± .00017	2.0825 ± .0009
Keswick Reservoir, Spring Creek arm, near Keswick	12/11/96	18.153 ± .008	15.511 ± .010	37.697 ± .031	0.85532 ± .00018	2.0788 ± .0009
Distributary Site						
Yolo Bypass at I-80 near West Sacramento	01/07/97	18.896 ± .010	15.625 ± .011	38.620 ± .034	0.82688 ± .00017	2.0438 ± .0008
Streambed Sediment Samples						
Sacramento River Sites						
Sacramento River at Rodeo Park	10/23/96	18.234 ± .013	15.542 ± .015	37.835 ± .048	0.85236 ± .00030	2.0750 ± .0013
Sacramento River above Churn Creek	10/22/96	18.354 ± .016	15.515 ± .017	37.964 ± .047	0.84532 ± .00048	2.0685 ± .0014
Sacramento River at Balls Ferry	10/22/96	18.704 ± .008	15.600 ± .010	38.389 ± .032	0.83404 ± .00017	2.0524 ± .0008
Sacramento River above Bend Bridge	10/22/96	18.819 ± .012	15.601 ± .012	38.482 ± .038	0.82901 ± .00021	2.0449 ± .0010
Sacramento River at Tehama	10/23/96	18.823 ± .019	15.591 ± .021	38.442 ± .059	0.82829 ± .00050	2.0423 ± .0016
Sacramento River at Colusa	11/14/96	18.871 ± .013	15.601 ± .014	38.520 ± .041	0.82672 ± .00030	2.0413 ± .0011
Sacramento River at Verona	11/13/96	18.874 ± .010	15.625 ± .011	38.590 ± .034	0.82788 ± .00019	2.0446 ± .0009
Sacramento River at Freeport	11/15/96	18.877 ± .008	15.632 ± .010	38.597 ± .032	0.82812 ± .00017	2.0447 ± .0008
Tributary Site						
Cottonwood Creek near Cottonwood	10/23/96	18.921 ± .010	15.638 ± .012	38.646 ± .035	0.82646 ± .00033	2.0425 ± .0010

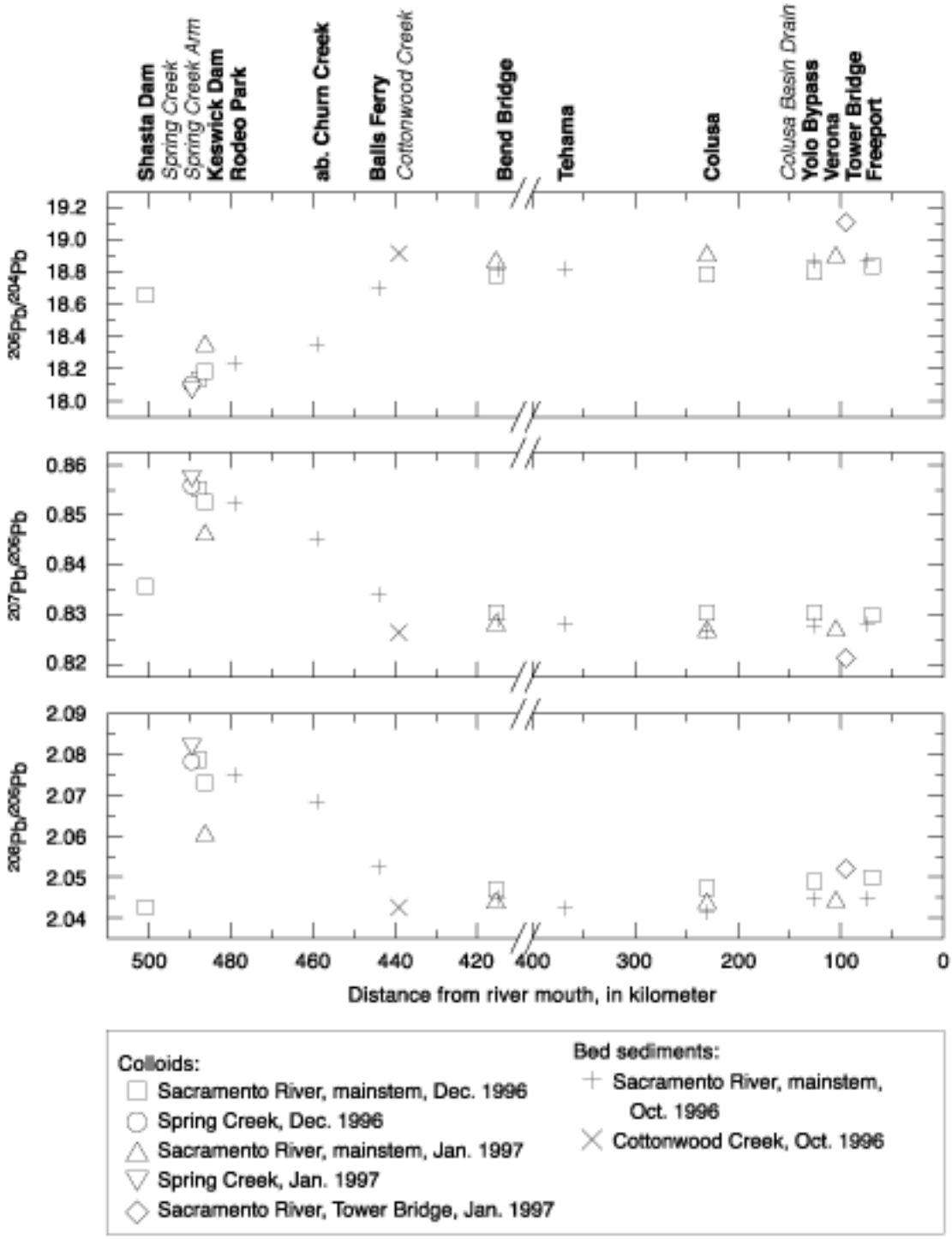


Figure 52. Plots of lead (Pb) isotope ratios in relation to distance (broken scale) from the Sacramento River mouth, California, for streambed sediments and suspended colloids. *A.* $^{206}Pb/^{204}Pb$, *B.* $^{207}Pb/^{206}Pb$, *C.* $^{208}Pb/^{206}Pb$. Site names in bold are mainstem sites and those in italics are tributary sites.

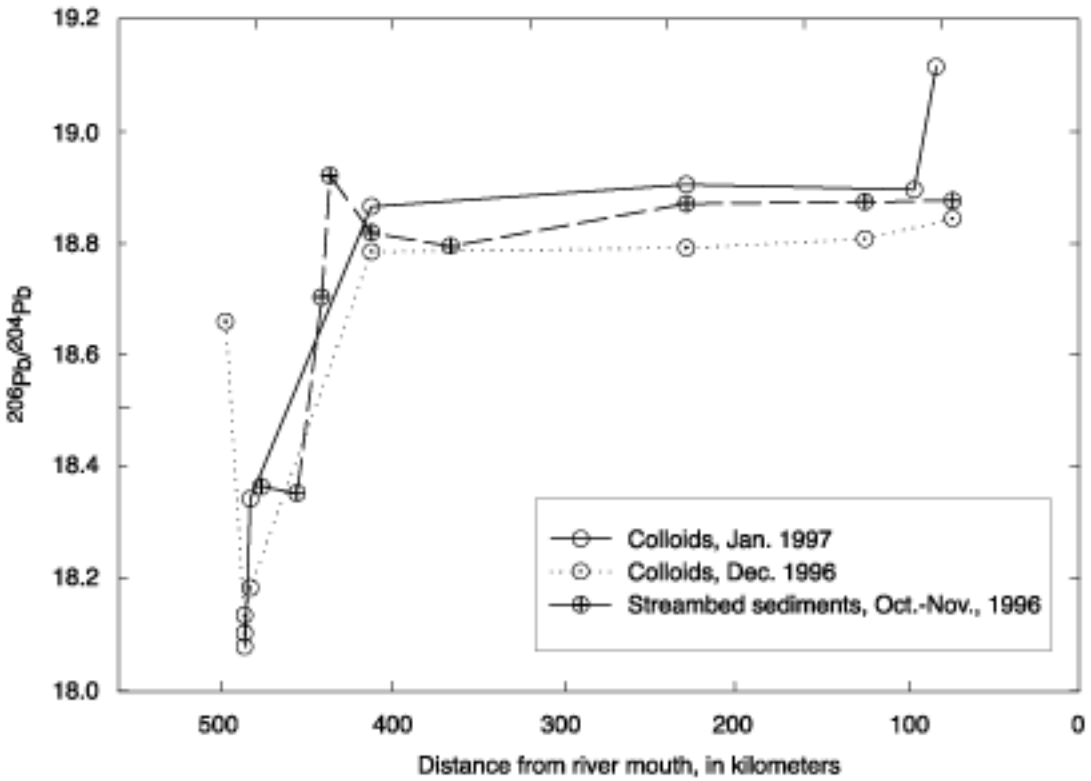
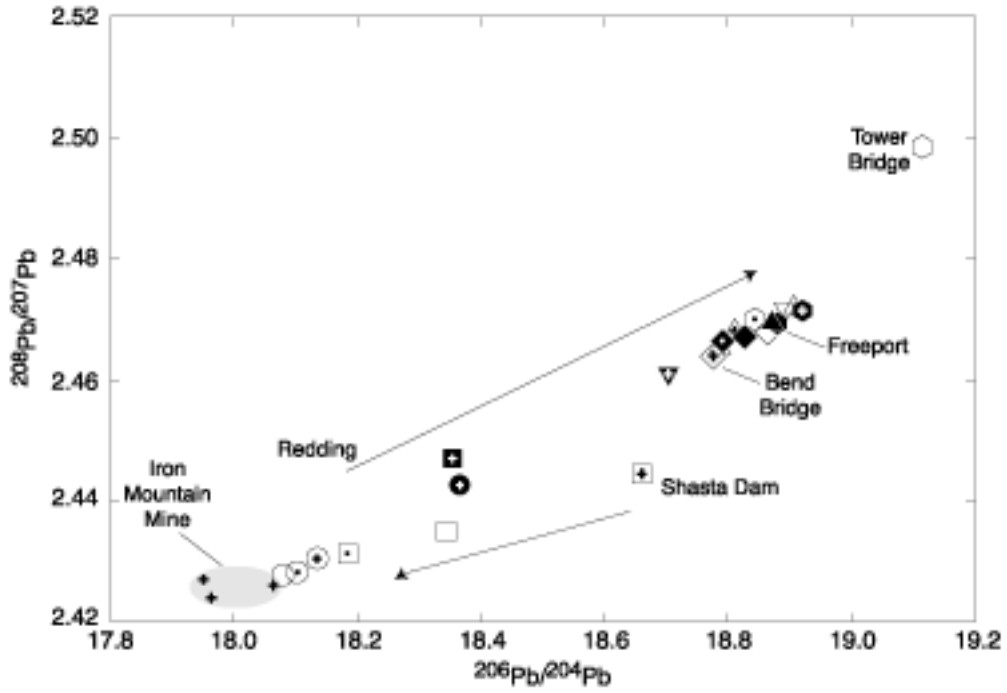


Figure 53. Plot of $^{206}Pb/^{204}Pb$ in relation to distance (continuous scale) from the Sacramento River mouth, California, for streambed sediments and suspended colloids.



EXPLANATION

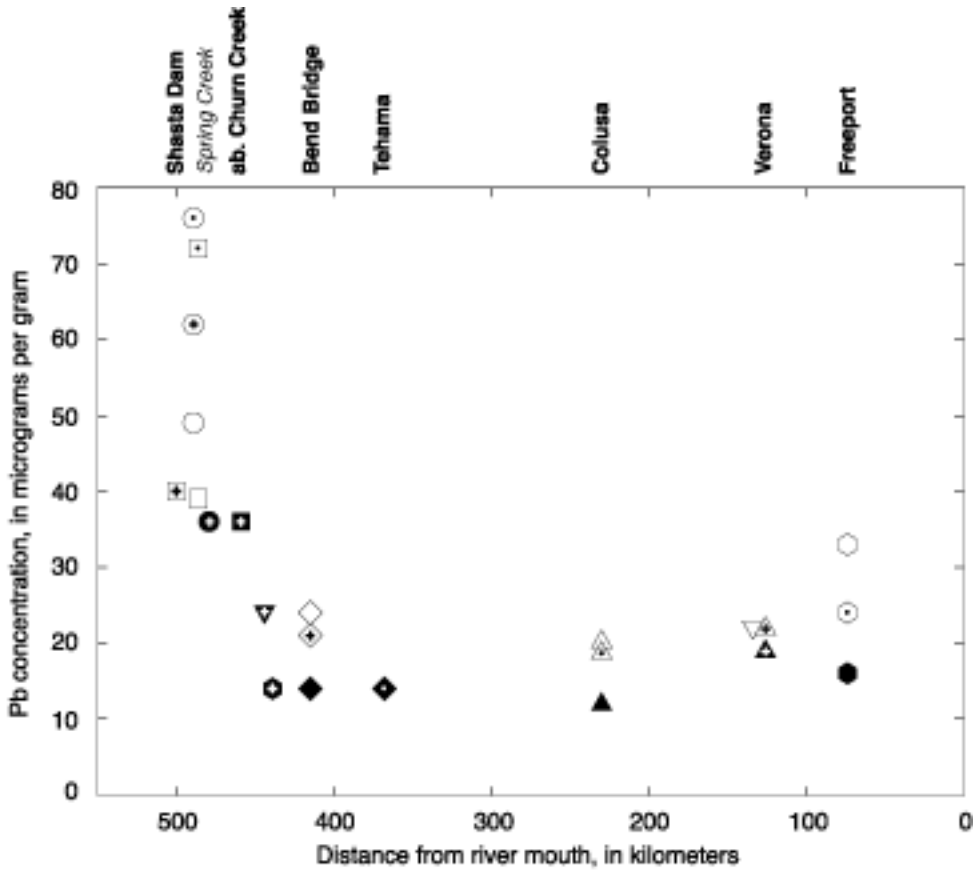
Colloids:

- Sacramento River below Shasta Dam, Dec. 1996
- Sacramento River below Keswick Dam, Dec. 1996
- Sacramento River below Keswick Dam, Jan. 1997
- Sacramento River above Bend Bridge near Red Bluff, Dec. 1996
- Sacramento River above Bend Bridge near Red Bluff, Jan. 1997
- Sacramento River at Colusa, Dec. 1996
- Sacramento River at Colusa, Jan. 1997
- Sacramento River at Verona, Dec. 1996
- Sacramento River at Tower Bridge, Jan. 1997
- Sacramento River at Freeport, Dec. 1996
- Spring Creek below Spring Creek Debris Dam near Keswick, Dec. 1996
- Spring Creek below Iron Mountain Road near Keswick, Jan. 1997
- Keswick Reservoir, Spring Creek arm, Dec. 1996
- Yolo Bypass at I-80 near West Sacramento, Jan. 1997

Streambed sediments:

- Sacramento River at Rodeo Park near Redding, Oct. 1996
- Sacramento River above Churn Creek near Anderson, Oct. 1996
- Sacramento River at Balls Ferry, Oct. 1996
- Sacramento River above Bend Bridge, Oct. 1996
- Sacramento River at Tehama, Oct. 1996
- Sacramento River at Colusa, Nov. 1997
- Sacramento River at Verona, Nov. 1996
- Sacramento River at Freeport, Nov. 1996
- Cottonwood Creek near Cottonwood, Oct. 1996
- Iron Mountain Mine area (Doe and others, 1985)

Figure 54. Plot of $^{206}Pb/^{204}Pb$ versus $^{208}Pb/^{207}Pb$ for streambed sediments and suspended colloids in the Sacramento River Basin, California.



EXPLANATION

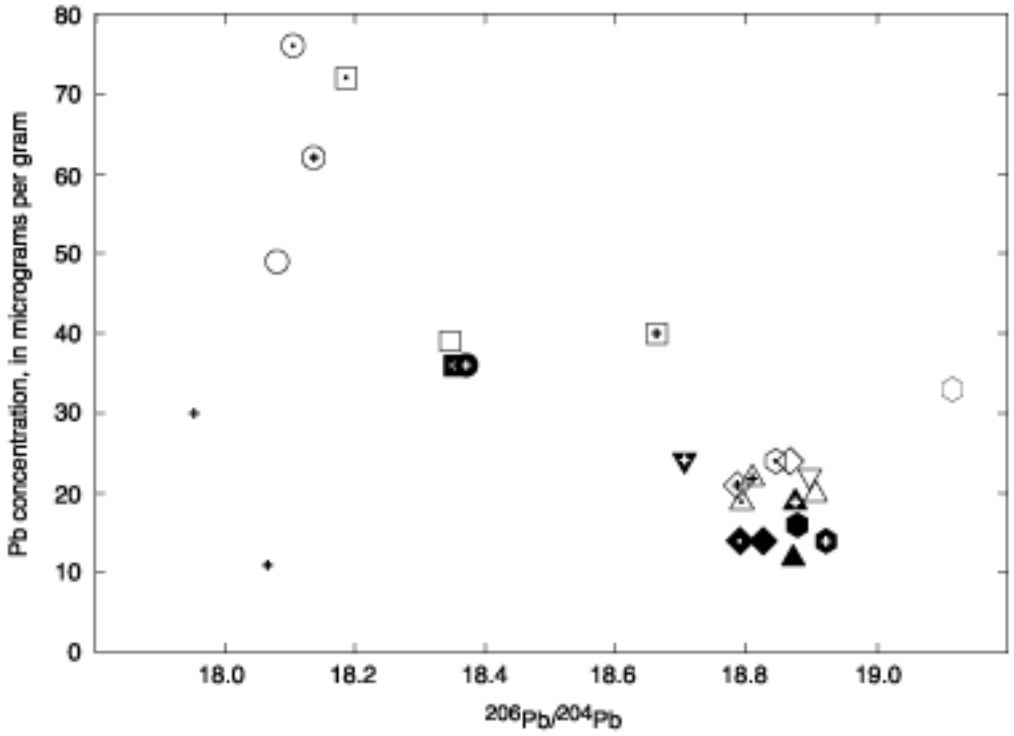
Colloids

- Sacramento River below Shasta Dam, Dec. 1996
- Sacramento River below Keswick Dam, Dec. 1996
- Sacramento River below Keswick Dam, Jan. 1997
- Sacramento River above Bend Bridge near Red Bluff, Dec. 1996
- Sacramento River above Bend Bridge near Red Bluff, Jan. 1997
- Sacramento River at Colusa, Dec. 1996
- Sacramento River at Colusa, Jan. 1997
- Sacramento River at Verona, Dec. 1996
- Sacramento River at Tower Bridge, Jan. 1997
- Sacramento River at Freeport, Dec. 1996
- Spring Creek below Spring Creek Debris Dam near Keswick, Dec. 1996
- Spring Creek below Iron Mountain Road near Keswick, Jan. 1997
- Sacramento River near Spring Creek Arm, Dec. 1996
- Yolo Bypass at I-80 near West Sacramento, Jan. 1997

Streambed sediments

- Sacramento River at Rodeo Park near Redding, Oct. 1996
- Sacramento River above Churn Creek near Anderson, Oct. 1996
- Sacramento River at Balls Ferry, Oct. 1996
- Sacramento River above Bend Bridge, Oct. 1996
- Sacramento River at Tehama, Oct. 1996
- Sacramento River at Colusa, Nov. 1997
- Sacramento River at Verona, Nov. 1996
- Sacramento River at Freeport, Nov. 1996
- Cottonwood Creek near Cottonwood, Oct. 1996

Figure 55. Plot of lead (Pb) concentration in streambed sediments and suspended colloids versus distance (continuous scale) from the Sacramento River mouth, California. Site names in bold are mainstem sites and those in italics are tributary sites.



EXPLANATION

Colloids:

- Sacramento River below Shasta Dam, Dec. 1996
- Sacramento River below Keswick Dam, Dec. 1996
- Sacramento River below Keswick Dam, Jan. 1997
- Sacramento River above Bend Bridge near Red Bluff, Dec. 1996
- Sacramento River above Bend Bridge near Red Bluff, Jan. 1997
- Sacramento River at Colusa, Dec. 1996
- Sacramento River at Colusa, Jan. 1997
- Sacramento River at Verona, Dec. 1996
- Sacramento River at Tower Bridge, Jan. 1997
- Sacramento River at Freeport, Dec. 1996
- Spring Creek below Spring Creek Debris Dam near Keswick, Dec. 1996
- Spring Creek below Iron Mountain Road near Keswick, Jan. 1997
- Sacramento River near Spring Creek Arm, Dec. 1996
- Yolo Bypass at I-80 near West Sacramento, Jan. 1997

Streambed sediments:

- Sacramento River at Rodeo Park near Redding, Oct. 1996
- Sacramento River above Churn Creek near Anderson, Oct. 1996
- Sacramento River at Balls Ferry, Oct. 1996
- Sacramento River above Bend Bridge, Oct. 1996
- Sacramento River at Tehama, Oct. 1996
- Sacramento River at Colusa, Nov. 1997
- Sacramento River at Verona, Nov. 1996
- Sacramento River at Freeport, Nov. 1996
- Cottonwood Creek near Cottonwood, Oct. 1996
- Iron Mountain Mine area (Doe and others, 1985)

Figure 56. Plot of $^{206}Pb/^{204}Pb$ versus lead concentration for streambed sediments and suspended colloids in the Sacramento River Basin, California. Pb, lead.

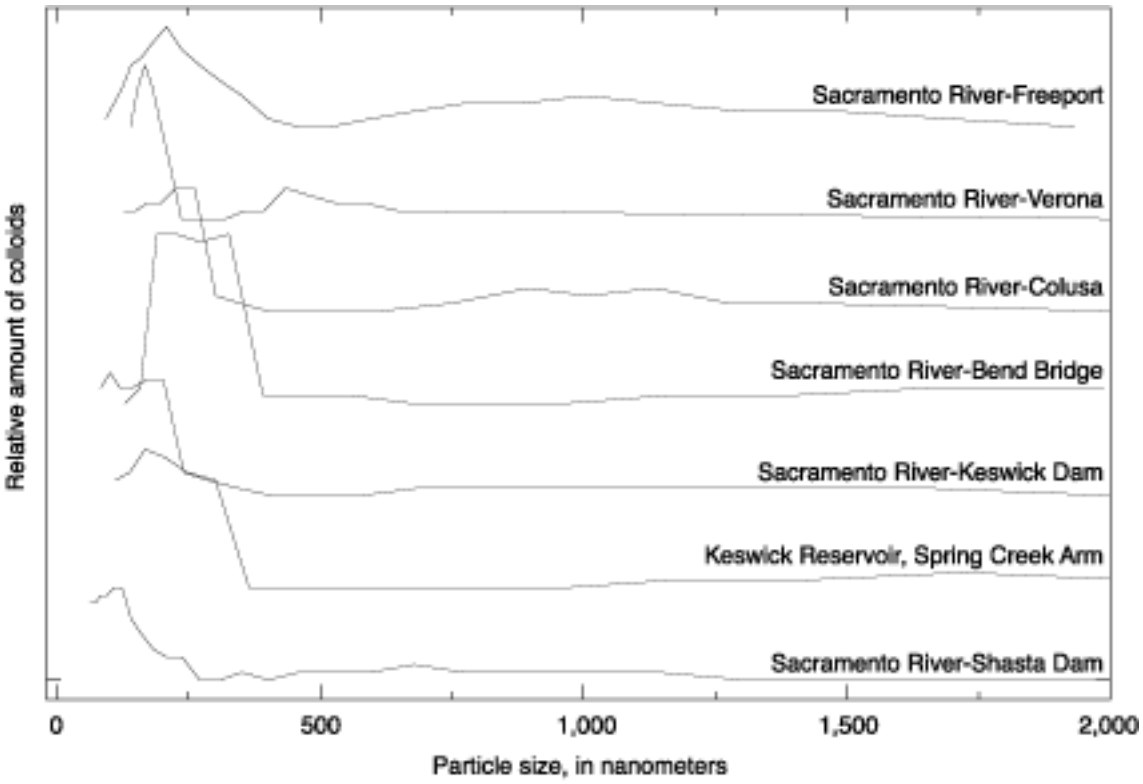


Figure 57. Plot of particulate size distributions for colloid samples collected during September 1996 along the Sacramento River, California.

(Cottonwood Creek) are also given in Appendix 6 (table A6-2). These distributions were determined using whole sediment samples, whereas the fraction of the sediment that was analyzed chemically was the part that passed through a 62-μm screen, as described earlier. The proportion of the whole sediment that passed through the 62-μm screen ranged from 3 to 44 percent, by weight, with a median value of 11 percent, by weight. The sand-sized fraction (62 μm to 2.0 mm) comprises more than 50 percent, by weight, of eight of the nine samples analyzed; the only exception was the sample from Bend Bridge, which had 63 percent, by weight, larger than 2.0 mm (table A6-2).

Summary and Conclusions

Charles N. Alpers, Howard E. Taylor, *and* Joseph L. Domagalski

Results from this study represent some of the first available data of high quality for dissolved and colloidal concentrations of trace elements in the reach of the Sacramento River from Shasta Dam to Freeport. The primary purposes of this report are to document the methods and quality assurance and quality control procedures used in this study and to provide the resulting data in accessible format.

This study used a multidisciplinary approach to improving the understanding of metal distribution, fate, and transport in the Sacramento River. Samples of water, streambed sediment and(or) caddisfly larvae were collected on one or more occasions during the period between June 1996 and July 1997 at 11 sites along the reach of the Sacramento River between Shasta Dam and Freeport; at 7 different tributary sites; and at 1 distributary site, the Yolo Bypass. Water samples were collected and processed using ultraclean techniques necessary for accurate and precise determination of trace and ultratrace constituents. Tangential-flow ultrafiltration (0.005-μm equivalent pore size) was used to determine “dissolved” concentrations that were compared with results from conventional filtration (0.45- and 0.40-μm pore size). The ultrafiltrates give a better approximation to truly

dissolved metal concentrations and allow the extent of colloidal transport to be assessed.

During six sampling periods between July 1996 and June 1997, colloid concentrates were prepared using the retentate from tangential-flow ultrafiltration of large (approximately 100 L) water samples from six mainstem Sacramento River sites (below Shasta Dam, below Keswick Dam, at Bend Bridge, at Colusa, at Verona, and at Freeport), and the Yolo Bypass at Interstate 80 during high flow. The colloid concentrates were analyzed for total metals and some were also subjected to sequential extractions to determine forms of metals in operationally defined fractions: reducible (including hydrous iron and manganese oxides), oxidizable (including organic material and sulfides), and residual (surviving both of the previous extractions).

It was generally found that the sum of dissolved and colloidal concentrations using ultrafiltrates and retentate (colloid concentrate) samples was a more reliable way to estimate total water-column loadings rather than conventional whole-water analyses.

Some other key results of this study are as follows:

1. A. significant proportion of the trace metals transported in the Sacramento River between Shasta Dam and Freeport occurs in colloidal form (operationally defined as grain size between about 0.005- and 1.0-μm diameter). Colloids represent the dominant form of aluminum, iron, lead, and mercury in the water column and are an important factor in the distribution of other trace metals. The proportion of loading that is colloidal as opposed to "dissolved" (less than about 0.005-μm diameter) generally decreases in the order copper greater than zinc and cadmium.
2. The influence of metal-laden acidic drainage from the Iron Mountain mine site (by way of Spring Creek and the Spring Creek arm of Keswick Reservoir) can be seen in data from water samples from the site below Keswick Dam, where historically, the Basin Plan water-quality standards for copper have been exceeded. (The Basin Plan standard for copper in this area is 5.6 μg/L, which is based on a hardness of 40 mg/L and filtration using a 0.45-μm filter.) Some water-quality standard exceedances occurred in January 1997, despite ongoing operation of the lime neutralization plant at Iron Mountain, which reportedly removes about 80 percent of cooper loads and about 90 percent of zinc and cadmium loads from Spring Creek. In mid-December 1996, conventionally filtered copper concentrations were 4.6 to 5.1 μg/L and zinc ranged from 6 to 9 μg/L. During flood conditions in early January 1997, conventionally filtered copper concentrations were 4 to 9 μg/L and zinc ranged from 9 to 16 μg/L. Ultrafiltrates (0.005-μm equivalent pore size) of water samples from below Keswick Dam in December 1996 and January 1997 had copper concentrations about 40 to 70 percent lower than the conventional (0.40- and 0.45-μm) filtrates and zinc concentrations were 10 to 50 percent lower, indicating significant colloidal transport of copper and to a lesser extent, zinc.
3. Lead isotope data in colloid concentrates and streambed sediments provide a useful fingerprint or natural tracer for lead contamination from Iron Mountain mine drainage by way of Spring Creek and Keswick Reservoir. In streambed sediment and suspended colloid samples taken during 1996 and 1997, lead contamination from Iron Mountain is a relatively significant component of the total lead found at Sacramento River sampling sites at Rodeo Park (in Redding) and above Churn Creek (near Anderson), is a much lesser component at Balls Ferry, and is a relatively minor component of the lead in colloids and streambed sediment at Bend Bridge (near Red Bluff) and at sites further downstream.
4. Bioaccumulation of metals in caddisfly larvae was assessed at five sites in the Sacramento River between Redding and Tehama and at one reference site (Cottonwood Creek, near Redding). Samples were taken in October 1996. Cadmium concentrations in caddisfly larvae from Sacramento River sites were enriched 5 to 36 times than those from the reference site. Cadmium concentrations of the whole body ranged from 0.7 to 2.2 μg/g, dry weight. Of this total, approximately 60 percent (0.4 to 1.3 μg cadmium per gram, dry weight) was

associated with the cell cytosol, an intracellular fraction that is indicative of metal bioavailability. Concentrations in the Sacramento River are comparable with other areas severely impacted by mining, such as the Clark Fork River downstream of Butte, Montana (Cain and others, 2000). Concentrations of copper and zinc also showed some enrichment in caddisfly whole bodies and cytosol fractions, which were enriched 1.4 to 3.0 times. The caddisfly data indicate that bioavailable forms of cadmium persist in the Sacramento River downstream of Tehama.

5. The geochemical forms of metals in colloid concentrates from the Sacramento River were evaluated using sequential extraction techniques. During May and June 1997, cadmium was dominantly associated with the reducible (iron–manganese oxide) fraction at all mainstem sampling sites, whereas copper and zinc were more or less evenly distributed between reducible and residual (refractory) fractions at all sites, with a small amount present in the oxidizable (organic plus sulfide) fraction. These results are consistent with the caddisfly bioaccumulation data that indicate that cadmium is relatively more bioavailable than copper or zinc in the river reach between Redding and Tehama.
6. The concentrations of total inorganic mercury in the Sacramento River increased during storm water runoff and were above the EPA water-quality criterion for aquatic life (12 ng/L) during high flows in December 1996 and January 1997, from the Bend Bridge site located near Red Bluff, downstream to Freeport. Dissolved inorganic mercury concentrations (based on 0.005-μm equivalent pore-size ultrafiltration) were found to be very low and relatively constant under a variety of flow conditions, but dissolved plus colloidal concentrations were found to increase with increasing discharge and suspended sediment transport. The concentrations of colloidal mercury were found to be similar to those measured in whole-water samples. Therefore, much of the mercury transported in the Sacramento River is in the colloidal size fraction. Sequential extraction of mercury from the colloid fraction, using specific chemical reagents, showed that most of the mercury is in operationally defined oxidizable and residual fractions with only a minor component in the reducible fraction. The implications for the bioavailability of mercury from these colloidal forms of mercury are currently unknown and represent a logical extension of this research.

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Glossary

Accuracy The measure of the degree of conformance of values generated by a specific analytical method with the true or expected value of that measurement. In this study, accuracy is evaluated by measurement of standard reference materials, spike recoveries, and blanks, and is quantified by the value of REC (Percentage Recovery).

Anion Negatively charged aqueous ion. Examples of common anions in natural waters are chloride (Cl^-) and sulfate (SO_4^{2-}).

Bias Systematic error in laboratory measurements.

Capsule filter A sealed, disposable filtration device through which raw water is pumped to remove particulates. In this study, the term refers to a tortuous-path filter (manufactured by Gelman), with nominal pore diameter of 0.45 micrometers, that is used routinely by the USGS's NAWQA Program.

Cation Positively charged aqueous ion. Examples of common cations in natural waters are sodium (Na^+) and calcium (Ca^{2+}).

Certified value Concentration of a substance in a standard reference material that is certified as correct by an official agency or organization, such as the National Institute of Standards and Technology.

Colloids Fine particles suspended in water. In this study, the lower size limit of colloid particles is operationally defined by passage through a tangential-flow ultrafilter with pore size of 10,000 nominal molecular weight limit (NMWL), or daltons, approximately equivalent to 0.005 micrometers. The upper limit of grain size for colloids in this study is operationally defined by settling for one hour (approximately 1 micrometer).

Colloid concentrate Sample of suspended colloids derived from raw water using ultrafiltration methods. In this study, typically 100 liters of raw water were processed to generate a concentrate of about 0.5 liters in volume that contained a mass of colloidal solids in the range of 0.02 to 2 grams. The concentrate was freeze-dried and then analyzed in a manner similar to that of streambed sediment samples.

Completeness Percentage of analyses meeting the data quality objectives for accuracy and precision in the Quality Assurance Project Plan (see Appendix 1).

Critical elements The elements of most interest to stakeholders in the Sacramento River watershed; operationally defined to include cadmium, copper, lead, mercury, and zinc. Iron and aluminum are included in some discussions of critical elements because of the importance of these major elements to trace element transport.

Detection limit The minimum concentration of a substance that can be measured and reported with 95 percent confidence that the analyte concentration is greater than zero.

Dissolved concentration The concentration of a substance that is present in water, exclusive of suspended particles. For this study, the ultrafiltrate is assumed to be the best approximation to truly dissolved concentrations.

Duplicate sample A split sample of any matrix (water, sediment, or tissue) taken for quality assurance purposes to assess the variability of either field conditions or laboratory methods.

Effective concentration A calculated quantity that represents the sum of the equivalent colloid concentration in water and the dissolved concentration, based on ultrafiltrates for this study.

Equipment blank A water sample taken for quality assurance purposes. The sample consists of deionized water that is put in contact with an individual piece of water-sample processing equipment. The blank is designed to detect contamination problems associated with specific pieces of equipment.

Equivalent colloid concentration in water A calculated quantity that represents the concentration in water of a constituent based only on the colloid-sized particles. The quantity is calculated in this study using chemical data from the colloid concentrates and whole-water (unfiltered) concentrations of aluminum, with the assumption that essentially all aluminum in the whole-water samples is in colloidal form and that the dissolved aluminum concentrations are negligible.

Field blank A water sample taken for quality assurance purposes that consists of deionized water processed in a similar manner to unknown water samples. The blank is designed to detect contamination problems, such as airborne dust, associated with specific field sites.

Laboratory blank A water sample taken for quality assurance purposes that consists of deionized water put through the analysis procedure in a manner identical to unknown samples. The blank is designed to determine detection limits and baseline shifts for analytical methods.

Major elements Elements that are in greatest abundance in a water or solid sample includes major cations and major anions. Major cations in water generally include calcium, magnesium, manganese, potassium, silicon (Si), and sodium.

Membrane filter A wafer-thin, disposable filtration device that is placed inside a holder for each use. In this study, the term refers to a polycarbonate membrane (manufactured by Nuclepore) with uniform holes of 0.40 micrometers in diameter.

MPV Most probable value. Concentration of substance in a noncertified standard reference material that is provided on the basis of analysis by numerous laboratories, usually as the median value. (Compare with certified value.)

Oxidizable Fraction of sequential extraction that is liberated by digestion of a sediment or colloid sample with an oxidizing solution. In this study, a persulfate solution is used to extract metals associated with organic and sulfide components.

Precision The degree of similarity among independent measurements of the same quantity. For this study, precision is quantified by the values of Relative Percentage Difference (RPD) and Relative Standard Deviation (RSD).

REC Percentage Recovery. Quantity computed for the evaluation of accuracy of laboratory analytical data using standard reference materials or recovery of known concentrations of analytes in spiked samples.

For standard reference materials:

$$\mathrm{REC_{SRM}} = \frac{\text{measured value}}{\text{certified or most probable value}} \times 100$$

For spike recoveries:

$$\mathrm{REC_{SPIKE}} = \frac{\text{measured value}}{\text{expected value}} \times 100$$

where the expected value is the original measured concentration in the sample plus the known concentration of the spike.

RPD Relative Percentage Difference. Quantity computed for the evaluation of precision (or variability) of laboratory analytical data using randomly submitted split samples.

$$\mathrm{RPD} = \frac{\text{difference between reported values}}{\text{average reported value}} \times 100$$

RSD Relative Standard Deviation. A quantity computed for the evaluation of precision (or variability) of data. Relative standard deviation is the standard deviation of a series of measurements divided by the average of those measurements times 100:

$$\mathrm{RSD} = \frac{\text{standard deviation}}{\text{average reported value}} \times 100$$

Rare earth elements The chemical elements between atomic numbers 57 and 71, inclusive. These elements are lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium. The chemical characteristics of these elements are generally very similar.

Redox Oxidation-reduction. Certain elements can exist at more than one valence state, such as iron(II) and iron(III); the redox state refers to the relative abundance or chemical activity of the various valences of such elements.

Reducible Fraction of sequential extraction that is liberated by digestion of a sediment or colloid sample with a reducing solution. In this study, a hydroxylamine hydrochloride solution is used to extract metals associated with iron and manganese oxide components.

Replicate sample A split sample of any matrix (water, sediment, or tissue) taken for quality assurance purposes to assess the variability of either field conditions or laboratory methods; similar to a duplicate sample, but not limited to two splits.

Residual Fraction of sequential extraction that is remaining after step-wise digestion of a sediment or colloid sample with both reducing and oxidizing solutions. In this study, a complete digestion using hydrofluoric acid, nitric acid, and hydrochloric acid was used dissolve the residual fraction.

Retentate During the tangential-flow ultrafiltration process, the stream retaining the colloidal material, that does not pass through the filters.

Sequential extraction A process that is designed to determine the concentrations of metals associated with different chemical forms in a solid sample of streambed sediment or colloid concentrate. The sequence of extractions used in this study was: (1) reducible (hydroxylamine hydrochloride), (2) oxidizable (persulfate), and (3) residual (complete digestion using hydrofluoric acid, nitric acid, and hydrochloric acid).

SRM Standard Reference Material. Standard used to evaluate accuracy and precision of laboratory measurements in various matrices including water, solids, and biological tissues. SRMs used in this study are distributed by the National Institute of Standards and Technology (NIST) and by the U.S. Geological Survey (USGS). NIST provides certified values for certain constituents in its SRMs and often provides noncertified, "for informational purposes" values for other constituents. The USGS provides "most probable value" concentrations for constituents in its noncertified Standard Reference Water Samples.

Tangential-flow ultrafiltration A filtration process that results in separation of extremely fine particles from water by passing the water repeatedly along the surfaces of a stack of filter membranes; only a small proportion of the water passes through the filters on a given pass; the water is recirculated until the desired volume of ultrafiltrate is attained, or the desired concentration of colloids; in this study, filters with a nominal pore size of 10,000 NMWL or daltons (equivalent to approximately 0.005 micrometers) were used with Minitan and Pellicon units (manufactured by Millipore Corp.).

Total digestion For streambed sediments and colloid concentrates, a chemical procedure that results in complete dissolution of the samples so that the chemical composition can be determined; in this study, complete digestion was achieved using hydrofluoric acid, nitric acid, and hydrochloric acid.

Total recoverable analysis For unfiltered water samples, a procedure that results in partial extraction of metals from suspended solids; in this study, nitric acid was added in the field to prevent precipitation of iron oxides, then hydrochloric acid was added in the laboratory.

Trace elements Elements that are generally present in very low concentrations in water or solid samples.

Ultrafiltrate The water that passes through a tangential-flow ultrafilter; operationally the best approximation to truly dissolved component of water; in this study, an ultrafilter pore size of 10,000 NMWL (equivalent to approximately 0.005 micrometers) were used.

Ultrafiltration see Tangential-flow ultrafiltration.

Whole-water sample An unfiltered (raw) water sample.

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Appendix 1. QUALITY ASSURANCE PROJECT PLAN FOR THE DATA COLLECTION ACTIVITIES OF THE SACRAMENTO RIVER METALS TRANSPORT STUDY

Editors' Note:

The Quality Assurance Project Plan (QAPP) given in Appendix 1 has been edited slightly from its original version. The Plan has been verified against the main report with clarification of some notation. Other areas remain unchanged, though they may differ in the main report; for example, "REC" in the original version of the QAPP remains unchanged but has been changed to "REC_{SPIKE}" and "REC_{SRM}" in the main report. Tables and figures have been reformatted for clarity, typographical errors have been corrected, and references cited in the text but inadvertently left off the references list have been added. No major revisions have been made.

QUALITY ASSURANCE PROJECT PLAN FOR THE DATA COLLECTION ACTIVITIES OF THE SACRAMENTO RIVER METALS TRANSPORT STUDY

November 1996

Prepared by the U. S. Geological Survey for the
Sacramento Regional County Sanitation District

The use of firm, trade, and brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey

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1. Title Page and Approvals

REVISED DRAFT QUALITY ASSURANCE PROJECT PLAN FOR THE DATA COLLECTION ACTIVITIES OF THE SACRAMENTO RIVER METALS TRANSPORT STUDY

Implemented by the Sacramento Regional County Sanitation District

Approvals:

Project Manager	Cheryl Crepon, Water Quality Division Chief, SRCSD	12/12/96 Date
QA Manager	Charles N. Alpers, Research Chemist, U.S. Geological Survey	12/4/96 Date
QA Officer	Dr. Howard E. Taylor, Research Chemist, U.S. Geological Survey	12/9/96 Date
State Board Contract Manager	Greg Frantz, California State Water Resources Control Board	12/19/96 Date

2. Distribution List

Cheryl Creson, Sacramento Regional County Sanitation District
Rosemary Clark, Sacramento Regional County Sanitation District

Greg Frantz, State Water Resources Control Board

Technical Advisory Committee:

Jerry Boles, Department of Water Resources, State of California
Jim Bybee, National Marine Fisheries Service
Ron Churchill, Department of Mines and Geology, State of California
Val Connor, Regional Water Quality Control Board–Central Valley Region
Bill Croyle, Regional Water Quality Control Board–Central Valley Region
Lee Erickson, Stauffer Management Co.
John Fields, Bureau of Reclamation
Brian Finlayson, Department of Fish and Game, State of California
Russ Flegal, University of California–Santa Cruz
Dean Heckathorn, U.S. Fish and Wildlife Service
Dennis Heiman, Regional Water Quality Control Board–Central Valley Region
Rick Humpreys, State Water Resources Control Board
Nick Iadanza, National Marine Fisheries Service
Bill Jennings, Delta Keeper
Ray Krauss, Homestake Mining Co.
Stefan Lorenzato, State Water Resources Control Board
Paul Meyer, Bureau of Land Management
Michael Pickering, Brush Creek Mining and Development Co.
Kerry Rae, Bureau of Reclamation
Mike Saiki, U.S. Geological Survey, Biological Resources Division
Darell Slotton, University of California–Davis
Chris Stathos, Suction Dredgers Ad-Hoc Committee
Rick Sugarek, U.S. Environmental Protection Agency
Claus Suverkropp, Larry Walker Associates
Jane Vorpagel, Department of Fish and Game, State of California
Dan Welsh, U.S. Fish and Wildlife Service
Ray Zimny, U.S. Army Corps of Engineers

3. Project Organization and Responsibility

This project will be managed by the Sacramento Regional County Sanitation District (SRCSD). The project manager is Ms. Cheryl Creson, Chief of the Water Quality Division of the SRCSD.

The project quality assurance manager is Dr. Charles N. Alpers, Research Chemist with the U.S. Geological Survey (USGS) in Sacramento. Sample collection and most data acquisition work will be conducted by the USGS.

Analysis of water samples for trace and ultratrace elements (including mercury), and major cations in water, in colloid concentrates, and in sediment extracts will be done by the USGS laboratory in Boulder, Colorado, under the supervision of Dr. Howard E. Taylor, who is the Quality Assurance officer for this work. Dr. Taylor will also assist in training USGS field personnel in sampling and equipment cleaning procedures.

Analysis of nutrients, organic carbon, and major anions in water samples will be done by the USGS National Water Quality Laboratory in Arvada, Colorado. The Quality Assurance officer for this portion of the work is Dr. Peter Rogerson, who is Director of the USGS National Water Quality Laboratory (NWQL).

Analysis of iron redox species in water samples will be done by the USGS in Sacramento, under the direction of Dr. Charles N. Alpers. Grain size distribution of suspended sediment will be done by the USGS laboratory in Vancouver, Washington. Grain size distribution in colloid concentrates will be done at the USGS laboratory in Boulder, Colorado.

Mössbauer spectroscopy will be done by the Technical University in Munich, Germany under the direction of Dr. Udo Schwertmann. Flow measurements will be provided by the USGS, the California Department of Water Resources, the Bureau of Reclamation, and other water agencies responsible for recording stream flow in the study area.

A technical advisory committee (TAC) will serve as technical reviewers for the project. The TAC consists of staff from the SRCSD, Larry Walker Associates (contractor to the SRCSD), the California State Water Resources Control Board (SWRCB), the Regional Water Quality Control Board - Central Valley Region, the California Department of Conservation (Division of Mines and Geology), the California Dept. of Fish and Game, the U.S. Environmental Protection Agency (EPA) Region IX, CH2M-Hill (contractor to the U.S. EPA), the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the Bureau of Reclamation, The Bureau of Land Management, the U.S. Forest Service, the U.S. Army Corps of Engineers, the National Marine Fisheries Service, the University of California at Davis, the University of California at Santa Cruz, and commercial and recreational mining interests.

4. Project Description

4.1 Project Definition

Metals from abandoned and inactive mines represent a major source of potentially toxic contamination to fish populations of the Sacramento River in northern California. Concentrations of copper (Cu), zinc (Zn), cadmium (Cd), lead (Pb), and mercury (Hg) are of concern regarding aquatic life at several points in the Sacramento River. The winter-run Chinoook salmon, a federally listed endangered species, has critical habitat in the Sacramento River, as do other threatened aquatic species.

In the lower part of the Sacramento Basin, agricultural activities may be an important source of copper to the river because of the widespread application of compounds such as copper sulfate for control of algae in rice fields. Urban runoff represents a third potential source of metals to the river.

Mercury contamination is a well documented problem in several streams tributary to the Sacramento River. Mercury may be transported to the river from natural geological sources in

the Coast Ranges, from abandoned mercury mines, from base metal mines, and from mercury which was transported into the Sierra Nevada and foothill regions for use in historical gold mining operations. Non-point sources associated with urban land use may also contribute mercury to the river environment.

4.2 Project Objectives and Approach

The overall objective of the study is to quantify the speciation and transport of copper, zinc, lead, cadmium, and mercury in the Sacramento River below Shasta Dam and to identify sources of trace metals to the Sacramento River, including mines, agriculture, and urban runoff. The geochemical studies are designed to determine the processes affecting the transport mechanisms of dissolved metals and metals associated with fine-grained sediments. Improved knowledge of these issues will provide an understanding of how the river responds chemically to introduced metals. This understanding is critical to determining the benefits throughout the watershed of ongoing and proposed remediation at the Iron Mountain Mines Superfund site and at other mines in the vicinity of Shasta Lake and to determining the likelihood that such remediation may or may not lead to the reduction of metal loadings in the Sacramento River.

Three critical unanswered questions with regard to metals in the Sacramento River will be addressed: (1) What is the distribution and speciation of metals in the dissolved, colloidal, and suspended phases? (2) How do metal concentration and speciation change as a function of distance down-river? and (3) What is the relative magnitude of metal sources, including mine drainage, agricultural drainage, and urban runoff?

Water samples will be collected and analyzed at selected locations to characterize the grain size of suspended particles having elevated concentrations of metals and to determine concentrations of dissolved metals. Tangential-flow ultrafiltration using filter membranes rated at 10,000 Nominal Molecular Weight Units (NMWU, or daltons), equivalent to 0.005 μm pore diameter, will be used to process large volumes of river water so that suitable amounts of colloidal material can be concentrated for analysis. Water samples also will be filtered with conventional 0.45 micrometer pore-diameter membranes for comparison with data collected by

the National Water Quality Assessment Program (NAWQA) of the U.S. Geological Survey and other agencies collecting water-quality data in the Sacramento River Basin. However, the tangential-flow system is expected to provide a more reliable separation of solids because partial clogging of membrane pores is avoided (e.g. Horowitz and others, 1994).

Filtrates from 0.005 equivalent and 0.45 micrometer pore-diameter membranes and colloids concentrated during ultrafiltration will be analyzed chemically to determine the distribution of metals and major elements in different suspended size fractions and in the operationally defined "dissolved" phase. Trace elements and major cations will be determined by inductively coupled plasma/atomic emission spectrometry (ICP–AES) initially, followed by inductively coupled plasma/mass spectrometry (ICP–MS) for all elements with concentrations less than about 500 μg/L. The methodology that will be used was developed by the USGS National Research Program (Garbarino and Taylor, 1995) to achieve state-of-the-art detection limits for trace metals. Concentrations of mercury will be determined by cold vapor atomic fluorescence spectrometry (CV–AFS). Major anions will be determined by ion chromatography (IC). Ferrous and total iron will be determined by using ultraviolet (UV) spectroscopy with ferrozine as the complexing agent (Stookey, 1970). Aqueous speciation and ion-paring analysis will be carried out using the computer program WATEQ4F (Ball and Nordstrom, 1991) or the equivalent update. Light-scattering spectrometry and X-ray sedimentation analysis will be used to characterize the grain size distribution of the colloidal concentrates.

Mineralogy of suspended and colloidal material will be assessed using X-ray diffraction (XRD) and low-temperature Mössbauer spectroscopy, techniques required to determine the crystallinity and structure of poorly crystalline forms of hydrous iron and aluminum oxides and hydroxy-sulfates (Murad and others, 1994). Extended X-ray Absorption Fine Structure (EXAFS) spectroscopy and related methods will be investigated in an attempt to determine the nature of chemical bonds between trace metals and hydrous iron and aluminum oxide particles, and in particular to distinguish between metal adsorption and co-precipitation (e.g. Waychunas and others, 1993). This distinction is important for determining geochemical mechanisms that could lead to bioavailability via release of trace metals from suspended solids, for example: (a) desorption of metals from Fe-Al-hyroxy-sulfate mineral surfaces in response to pH change, (b) release of metals associated with Fe-Al-hydroxy-sulfate minerals by mineral dissolution driven by iron photoreduction of pH change, and (c) oxidative dissolution of mono-sulfide minerals.

Temperature, specific conductance, pH and alkalinity will be measured in the field.

Bed sediment samples will be collected at all the sampling sites. Sediment samples will be screened using river water to exclude material coarser than 63 μm, consistent with protocols used elsewhere in the Sacramento Basin by USGS as part of the NAWQA program. Sequential extractions will be carried out on bed-sediment samples and colloidal concentrates using a series of increasingly strong acids and oxidizing (or reducing) agents (Chao and Zhou, 1983) to determine the likely mineral or metal-organic hosts for different trace metals (Cu, Zn, Cd, Pb, Hg, Fe, and Al). The extracted solutions will be analyzed by ICP–AES, ICP–MS, and CV–AFS. Minerology and trace-metal bonding characteristics will be evaluated using the techniques previously described (XRD, Mössbauer spectroscopy, and EXAFS).

Sediment pore water will be extracted and analyzed for metal concentrations at sites where suitable fine grained sediment deposits exist, to aid in the evaluation of water-sediment interactions. Aqueous speciation and ion-paring analysis will be carried out on sediment pore water using the computer program WATEQ4F (Ball and Nordstrom, 1991), or updated equivalent, for the sediment environments.

4.3 Sampling Site Locations

Sample site locations for both water and sediment sampling are shown in Figures 1 and 2. The effect of metal concentrations in Spring Creek will be assessed by taking one sample in Keswick Reservoir below Shasta Dam, another sample in the Spring Creek arm of Keswick Reservoir, and a third sample below Keswick Dam. The four other sampling sites for both water and sediment are located on the Sacramento River farther downstream of Keswick Dam. Data from these sites will be used to assess changes in concentrations, loading, and partitioning of metals as they are transported downstream and also to identify and characterize any additional contaminant sources from agricultural and urban land use in the lower areas of the basin. In addition, sediment samples will be taken from five to eight sites along the Sacramento River between Keswick Dam and Red Bluff, plus from one tributary creek near Redding. These additional sediment samples will taken at sites where caddis fly larvae will be collected for a complementary study of metal bioaccumulation.

Currently identified sampling sites:

Site name	USGS Site number
1) Keswick Reservoir below Shasta Dam	404259122252501
2) Keswick Reservoir, Spring Creek Arm	403750122272301
3) Sacramento River below Keswick Dam	403633122264301
4) Sacramento River near Bend Bridge	11377100
5) Sacramento River at Colusa	11389500
6) Sacramento River near Verona	11425500
7) Sacramento River at Freeport	1144765

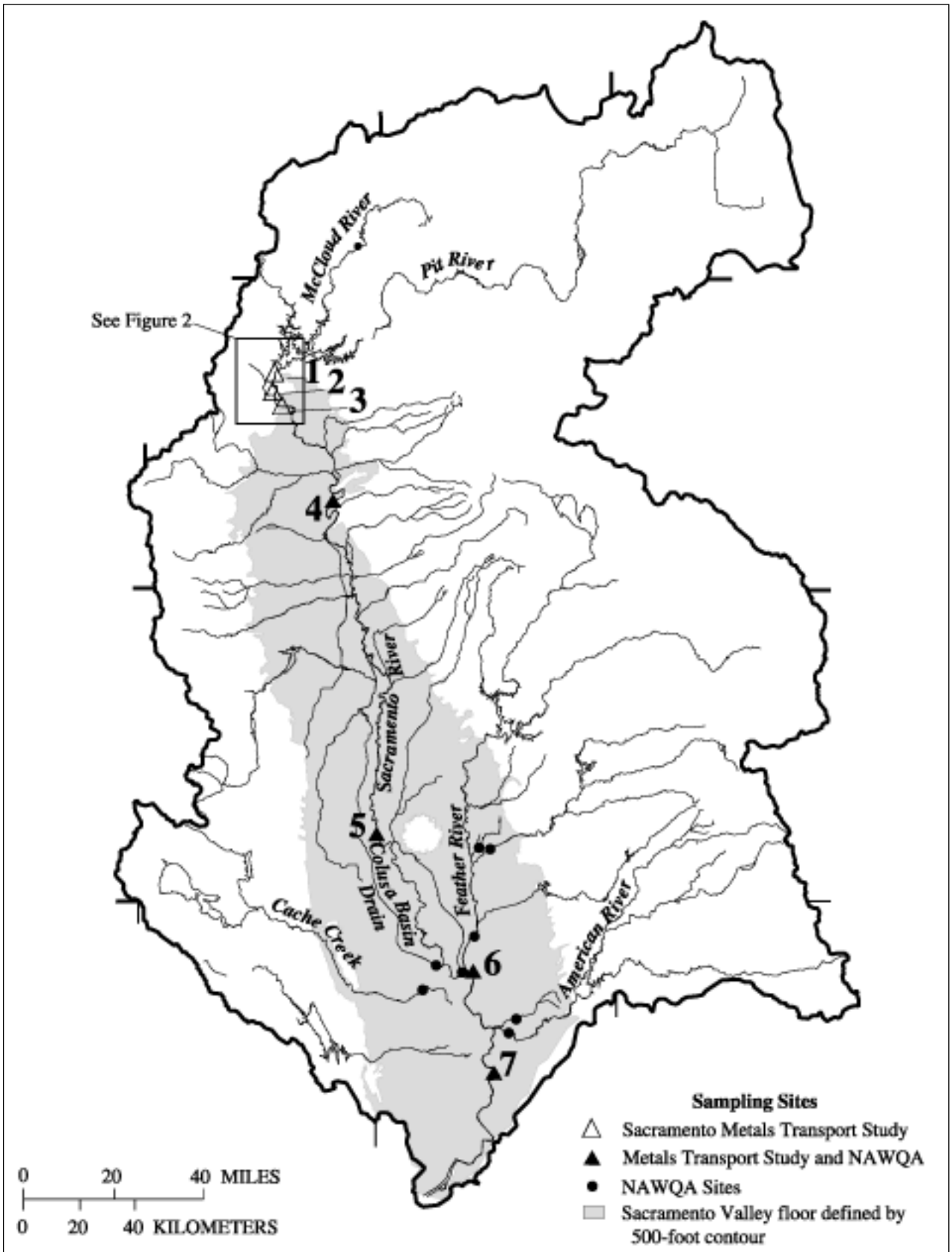

Figure 1. Location of sampling sites and site numbers.

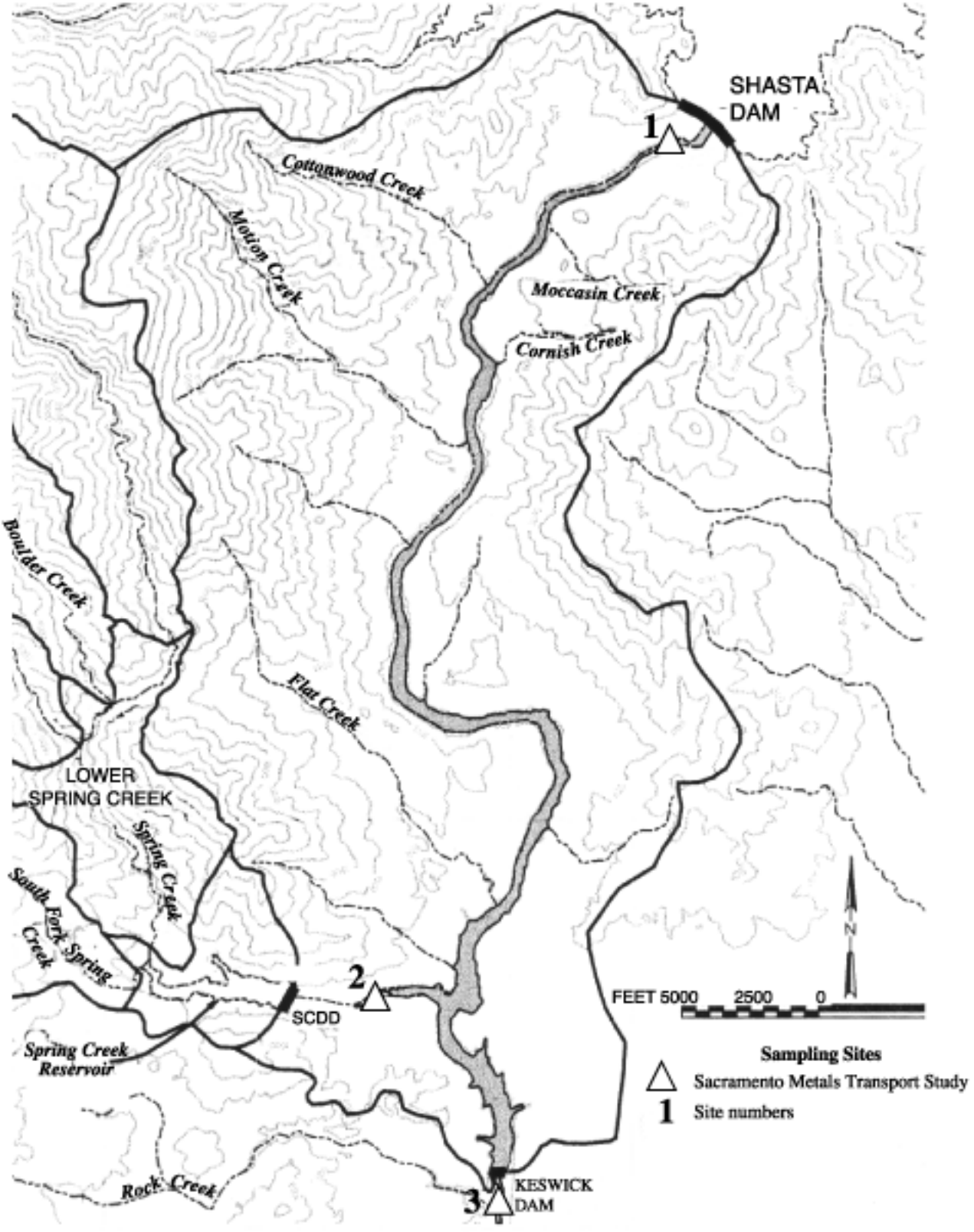

Figure 2. Sites in and below Keswick Reservoir.

4.4 Sampling Schedule

Sample collection is expected to be done between July 1996 and June 1997. Samples will be collected periodically throughout the year to assess effects of seasonal changes and also during high flows associated with winter storms to assess the effect of these events on the loading and partitioning of metals in the river. A minimum of six water samples and one bed sediment sample will be collected at each site.

1996	July	Water samples
	Aug.	Bottom sediment samples
	Sept.	Water samples
	Nov.	Water samples collected at predicted lowest flows of the year
1997	Dec./Jan.	Water samples collected during storm events
	Feb./Mar	Water samples collected during storm events
	May/June	Water samples collected during the period of rice field drainage
	July	Water samples (if funding is sufficient)

5. Quality Assurance Objectives for Field and Laboratory Measurements

The objective of data collection in this project is to produce data that represent, as closely as possible, in situ conditions of the sampled water body. This objective will be achieved by using accepted methods to collect and analyze water and sediment samples and by evaluating field and laboratory measurements in terms of detection limits, precision, accuracy, and completeness as summarized in Table 1 through 3. The detection limits in Tables 1 and 2 are based on previous work done by the analytical laboratory (under the direction of Dr. Howard Taylor) that will conduct the analyses for this study. Actual limits of detection and quantitation for this study will be determined using data analysis techniques described by Garbarino and Taylor (1995).

Table 1. Quality assurance data objectives for chemical analyses of water samples

[concs., concentrations; CV–AFS, cold-vapor/atomic fluorescence spectrometry; IC, ion chromatography; ICP–AES, inductively coupled plasma/atomic emission spectrometry; ICP–MS, inductively coupled plasma/mass spectrometry; IRS, infrared spectrometry; REC, percentage recovery; ROE, residual on evaporation; RPD, relative percentage difference, SRM, Standard Reference Material; UV, ultraviolet spectroscopy, μg/L, microgram per liter; %, percent]

Constituent	Method	Detection Limit	Precision	Accuracy	Complete-ness
Copper	ICP–MS	0.02 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Zinc	ICP–MS	0.08 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Lead	ICP–MS	0.06 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Cadmium	ICP–MS	0.05 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Mercury	CV–AFS	0.0004 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Iron	ICP–AES	5 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Iron (II) and total (III by difference)	UV	10 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Aluminum	ICP–MS	0.2 μg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Sulfate	IC	0.1 mg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Chloride	IC	0.1 mg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%

Table. 1 "continued"

Constituent	Method	Detection Limit	Precision	Accuracy	Complete-ness
Fluoride	IC	0.1 mg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Total dissolved solids	Gravimetric (ROE)	1 mg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Nitrite	IC	0.01 mg/L as nitrogen	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Nitrate + nitrite	Colorimetric (cadmium reduction-diazotization)	0.05 mg/L as nitrogen	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Ammonia	Colorimetric (salicylate-hypochlorite)	0.01 mg/L as nitrogen	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Ammonia + organic nitrogen	Colorimetric (salicylate-hypochlorite)	0.20 mg/L as nitrogen	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Phosphorus (total)	Colorimetric (phosphomolyb-date)	0.01 mg/L as phosphorus	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Phosphorus (orthophos-phate	Colorimetric (phosphomolyb-date)	0.01 mg/L as phosphorus	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
Organic carbon	Wet oxidation, IRS	0.1 mg/L	Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%

Table 2. Quality assurance data objectives for chemical analyses of bed-sediment samples and colloid concentrates, including sequential extractions

[concs., concentrations; ICP–MS, inductively coupled plasma/mass spectrometry; CV–AFS, cold-vapor/atomic fluorescence spectrometry; ICP–AES, inductively coupled plasma/atomic emission spectrometry; REC, percent recovery; ROE, residual on evaporation; RPD, relative percentage difference, SRM, Standard Reference Material; %, percent; µg/g, microgram per gram]

Constituent	Method	Detection Limit	Precision	Accuracy	Completeness
Copper	ICP–MS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		0.3			
oxidation		0.4			
residual		2			
Zinc	ICP–MS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		0.1			
oxidation		4			
residual		5			
Lead	ICP–MS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		0.3			
oxidation		1.5			
residual		2			
Cadmium	ICP–MS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		0.3			
oxidation		1.5			
residual		3			
Mercury	CV–AFS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		0.004			
oxidation		0.02			
residual		0.06			
Iron (total)	ICP–AES		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		1			
oxidation		5			
residual		10			
Aluminum	ICP–MS		Duplicate RPD ≤25% or ±50% at concs. <10 times the detection limit	SRM REC or Lab Spike = 100% ±25% or ±50% at concs. <10 times the detection limit	90%
reduction		2			
oxidation		10			
residual		20			

Table 3. Quality assurance data objectives for field measurements of water quality

[DIFF, diffraction; REC, percentage recovery. °C, degree Celsius. %, percent. mg/L, milligram per liter]

Measurement	Method	Accuracy	Completeness
Alkalinity	Gran titration	REC = 100% ±25%	90%
pH	Electrochemical	DIFF <0.1 unit	90%
Temperature	Thermistor	DIFF <1°C	90%
Dissolved oxygen	Electrochemical	DIFF <0.2 mg/L	90%
Specific conductance	Electrical resistance	DIFF ±3%	90%

6. Specific Routine Procedures Used to Assess Data

Detection limits used in this study are the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Detection limits must be low enough to evaluate the presence of a substance at the concentrations of interest.

Precision (or variability) is the degree of similarity among independent measurements of the same quantity. The precision of laboratory analytical data is evaluated by randomly submitted split samples and evaluated in terms of relative percentage difference (RPD).

$$\text{RPD} = \frac{\text{difference between reported values}}{\text{average reported value}} \times 100$$

Accuracy (bias or systematic error) is defined in this study as the measure of the degree of conformance of values generated by a specific method with the true or expected value of that measurement. The accuracy of field measurements is evaluated by the use of standard methods of analysis with the appropriate calibration standards. The accuracy of laboratory analytical data is assessed by analyzing standard reference materials (SRM) or the recovery of known concentrations of analytes in spiked samples and calculating the percent recovery (REC) where:

$$\text{RPD} = \frac{\text{measured value}}{\text{expected value}} \times 100$$

Both precision and accuracy will be enhanced by the use of standardized methods for sample collection, handling and preservation and the analysis of field and laboratory blank samples.

Completeness is measured as the percent of valid analyses (those meeting the accuracy and precision objectives). Water samples will be taken at seven sites on at least six occasions for a total of at least 42 samples. Therefore, to achieve 90 percent completeness, 38 of 42 samples must meet the quality assurance data objectives.

7. Sample Collection

Sampling procedures and many of the analytical methods used in this study are identical to those used in the USGS NAWQA project currently underway in the Sacramento River Basin. Data produced by the two studies will be directly comparable to one another.

Representative water samples for total and dissolved constituent analysis will be collected concurrently with samples for colloidal analysis at each site.

7.1 Surface Water Sampling Procedures

Samples from sites accessible by bridge only (Sacramento River below Shasta Dam and Sacramento River at Bend Bridge, during high flow) will be collected using a USGS D77 sampler (Horowitz and others, 1994) shown in Figure 3. The bronze body of the sampler has been epoxy coated to eliminate potential contamination from the sampler itself. The 3-L sample bottle and all parts of the equipment that contact the sample are made of Teflon. The sampler will be suspended from a boat at other sites where it is used. The D-77 sampler is designed to fill the sample bottle in an isokinetic manner (the water enters the sampler at the same velocity as the

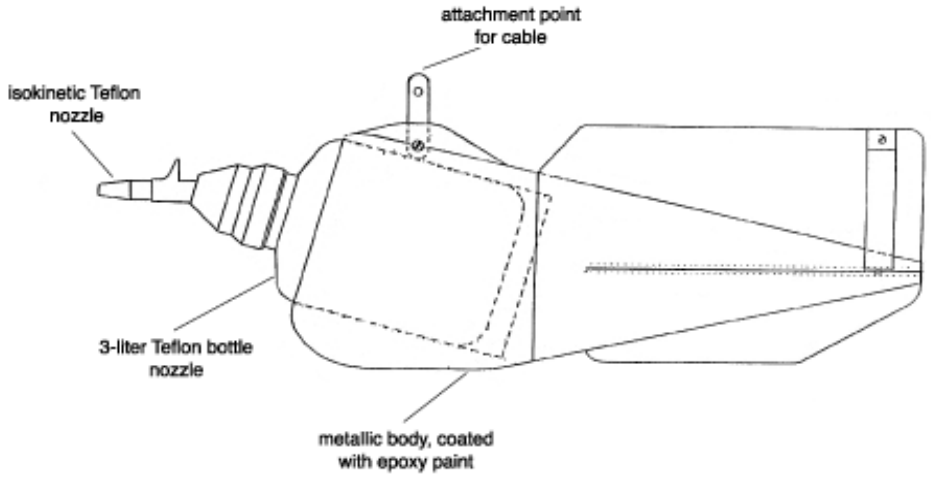

Figure 3. Depth-integrating sampler, D-77.

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water near the sampler) to ensure that concentrations of suspended sediment particles are representative of concentrations in the water sampled. This equipment is capable of collecting an isokinetic sample to a depth of about 15 feet. If this depth is exceeded at a sampling station, a modification of the sampler will be made to extend its depth range. This modification consists of using a perforated polyethylene bottle with a Teflon bag liner in place of a standard 3-L bottle. A set of Teflon bags will be dedicated to each sampling site to minimize potential for contamination between sites.

Samples from the Sacramento River below Keswick Dam will be collected with Teflon tubing using a peristaltic pump from near shore directly into Teflon bottles and polyethylene carboys. The narrow and turbulent channel at this location appears very well mixed and boat access is not feasible. The same approach will be used to sample the Sacramento River below Shasta Dam at low flows. The sites accessible by boat (Spring Creek arm of Keswick Reservoir, and the Sacramento River at Colusa, Verona, and Freeport) also will be sampled using Teflon tubing and a peristaltic pump. The tubing will be secured in 10-feet of polyvinyl chloride (PVC) pipe and suspended into the water column from the bow of the boat to minimize potential contamination. During sample collection, the depth of the tubing intake will be varied between 1 and 9 feet below the river surface.

Mercury and lead will be sampled from a single vertical traverse near the middle of the river. Composite samples for other trace metals, major ions, and other constituents will be collected using equal-discharge-increment methods (Edwards and Glysson, 1988) which provide a cross-section transect sample whose concentration is discharge weighted, both vertically and laterally. Between 5 and 15 lateral points will be sampled on each cross-section. Because of the size of the river and the minimum fill rates of the D77 sampler, sample volume is expected to be between 6 to 20 L and will require multiple sample bottles. Samples for total and dissolved constituents will remain in the 3-L Teflon bottle in which they were collected until processing, or will be composited in a Teflon-lined churn. Because a large volume of water is needed to recover an adequate mass of colloidal material, samples collected for colloid analysis from the vertical stations on a cross-section transect will be composited in one or more 25-L polyethylene carboys. Concentrations of metals in the colloidal fractions are expected to be high enough that any slight

contamination or adsorption resulting from the use of polyethylene rather than Teflon containers should not be significant. Each site will have a dedicated set of carboys that will be used only at that site in order to minimize the potential for contamination between sites.

Samples for mercury and lead analyses will be collected from just one sampling point located at the center of flow using a specially cleaned sample bottle and nozzle. While a width integrated sample provides more confidence that the sample is truly representative of the river at the time of sampling, it also exposes the sample to the atmosphere and potential contamination for a longer period of time. Because concentrations of dissolved mercury and lead are expected to be low, it will be critical to achieve minimal levels of contamination.

7.1.1 Subsample requirements

Once a representative sample of the river water has been collected, a variety of subsamples will be split and processed before shipping to laboratories. Processing will take place in a mobile laboratory that was built for use in the USGS NAWQA program. The mobile lab allows for efficient sample preparation in a clean environment. Subsample requirements for the project are listed in Table 4.

Table 4. Subsamples of water required for scheduled analyses

[*, triple-distilled HNO_3 for ultratrace element preservation; (a), a split sample will be held for archive purposes. conc., concentration; CA, California, CO, Colorado; EXAFS, extended X-ray absorption fine structure; NMWL, nominal molecular weight limit; Poly, polyethylene; USGS, U.S. Geological Survey; XRD, X-ray diffraction. μm, micrometer]

Matrix/filtration	Analysis	Preservation	Bottle type, volume	Laboratory
Whole water	Mercury	Oxidize ($K_2Cr_2O_7$) Acidify (HNO_3*)	Glass, 125 mL (a)	USGS–Boulder, CO
	Lead	Acidify (HNO_3*)	Teflon, 250 mL	USGS–Boulder, CO
	Major/trace elements (cations)	Acidify (HNO_3*)	Poly, 125 mL (a)	USGS–Boulder, CO
	Major elements (anions)	None	Poly, 125 mL (a)	USGS–Arvada, CO
	Suspended sediment conc.	None	Poly, 1,000 mL	USGS–Salinas, CA
0.45 μm filtrate (silver filter)	Organic carbon, dissolved	None	Glass, baked, 125 mL	USGS–Arvada, CO
Silver filter retentate	Organic carbon suspended	None	Petri dish	USGS–Arvada, CO
0.45 μm filtrate (capsule filter)	Mercury	Oxidize ($K_2Cr_2O_7$) Acidify (HNO_3*)	Glass, 125 mL (a)	USGS–Boulder, CO
	Lead	Acidify (HNO_3*)	Teflon, 250 mL	USGS–Boulder, CO
	Major/trace elements (cations)	Acidify	Poly, 125 mL (a)	USGS–Boulder, CO
	Major elements (anions)	None	Poly, 125 mL	USGS–Arvada, CO
	Iron, redox speciation	Acidify (HCl), chill	Poly, amber, 125 mL	USGS–Sacramento, CA
	Nutrients	Chill	Poly, amber, 125 mL	USGS–Arvada, CO
10,000 NMWL filtrate 0.005 μm equivalent	Mercury	Oxidize ($K_2Cr_2O_7$) Acidify (HNO_3*)	Glass, 125 mL (a)	USGS–Boulder, CO
	Lead	Acidify (HNO_3*)	Teflon, 250 mL	USGS–Boulder, CO
	Lead isotopes	Acidify (HNO_3*)	Teflon, 1 L	USGS–Denver, CO
	Major/trace elements (cations)	Acidify (HNO_3*)	Poly, 125 mL (a)	USGS–Boulder, CO
	Major elements (anions)	None	Poly, 125 mL (a)	USGS–Arvada, CO
	Iron, redox speciation	Acidify (HCl), chill	Poly, amber, 125 mL	USGS–Sacramento, CA

Table 4. "*continued*"

Matrix/filtration	Analysis	Preservation	Bottle type, volume	Laboratory
Colloidal concentrate	Major/trace elements (cations) total and sequential extractions	Chill	Teflon, 500–1,000 mL	USGS–Boulder, CO
	Lead, total and isotopes	Acidify (HNO_3*)	Teflon, 250 mL	USGS–Denver, CO
	XRD	Chill	Poly, 100 mL	USGS–Sacramento, CA
	EXAFS	Chill	Poly, 100 mL	USGS–Menlo Park, CA Stanford University
	Mössbauer spectroscopy	Freeze dry	Poly, wide-mouth, 200 mL	Technical University, Munich, Germany
	Particle size distribution (light scattering spectrometry)	Chill	Poly, 100 mL	USGS–Boulder, CO

7.1.2 Sample processing and Preservation

7.1.2.1 Splitting

The cone splitter (Figure 4) is used by the USGS NAWQA program as the primary splitter to divide the collected sample into subsamples for inorganic-constituent, and suspended-sediment analyses (Ward and Harr, 1990; Capel and others, 1995). Subsamples for filtered inorganic-constituent, suspended-sediment, and field analyses will be collected from the first set of split samples from the cone splitter. Subsequent splits will be used to collect subsamples for raw (unfiltered) inorganic-constituent analyses. Samples for tangential-flow filtration will be composited in a Teflon-lined churn, from which water will be pumped using Teflon tubing.

Samples from the D-77 sampler will be collected in several (two to five) 3-L Teflon bottles

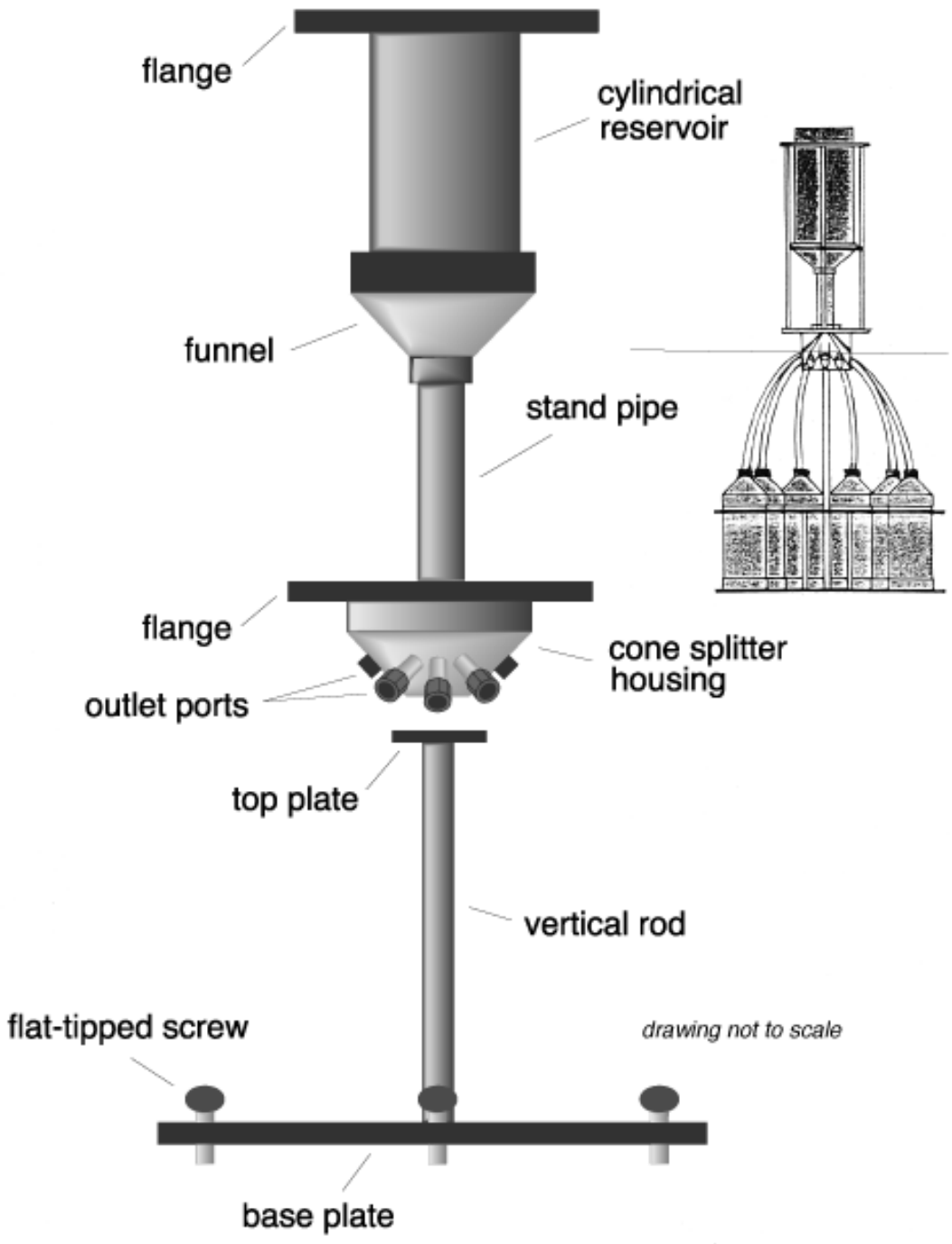

Figure 4. The all-Teflon cone splitter and stand.

and later poured into the cone splitter. This method allows the cone splitter to function as both a splitter and compositor.

The splitting process is as follows:

1. Set up the cone splitter on a flat, open area. A level splitter is critical to performance. All Teflon tubes should be approximately the same length and the entire apparatus including subsample containers is tented in a plastic bag. Water is poured directly into the splitter reservoir through a hole in the plastic tent, which is covered between pours.

2. Field rinse all sample-collection and splitting equipment with native water. Collect the rinse water near the shore to avoid heavy suspended sediments. Pour rinse water from the D-77 sample bottle through the Teflon cap and nozzle and into the cone splitter. Three 1-L rinses are effective then one 3-L rinse.

3. Place subsample containers under each outlet tube. The tubes need only extend into the receiving containers far enough to prevent spillage.

4. Agitate the sample (10 to 15 seconds) in the D-77 bottle to resuspend the sediments. Invert the bottle over the cone splitter reservoir. Sample transfer should be rapid. Maintain a head of water above the standpipe to prevent air from entering the splitting block.

5. Remove subsample containers from cone splitter and cap immediately.

6. An additional split is necessary to obtain the smaller volumes of some required subsamples. Reload splitter ports with the required bottles and pour a subsample from the first set of split samples.

7. Disassemble the cone splitter after completing the sample processing and clean before reuse or storing.

7.1.2.2 Filtration–0.45 μm filter, organic carbon

The filtration procedure for dissolved and suspended organic carbon analyses uses a stainless-steel or Teflon-pressure filter assembly fitted with a 47-mm diameter, silver, 0.45-μm

pore-size filter and a peristaltic pump that has been fitted with Tygon tubing to filter the sample. Filtering and processing methods follow NAWQA protocol (Shelton, 1994).

7.1.2.3 Filtration–0.45 μm, inorganic constituents

A disposable 0.45 μm capsule filter (Gelman 12175) will be used to filter samples for major and trace element analyses. This filter is currently being used by the NAWQA program in the Sacramento Basin and the 0.45 μm pore size is used to define the dissolved phase in most water-quality studies. The use of this filter will facilitate comparison of results obtained by this study with results from NAWQA and other studies in the basin. Data obtained with the 0.45 μm filter will also be used to compare the results from standard versus ultrafiltration methods.

A peristaltic pump head with Tygon tubing or a Teflon diaphragm pump head with corrugated Teflon tubing will be used to create the pressure required to force samples through the filter units. The detailed procedures follow NAWQA protocols (Shelton, 1994).

7.1.2.4 Filtration–10,000 NMWU (0.005 μm equivalent)

A Minitan tangential-flow filter apparatus will be used to obtain a filtered sample for analysis of dissolved constituents defined by the less than 0.005 μm equivalent particle size. A Pellicon tangential-flow filter apparatus will be used to obtain a concentrate of colloidal material. Cleaning procedures will be the same as for other equipment that contacts the water sample. To further minimize contamination, a dedicated set of filter membranes and tubing for both Minitan and Pellicon filters will be used at each sampling site. The carboy(s) containing the sample collected for colloid processing will be allowed to sit quietly for an hour before filtration to let the coarser grained suspended sediment settle to the bottom of the container. Water will be pumped from a fixed distance above the sediment layer in order to eliminate the larger size fractions from the colloidal concentrate.

7.1.2.5 Preservation

Samples for trace metal analyses and major cations will be stabilized by acidifying to a pH of 2 or less with ultrapure (distilled) concentrated nitric acid. In addition, potassium dichromate will be added to samples for mercury analysis. Samples for redox speciation will be stabilized by acidifying to a pH of 2 or less with ultrapure (distilled) hydrochloric acid, then chilled on ice. Samples collected for organic carbon and nutrient analysis will be chilled on ice during storage and transportation to the lab. Preservation of all samples to be collected is summarized in Table 4. Samples will be processed inside a plastic tent set up on a counter of the mobile laboratory to minimize atmospheric contamination during handling.

7.2 Bed Sediment Sampling Procedures

Sediment samples will be collected using either a coring device for deep-water sites or large plastic spoons for shallow-water sites. Sediment cores will be collected in pre-washed, acid-cleaned 10.2-cm diameter, acrylic butyrate core liners placed in a gravity corer. The gravity corer will be slowly lowered into the sediment to avoid disturbance of the sediment-water interface. The cores will be kept upright and carefully transported to a field-based laboratory. Shallow-water sampling will be carried out according to USGS NAWQA protocols (Shelton and Capel, 1994). For samples for which it is determined that extraction of pore waters will not be needed, samples will be screened with a nylon screen and river water to exclude material greater than 63 μm.

7.2.1 Subsample requirements

Once a sample of the bed sediment has been collected, a variety of subsamples will be split and

processed before shipping to laboratories. Subsample requirements are listed in Table 5.

Table 5. Subsamples of bed sediment required for scheduled analyses

[EXAFS, extended X-ray absorption fine structure; NMWL, nominal molecular weight limit; Poly, polyethylene; USGS, U.S. Geological Survey; XRD, X-ray diffraction. mL, milliliter]

Matrix	Analysis	Preservation	Bottle type, volume
Pore water	Major/trace elements (cations)	Acidify	Poly, 125 mL
	Major elements (anions)	None	Poly, 125 mL
Bed sediment	Tract elements, sequential extractions	Chill	Poly, wide-mouth 100 mL
	Sulfur speciation	Chill	Poly, wide-mouth 100 mL
	XRD	Chill	Poly, wide-mouth 100 mL
	EXAFS	Chill	Poly, wide-mouth 100 mL
	Mössbauer spectroscopy	Freeze-dry	Poly, wide-mouth 100 mL
	Particle size distribution (sieve, sedigraph)	Chill	Poly, wide-mouth 100 mL

7.2.2 Sample Processing and Preservation

Cores selected for pore water extraction will be sectioned for sediment and associated porewater within 8 to 24 hours of collection. The water overlying the sediment will first be siphoned off to within 1 to 10 cm of the interface using Tygon tubing. A sample of this overlying water will then be taken with a 10- to 30-mL plastic syringe. The cores will be extruded and sectioned into appropriate depth intervals in a nitrogen-filled glove bag, to minimize oxidation of the pore water. The individual core sections will then be placed in nitrogen-filled 50-mL centrifuge tubes. Subsamples of whole sediment will also be taken for determination of water content and grain-size distribution. The centrifuge tubes will be removed from the glove box and centrifuged at 1500 rpm for 20 minutes to separate porewater and sediment. The tubes will then be returned to the glove box and the supernatant extracted with pre-cleaned 2-mL plastic syringes and filtered through 0.2-μm cartridge filters. Filtered portions will be placed into acid-cleaned 30-mL polyethylene bottles for metal determinations. If there is sufficient volume, portions of pore water will also be taken for alkalinity and anion determinations. The pore water, samples for metal analysis will be acidified to pH < 2 with ultrapure, concentrated nitric acid. Sediment samples will be placed in acid washed containers and packed in ice for transport to the analytical laboratories.

7.3 Equipment cleaning

The sample collecting and processing equipment is soaked in dilute phosphate-free detergent solution, rinsed with tap water, soaked in 5.0 percent hydrochloric acid (HCl), and rinsed extensively with deionized water prior to each field trip and between sites. Detergents and acids will be used with care to avoid possible contamination of the sample by their residue. A thorough native-water rinse is required at each field site before sampling to remove any remaining cleaning agents and equilibrate the equipment to the sampling conditions. Details on procedures are outlined below.

The sampler bottle, cap and nozzle, cone splitter, churn splitter, filter support, pumphead,

tubing, and any other equipment that will contact the sample are cleaned prior to each field trip and between sites as follows:

1. Disassemble (if necessary) wearing vinyl gloves.
2. Soak for 30 minutes in a 0.2-percent solution of phosphate-free detergent and scrub with a nonmetallic brush. Use a small bottle brush for the cone-splitter parts.
3. Change gloves and rinse thoroughly with warm tap water to remove all soap residue.
4. Soak for 30 minutes in a solution of 5.0-percent hydrochloric acid. Swirling the equipment in the acid solution will adequately desorb any metals not removed during the washing process. The used acid/water solution should be placed in a waste container for proper disposal.
5. Change gloves and rinse three times with deionized water.
6. Protect areas of the equipment that will contact the sample with Teflon tape and place in a sealable plastic bag for storage and transport.
7. Rinse sampling and splitting equipment at the site with 2- to 3-L of native water before sampling.
8. Rinse sampling and splitting equipment with deionized water immediately after each use.

Equipment used for filtering the organic-carbon samples will be baked at 450°C for 2 hours or cleaned using organic-free deionized water and aggressive scrubbing. Equipment will be isolated from any procedure using methanol.

8. Sample Custody

All bottles will be clearly labeled with a waterproof marker or preprinted labels so the laboratories can identify the samples. The minimum information required is the project name, site identification number, date and time, and type of analysis requested.

An analytical services request form with the same information as the bottle labels will be included with each sample. Copies of the forms will be retained by data management personnel.

Samples will be shipped to laboratories by Federal Express overnight service from Sacramento or Redding, California, within 24 hours of collection and processing. Laboratories will notify data management personnel by electronic mail or standard mail service upon the arrival of samples.

9. Field Measurements

Specific conductance, dissolved oxygen, temperature, and pH, will be determined using the detailed procedures in the NAWQA field guide (Shelton, 1994). Alkalinity will be determined by Gran titration (Stumm and Morgan, 1981) using 0.16 N hydrochloric acid with a Hach digital titrator. Specific conductance, pH, and alkalinity will be determined from a split of the unfiltered water sample. Dissolved oxygen and temperature will be measured instream at the center of flow when feasible, otherwise from near shore. Stream discharge will be determined at all river sites. Sites 4 through 7 are located at USGS gaging stations and discharge will be estimated using current stage-discharge ratings from measurements of stage at the time of sampling (Rantz and others, 1982). Discharge at site 3 (below Keswick Dam) will be determined from BOR flow release records at Keswick Dam. Flow into the Spring Creek arm of Keswick Reservoir will be determined from Spring Creek Reservoir and power plant release records.

10. Calibration Procedures and Frequency

All laboratory apparatuses (analytical balances, volumetric equipment, deionized water systems, etc. are calibrated on at least an annual basis. Laboratory instruments (ICP–AES, ICP–MS, etc.) are recalibrated with each batch of samples that are analyzed. Calibration standards are rerun (as samples) at a 10 percent frequency (l out of 10 samples analyzed) to check for instrument drift. If drift exceeds predetermined limits (variable for instrument, element, and concentration level), the instrument is recalibrated prior to analysis of additional samples.

Usually five, and a minimum of three calibration standards (matrix matched), are used to establish calibration curves, bracketing the concentration range expected for the samples.

Field instruments (electrical conductance, pH, and dissolved oxygen) are calibrated prior to each measurement following standard USGS procedures (Ward and Harr, 1990; Shelton 1994). Certified and dated conductance and pH standards are supplied by the USGS National Water Quality Laboratory. Dissolved oxygen meters are calibrated from the theoretical oxygen saturation of a humid atmosphere at a given temperature and pressure.

11. Analytical Procedures

11.1 Concentration of dissolved major and trace elements:

The analytes are determined sequentially according to mass, on a single aliquot utilizing argon plasma ionization, mass spectrometric separation, and electron multiplier detection. Each analysis is based on the mean of three replicate determinations. Trace metals and major cations are analyzed using a Perkin Elmer-Sciex, Model 5000, modified inductively coupled plasma–mass spectrometer (ICP–MS). Major cations are analyzed using a Jarrell-Ash, Model 975, inductively coupled plasma–atomic emission spectrometer (ICP–AES). Calibration is performed using a reagent blank and three multi-element calibration standards. Linear regression analysis, through zero and based on 3 points, is employed to generate the calibration equation. All standards and samples are blank subtracted to insure correction for contamination as well as background correction. The methodology has been previously described (Taylor and others, 1990; Taylor and Garbarino, 1991; Garbarino and Taylor, 1995). Mercury is analyzed by cold vapor–atomic fluorescence spectroscopy using methods described by Roth (1994). Major anions will be analyzed using an ion chromatograph calibrated with at least 3 standards.

11.2 Redox speciation of iron:

Iron redox species will be determined with a colorimetric method using ferrozine as the color producing reagent (Stookey, 1970). For the determination of $Fe_{(II)}$, the 562-nm absorbance of the acidified and buffered sample will be measured with a Perkin Elmer Model Lambda 3b UV/VIS spectrophotometer equipped with 1-cm cells for the 10–40 μg range and 5-cm cells for the 2–10 μg range. For the determination of total Fe, a hydroxylamine hydrochloride reductant will be added. Ferric iron will be calculated from the difference between total Fe and $Fe_{(II)}$.

11.3 Sequential extractions of bed sediment and colloidal material:

Three individual extractions will be done to each bed-sediment or colloidal concentrate sample, following the methods described by Hayes (1993). Hydroxylamine-HCl (0.25 M) will be used to dissolve the inorganic fraction of exchangeable metal ions in the sample. Potassium persulfate (0.17M) in 2 percent (volume/volume) sulfuric acid will be used to oxidize organic material. Dissolution of the silicates and other refractory material will be done in strong acids (hydrofluoric, nitric, and hydrochloric acids).

Each extraction will be analyzed by ICP–MS, ICP–AES, CV–AFS, and IC using methods described above for the analysis of major and trace elements in water samples.

11.4 Analysis of sulfur speciation and mineralogy in colloid concentrates and bed sediment:

The forms of sulfur in colloidal concentrates and bed sediment is determined from the chemical analysis of a series of extractions (Rice and others, 1993). An initial extraction with acetone is done to remove elemental sulfur. This extraction is followed by treatment with hot 6 *N* HC to dissolve acid-volatile sulfides (AVS, assumed to be monosulfides). The sulfide is purged from the sample with nitrogen gas and precipitated as silver sulfide. The hot-acid-treated sample is then filtered and soluble inorganic sulfates are determined by analyzing barium sulfate precipitated from the filtrate following the addition of barium chloride. The retentate is again extracted with acetone to recover AVS oxidized to sulfur during the acid treatment. Disulfide remaining in the retentate are determined following Cr^{2+} reduction/ distillation and precipitation as silver sulfide. Organically bound sulfur is determined from the residue of the disulfide sulfur determination by using an Eschka fusion to form SO_4^{2-} followed by precipitation as barium sulfate. Modifications to the above procedure, such as the addition of stannous chloride to the hot acid treatment, will be done to evaluate the effect of ferric iron (especially diagenetic ferric oxides) on the recovery of acid-volatile sulfides. To evaluate the significance of any recovery of pyritic sulfur as AVS, the analyses will be followed by determination of sulfur isotopy ($\delta^{34}S$-values) and mass-balance calculations.

11.5 Mineralogy of colloidal material and bed sediment using X-ray diffraction

X-ray Diffraction (XRD) can provide a qualitative determination of the mineral phases present in the sediment and the suspended sediments. The data will be collected on a Scintag Pad V Automated Diffractometer, which is equipped with a scitillation detector and a graphite monochromator. Computer control of data collection and of data processing will enhance mineral identification and characterization. When concentration in a sample is less than approximately 5 percent or if the mineral is poorly crystalline, the phase in question often must be concentrated by physical differences (density, shape, size, or magnetic susceptibility) or by chemical means (chemical etching of specific phases usually called selective extractions). This equipment is available in the USGS California District laboratory. Emphasis will be placed on characterizing those mineral phases involved with metal transport.

11.6 Mineralogy using Mössbauer spectroscopy:

Information from ^{57}Fe Mössbauer spectroscopy will be combined with X-ray diffraction techniques to evaluate poorly crystallized minerals produced by the oxidation of sulfides. This has proven useful for identification of iron bearing minerals of small particle size and low concentration. A ^{57}Co source of λ-ray is used to generate the Mössbauer spectra which are characteristic of specific iron minerals.

11.7 Bonding of metals using EXAFS:

Extended X-ray Absorption Fine Structure (EXAFS) spectroscopy will be used to determine the local molecular structure about the average Fe ion in poorly crystallized ferrihydrite polymers. EXAFS spectra will be recorded in both transmission and fluorescence modes at the Stanford Synchrotron Radiation Laboratory using methods described by Waychunas and others (1993).

11.8 Particle size distribution:

Particle size distributions of suspended sediment samples wet sieve and sedigraph methods. Particle size distributions of colloidal material will be determined using light scattering spectrometry.

11.9 Lead-isotope methods:

An appropriate weight of sediment sample or colloid material is digested in 2*M* HCl + H_2O_2 to provide a minimum amount of Pb for isotopic analysis (generally 50 ng or more). Digestions are done in FEP Teflon ware under laminar flow conditions using ultra-pure reagents, as described by Church and others (1993). Lead is separated in the bromide medium on Dowex 1x8 anion exchange using micro-columns. Analysis of the lead is performed on a multi-collector mass spectrometer; precision for the isotopic ratios is better than 1/1000. Analyses of blind duplicates, standards, and SRM 981 are used to monitor reproducibility and correct for isotopic fractionation, as described by Church and others (1993). Blanks are generally less than 1 ng for samples of this size. All analytical procedures and done under chain-of-custody protocol, under the direction of Dr. Stan Church, who is Quality Assurance officer for the lead isotope analyses.

12. Data Reduction, Validation, and Reporting

Data from field measurements will be entered in the USGS National Water Information Database (NWIS) after each field run. Laboratory data will be transmitted to the USGS project leader on laboratory analysis sheets from each participating laboratory and will include laboratory QA/QC data. Data from all laboratories will be entered into a single spreadsheet database maintained in the USGS Sacramento District office. QA/QC data will be reviewed as it is received and compared to the project Quality Assurance Objectives. Data not meeting objectives will be flagged and included in a report summarizing the activities and results of each sampling run.

13. Quality Control Checks

The purposes of QC samples are to ensure that reported data represent actual values and that the data are reproducible and precise. The QC samples described below are used to evaluate field techniques, equipment, and laboratory methods.

13.1 Laboratory Analysis

Laboratory analysis of major and trace elements in water samples, colloid concentrates, and bed-sediment extracts will be done by the USGS lab in Boulder, Colorado (under the direction of Dr. Howard Taylor). All sample determinations will be performed in triplicate, with the mean value of the triplicate analysis being reported as the most probable value of concentration. Outliers are evaluated and rejected when statistically valid.

Standard Reference Materials (National Institute of Standards, USGS, and other sources) similar in composition (both matrix and analyte concentration) to the samples being analyzed, are processed and analyzed at a frequency of at least 10 percent of the samples determined. Control charts are maintained to assure that interference corrections (where necessary) or calibration procedures are within predetermined specifications.

Laboratory blanks are used to evaluate bias from deionized water and laboratory reagents used during the sample analysis.

When necessary and where appropriate, spike additions are made to samples, prior to analysis, to evaluate spike recovery. This is particularly important when preconcentration matrix separation, or speciation considerations are implemented.

All samples in a given batch are analyzed in random order to minimize errors associated with sample composition.

Split samples for metals other than mercury will be sent periodically to both Dr. Howard Taylor's lab and the USGS National Water Quality Laboratory (NWQL) to evaluate any differences in the analytic results from the two labs. The NAWQA program uses the NWQL for its routine inorganic chemical analysis (Stanley and others, 1992), and comparison of the two labs is necessary to ensure comparability between data sets created by the two projects. Splits of mercury samples will be sent to the USGS lab in Madison, Wisconsin (under the direction of Dr. David Krabbenhoft). The Madison lab is also analyzing mercury for the Sacramento NAWQA project.

13.2 Field procedures

Equipment blanks will be done prior to or during the first field run to ensure that contaminants are not being introduced by any apparatus or procedure. During the sample collection phase of the project, field blanks will be processed through each stage of sample collection and processing to evaluate potential field contamination problems. Field blanks will be collected between samples at least once during each field run to check the efficacy of equipment cleaning procedures between sites. Additional field blanks will be collected at sites deemed critical to the successful completion of the study objectives.

Triplicate field samples will be collected at all locations at least once during the study to establish field sampling and processing variance. The triplicate samples will be treated as separate unknowns as they are submitted to the laboratories.

14. Performance and Systems Audits

All field personnel participate in the annual USGS National Field Quality Program. Reference samples for pH, specific conductance, and alkalinity are analyzed with the equipment used in field determinations. Satisfactory determinations are based on deviation from the most probable value

for each coded reference sample: pH, ± 0.1 unit; specific conductance, ±4%, and alkalinity, ±1.5 standard deviations.

15. Preventative Maintenance

Field meters and other equipment are inspected and tested before field runs and worn or defective parts replaced. New batteries are installed at least annually or when meters have been inactive for an unknown length of time. Backup meters, spare parts (electrodes, membranes, filling solutions, etc.), and batteries are taken into the field for unscheduled replacement or repair.

16. Corrective Action

Corrective action will be taken before completion of any further field work if instrument malfunction is observed. Corrective action will also be taken whenever data are determined to be outside acceptable limits, as defined by the Quality Assurance Objectives.

Corrective action shall include reanalysis of samples after problems have been remedied. The method of standard additions may be used if spike recoveries are found to be outside acceptable limits. Any data not meeting Quality Assurance Objectives, but judged of potential usefulness, will be flagged and its deficiencies with regard to quality criteria described.

17. Quality Assurance Reports to Management

Following the review of field and laboratory results from each sampling run, the USGS project leader will compile a Quality Assurance Report summarizing the work completed, results of performance evaluations, results of data quality assessments, significant problems and recommended solutions. Summaries of this information will be included in quarterly project status reports.

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Appendix 2. Quality Assurance and Quality Control Data for Chemical Analyses

Table A2-1. Results of EPA's Performance Evaluations WP036 (A2-1a), WP037 (A2-1b), and WP038 (A2-1c) for the USGS's National Water Quality Laboratory.

Table A2-2. Results of laboratory and field blanks for water sample processing.

Table A2-3. Observed metal concentrations and percentage recovery in biological reference materials processed using the same methods as caddisfly samples.

Table A2-4.Procedural blanks for caddisfly samples collected from the Sacramento River and Cottonwood Creek, October 21–23, 1996.

Table A2-5. Concentration data for standard reference materials.

Table A2–1a. Results of EPA's Performance Evaluation WP036 for the USGS's National Water Quality Laboratory

[*, Based on gravimetric calculations or a reference value when necessary; TDS, total dissolved solids. °C, degree Celsius]

Constituent	Reported value	True value*	Acceptance limits	Warning limits	Performance evaluation
Trace metals (micrograms/liter)					
Aluminum	3,602	3,609	3,130–4,040	3,250–3,920	Acceptable
Cadmium	130	131	113–148	117–144	Acceptable
Copper	564	552	515–618	528–605	Acceptable
Iron	831	790	715–934	742–906	Acceptable
Mercury	4.58	4.7	3.53–5.91	3.83–5.61	Acceptable
Lead	371	375	332–429	344–417	Acceptable
Zinc	1,187	1,203	1,100–1,370	1,140–1,340	Acceptable
Major ions (milligrams/liter)					
TDS at 180°C	142	148	104–187	114–177	Acceptable
Calcium	16.6	17	14.8–19.5	15.4–18.9	Acceptable
Magnesium	1.17	1.2	0.983–1.42	1.04–1.37	Acceptable
Sodium	7.47	7.46	6.55–9.17	6.88–8.85	Acceptable
Potassium	34.5	33.1	30.5–37.5	31.4–36.6	Acceptable
Alkalinity (as $CaCO_3$)	13.6	13	9.69–16.8	10.6–15.9	Acceptable
Chloride	34.6	34.8	30.8–38.4	31.8–37.4	Acceptable
Fluoride	0.21	0.21	0.153–0.27	0.168–0.255	Acceptable
Sulfate	43.4	44	36.4–49.1	37.9–47.5	Acceptable
Nutrients (milligrams/liter)					
Ammonia–nitrogen	10.2	10	8.05–12	8.52–11.5	Acceptable
Nitrate–nitrogen	2.32	2.1	1.73–2.48	1.82–2.39	Acceptable
Orthophosphate	0.993	0.88	0.768–1.02	0.798–0.988	Warning[1]
Kjeldahl–nitrogen	8.78	8.9	6.62–10.9	7.13–10.4	Acceptable
Total Phosphorous	3.06	2.9	2.46–3.43	2.58–3.31	Acceptable

[1]The orthophosphate quality control samples were within range, but the test sample was diluted 1 to 10. This dilution was too large resulting in the values being at the low end of the reporting range. This added variability to the results. Analysts were cautioned that the measured results should be at mid-range or higher.

Table A2–1b. Results of EPA's Performance Evaluation WP037 for the USGS's National Water Quality Laboratory

[*, Based on gravimetric calculations or a reference value when necessary; TDS, total dissolved solids. °C, degree Celsius]

Constituent	Reported value	True value*	Acceptance limits	Warning limits	Performance evaluation
Trace metals (micrograms/liter)					
Aluminum	1,160	1,203	1,030–1,360	1,070–1,310	Acceptable
Cadmium	21.5	22.2	18.3–26.4	19.4–25.4	Acceptable
Copper	112	115	102–128	105–124	Acceptable
Iron	399	393	350–445	362–433	Acceptable
Mercury	0.45	0.494	0.266–0.729	0.324–0.671	Acceptable
Lead	128	130	109–147	114–143	Acceptable
Zinc	290	296	263–332	272–323	Acceptable
Major ions (milligrams/liter)					
TDS at 180 °C	607	685	461–932	521–872	Acceptable
Calcium	67.4	66	61–73.2	62.5–71.6	Acceptable
Magnesium	36.4	37	33.7–40	34.5–39.2	Acceptable
Sodium	90.5	92.2	85.1–101	87.1–98.6	Acceptable
Potassium	16.7	17	14.6–19.8	15.3–19.2	Acceptable
Total alkali	92	91	82.2–99	84.3–96.9	Acceptable
Chloride	228	226	207–250	212–244	Acceptable
Fluoride	2.59	2.6	2.25–2.92	2.34–2.84	Acceptable
Sulfate	118	118	99.9–138	105–133	Acceptable
Nutrients (milligrams/liter)					
Ammonia–nitrogen	0.277	0.261	0.12–0.444	0.159–0.405	Acceptable
Nitrate–nitrogen	0.608	0.62	0.47–0.756	0.504–0.722	Acceptable
Orthophosphate	5.94	5.5	4.84–6.25	5.01–6.09	Acceptable
Kjeldahl–nitrogen	2.82	2.6	1.72–3.53	1.94–3.31	Acceptable
Total Phosphorous	7.95	7	5.99–8.24	6.26–7.97	Acceptable

Table A2–1c. Results of EPA's Performance Evaluation WP038 for the USGS's National Water Quality Laboratory

[*, Based on gravimetric calculations or a reference value when necessary; NO_2+NO_3, nitrite plus nitrate; NWQL, National Water Quality Laboratory. mg/L, milligram per liter]

Constituent	Reported value	True value*	Acceptance limits	Performance evaluation
Trace metals (micrograms/liter)				
Cadmium	29.7	28.5	22.8–34.2	Acceptable
Copper	510	490	441–539	Acceptable
Lead	17.4	16	11.2–20.8	Acceptable
Mercury	3.3	3.8	2.66–4.94	Acceptable
Zinc	781	760	706–824	Acceptable
Nutrients/fluoride (milligrams/liter)				
Nitrate as nitrogen	9.52	9.5	8.55–10.5	Acceptable
Fluoride	2.78	2.9	2.61–3.19	Acceptable
Nitrite as nitrogen	0.68	0.82	0.697–0.943	Not acceptable[1]
Orthophosphate as phosphorus	1.66	1.6	1.43–1.77	Acceptable

[1]The reported value was 0. 68 mg/L; the true value was reported to be 0.820 mg/L and the acceptance range was 0.697–0.943 mg/L. At the NWQL, nitrite is analyzed simultaneously with the nitrate + nitrite analysis, and for WS039, the NO_2 + NO_3 sample had to be diluted. This diluted value was reported instead of the nondiluted value. The operator and future operators will be instructed that the value of the nondiluted sample or smallest dilution is to be used.

Table A2-2. Results of laboratory and field blanks for water sample processing

[Explanation:
Source water for all blanks was double deionized Type 1 [18 MΩ-cm (megohm-centimeters)] water generated with a Milli-Q system. All analyses were done by ICP–MS (inductively coupled plasma-mass spectrometry) unless indicated otherwise. Water used to generate field blanks was double deionized water generated in the laboratory (same Type 1) and carried into the field in acid-cleaned, high-density polyethylene (HDPE) jerrycans. Labels under the heading 'Blank Type' indicate whether the blank sample was generated and processed in the laboratory (Lab Blank) or if the blank sample was generated at a field sampling site (Field Blank) and then processed either in the field or in the laboratory. The 'Process Type' heading indicates the type of processing or processing step to which the blank was subjected. A key to the abbreviations is listed below:

DIW	deionized water; blanks preserved in the same ultrahigh purity 1 percent nitric acid (HNO_3) (Kuehner and others, 1972) used to preserve the samples
8LCh	8-L polytetrafluoroethylene (PTFE, or Teflon)-coated churn used for compositing, subsampling, and transporting the sample from field to laboratory during the specified sampling period
MemF	0.40 μm pore-size polycarbonate membrane filter process (Nuclepore)
CapF	0.45 μm pore-size polyethersulfone capsule filter process (Gelman)
UF1	0.005 μm equivalent pore-size tangential-flow ultrafilter (Minitan) with a low-binding regenerated cellulose memabrane of 240 cm^2 [Millipore Corp. model PLGCOMP04, 10,000 daltons, or normal molecular weight limit (NMWL)] used only to process samples from expected low concentration sites
UF2	0.005 μm equivalent pore-size tangential-flow ultrafilter (Minitan) with a low-binding regenerated cellulose memabrane of 240 cm^2 (Millipore model PLGCOMP04, 10,000 NMWL) used to process samples from expected high concentration sites
UF3	0.005 μm equivalent pore-size tangential-flow ultrafilter (Pellicon) with a regenerated cellulose memabrane of 7,440 cm^2 (Millipore Corp. model PLGC, 10,000 NMWL) used only to isolate suspended sediment samples
HgP	deionized water preserved in the same potassium dichromate/nitric acid ($K_2Cr_2O_7/HNO_3$) solution used to preserve the mercury samples
20LCh	20-L PTFE-coated churn used for compositing, subsampling, and transporting the sample from field to laboratory during the specified sampling period
THB	PTFE holding bottle blank used to hold subsample from churn for samples filtered through the 0.40 μm pore-size polycarbonate membrane filter
20LCh-1	20-L PTFE-coated churn (1 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
20LCh-2	20-L PTFE-coated churn (2 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
20LCh-3	20-L PTFE-coated churn (3 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
20LCh-4	20-L PTFE-coated churn (4 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
20LCh-5	20-L PTFE-coated churn (5 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
20LCh-6	20-L PTFE-coated churn (6 of 6) used for compositing, subsampling, and transporting the sample from field to laboratory
25LCb	25-L HDPE carboy used to transport sample water from the field to the laboratory for the suspended sediment (colloid) sample
UFVP	0.005 μm equivalent pore-size tangential-flow ultrafilter (240 cm^2); collected only during the May/June sampling event to determine if carryover from the "Sacramento River at Verona" sample affected the "Yolo Bypass at I-80 near West Sacramento" sample
JyCn	12-L PTFE-coated HDPE jerrycan used to transport sample water from field to the laboratory
SCDI	deionized water that was carried into the field to the "Spring Creek below Spring Creek Debris Dam near Keswick" site, preserved in the same high purity 1 percent HNO_3 used to preserve the samples
SCADI	deionized water that was carried into the field to the "Keswick Reservoir, Spring Creek arm, near Keswick" site, preserved in the same high purity 1 percent HNO_3 used to preserve the samples
TfTb	PTFE tubing used to collect sample water at selected sites; the length of tubing contained a 25-cm section of either silicone or neoprene tubing through the pump head of the peristaltic pump
Grab	3-L PTFE bottle used to collect a grab sample from the center of the stream channel.

Numbers in parentheses in the column "Process Type" (for example, 1/1) indicate whether multiple samples were collected for that sampling period (second number) and which replicate they represent (first number). mm/dd/yy, month/day/year; ICP–AES, inductively coupled plasma-atomic emission spectrometry; NMWL, nominal molecular weight limit; PTFE, polytetrafluoroethylene; UV–vis, ultraviolet visible spectroscopy. —, no sample collected for specified analysis; comp., composite sample; na, no data available; <, less than indicated detection limit. cm, centimeter; cm^2, square centimenter; L, liter; mm, millimeter; μg/L, microgram per liter; μm, micrometer]

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.11 ± 0.04	< 0.012 ± 0.001	< 0.03 ± 0.01	< 0.011 ± 0.006
Lab Blank	8LCh (1/1)	07/10/96	0.80 ± 0.02	< 0.012 ± 0.002	< 0.03 ± 0.01	0.050 ± 0.042
Lab Blank	MemF (1/1)	07/10/96	0.70 ± 0.08	< 0.012 ± 0.004	< 0.03 ± 0.01	< 0.011 ± 0.008
Lab Blank	CapF (1/1)	07/10/96	< 0.11 ± 0.01	< 0.012 ± 0.004	< 0.03 ± 0.01	< 0.011 ± 0.003
Lab Blank	UF1 (1/1)	07/10/96	0.43 ± 0.05	< 0.007 ± 0.004	< 0.02 ± 0.00	0.050 ± 0.003
Lab Blank	UF2 (1/1)	07/10/96	< 0.11 ± 0.08	< 0.012 ± 0.000	< 0.03 ± 0.01	0.026 ± 0.005
Lab Blank	UF3 (1/1)	07/12/96	0.47 ± 0.11	< 0.007 ± 0.001	< 0.02 ± 0.01	0.051 ± 0.001
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.11 ± 0.07	< 0.012 ± 0.002	< 0.03 ± 0.00	< 0.011 ± 0.002
Field Blank	8LCh (1/1)	07/17/96	0.53 ± 0.07	< 0.007 ± 0.002	< 0.02 ± 0.01	0.022 ± 0.800
Field Blank	MemF (1/1)	07/17/96	0.38 ± 0.16	< 0.007 ± 0.001	< 0.02 ± 0.02	< 0.011 ± 0.166
Field Blank	CapF (1/1)	07/17/96	0.11 ± 0.09	< 0.012 ± 0.003	< 0.03 ± 0.01	0.034 ± 0.003
Field Blank	UF2 (1/1)	07/17/96	< 0.11 ± 0.01	< 0.012 ± 0.002	< 0.03 ± 0.01	0.052 ± 0.005
Field Blank	UF3 (1/1)	07/17/96	0.13 ± 0.11	< 0.012 ± 0.000	< 0.03 ± 0.01	< 0.011 ± 0.001
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	0.11 ± 0.04	< 0.006 ± 0.008	< 0.06 ± 0.01	< 0.005 ± 0.007
Lab Blank	20LCh (1/1)	09/18/96	0.41 ± 0.02	0.019 ± 0.002	< 0.05 ± 0.02	0.017 ± 0.004
Lab Blank	MemF (1/1)	09/18/96	0.83 ± 0.06	< 0.014 ± 0.001	< 0.03 ± 0.04	0.014 ± 0.005
Lab Blank	CapF (1/1)	09/18/96	0.13 ± 0.02	< 0.014 ± 0.002	< 0.03 ± 0.02	0.037 ± 0.004
Lab Blank	UF2 (1/1)	09/18/96	0.15 ± 0.04	0.019 ± 0.005	< 0.05 ± 0.05	0.029 ± 0.006
Lab Blank	UF3 (1/1)	09/18/96	0.26 ± 0.04	< 0.006 ± 0.001	< 0.06 ± 0.01	0.008 ± 0.002
Lab Blank	THB (1/1)	09/18/96	0.31 ± 0.03	< 0.014 ± 0.001	< 0.03 ± 0.02	0.015 ± 0.003
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	0.12 ± 0.02	< 0.006 ± 0.006	< 0.06 ± 0.01	0.011 ± 0.002
Field Blank	20LCh (1/1)	09/18/96	0.23 ± 0.02	< 0.014 ± 0.003	< 0.03 ± 0.04	0.008 ± 0.002
Field Blank	MemF (1/1)	09/18/96	0.17 ± 0.03	< 0.006 ± 0.005	< 0.06 ± 0.03	0.007 ± 0.001
Field Blank	CapF (1/1)	09/18/96	0.06 ± 0.03	< 0.014 ± 0.007	< 0.03 ± 0.04	0.007 ± 0.002
Field Blank	UF2 (1/1)	09/18/96	0.28 ± 0.04	< 0.006 ± 0.004	< 0.06 ± 0.03	0.009 ± 0.002
Field Blank	UF3 (1/1)	09/18/96	1.2 ± 0.1	< 0.014 ± 0.005	< 0.03 ± 0.00	0.016 ± 0.001
Field Blank	THB (1/1)	09/18/96	0.15 ± 0.05	< 0.014 ± 0.007	< 0.03 ± 0.02	0.009 ± 0.007
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	0.20 ± 0.08	< 0.03 ± 0.01	< 0.09 ± 0.03	< 0.05 ± 0.02
Lab Blank	8LCh (1/1)	11/13/96	0.97 ± 0.06	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.02
Lab Blank	MemF (1/1)	11/13/96	0.73 ± 0.18	< 0.03 ± 0.00	< 0.09 ± 0.03	< 0.05 ± 0.01

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L
Lab Blank	CapF (1/1)	11/14/96	0.28 ± 0.07	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.00
Lab Blank	UF2 (1/1)	11/13/96	0.19 ± 0.02	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.02
Lab Blank	UF3 (1/1)	11/13/96	0.58 ± 0.01	< 0.03 ± 0.02	< 0.09 ± 0.01	< 0.05 ± 0.01
Lab Blank	THB (1/1)	11/13/96	0.40 ± 0.15	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.00
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.11 ± 0.01	< 0.03 ± 0.01	< 0.09 ± 0.04	< 0.05 ± 0.01
Field Blank	8LCh (1/1)	11/20/96	< 0.11 ± 0.00	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.01
Field Blank	MemF (1/1)	11/20/96	0.11 ± 0.06	< 0.03 ± 0.00	< 0.09 ± 0.03	< 0.05 ± 0.02
Field Blank	CapF (1/1)	11/20/96	< 0.05 ± 0.00	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.00
Field Blank	UF1 (1/1)	11/20/96	< 0.05 ± 0.05	< 0.03 ± 0.01	< 0.09 ± 0.04	< 0.05 ± 0.01
Field Blank	UF3 (1/1)	11/20/96	< 0.11 ± 0.11	< 0.03 ± 0.00	< 0.09 ± 0.02	< 0.05 ± 0.00
Field Blank	THB (1/1)	11/20/96	0.98 ± 0.04	< 0.03 ± 0.01	< 0.09 ± 0.02	< 0.05 ± 0.03
Field Blank	CapF (1/1)	11/20/96	0.07 ± 0.03	< 0.03 ± 0.00	< 0.09 ± 0.01	< 0.05 ± 0.02
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.05 ± 0.03	< 0.015 ± 0.002	< 0.04 ± 0.00	< 0.007 ± 0.008
Lab Blank	MemF (1/1)	12/16/96	0.11 ± 0.02	< 0.015 ± 0.009	< 0.04 ± 0.04	0.011 ± 0.016
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	0.16 ± 0.19	< 0.015 ± 0.002	0.06 ± 0.01	0.013 ± 0.005
Lab Blank	UF3 (1/1)	12/16/96	0.15 ± 0.04	< 0.015 ± 0.003	< 0.04 ± 0.01	< 0.007 ± 0.002
Lab Blank	THB (1/1)	12/16/96	0.17 ± 0.08	< 0.015 ± 0.007	< 0.04 ± 0.01	< 0.007 ± 0.005
Lab Blank	20LCh-1 (1/1)	12/16/96	0.17 ± 0.06	< 0.015 ± 0.002	< 0.04 ± 0.00	< 0.007 ± 0.003
Lab Blank	20LCh-2 (1/1)	12/16/96	0.19 ± 0.12	0.021 ± 0.002	< 0.04 ± 0.00	< 0.007 ± 0.003
Lab Blank	20LCh-3 (1/1)	12/16/96	0.98 ± 0.12	< 0.015 ± 0.000	< 0.04 ± 0.01	0.026 ± 0.005
Lab Blank	20LCh-4 (1/1)	12/16/96	0.09 ± 0.02	< 0.015 ± 0.001	< 0.04 ± 0.00	< 0.007 ± 0.003
Lab Blank	20LCh-5 (1/1)	12/16/96	0.43 ± 0.18	< 0.015 ± 0.001	< 0.04 ± 0.01	0.024 ± 0.011
Lab Blank	20LCh-6 (1/1)	12/16/96	0.17 ± 0.08	< 0.015 ± 0.004	< 0.04 ± 0.01	0.007 ± 0.006
Lab Blank	UF1 (1/1)	12/16/96	< 0.05 ± 0.03	< 0.015 ± 0.004	< 0.04 ± 0.01	< 0.007 ± 0.005
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	0.42 ± 0.01	< 0.015 ± 0.000	< 0.04 ± 0.02	0.007 ± 0.017
Field Blank	8LCh (1/1)	12/17/96	0.54 ± 0.01	< 0.015 ± 0.003	< 0.04 ± 0.00	0.015 ± 0.003
Field Blank	MemF (1/1)	12/17/96	0.23 ± 0.03	< 0.015 ± 0.003	< 0.04 ± 0.01	0.040 ± 0.013
Field Blank	CapF (1/1)	12/17/96	0.23 ± 0.20	< 0.015 ± 0.004	< 0.04 ± 0.01	0.018 ± 0.009
Field Blank	UF2 (1/1)	12/17/96	0.09 ± 0.03	< 0.015 ± 0.014	0.20 ± 0.01	0.073 ± 0.016
Field Blank	THB (1/1)	12/17/96	2.14 ± 0.34	< 0.015 ± 0.011	< 0.04 ± 0.01	0.075 ± 0.019
Lab Blank	DIW (1/1)	01/06/97	< 0.04 ± 0.02	< 0.015 ± 0.002	< 0.04 ± 0.01	< 0.02 ± 0.00

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.05 ± 0.01	< 0.015 ± 0.005	0.06 ± 0.02	< 0.02 ± 0.01
Lab Blank	MemF (1/1)	01/06/97	0.07 ± 0.01	< 0.015 ± 0.003	< 0.03 ± 0.00	< 0.02 ± 0.00
Lab Blank	CapF (1/1)	01/06/97	0.1 ± 0.0	< 0.008 ± 0.005	< 0.04 ± 0.01	0.027 ± 0.009
Lab Blank	UF2 (1/2)	01/06/97	< 0.05 ± 0.01	< 0.015 ± 0.003	0.11 ± 0.03	< 0.02 ± 0.00
Lab Blank	UF2 (2/2)	01/06/97	0.11 ± 0.02	< 0.02 ± 0.00	0.09 ± 0.04	< 0.03 ± 0.01
Lab Blank	UF3 (1/1)	01/06/97	66 ± 1	< 0.015 ± 0.002	0.08 ± 0.01	0.54 ± 0.00
Lab Blank	THB (1/1)	01/06/97	0.09 ± 0.07	< 0.015 ± 0.004	< 0.03 ± 0.01	< 0.02 ± 0.00
Lab Blank	25LCb (1/1)	01/06/97	< 0.05 ± 0.01	< 0.015 ± 0.003	< 0.03 ± 0.02	< 0.02 ± 0.00
Lab Blank	DIW (1/1)	01/06/97	1.27 ± 0.01	< 0.015 ± 0.005	< 0.03 ± 0.01	< 0.02 ± 0.00
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	0.09 ± 0.01	< 0.015 ± 0.003	< 0.03 ± 0.01	< 0.02 ± 0.00
Lab Blank	UF2 (1/1)	05/28/97	< 0.1 ± 0.1	< 0.008 ± 0.005	< 0.04 ± 0.01	0.025 ± 0.007
Lab Blank	UF3 (1/1)	05/28/97	5.3 ± 0.2	< 0.008 ± 0.006	< 0.04 ± 0.04	0.053 ± 0.007
Lab Blank	THB (1/1)	05/28/97	0.5 ± 0.0	< 0.008 ± 0.004	< 0.04 ± 0.01	0.026 ± 0.004
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	0.5 ± 0.0	< 0.008 ± 0.004	< 0.04 ± 0.02	0.014 ± 0.002
Field Blank	DIW (2/2)	06/05/97	0.9 ± 0.0	< 0.008 ± 0.010	< 0.04 ± 0.02	0.019 ± 0.006
Field Blank	CapF (1/3)	06/05/97	< 0.1 ± 0.0	< 0.008 ± 0.006	< 0.04 ± 0.03	< 0.008 ± 0.002
Field Blank	UFVP (1/1)	06/05/97	< 0.1 ± 0.0	< 0.008 ± 0.002	< 0.04 ± 0.01	0.018 ± 0.004
Field Blank	JyCn (1/1)	06/05/97	1.9 ± 0.0	< 0.008 ± 0.010	< 0.04 ± 0.01	0.034 ± 0.007
Field Blank	CapF (2/3)	06/05/97	0.11 ± 0.06	< 0.01 ± 0.00	< 0.03 ± 0.01	0.02 ± 0.01
Field Blank	CapF (3/3)	06/05/97	0.09 ± 0.03	< 0.01 ± 0.00	< 0.03 ± 0.00	0.03 ± 0.01
Field Blank	SCDI (1/1)	06/05/97	0.23 ± 0.09	< 0.01 ± 0.01	< 0.03 ± 0.01	< 0.01 ± 0.01
Field Blank	SCADI (1/1)	06/05/97	0.24 ± 0.06	< 0.01 ± 0.01	< 0.03 ± 0.02	0.01 ± 0.00
Field Blank	TfTb (1/1)	06/05/97	< 0.06 ± 0.06	< 0.01 ± 0.01	< 0.03 ± 0.01	0.02 ± 0.03
Lab Blank	DIW (1/1)	05/28/97	< 0.1 ± 0.0	< 0.008 ± 0.001	< 0.04 ± 0.02	< 0.008 ± 0.000
Lab Blank	MemF (1/1)	05/28/97	0.1 ± 0.0	< 0.008 ± 0.005	< 0.04 ± 0.02	0.015 ± 0.003
Lab Blank	CapF (1/1)	05/28/97	< 0.1 ± 0.0	< 0.008 ± 0.005	< 0.04 ± 0.03	< 0.008 ± 0.000

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.01 ± 0.002	< 0.005 ± 0.001	1.9 ± 0.2	< 0.004 ± 0.003
Lab Blank	8LCh (1/1)	07/10/96	< 0.01 ± 0.003	< 0.005 ± 0.000	1.7 ± 0.2	0.006 ± 0.001
Lab Blank	MemF (1/1)	07/10/96	< 0.01 ± 0.001	< 0.005 ± 0.000	1.8 ± 0.8	0.006 ± 0.001
Lab Blank	CapF (1/1)	07/10/96	< 0.01 ± 0.004	< 0.005 ± 0.000	1.7 ± 0.4	< 0.004 ± 0.003
Lab Blank	UF1 (1/1)	07/10/96	< 0.018 ± 0.002	< 0.005 ± 0.002	1.8 ± 0.2	0.010 ± 0.001
Lab Blank	UF2 (1/1)	07/10/96	< 0.01 ± 0.003	< 0.005 ± 0.000	2.1 ± 0.8	< 0.004 ± 0.005
Lab Blank	UF3 (1/1)	07/12/96	< 0.018 ± 0.007	< 0.005 ± 0.002	2.7 ± 0.3	0.009 ± 0.002
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.01 ± 0.003	< 0.005 ± 0.000	1.7 ± 0.3	< 0.004 ± 0.002
Field Blank	8LCh (1/1)	07/17/96	< 0.018 ± 0.005	< 0.005 ± 0.002	1.8 ± 0.6	0.048 ± 0.003
Field Blank	MemF (1/1)	07/17/96	< 0.018 ± 0.004	< 0.005 ± 0.003	2.0 ± 0.6	< 0.006 ± 0.003
Field Blank	CapF (1/1)	07/17/96	< 0.01 ± 0.003	< 0.005 ± 0.001	1.6 ± 0.2	0.005 ± 0.002
Field Blank	UF2 (1/1)	07/17/96	< 0.01 ± 0.001	< 0.005 ± 0.002	1.7 ± 0.6	< 0.004 ± 0.000
Field Blank	UF3 (1/1)	07/17/96	< 0.01 ± 0.004	< 0.005 ± 0.000	2.5 ± 0.6	< 0.004 ± 0.001
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.03 ± 0.02	< 0.006 ± 0.002	2.2 ± 0.7	< 0.007 ± 0.004
Lab Blank	20LCh (1/1)	09/18/96	< 0.013 ± 0.010	< 0.01 ± 0.002	1.6 ± 0.3	< 0.007 ± 0.004
Lab Blank	MemF (1/1)	09/18/96	< 0.017 ± 0.021	< 0.006 ± 0.000	3 ± 3	< 0.007 ± 0.003
Lab Blank	CapF (1/1)	09/18/96	< 0.017 ± 0.010	< 0.006 ± 0.001	3 ± 1	< 0.007 ± 0.005
Lab Blank	UF2 (1/1)	09/18/96	< 0.013 ± 0.010	< 0.01 ± 0.001	4.5 ± 2.2	< 0.007 ± 0.005
Lab Blank	UF3 (1/1)	09/18/96	< 0.03 ± 0.00	< 0.006 ± 0.002	2.1 ± 0.3	< 0.007 ± 0.002
Lab Blank	THB (1/1)	09/18/96	< 0.017 ± 0.006	< 0.006 ± 0.000	3 ± 3	< 0.007 ± 0.005
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.03 ± 0.01	< 0.006 ± 0.002	2.6 ± 1.0	< 0.007 ± 0.005
Field Blank	20LCh (1/1)	09/18/96	< 0.017 ± 0.008	< 0.006 ± 0.001	< 2 ± 0	< 0.007 ± 0.005
Field Blank	MemF (1/1)	09/18/96	< 0.03 ± 0.00	< 0.006 ± 0.001	1.2 ± 0.2	< 0.007 ± 0.005
Field Blank	CapF (1/1)	09/18/96	< 0.017 ± 0.014	< 0.006 ± 0.000	4 ± 3	0.008 ± 0.002
Field Blank	UF2 (1/1)	09/18/96	< 0.03 ± 0.03	< 0.006 ± 0.002	2.3 ± 0.7	< 0.007 ± 0.005
Field Blank	UF3 (1/1)	09/18/96	0.018 ± 0.002	< 0.006 ± 0.001	3 ± 1	< 0.007 ± 0.004
Field Blank	THB (1/1)	09/18/96	< 0.017 ± 0.013	< 0.006 ± 0.002	5 ± 4	< 0.007 ± 0.003
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.03 ± 0.00	< 0.008 ± 0.001	2 ± 0	< 0.012 ± 0.001
Lab Blank	8LCh (1/1)	11/13/96	< 0.03 ± 0.03	< 0.008 ± 0.001	< 2 ± 0	< 0.012 ± 0.006
Lab Blank	MemF (1/1)	11/13/96	< 0.03 ± 0.02	< 0.008 ± 0.002	< 2 ± 1	< 0.012 ± 0.004

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.03 ± 0.02	< 0.008 ± 0.001	< 2 ± 0	< 0.012 ± 0.002
Lab Blank	UF2 (1/1)	11/13/96	< 0.03 ± 0.02	< 0.008 ± 0.000	< 2 ± 0	< 0.012 ± 0.001
Lab Blank	UF3 (1/1)	11/13/96	< 0.03 ± 0.03	< 0.008 ± 0.001	< 2 ± 1	< 0.012 ± 0.001
Lab Blank	THB (1/1)	11/13/96	< 0.03 ± 0.02	< 0.008 ± 0.001	< 2 ± 1	< 0.012 ± 0.001
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.000	< 2 ± 0	< 0.012 ± 0.002
Field Blank	8LCh (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.000	< 2 ± 0	< 0.012 ± 0.002
Field Blank	MemF (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.001	< 2 ± 1	< 0.012 ± 0.003
Field Blank	CapF (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.000	< 2 ± 0	< 0.012 ± 0.006
Field Blank	UF1 (1/1)	11/20/96	< 0.03 ± 0.01	< 0.008 ± 0.001	< 2 ± 1	< 0.012 ± 0.008
Field Blank	UF3 (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.000	< 2 ± 1	< 0.012 ± 0.003
Field Blank	THB (1/1)	11/20/96	< 0.03 ± 0.01	< 0.008 ± 0.001	< 2 ± 0	< 0.012 ± 0.003
Field Blank	CapF (1/1)	11/20/96	< 0.03 ± 0.02	< 0.008 ± 0.001	< 2 ± 1	< 0.012 ± 0.010
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.014 ± 0.007	< 0.011 ± 0.000	< 4 ± 2	0.007 ± 0.002
Lab Blank	MemF (1/1)	12/16/96	< 0.014 ± 0.000	< 0.011 ± 0.001	< 4 ± 2	< 0.005 ± 0.002
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.014 ± 0.004	< 0.011 ± 0.000	< 4 ± 3	< 0.005 ± 0.004
Lab Blank	UF3 (1/1)	12/16/96	< 0.014 ± 0.006	< 0.011 ± 0.001	< 4 ± 2	< 0.005 ± 0.005
Lab Blank	THB (1/1)	12/16/96	< 0.014 ± 0.002	< 0.011 ± 0.001	< 4 ± 2	< 0.005 ± 0.005
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.014 ± 0.007	< 0.011 ± 0.001	< 4 ± 2	< 0.005 ± 0.003
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.014 ± 0.005	< 0.011 ± 0.000	< 4 ± 1	< 0.005 ± 0.004
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.014 ± 0.001	< 0.011 ± 0.001	< 4 ± 2	< 0.005 ± 0.002
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.014 ± 0.007	< 0.011 ± 0.000	< 4 ± 2	< 0.005 ± 0.002
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.014 ± 0.004	< 0.011 ± 0.000	< 1 ± 1	< 0.005 ± 0.005
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.014 ± 0.002	< 0.011 ± 0.002	< 4 ± 3	< 0.005 ± 0.002
Lab Blank	UF1 (1/1)	12/16/96	< 0.014 ± 0.002	< 0.011 ± 0.001	< 4 ± 3	< 0.005 ± 0.001
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.014 ± 0.003	< 0.011 ± 0.000	< 4 ± 2	< 0.005 ± 0.002
Field Blank	8LCh (1/1)	12/17/96	< 0.014 ± 0.005	< 0.011 ± 0.001	< 4 ± 3	< 0.005 ± 0.003
Field Blank	MemF (1/1)	12/17/96	< 0.014 ± 0.003	< 0.011 ± 0.002	< 4 ± 4	< 0.005 ± 0.005
Field Blank	CapF (1/1)	12/17/96	< 0.014 ± 0.005	< 0.011 ± 0.001	< 3 ± 2	< 0.013 ± 0.007
Field Blank	UF2 (1/1)	12/17/96	< 0.014 ± 0.004	< 0.011 ± 0.000	< 4 ± 1	< 0.005 ± 0.002
Field Blank	THB (1/1)	12/17/96	< 0.014 ± 0.006	< 0.011 ± 0.001	< 4 ± 0	< 0.005 ± 0.003
Lab Blank	DIW (1/1)	01/06/97	< 0.015 ± 0.006	< 0.01 ± 0.001	< 3 ± 0	0.013 ± 0.009

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.015 ± 0.004	< 0.01 ± 0.001	< 3 ± 1	< 0.006 ± 0.004
Lab Blank	MemF (1/1)	01/06/97	< 0.015 ± 0.006	< 0.01 ± 0.001	< 3 ± 1	< 0.006 ± 0.005
Lab Blank	CapF (1/1)	01/06/97	< 0.04 ± 0.03	< 0.0009 ± 0.0001	< 1 ± 1	< 0.02 ± 0.00
Lab Blank	UF2 (1/2)	01/06/97	< 0.015 ± 0.007	< 0.01 ± 0.002	< 3 ± 0	< 0.006 ± 0.002
Lab Blank	UF2 (2/2)	01/06/97	< 0.015 ± 0.015	< 0.014 ± 0.001	< 4 ± 1	< 0.011 ± 0.002
Lab Blank	UF3 (1/1)	01/06/97	< 0.015 ± 0.000	< 0.01 ± 0.001	< 3 ± 0	< 0.006 ± 0.002
Lab Blank	THB (1/1)	01/06/97	< 0.015 ± 0.003	< 0.01 ± 0.001	< 3 ± 1	< 0.006 ± 0.001
Lab Blank	25LCb (1/1)	01/06/97	< 0.015 ± 0.005	< 0.01 ± 0.000	< 3 ± 0	< 0.006 ± 0.002
Lab Blank	DIW (1/1)	01/06/97	< 0.015 ± 0.008	< 0.01 ± 0.001	< 3 ± 0	< 0.006 ± 0.004
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.015 ± 0.008	< 0.01 ± 0.001	< 3 ± 2	< 0.006 ± 0.003
Lab Blank	UF2 (1/1)	05/28/97	< 0.04 ± 0.01	< 0.0009 ± 0.0003	< 1 ± 0	< 0.02 ± 0.01
Lab Blank	UF3 (1/1)	05/28/97	< 0.04 ± 0.01	< 0.0009 ± 0.0013	< 1 ± 0	< 0.02 ± 0.01
Lab Blank	THB (1/1)	05/28/97	< 0.04 ± 0.02	< 0.0009 ± 0.0002	< 1 ± 0	< 0.02 ± 0.00
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.04 ± 0.02	< 0.0009 ± 0.0004	< 1 ± 0	< 0.02 ± 0.01
Field Blank	DIW (2/2)	06/05/97	< 0.04 ± 0.01	< 0.0009 ± 0.0005	< 1 ± 1	< 0.004 ± 0.004
Field Blank	CapF (1/3)	06/05/97	< 0.04 ± 0.01	< 0.0009 ± 0.0004	< 1 ± 0	< 0.02 ± 0.01
Field Blank	UFVP (1/1)	06/05/97	< 0.04 ± 0.01	< 0.0009 ± 0.0004	< 1 ± 1	< 0.004 ± 0.001
Field Blank	JyCn (1/1)	06/05/97	< 0.04 ± 0.01	< 0.0009 ± 0.0004	< 1 ± 0	< 0.02 ± 0.01
Field Blank	CapF (2/3)	06/05/97	< 0.04 ± 0.01	< 0.001 ± 0.000	< 0.8 ± 1.6	0.007 ± 0.002
Field Blank	CapF (3/3)	06/05/97	< 0.04 ± 0.04	< 0.001 ± 0.000	< 0.8 ± 0.5	0.005 ± 0.004
Field Blank	SCDI (1/1)	06/05/97	< 0.04 ± 0.01	< 0.001 ± 0.001	0.9 ± 1.3	< 0.01 ± 0.00
Field Blank	SCADI (1/1)	06/05/97	< 0.04 ± 0.03	< 0.001 ± 0.002	< 0.8 ± 0.1	< 0.01 ± 0.01
Field Blank	TfTb (1/1)	06/05/97	< 0.04 ± 0.01	< 0.001 ± 0.001	< 0.8 ± 0.6	< 0.01 ± 0.01
Lab Blank	DIW (1/1)	05/28/97	< 0.04 ± 0.01	< 0.0009 ± 0.0004	< 1 ± 0	< 0.02 ± 0.00
Lab Blank	MemF (1/1)	05/28/97	< 0.04 ± 0.01	< 0.0009 ± 0.0003	< 1 ± 0	0.005 ± 0.002
Lab Blank	CapF (1/1)	05/28/97	< 0.04 ± 0.01	< 0.0009 ± 0.0004	< 1 ± 0	< 0.004 ± 0.003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Calcium mg/L	Cerium µg/L	Chromium µg/L	Cobalt µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.001 ± 0.000	< 0.0005 ± 0.0003	< 0.12 ± 0.03	< 0.004 ± 0.000
Lab Blank	8LCh (1/1)	07/10/96	0.040 ± 0.001	0.0023 ± 0.0003	< 0.12 ± 0.06	< 0.004 ± 0.003
Lab Blank	MemF (1/1)	07/10/96	< 0.001 ± 0.000	0.0007 ± 0.0005	< 0.12 ± 0.04	< 0.004 ± 0.002
Lab Blank	CapF (1/1)	07/10/96	< 0.001 ± 0.000	< 0.0005 ± 0.0001	< 0.12 ± 0.02	< 0.004 ± 0.002
Lab Blank	UF1 (1/1)	07/10/96	< 0.001 ± 0.000	< 0.0007 ± 0.0006	< 0.2 ± 0.4	< 0.005 ± 0.004
Lab Blank	UF2 (1/1)	07/10/96	< 0.001 ± 0.000	< 0.0005 ± 0.0001	< 0.12 ± 0.16	< 0.004 ± 0.001
Lab Blank	UF3 (1/1)	07/12/96	< 0.001 ± 0.000	0.0007 ± 0.0005	< 0.2 ± 0.2	< 0.005 ± 0.002
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.002 ± 0.000	< 0.0005 ± 0.0002	< 0.12 ± 0.01	< 0.004 ± 0.002
Field Blank	8LCh (1/1)	07/17/96	0.016 ± 0.009	0.0055 ± 0.0009	< 0.2 ± 0.1	< 0.005 ± 0.003
Field Blank	MemF (1/1)	07/17/96	0.03 ± 0.05	< 0.0007 ± 0.0015	< 0.2 ± 0.0	< 0.005 ± 0.004
Field Blank	CapF (1/1)	07/17/96	0.010 ± 0.000	0.0009 ± 0.0002	< 0.12 ± 0.11	< 0.004 ± 0.002
Field Blank	UF2 (1/1)	07/17/96	< 0.01 ± 0.01	< 0.0005 ± 0.0002	< 0.12 ± 0.01	< 0.004 ± 0.001
Field Blank	UF3 (1/1)	07/17/96	< 0.002 ± 0.001	< 0.0005 ± 0.0003	< 0.12 ± 0.03	< 0.004 ± 0.000
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.02 ± 0.01	< 0.0011 ± 0.0008	< 0.3 ± 0.0	< 0.008 ± 0.003
Lab Blank	20LCh (1/1)	09/18/96	< 0.009 ± 0.005	< 0.0011 ± 0.0005	0.15 ± 0.12	< 0.011 ± 0.003
Lab Blank	MemF (1/1)	09/18/96	< 0.012 ± 0.004	< 0.0005 ± 0.0003	< 0.17 ± 0.21	< 0.006 ± 0.012
Lab Blank	CapF (1/1)	09/18/96	< 0.009 ± 0.006	< 0.0005 ± 0.0005	< 0.17 ± 0.02	< 0.006 ± 0.008
Lab Blank	UF2 (1/1)	09/18/96	< 0.011 ± 0.000	< 0.0011 ± 0.0005	< 0.12 ± 0.05	< 0.011 ± 0.007
Lab Blank	UF3 (1/1)	09/18/96	< 0.02 ± 0.00	< 0.0011 ± 0.0009	< 0.3 ± 0.0	< 0.008 ± 0.003
Lab Blank	THB (1/1)	09/18/96	< 0.009 ± 0.002	0.0006 ± 0.0004	0.26 ± 0.11	< 0.006 ± 0.007
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.012 ± 0.017	< 0.0011 ± 0.0002	< 0.3 ± 0.1	< 0.008 ± 0.002
Field Blank	20LCh (1/1)	09/18/96	< 0.012 ± 0.001	< 0.0005 ± 0.0005	< 0.17 ± 0.03	< 0.006 ± 0.004
Field Blank	MemF (1/1)	09/18/96	< 0.012 ± 0.001	< 0.0011 ± 0.0002	< 0.3 ± 0.2	< 0.008 ± 0.008
Field Blank	CapF (1/1)	09/18/96	< 0.012 ± 0.000	< 0.0005 ± 0.0003	< 0.17 ± 0.07	< 0.006 ± 0.007
Field Blank	UF2 (1/1)	09/18/96	< 0.012 ± 0.001	< 0.0011 ± 0.0005	< 0.3 ± 0.0	< 0.008 ± 0.004
Field Blank	UF3 (1/1)	09/18/96	< 0.012 ± 0.000	0.0015 ± 0.0005	< 0.17 ± 0.06	< 0.006 ± 0.004
Field Blank	THB (1/1)	09/18/96	< 0.012 ± 0.002	< 0.0005 ± 0.0002	< 0.17 ± 0.06	< 0.006 ± 0.002
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.011 ± 0.001	< 0.0009 ± 0.0003	< 0.12 ± 0.00	< 0.005 ± 0.002
Lab Blank	8LCh (1/1)	11/13/96	< 0.011 ± 0.001	< 0.0009 ± 0.0001	< 0.12 ± 0.06	< 0.005 ± 0.003
Lab Blank	MemF (1/1)	11/13/96	< 0.011 ± 0.001	0.0026 ± 0.0010	< 0.12 ± 0.04	< 0.005 ± 0.002

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Calcium mg/L	Cerium µg/L	Chromium µg/L	Cobalt µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.011 ± 0.005	< 0.0009 ± 0.0002	< 0.12 ± 0.03	< 0.005 ± 0.000
Lab Blank	UF2 (1/1)	11/13/96	< 0.011 ± 0.001	< 0.0009 ± 0.0004	< 0.12 ± 0.08	< 0.005 ± 0.005
Lab Blank	UF3 (1/1)	11/13/96	< 0.011 ± 0.001	0.0020 ± 0.0008	< 0.12 ± 0.02	< 0.005 ± 0.003
Lab Blank	THB (1/1)	11/13/96	< 0.011 ± 0.002	< 0.0009 ± 0.0004	< 0.12 ± 0.01	< 0.005 ± 0.000
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.011 ± 0.001	< 0.0009 ± 0.0003	< 0.12 ± 0.05	< 0.005 ± 0.000
Field Blank	8LCh (1/1)	11/20/96	< 0.011 ± 0.000	< 0.0009 ± 0.0004	< 0.12 ± 0.03	< 0.005 ± 0.003
Field Blank	MemF (1/1)	11/20/96	< 0.011 ± 0.001	< 0.0009 ± 0.0007	< 0.12 ± 0.01	< 0.005 ± 0.003
Field Blank	CapF (1/1)	11/20/96	< 0.011 ± 0.002	< 0.0009 ± 0.0008	< 0.12 ± 0.06	< 0.005 ± 0.000
Field Blank	UF1 (1/1)	11/20/96	< 0.002 ± 0.001	< 0.0009 ± 0.0004	< 0.12 ± 0.01	< 0.005 ± 0.004
Field Blank	UF3 (1/1)	11/20/96	< 0.002 ± 0.003	0.0012 ± 0.0004	< 0.12 ± 0.08	< 0.005 ± 0.002
Field Blank	THB (1/1)	11/20/96	0.011 ± 0.020	0.0023 ± 0.0002	< 0.12 ± 0.05	< 0.005 ± 0.000
Field Blank	CapF (1/1)	11/20/96	< 0.003 ± 0.002	< 0.0009 ± 0.0005	< 0.12 ± 0.04	< 0.005 ± 0.001
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.02 ± 0.00	< 0.0004 ± 0.0001	< 0.06 ± 0.03	< 0.009 ± 0.002
Lab Blank	MemF (1/1)	12/16/96	< 0.02 ± 0.00	0.0005 ± 0.0003	< 0.06 ± 0.03	< 0.009 ± 0.001
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.02 ± 0.00	< 0.0004 ± 0.0002	< 0.06 ± 0.06	< 0.009 ± 0.001
Lab Blank	UF3 (1/1)	12/16/96	< 0.02 ± 0.00	0.0005 ± 0.0004	< 0.06 ± 0.02	< 0.009 ± 0.003
Lab Blank	THB (1/1)	12/16/96	< 0.02 ± 0.00	< 0.0004 ± 0.0001	< 0.06 ± 0.02	< 0.009 ± 0.001
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.02 ± 0.01	< 0.0004 ± 0.0002	< 0.06 ± 0.03	< 0.009 ± 0.002
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.02 ± 0.01	< 0.0004 ± 0.0004	< 0.06 ± 0.05	< 0.009 ± 0.001
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.02 ± 0.00	< 0.0004 ± 0.0000	< 0.06 ± 0.03	< 0.009 ± 0.002
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.02 ± 0.00	< 0.0004 ± 0.0003	< 0.06 ± 0.02	< 0.009 ± 0.004
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.02 ± 0.01	0.0012 ± 0.0003	< 0.05 ± 0.04	< 0.009 ± 0.002
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.02 ± 0.00	0.0004 ± 0.0004	< 0.06 ± 0.07	< 0.009 ± 0.002
Lab Blank	UF1 (1/1)	12/16/96	< 0.008 ± 0.004	< 0.0004 ± 0.0002	< 0.06 ± 0.04	< 0.009 ± 0.001
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.008 ± 0.001	0.0008 ± 0.0002	< 0.06 ± 0.04	< 0.009 ± 0.003
Field Blank	8LCh (1/1)	12/17/96	< 0.008 ± 0.001	0.0017 ± 0.0003	< 0.06 ± 0.03	< 0.009 ± 0.001
Field Blank	MemF (1/1)	12/17/96	< 0.02 ± 0.00	0.0007 ± 0.0003	< 0.06 ± 0.07	< 0.009 ± 0.001
Field Blank	CapF (1/1)	12/17/96	< 0.008 ± 0.003	< 0.0004 ± 0.0002	< 0.06 ± 0.00	< 0.007 ± 0.005
Field Blank	UF2 (1/1)	12/17/96	< 0.02 ± 0.00	< 0.0004 ± 0.0002	< 0.06 ± 0.04	< 0.009 ± 0.002
Field Blank	THB (1/1)	12/17/96	< 0.02 ± 0.00	0.0024 ± 0.0001	< 0.06 ± 0.01	< 0.009 ± 0.002
Lab Blank	DIW (1/1)	01/06/97	< 0.008 ± 0.002	< 0.0004 ± 0.0001	< 0.04 ± 0.05	< 0.009 ± 0.003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Calcium mg/L	Cerium µg/L	Chromium µg/L	Cobalt µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.008 ± 0.001	< 0.0004 ± 0.0002	< 0.04 ± 0.04	< 0.009 ± 0.003
Lab Blank	MemF (1/1)	01/06/97	< 0.008 ± 0.002	< 0.0004 ± 0.0002	< 0.04 ± 0.02	< 0.009 ± 0.003
Lab Blank	CapF (1/1)	01/06/97	< 0.1 ± 0.0	< 0.0005 ± 0.0003	< 0.08 ± 0.06	0.004 ± 0.002
Lab Blank	UF2 (1/2)	01/06/97	< 0.008 ± 0.001	< 0.0004 ± 0.0003	< 0.04 ± 0.04	< 0.009 ± 0.003
Lab Blank	UF2 (2/2)	01/06/97	< 0.007 ± 0.001	< 0.0009 ± 0.0003	< 0.08 ± 0.02	< 0.005 ± 0.001
Lab Blank	UF3 (1/1)	01/06/97	< 0.008 ± 0.001	0.050 ± 0.002	0.15 ± 0.02	0.030 ± 0.001
Lab Blank	THB (1/1)	01/06/97	< 0.008 ± 0.007	< 0.0004 ± 0.0001	< 0.04 ± 0.04	< 0.009 ± 0.002
Lab Blank	25LCb (1/1)	01/06/97	< 0.008 ± 0.001	< 0.0004 ± 0.0003	< 0.04 ± 0.03	< 0.009 ± 0.003
Lab Blank	DIW (1/1)	01/06/97	< 0.008 ± 0.003	< 0.0004 ± 0.0003	< 0.04 ± 0.01	< 0.009 ± 0.001
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	0.008 ± 0.004	< 0.0004 ± 0.0001	< 0.04 ± 0.01	< 0.009 ± 0.003
Lab Blank	UF2 (1/1)	05/28/97	< 0.01 ± 0.00	< 0.0005 ± 0.0001	< 0.08 ± 0.06	< 0.003 ± 0.001
Lab Blank	UF3 (1/1)	05/28/97	< 0.01 ± 0.00	0.0040 ± 0.0001	< 0.08 ± 0.08	0.004 ± 0.003
Lab Blank	THB (1/1)	05/28/97	< 0.01 ± 0.00	< 0.0005 ± 0.0002	< 0.08 ± 0.07	< 0.003 ± 0.001
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.01 ± 0.00	0.0007 ± 0.0002	< 0.08 ± 0.04	< 0.003 ± 0.002
Field Blank	DIW (2/2)	06/05/97	< 0.01 ± 0.00	0.0006 ± 0.0002	< 0.08 ± 0.05	< 0.003 ± 0.002
Field Blank	CapF (1/3)	06/05/97	< 0.01 ± 0.00	< 0.0005 ± 0.0002	< 0.08 ± 0.05	0.003 ± 0.002
Field Blank	UFVP (1/1)	06/05/97	< 0.01 ± 0.00	< 0.0005 ± 0.0002	< 0.08 ± 0.03	< 0.003 ± 0.001
Field Blank	JyCn (1/1)	06/05/97	< 0.01 ± 0.00	0.0016 ± 0.0005	< 0.08 ± 0.08	< 0.003 ± 0.001
Field Blank	CapF (2/3)	06/05/97	< 0.01 ± 0.00	< 0.0004 ± 0.0001	< 0.1 ± 0.1	< 0.003 ± 0.001
Field Blank	CapF (3/3)	06/05/97	< 0.02 ± 0.00	< 0.0004 ± 0.0002	< 0.1 ± 0.1	< 0.003 ± 0.002
Field Blank	SCDI (1/1)	06/05/97	< 0.02 ± 0.00	< 0.0004 ± 0.0003	< 0.1 ± 0.0	< 0.003 ± 0.004
Field Blank	SCADI (1/1)	06/05/97	< 0.02 ± 0.00	0.0005 ± 0.0008	< 0.1 ± 0.1	0.011 ± 0.006
Field Blank	TfTb (1/1)	06/05/97	< 0.02 ± 0.00	< 0.0004 ± 0.0008	< 0.1 ± 0.0	< 0.003 ± 0.000
Lab Blank	DIW (1/1)	05/28/97	< 0.01 ± 0.00	< 0.0005 ± 0.0002	< 0.08 ± 0.02	< 0.003 ± 0.002
Lab Blank	MemF (1/1)	05/28/97	< 0.01 ± 0.00	< 0.0005 ± 0.0002	< 0.08 ± 0.06	< 0.003 ± 0.000
Lab Blank	CapF (1/1)	05/28/97	< 0.01 ± 0.00	< 0.0005 ± 0.0001	< 0.08 ± 0.05	< 0.003 ± 0.001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Copper µg/L	Dysprosium µg/L	Erbium µg/L	Europium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.03 ± 0.00	< 0.0007 ± 0.0002	< 0.0011 ± 0.0004	< 0.0003 ± 0.0002
Lab Blank	8LCh (1/1)	07/10/96	0.03 ± 0.01	< 0.0007 ± 0.0002	< 0.0011 ± 0.0007	< 0.0003 ± 0.0001
Lab Blank	MemF (1/1)	07/10/96	< 0.03 ± 0.01	< 0.0007 ± 0.0006	< 0.0011 ± 0.0006	< 0.0003 ± 0.0001
Lab Blank	CapF (1/1)	07/10/96	0.03 ± 0.03	< 0.0007 ± 0.0002	< 0.0011 ± 0.0005	< 0.0003 ± 0.0001
Lab Blank	UF1 (1/1)	07/10/96	0.03 ± 0.02	< 0.0017 ± 0.0000	< 0.002 ± 0.001	< 0.001 ± 0.0003
Lab Blank	UF2 (1/1)	07/10/96	< 0.03 ± 0.02	< 0.0007 ± 0.0005	< 0.0011 ± 0.0006	< 0.0003 ± 0.0002
Lab Blank	UF3 (1/1)	07/12/96	0.07 ± 0.01	< 0.0017 ± 0.0010	< 0.002 ± 0.001	< 0.001 ± 0.0005
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.03 ± 0.02	< 0.0007 ± 0.0000	< 0.0011 ± 0.0007	< 0.0003 ± 0.0002
Field Blank	8LCh (1/1)	07/17/96	< 0.03 ± 0.01	< 0.0017 ± 0.0011	< 0.002 ± 0.001	< 0.001 ± 0.0008
Field Blank	MemF (1/1)	07/17/96	< 0.03 ± 0.11	< 0.0017 ± 0.0026	< 0.002 ± 0.001	< 0.001 ± 0.0008
Field Blank	CapF (1/1)	07/17/96	0.82 ± 0.01	< 0.0007 ± 0.0004	< 0.0011 ± 0.0002	< 0.0003 ± 0.0003
Field Blank	UF2 (1/1)	07/17/96	0.04 ± 0.02	< 0.0007 ± 0.0003	< 0.0011 ± 0.0002	0.0003 ± 0.0002
Field Blank	UF3 (1/1)	07/17/96	< 0.03 ± 0.01	< 0.0007 ± 0.0003	< 0.0011 ± 0.0000	< 0.0003 ± 0.0002
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.02 ± 0.02	< 0.003 ± 0.002	< 0.003 ± 0.003	< 0.001 ± 0.001
Lab Blank	20LCh (1/1)	09/18/96	0.05 ± 0.01	< 0.0018 ± 0.0001	< 0.0018 ± 0.0010	< 0.001 ± 0.000
Lab Blank	MemF (1/1)	09/18/96	0.11 ± 0.04	< 0.0018 ± 0.0009	< 0.0015 ± 0.0009	< 0.001 ± 0.000
Lab Blank	CapF (1/1)	09/18/96	0.30 ± 0.05	< 0.0018 ± 0.0011	< 0.0015 ± 0.0007	< 0.001 ± 0.000
Lab Blank	UF2 (1/1)	09/18/96	0.06 ± 0.02	< 0.0018 ± 0.0006	< 0.0018 ± 0.0006	< 0.001 ± 0.000
Lab Blank	UF3 (1/1)	09/18/96	< 0.03 ± 0.02	< 0.003 ± 0.001	< 0.003 ± 0.000	< 0.001 ± 0.001
Lab Blank	THB (1/1)	09/18/96	0.06 ± 0.03	< 0.0018 ± 0.0006	< 0.0015 ± 0.0005	< 0.001 ± 0.000
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	0.02 ± 0.01	< 0.003 ± 0.001	< 0.003 ± 0.001	< 0.001 ± 0.000
Field Blank	20LCh (1/1)	09/18/96	< 0.02 ± 0.02	< 0.0018 ± 0.0014	< 0.0015 ± 0.0011	< 0.001 ± 0.000
Field Blank	MemF (1/1)	09/18/96	0.03 ± 0.01	< 0.003 ± 0.002	< 0.003 ± 0.000	< 0.001 ± 0.000
Field Blank	CapF (1/1)	09/18/96	0.12 ± 0.02	< 0.0018 ± 0.0017	< 0.0015 ± 0.0018	< 0.001 ± 0.001
Field Blank	UF2 (1/1)	09/18/96	0.03 ± 0.01	< 0.003 ± 0.001	< 0.003 ± 0.001	< 0.001 ± 0.000
Field Blank	UF3 (1/1)	09/18/96	0.03 ± 0.01	< 0.0018 ± 0.0005	< 0.0015 ± 0.0015	< 0.001 ± 0.000
Field Blank	THB (1/1)	09/18/96	< 0.02 ± 0.01	< 0.0018 ± 0.0011	< 0.0015 ± 0.0001	< 0.001 ± 0.000
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.02 ± 0.01	< 0.0017 ± 0.0020	< 0.003 ± 0.002	< 0.001 ± 0.0004
Lab Blank	8LCh (1/1)	11/13/96	< 0.02 ± 0.01	< 0.0017 ± 0.0015	< 0.003 ± 0.000	< 0.001 ± 0.0007
Lab Blank	MemF (1/1)	11/13/96	0.03 ± 0.01	< 0.0017 ± 0.0012	< 0.003 ± 0.002	< 0.001 ± 0.0003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Copper µg/L	Dysprosium µg/L	Erbium µg/L	Europium µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.02 ± 0.02	< 0.0017 ± 0.0005	< 0.003 ± 0.001	< 0.001 ± 0.0000
Lab Blank	UF2 (1/1)	11/13/96	0.09 ± 0.02	< 0.0017 ± 0.0009	< 0.003 ± 0.001	< 0.001 ± 0.0003
Lab Blank	UF3 (1/1)	11/13/96	0.09 ± 0.02	< 0.0017 ± 0.0006	< 0.003 ± 0.003	< 0.001 ± 0.0004
Lab Blank	THB (1/1)	11/13/96	0.02 ± 0.01	< 0.0017 ± 0.0001	< 0.003 ± 0.001	< 0.001 ± 0.0002
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.02 ± 0.00	< 0.0017 ± 0.0006	< 0.003 ± 0.001	< 0.001 ± 0.0002
Field Blank	8LCh (1/1)	11/20/96	< 0.02 ± 0.01	< 0.0017 ± 0.0010	< 0.003 ± 0.002	< 0.001 ± 0.0003
Field Blank	MemF (1/1)	11/20/96	< 0.02 ± 0.00	< 0.0017 ± 0.0016	< 0.003 ± 0.003	< 0.001 ± 0.0002
Field Blank	CapF (1/1)	11/20/96	< 0.02 ± 0.03	< 0.0017 ± 0.0008	< 0.003 ± 0.001	< 0.001 ± 0.0004
Field Blank	UF1 (1/1)	11/20/96	< 0.02 ± 0.01	< 0.0017 ± 0.0007	< 0.003 ± 0.001	< 0.001 ± 0.0007
Field Blank	UF3 (1/1)	11/20/96	0.02 ± 0.01	< 0.0017 ± 0.0010	< 0.003 ± 0.002	< 0.001 ± 0.0006
Field Blank	THB (1/1)	11/20/96	< 0.02 ± 0.01	< 0.0017 ± 0.0003	< 0.003 ± 0.001	< 0.001 ± 0.0003
Field Blank	CapF (1/1)	11/20/96	< 0.02 ± 0.02	< 0.0017 ± 0.0001	< 0.003 ± 0.001	< 0.001 ± 0.0005
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	0.03 ± 0.05	< 0.0015 ± 0.0009	< 0.002 ± 0.0013	< 0.001 ± 0.000
Lab Blank	MemF (1/1)	12/16/96	0.03 ± 0.01	< 0.0015 ± 0.0007	< 0.002 ± 0.0005	< 0.001 ± 0.000
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	0.03 ± 0.02	< 0.0015 ± 0.0007	< 0.002 ± 0.0002	< 0.001 ± 0.000
Lab Blank	UF3 (1/1)	12/16/96	0.16 ± 0.02	< 0.0015 ± 0.0008	< 0.002 ± 0.0007	< 0.001 ± 0.000
Lab Blank	THB (1/1)	12/16/96	0.02 ± 0.02	< 0.0015 ± 0.0002	< 0.002 ± 0.0006	< 0.001 ± 0.000
Lab Blank	20LCh-1 (1/1)	12/16/96	0.02 ± 0.02	< 0.0015 ± 0.0003	< 0.002 ± 0.0003	< 0.001 ± 0.000
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.011 ± 0.00	< 0.0015 ± 0.0005	< 0.002 ± 0.0010	< 0.001 ± 0.000
Lab Blank	20LCh-3 (1/1)	12/16/96	0.05 ± 0.01	< 0.0015 ± 0.0011	< 0.002 ± 0.0010	< 0.001 ± 0.000
Lab Blank	20LCh-4 (1/1)	12/16/96	0.02 ± 0.01	< 0.0015 ± 0.0010	< 0.002 ± 0.0007	< 0.001 ± 0.000
Lab Blank	20LCh-5 (1/1)	12/16/96	0.10 ± 0.06	< 0.0015 ± 0.0007	< 0.002 ± 0.0004	< 0.001 ± 0.000
Lab Blank	20LCh-6 (1/1)	12/16/96	0.11 ± 0.04	< 0.0015 ± 0.0004	< 0.002 ± 0.0004	< 0.001 ± 0.000
Lab Blank	UF1 (1/1)	12/16/96	0.05 ± 0.02	< 0.0015 ± 0.0008	< 0.002 ± 0.0005	< 0.001 ± 0.000
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	0.10 ± 0.04	< 0.0015 ± 0.0002	< 0.002 ± 0.0003	< 0.001 ± 0.000
Field Blank	8LCh (1/1)	12/17/96	0.06 ± 0.01	< 0.0015 ± 0.0007	< 0.002 ± 0.0001	< 0.001 ± 0.000
Field Blank	MemF (1/1)	12/17/96	0.07 ± 0.00	< 0.0015 ± 0.0005	< 0.002 ± 0.0005	< 0.001 ± 0.000
Field Blank	CapF (1/1)	12/17/96	0.17 ± 0.04	< 0.0015 ± 0.0004	< 0.002 ± 0.0002	< 0.001 ± 0.000
Field Blank	UF2 (1/1)	12/17/96	0.02 ± 0.01	< 0.0015 ± 0.0002	< 0.002 ± 0.0004	< 0.001 ± 0.000
Field Blank	THB (1/1)	12/17/96	0.05 ± 0.02	< 0.0015 ± 0.0007	< 0.002 ± 0.0006	< 0.001 ± 0.000
Lab Blank	DIW (1/1)	01/06/97	< 0.018 ± 0.021	< 0.0014 ± 0.0004	< 0.0013 ± 0.0002	< 0.001 ± 0.000

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Copper µg/L	Dysprosium µg/L	Erbium µg/L	Europium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.03 ± 0.01	< 0.0014 ± 0.0006	< 0.0013 ± 0.0007	< 0.001 ± 0.000
Lab Blank	MemF (1/1)	01/06/97	< 0.03 ± 0.00	< 0.0014 ± 0.0010	< 0.0013 ± 0.0003	< 0.001 ± 0.000
Lab Blank	CapF (1/1)	01/06/97	0.44 ± 0.00	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.0008 ± 0.0003
Lab Blank	UF2 (1/2)	01/06/97	< 0.03 ± 0.01	< 0.0014 ± 0.0002	< 0.0013 ± 0.0008	< 0.001 ± 0.000
Lab Blank	UF2 (2/2)	01/06/97	< 0.018 ± 0.017	< 0.0018 ± 0.0021	< 0.0018 ± 0.0016	< 0.001 ± 0.000
Lab Blank	UF3 (1/1)	01/06/97	0.29 ± 0.03	0.0039 ± 0.0003	0.0033 ± 0.0025	0.001 ± 0.000
Lab Blank	THB (1/1)	01/06/97	< 0.03 ± 0.00	< 0.0014 ± 0.0002	< 0.0013 ± 0.0010	< 0.001 ± 0.000
Lab Blank	25LCb (1/1)	01/06/97	< 0.03 ± 0.00	< 0.0014 ± 0.0000	< 0.0013 ± 0.0004	< 0.001 ± 0.000
Lab Blank	DIW (1/1)	01/06/97	0.18 ± 0.01	< 0.0014 ± 0.0007	< 0.0013 ± 0.0008	< 0.001 ± 0.000
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	0.05 ± 0.02	< 0.0014 ± 0.0002	< 0.0013 ± 0.0005	< 0.001 ± 0.000
Lab Blank	UF2 (1/1)	05/28/97	0.05 ± 0.01	< 0.002 ± 0.001	< 0.002 ± 0.000	< 0.0008 ± 0.0002
Lab Blank	UF3 (1/1)	05/28/97	0.19 ± 0.08	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.0008 ± 0.0002
Lab Blank	THB (1/1)	05/28/97	0.04 ± 0.01	< 0.002 ± 0.000	< 0.002 ± 0.000	< 0.0008 ± 0.0004
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	0.02 ± 0.01	< 0.002 ± 0.000	< 0.002 ± 0.000	< 0.0008 ± 0.0005
Field Blank	DIW (2/2)	06/05/97	< 0.04 ± 0.00	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.0008 ± 0.0001
Field Blank	CapF (1/3)	06/05/97	0.10 ± 0.01	< 0.002 ± 0.000	< 0.002 ± 0.000	< 0.0008 ± 0.0001
Field Blank	UFVP (1/1)	06/05/97	0.28 ± 0.03	< 0.002 ± 0.001	< 0.002 ± 0.000	< 0.0008 ± 0.0005
Field Blank	JyCn (1/1)	06/05/97	0.03 ± 0.03	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.0008 ± 0.0001
Field Blank	CapF (2/3)	06/05/97	0.24 ± 0.06	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.001 ± 0.000
Field Blank	CapF (3/3)	06/05/97	0.31 ± 0.00	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.001 ± 0.000
Field Blank	SCDI (1/1)	06/05/97	< 0.02 ± 0.01	< 0.002 ± 0.002	< 0.002 ± 0.000	< 0.001 ± 0.001
Field Blank	SCADI (1/1)	06/05/97	< 0.02 ± 0.02	< 0.002 ± 0.002	< 0.002 ± 0.000	< 0.001 ± 0.001
Field Blank	TfTb (1/1)	06/05/97	0.05 ± 0.03	< 0.002 ± 0.002	< 0.002 ± 0.000	< 0.001 ± 0.001
Lab Blank	DIW (1/1)	05/28/97	< 0.02 ± 0.01	< 0.002 ± 0.001	< 0.002 ± 0.001	< 0.0008 ± 0.0002
Lab Blank	MemF (1/1)	05/28/97	0.02 ± 0.01	< 0.002 ± 0.001	< 0.002 ± 0.000	< 0.0008 ± 0.0003
Lab Blank	CapF (1/1)	05/28/97	0.25 ± 0.01	< 0.002 ± 0.000	< 0.002 ± 0.000	< 0.0008 ± 0.0003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Gadolinium µg/L	Holmium µg/L	Iron (ICP-AES) µg/L	Iron (UV-Vis) µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.0009 ± 0.0003	< 0.0001 ± 0.0000	0.7 ± na	11 ± na
Lab Blank	8LCh (1/1)	07/10/96	< 0.0009 ± 0.0003	< 0.0001 ± 0.0001	2.5 ± na	11 ± na
Lab Blank	MemF (1/1)	07/10/96	< 0.0009 ± 0.0007	< 0.0001 ± 0.0001	1.7 ± na	20 ± na
Lab Blank	CapF (1/1)	07/10/96	< 0.0009 ± 0.0002	< 0.0001 ± 0.0001	0.9 ± na	24 ± na
Lab Blank	UF1 (1/1)	07/10/96	< 0.0017 ± 0.0013	0.0006 ± 0.0000	1.5 ± na	10 ± na
Lab Blank	UF2 (1/1)	07/10/96	< 0.0009 ± 0.0005	< 0.0001 ± 0.0001	2.2 ± na	25 ± na
Lab Blank	UF3 (1/1)	07/12/96	< 0.0017 ± 0.0001	< 0.0004 ± 0.0003	5.2 ± na	28 ± na
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.0009 ± 0.0006	< 0.0001 ± 0.0001	1.9 ± na	31 ± na
Field Blank	8LCh (1/1)	07/17/96	< 0.0017 ± 0.0011	0.0005 ± 0.0005	10.3 ± na	37 ± na
Field Blank	MemF (1/1)	07/17/96	< 0.0017 ± 0.0008	< 0.0004 ± 0.0002	4.9 ± na	24 ± na
Field Blank	CapF (1/1)	07/17/96	< 0.0009 ± 0.0002	< 0.0001 ± 0.0000	17.3 ± na	26 ± 0
Field Blank	UF2 (1/1)	07/17/96	< 0.0009 ± 0.0003	< 0.0001 ± 0.0000	1.2 ± na	21 ± na
Field Blank	UF3 (1/1)	07/17/96	< 0.0009 ± 0.0003	< 0.0001 ± 0.0001	1.7 ± na	— ± —
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0008 ± 0.0006	1.4 ± 0.4	13.4 ± na
Lab Blank	20LCh (1/1)	09/18/96	< 0.003 ± 0.001	< 0.0003 ± 0.0000	2.5 ± 1.0	9.7 ± na
Lab Blank	MemF (1/1)	09/18/96	< 0.002 ± 0.000	< 0.0004 ± 0.0001	6.0 ± 2.9	21.2 ± na
Lab Blank	CapF (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0004 ± 0.0002	3.9 ± 2.1	10.5 ± na
Lab Blank	UF2 (1/1)	09/18/96	< 0.003 ± 0.001	< 0.0003 ± 0.0001	1.4 ± na	15.0 ± na
Lab Blank	UF3 (1/1)	09/18/96	< 0.002 ± 0.002	< 0.0008 ± 0.0001	2.1 ± 0.9	8.6 ± na
Lab Blank	THB (1/1)	09/18/96	< 0.002 ± 0.000	< 0.0004 ± 0.0002	4.9 ± 0.9	— ± —
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.002 ± 0.002	< 0.0008 ± 0.0003	0.6 ± na	10.1 ± 3.3
Field Blank	20LCh (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0004 ± 0.0003	2.8 ± na	18.1 ± na
Field Blank	MemF (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0008 ± 0.0004	2.6 ± 1.0	11.7 ± 4.3
Field Blank	CapF (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0004 ± 0.0001	2.7 ± 2.1	9.9 ± na
Field Blank	UF2 (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0008 ± 0.0003	3.7 ± 3.3	8.0 ± 1.5
Field Blank	UF3 (1/1)	09/18/96	< 0.002 ± 0.000	< 0.0004 ± 0.0001	5.1 ± 0.0	11.3 ± na
Field Blank	THB (1/1)	09/18/96	< 0.002 ± 0.001	< 0.0004 ± 0.0001	< 0.4 ± na	10.6 ± na
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.003 ± 0.002	< 0.0005 ± 0.0001	11.5 ± na	<3 ± na
Lab Blank	8LCh (1/1)	11/13/96	< 0.003 ± 0.001	< 0.0005 ± 0.0004	3.2 ± na	<3 ± na
Lab Blank	MemF (1/1)	11/13/96	< 0.003 ± 0.002	< 0.0005 ± 0.0001	5.1 ± 0.0	2.1 ± na

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Gadolinium µg/L	Holmium µg/L	Iron (ICP-AES) µg/L	Iron (UV-Vis) µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.003 ± 0.001	< 0.0005 ± 0.0001	2.8 ± na	4.6 ± na
Lab Blank	UF2 (1/1)	11/13/96	< 0.003 ± 0.001	< 0.0005 ± 0.0005	1.8 ± 0.2	<3 ± na
Lab Blank	UF3 (1/1)	11/13/96	< 0.003 ± 0.001	< 0.0005 ± 0.0004	2.9 ± 0.8	<3 ± na
Lab Blank	THB (1/1)	11/13/96	< 0.003 ± 0.000	< 0.0005 ± 0.0003	1.5 ± 0.1	— ± —
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0003	1.5 ± 1.4	7.4 ± na
Field Blank	8LCh (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0003	1.9 ± 2.2	<3 ± 2.6
Field Blank	MemF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0002	4.7 ± na	<3 ± 0.6
Field Blank	CapF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0005	6.4 ± 0.9	7.2 ± na
Field Blank	UF1 (1/1)	11/20/96	< 0.003 ± 0.002	< 0.0005 ± 0.0002	2.7 ± na	<3 ± 0.8
Field Blank	UF3 (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0001	2.6 ± 2.1	<3 ± na
Field Blank	THB (1/1)	11/20/96	< 0.003 ± 0.002	< 0.0005 ± 0.0001	3.0 ± 0.9	— ± —
Field Blank	CapF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.0005 ± 0.0003	2.7 ± 2.8	— ± —
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.0013 ± 0.0003	< 0.0004 ± 0.0002	1.1 ± 0.4	<3 ± na
Lab Blank	MemF (1/1)	12/16/96	< 0.0013 ± 0.0002	< 0.0004 ± 0.0000	1.3 ± 0.8	4.4 ± na
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	4.2 ± na
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.0013 ± 0.0005	< 0.0004 ± 0.0000	5.2 ± 2.9	<3 ± na
Lab Blank	UF3 (1/1)	12/16/96	< 0.0013 ± 0.0004	< 0.0004 ± 0.0000	4.0 ± 2.2	8.7 ± na
Lab Blank	THB (1/1)	12/16/96	< 0.0013 ± 0.0006	< 0.0004 ± 0.0001	1.1 ± na	4.8 ± na
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.0013 ± 0.0015	< 0.0004 ± 0.0001	2.2 ± 0.3	4.0 ± na
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.0013 ± 0.0007	< 0.0004 ± 0.0001	1.2 ± 0.7	<3 ± na
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.0013 ± 0.0003	< 0.0004 ± 0.0001	2.3 ± 0.9	4.1 ± na
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.0013 ± 0.0011	< 0.0004 ± 0.0001	1.4 ± 1.0	3.0 ± na
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.0013 ± 0.0003	< 0.0004 ± 0.0001	4.3 ± na	3.9 ± na
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.0013 ± 0.0011	< 0.0004 ± 0.0001	4.7 ± 1.2	<3 ± na
Lab Blank	UF1 (1/1)	12/16/96	< 0.0013 ± 0.0006	< 0.0004 ± 0.0001	4.5 ± 2.9	3.1 ± na
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.0013 ± 0.0003	< 0.0004 ± 0.0001	1.6 ± na	6.4 ± na
Field Blank	8LCh (1/1)	12/17/96	< 0.0013 ± 0.0006	< 0.0004 ± 0.0001	3.5 ± 1.3	— ± —
Field Blank	MemF (1/1)	12/17/96	< 0.0013 ± 0.0008	< 0.0004 ± 0.0000	2.0 ± 1.8	3.1 ± na
Field Blank	CapF (1/1)	12/17/96	< 0.0013 ± 0.0008	< 0.0004 ± 0.0002	2.6 ± 2.6	— ± —
Field Blank	UF2 (1/1)	12/17/96	< 0.0013 ± 0.0009	< 0.0004 ± 0.0000	3.4 ± 3.9	<3 ± na
Field Blank	THB (1/1)	12/17/96	< 0.0013 ± 0.0003	< 0.0004 ± 0.0001	3.1 ± na	— ± —
Lab Blank	DIW (1/1)	01/06/97	< 0.002 ± 0.001	< 0.0003 ± 0.0001	< 0.8 ± 0.2	<3 ± na

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Gadolinium µg/L	Holmium µg/L	Iron (ICP-AES) µg/L	Iron (UV-Vis) µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.002 ± 0.001	< 0.0003 ± 0.0002	2.8 ± na	— ± —
Lab Blank	MemF (1/1)	01/06/97	< 0.002 ± 0.001	< 0.0003 ± 0.0001	5.8 ± 2.6	<3 ± na
Lab Blank	CapF (1/1)	01/06/97	< 0.001 ± 0.001	< 0.0004 ± 0.0003	— ± —	— ± —
Lab Blank	UF2 (1/2)	01/06/97	< 0.002 ± 0.002	< 0.0003 ± 0.0002	5.4 ± 1.6	<3 ± na
Lab Blank	UF2 (2/2)	01/06/97	< 0.002 ± 0.002	< 0.0003 ± 0.0001	5 ± 1	<3 ± na
Lab Blank	UF3 (1/1)	01/06/97	0.011 ± 0.002	0.0010 ± 0.0002	115 ± 1	15 ± na
Lab Blank	THB (1/1)	01/06/97	< 0.002 ± 0.000	< 0.0003 ± 0.0001	4.1 ± 1.9	<3 ± na
Lab Blank	25LCb (1/1)	01/06/97	< 0.002 ± 0.000	< 0.0003 ± 0.0002	3.9 ± na	<3 ± na
Lab Blank	DIW (1/1)	01/06/97	< 0.002 ± 0.001	< 0.0003 ± 0.0002	4.7 ± 0.4	— ± —
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.002 ± 0.001	< 0.0003 ± 0.0001	2.6 ± na	<3 ± na
Lab Blank	UF2 (1/1)	05/28/97	< 0.001 ± 0.001	< 0.0004 ± 0.0002	3.9 ± 0.5	— ± —
Lab Blank	UF3 (1/1)	05/28/97	0.001 ± 0.001	< 0.0004 ± 0.0001	10.2 ± na	— ± —
Lab Blank	THB (1/1)	05/28/97	< 0.001 ± 0.001	< 0.0004 ± 0.0000	1.6 ± 0.2	— ± —
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.001 ± 0.000	< 0.0004 ± 0.0001	2.2 ± na	— ± —
Field Blank	DIW (2/2)	06/05/97	< 0.001 ± 0.001	< 0.0004 ± 0.0001	2.2 ± 0.3	— ± —
Field Blank	CapF (1/3)	06/05/97	< 0.001 ± 0.001	< 0.0004 ± 0.0001	< 0.9 ± 0.2	5.6 ± 2.1
Field Blank	UFVP (1/1)	06/05/97	< 0.001 ± 0.001	< 0.0004 ± 0.0001	1.1 ± 0.6	6.9 ± 0.5
Field Blank	JyCn (1/1)	06/05/97	< 0.001 ± 0.000	< 0.0004 ± 0.0001	2.9 ± na	<3 ± 2.2
Field Blank	CapF (2/3)	06/05/97	< 0.002 ± 0.001	< 0.0005 ± 0.0002	4.1 ± 2.2	— ± —
Field Blank	CapF (3/3)	06/05/97	< 0.002 ± 0.003	< 0.0005 ± 0.0003	2.8 ± 0.9	— ± —
Field Blank	SCDI (1/1)	06/05/97	< 0.002 ± 0.003	< 0.0005 ± 0.0000	3.5 ± 3.9	— ± —
Field Blank	SCADI (1/1)	06/05/97	< 0.002 ± 0.002	< 0.0005 ± 0.0000	< 0.9 ± 0.2	— ± —
Field Blank	TfTb (1/1)	06/05/97	< 0.002 ± 0.001	< 0.0005 ± 0.0002	< 0.9 ± na	<3 ± 1.0
Lab Blank	DIW (1/1)	05/28/97	< 0.001 ± 0.000	< 0.0004 ± 0.0001	< 0.9 ± 0.2	— ± —
Lab Blank	MemF (1/1)	05/28/97	< 0.001 ± 0.001	< 0.0004 ± 0.0002	2.7 ± na	— ± —
Lab Blank	CapF (1/1)	05/28/97	< 0.001 ± 0.001	< 0.0004 ± 0.0001	< 0.7 ± 0.0	155.3 ± 6.3

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Iron (II) (UV-Vis) µg/L	Lanthanum µg/L	Lead µg/L	Lithium µg/L
Lab Blank	DIW (1/1)	07/10/96	<3 ± na	0.0002 ± 0.0002	< 0.005 ± 0.000	< 0.02 ± 0.01
Lab Blank	8LCh (1/1)	07/10/96	<3 ± na	0.0011 ± 0.0002	0.014 ± 0.001	< 0.02 ± 0.02
Lab Blank	MemF (1/1)	07/10/96	<3 ± na	0.0004 ± 0.0003	0.008 ± 0.001	< 0.02 ± 0.01
Lab Blank	CapF (1/1)	07/10/96	<3 ± na	< 0.0002 ± 0.0002	< 0.005 ± 0.001	< 0.02 ± 0.02
Lab Blank	UF1 (1/1)	07/10/96	<3 ± na	< 0.0005 ± 0.0004	< 0.004 ± 0.001	< 0.08 ± 0.08
Lab Blank	UF2 (1/1)	07/10/96	<3 ± na	< 0.0002 ± 0.0001	< 0.005 ± 0.002	< 0.02 ± 0.01
Lab Blank	UF3 (1/1)	07/12/96	<3 ± na	0.0005 ± 0.0002	0.016 ± 0.003	< 0.08 ± 0.04
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	<3 ± na	< 0.0002 ± 0.0001	< 0.005 ± 0.001	< 0.02 ± 0.02
Field Blank	8LCh (1/1)	07/17/96	<3 ± na	0.0023 ± 0.0002	0.022 ± 0.001	< 0.08 ± 0.05
Field Blank	MemF (1/1)	07/17/96	<3 ± na	< 0.0005 ± 0.0007	< 0.004 ± 0.001	< 0.08 ± 0.01
Field Blank	CapF (1/1)	07/17/96	<3 ± 2	0.0003 ± 0.0002	0.028 ± 0.001	< 0.02 ± 0.01
Field Blank	UF2 (1/1)	07/17/96	<3 ± na	< 0.0002 ± 0.0001	< 0.005 ± 0.001	< 0.02 ± 0.01
Field Blank	UF3 (1/1)	07/17/96	— ± —	< 0.0002 ± 0.0002	< 0.005 ± 0.002	< 0.02 ± 0.01
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	<3 ± na	< 0.0008 ± 0.0005	< 0.004 ± 0.003	< 0.04 ± 0.01
Lab Blank	20LCh (1/1)	09/18/96	<3 ± na	< 0.0005 ± 0.0006	0.007 ± 0.001	< 0.04 ± 0.01
Lab Blank	MemF (1/1)	09/18/96	4.5 ± na	< 0.0004 ± 0.0000	< 0.008 ± 0.000	< 0.04 ± 0.04
Lab Blank	CapF (1/1)	09/18/96	<3 ± na	< 0.0004 ± 0.0003	0.029 ± 0.005	< 0.04 ± 0.01
Lab Blank	UF2 (1/1)	09/18/96	<3 ± na	< 0.0005 ± 0.0006	0.009 ± 0.004	< 0.04 ± 0.02
Lab Blank	UF3 (1/1)	09/18/96	<3 ± na	< 0.0008 ± 0.0004	0.007 ± 0.005	< 0.04 ± 0.02
Lab Blank	THB (1/1)	09/18/96	— ± —	< 0.0004 ± 0.0004	0.009 ± 0.003	< 0.04 ± 0.01
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	<3 ± 2.4	< 0.0008 ± 0.0003	0.009 ± 0.008	< 0.04 ± 0.01
Field Blank	20LCh (1/1)	09/18/96	3.7 ± na	< 0.0004 ± 0.0006	< 0.004 ± 0.002	< 0.04 ± 0.02
Field Blank	MemF (1/1)	09/18/96	<3 ± 0.6	< 0.0008 ± 0.0003	0.005 ± 0.002	< 0.04 ± 0.02
Field Blank	CapF (1/1)	09/18/96	<3 ± na	< 0.0004 ± 0.0000	0.007 ± 0.002	< 0.04 ± 0.02
Field Blank	UF2 (1/1)	09/18/96	<3 ± 1.8	< 0.0008 ± 0.0001	< 0.004 ± 0.004	< 0.04 ± 0.05
Field Blank	UF3 (1/1)	09/18/96	<3 ± na	0.0004 ± 0.0002	< 0.004 ± 0.001	< 0.04 ± 0.01
Field Blank	THB (1/1)	09/18/96	<3 ± na	< 0.0004 ± 0.0004	< 0.004 ± 0.004	< 0.04 ± 0.03
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	<3 ± na	< 0.0007 ± 0.0005	< 0.007 ± 0.011	< 0.02 ± 0.00
Lab Blank	8LCh (1/1)	11/13/96	<3 ± na	< 0.0007 ± 0.0005	< 0.005 ± 0.001	< 0.02 ± 0.01
Lab Blank	MemF (1/1)	11/13/96	<3 ± na	0.0013 ± 0.0010	0.008 ± 0.000	< 0.02 ± 0.01

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Iron (II) (UV-Vis) µg/L	Lanthanum µg/L	Lead µg/L	Lithium µg/L
Lab Blank	CapF (1/1)	11/14/96	<3 ± na	< 0.0007 ± 0.0002	< 0.005 ± 0.013	< 0.02 ± 0.02
Lab Blank	UF2 (1/1)	11/13/96	<3 ± na	< 0.0007 ± 0.0004	< 0.005 ± 0.001	< 0.02 ± 0.00
Lab Blank	UF3 (1/1)	11/13/96	<3 ± na	0.0010 ± 0.0006	< 0.005 ± 0.010	< 0.02 ± 0.00
Lab Blank	THB (1/1)	11/13/96	— ± —	< 0.0007 ± 0.0001	0.006 ± 0.007	< 0.02 ± 0.02
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	<3 ± na	< 0.0007 ± 0.0001	< 0.005 ± 0.005	< 0.02 ± 0.01
Field Blank	8LCh (1/1)	11/20/96	<3 ± 0.0	0.0008 ± 0.0004	< 0.005 ± 0.013	< 0.02 ± 0.02
Field Blank	MemF (1/1)	11/20/96	<3 ± 0.4	< 0.0007 ± 0.0005	< 0.005 ± 0.001	< 0.02 ± 0.01
Field Blank	CapF (1/1)	11/20/96	<3 ± na	< 0.0007 ± 0.0000	< 0.005 ± 0.002	< 0.02 ± 0.01
Field Blank	UF1 (1/1)	11/20/96	<3 ± 0.0	< 0.0007 ± 0.0002	< 0.005 ± 0.006	< 0.02 ± 0.01
Field Blank	UF3 (1/1)	11/20/96	<3 ± na	< 0.0007 ± 0.0004	< 0.005 ± 0.001	< 0.02 ± 0.00
Field Blank	THB (1/1)	11/20/96	— ± —	0.0023 ± 0.0000	< 0.005 ± 0.001	< 0.02 ± 0.01
Field Blank	CapF (1/1)	11/20/96	— ± —	< 0.0007 ± 0.0001	< 0.005 ± 0.003	< 0.02 ± 0.00
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0003	< 0.003 ± 0.000	< 0.03 ± 0.01
Lab Blank	MemF (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0002	0.006 ± 0.003	< 0.03 ± 0.01
Lab Blank	CapF (1/1)	12/16/96	<3 ± na	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0004	0.004 ± 0.002	< 0.03 ± 0.01
Lab Blank	UF3 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0002	0.004 ± 0.005	< 0.03 ± 0.01
Lab Blank	THB (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0003	0.006 ± 0.005	< 0.03 ± 0.02
Lab Blank	20LCh-1 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0005	< 0.003 ± 0.004	< 0.03 ± 0.00
Lab Blank	20LCh-2 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0002	< 0.003 ± 0.001	< 0.03 ± 0.01
Lab Blank	20LCh-3 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0002	0.005 ± 0.002	< 0.03 ± 0.01
Lab Blank	20LCh-4 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0004	< 0.003 ± 0.004	< 0.03 ± 0.01
Lab Blank	20LCh-5 (1/1)	12/16/96	<3 ± na	0.0014 ± 0.0003	< 0.012 ± 0.010	< 0.03 ± 0.02
Lab Blank	20LCh-6 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0003	0.010 ± 0.008	< 0.03 ± 0.01
Lab Blank	UF1 (1/1)	12/16/96	<3 ± na	< 0.0004 ± 0.0002	< 0.003 ± 0.002	< 0.03 ± 0.01
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	<3 ± na	0.0005 ± 0.0001	0.012 ± 0.002	< 0.03 ± 0.03
Field Blank	8LCh (1/1)	12/17/96	— ± —	0.0006 ± 0.0003	0.007 ± 0.004	< 0.03 ± 0.00
Field Blank	MemF (1/1)	12/17/96	<3 ± na	< 0.0004 ± 0.0001	0.020 ± 0.001	< 0.03 ± 0.01
Field Blank	CapF (1/1)	12/17/96	— ± —	< 0.0004 ± 0.0002	0.010 ± 0.008	< 0.03 ± 0.01
Field Blank	UF2 (1/1)	12/17/96	<3 ± na	< 0.0004 ± 0.0000	0.004 ± 0.003	< 0.03 ± 0.00
Field Blank	THB (1/1)	12/17/96	— ± —	0.0012 ± 0.0009	0.007 ± 0.004	< 0.03 ± 0.01
Lab Blank	DIW (1/1)	01/06/97	<3 ± na	< 0.0006 ± 0.0002	< 0.004 ± 0.002	< 0.07 ± 0.00

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Iron (II) (UV-Vis) µg/L	Lanthanum µg/L	Lead µg/L	Lithium µg/L
Lab Blank	UF1 (1/1)	01/05/97	— ± —	< 0.0006 ± 0.0000	< 0.004 ± 0.001	< 0.07 ± 0.00
Lab Blank	MemF (1/1)	01/06/97	<3 ± na	< 0.0006 ± 0.0002	< 0.004 ± 0.003	< 0.07 ± 0.00
Lab Blank	CapF (1/1)	01/06/97	— ± —	< 0.0004 ± 0.0003	0.03 ± 0.00	< 0.5 ± 0.5
Lab Blank	UF2 (1/2)	01/06/97	<3 ± na	< 0.0006 ± 0.0003	< 0.004 ± 0.003	< 0.07 ± 0.02
Lab Blank	UF2 (2/2)	01/06/97	<3 ± na	< 0.0006 ± 0.0001	0.004 ± 0.003	< 0.06 ± 0.01
Lab Blank	UF3 (1/1)	01/06/97	<3 ± na	0.0190 ± 0.0008	0.027 ± 0.002	< 0.07 ± 0.01
Lab Blank	THB (1/1)	01/06/97	<3 ± na	< 0.0006 ± 0.0002	< 0.004 ± 0.002	< 0.07 ± 0.03
Lab Blank	25LCb (1/1)	01/06/97	<3 ± na	< 0.0006 ± 0.0003	0.007 ± 0.001	< 0.07 ± 0.00
Lab Blank	DIW (1/1)	01/06/97	— ± —	< 0.0006 ± 0.0001	0.083 ± 0.006	< 0.07 ± 0.03
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	<3 ± na	< 0.0006 ± 0.0001	< 0.004 ± 0.001	< 0.07 ± 0.01
Lab Blank	UF2 (1/1)	05/28/97	— ± —	< 0.0004 ± 0.0001	< 0.01 ± 0.01	< 0.5 ± 0.2
Lab Blank	UF3 (1/1)	05/28/97	— ± —	0.0020 ± 0.0006	0.01 ± 0.01	< 0.5 ± 0.2
Lab Blank	THB (1/1)	05/28/97	— ± —	< 0.0004 ± 0.0001	< 0.01 ± 0.00	< 0.5 ± 0.2
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	— ± —	0.0004 ± 0.0001	< 0.01 ± 0.00	< 0.5 ± 0.2
Field Blank	DIW (2/2)	06/05/97	— ± —	< 0.0004 ± 0.0003	< 0.008 ± 0.000	< 0.5 ± 0.1
Field Blank	CapF (1/3)	06/05/97	<3 ± 1.1	< 0.0004 ± 0.0002	< 0.01 ± 0.00	< 0.5 ± 0.1
Field Blank	UFVP (1/1)	06/05/97	<3 ± 2.2	< 0.0004 ± 0.0001	< 0.01 ± 0.00	< 0.5 ± 0.1
Field Blank	JyCn (1/1)	06/05/97	<3 ± 0.2	0.0006 ± 0.0003	< 0.01 ± 0.00	< 0.5 ± 0.2
Field Blank	CapF (2/3)	06/05/97	— ± —	< 0.0006 ± 0.0002	< 0.008 ± 0.001	< 0.2 ± 0.1
Field Blank	CapF (3/3)	06/05/97	— ± —	< 0.0006 ± 0.0004	< 0.008 ± 0.000	< 0.2 ± 0.3
Field Blank	SCDI (1/1)	06/05/97	— ± —	< 0.0006 ± 0.0007	< 0.01 ± 0.01	< 0.2 ± 0.1
Field Blank	SCADI (1/1)	06/05/97	— ± —	< 0.0006 ± 0.0004	< 0.01 ± 0.00	0.2 ± 0.8
Field Blank	TfTb (1/1)	06/05/97	<3 ± 0.6	< 0.0006 ± 0.0005	< 0.01 ± 0.00	< 0.2 ± 0.0
Lab Blank	DIW (1/1)	05/28/97	— ± —	< 0.0004 ± 0.0004	< 0.01 ± 0.00	< 0.5 ± 0.2
Lab Blank	MemF (1/1)	05/28/97	— ± —	< 0.0004 ± 0.0002	< 0.008 ± 0.003	< 0.5 ± 0.2
Lab Blank	CapF (1/1)	05/28/97	<3 ± 2.3	< 0.0004 ± 0.0002	< 0.008 ± 0.001	< 0.5 ± 0.1

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Lutetium µg/L	Magnesium µg/L	Manganese µg/L	Mercury µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.0003 ± 0.0001	< 0.001 ± 0.000	< 0.005 ± 0.002	0.0005 ± 0.0002
Lab Blank	8LCh (1/1)	07/10/96	< 0.0003 ± 0.0001	0.003 ± 0.000	0.14 ± 0.00	<0.0004 ± 0.0001
Lab Blank	MemF (1/1)	07/10/96	< 0.0003 ± 0.0001	< 0.001 ± 0.000	0.006 ± 0.002	0.0005 ± 0.0002
Lab Blank	CapF (1/1)	07/10/96	< 0.0003 ± 0.0000	< 0.001 ± 0.000	0.007 ± 0.004	0.0007 ± 0.0001
Lab Blank	UF1 (1/1)	07/10/96	< 0.0006 ± 0.0001	< 0.001 ± 0.000	< 0.02 ± 0.00	<0.0004 ± 0.0001
Lab Blank	UF2 (1/1)	07/10/96	< 0.0003 ± 0.0000	< 0.001 ± 0.000	< 0.005 ± 0.001	<0.0004 ± 0.0001
Lab Blank	UF3 (1/1)	07/12/96	< 0.0006 ± 0.0002	< 0.001 ± 0.000	0.03 ± 0.01	— ± —
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	0.0007 ± 0.0001
Field Blank	DIW (1/1)	07/17/96	< 0.0003 ± 0.0001	< 0.003 ± 0.000	0.009 ± 0.003	<0.0004 ± 0.0001
Field Blank	8LCh (1/1)	07/17/96	< 0.0006 ± 0.0002	0.004 ± 0.001	0.31 ± 0.03	0.0022 ± 0.0003
Field Blank	MemF (1/1)	07/17/96	< 0.0006 ± 0.0002	0.016 ± 0.026	< 0.02 ± 0.03	0.0006 ± 0.0001
Field Blank	CapF (1/1)	07/17/96	< 0.0003 ± 0.0001	< 0.003 ± 0.000	0.14 ± 0.00	0.0059 ± 0.0013
Field Blank	UF2 (1/1)	07/17/96	< 0.0003 ± 0.0001	< 0.003 ± 0.002	0.017 ± 0.006	<0.0004 ± 0.0000
Field Blank	UF3 (1/1)	07/17/96	< 0.0003 ± 0.0001	< 0.003 ± 0.002	0.005 ± 0.001	0.0008 ± 0.0002
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	<0.0004 ± 0.0003
Lab Blank	DIW (1/1)	09/18/96	< 0.0008 ± 0.0001	< 0.009 ± 0.005	< 0.02 ± 0.01	< 0.0004 ± 0.0002
Lab Blank	20LCh (1/1)	09/18/96	< 0.0004 ± 0.0001	< 0.006 ± 0.003	< 0.03 ± 0.01	< 0.0004 ± 0.0001
Lab Blank	MemF (1/1)	09/18/96	< 0.0003 ± 0.0001	< 0.004 ± 0.002	0.031 ± 0.007	< 0.0004 ± 0.0002
Lab Blank	CapF (1/1)	09/18/96	< 0.0003 ± 0.0002	< 0.006 ± 0.000	0.015 ± 0.026	0.0004 ± 0.0001
Lab Blank	UF2 (1/1)	09/18/96	< 0.0004 ± 0.0002	< 0.006 ± 0.000	< 0.03 ± 0.01	< 0.0004 ± 0.0002
Lab Blank	UF3 (1/1)	09/18/96	< 0.0008 ± 0.0001	< 0.009 ± 0.001	0.02 ± 0.00	— ± —
Lab Blank	THB (1/1)	09/18/96	< 0.0003 ± 0.0004	< 0.006 ± 0.001	0.33 ± 0.03	— ± —
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	0.0004 ± 0.0001
Field Blank	DIW (1/1)	09/18/96	< 0.0008 ± 0.0004	< 0.008 ± 0.008	< 0.02 ± 0.00	< 0.0004 ± 0.0001
Field Blank	20LCh (1/1)	09/18/96	< 0.0003 ± 0.0003	< 0.004 ± 0.001	< 0.014 ± 0.010	0.0007 ± 0.0001
Field Blank	MemF (1/1)	09/18/96	< 0.0008 ± 0.0002	< 0.008 ± 0.001	0.03 ± 0.01	< 0.0004 ± 0.0003
Field Blank	CapF (1/1)	09/18/96	< 0.0003 ± 0.0003	< 0.004 ± 0.001	< 0.014 ± 0.002	< 0.0004 ± 0.0002
Field Blank	UF2 (1/1)	09/18/96	< 0.0008 ± 0.0000	< 0.008 ± 0.001	< 0.02 ± 0.00	0.0005 ± 0.0001
Field Blank	UF3 (1/1)	09/18/96	< 0.0003 ± 0.0002	< 0.004 ± 0.001	0.040 ± 0.007	< 0.0004 ± 0.0002
Field Blank	THB (1/1)	09/18/96	< 0.0003 ± 0.0001	< 0.004 ± 0.002	< 0.014 ± 0.002	< 0.0004 ± 0.0003
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	< 0.0004 ± 0.0002
Lab Blank	DIW (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.003 ± 0.000	< 0.04 ± 0.03	< 0.0004 ± 0.0002
Lab Blank	8LCh (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.003 ± 0.000	0.06 ± 0.02	< 0.0004 ± 0.0002
Lab Blank	MemF (1/1)	11/13/96	< 0.0007 ± 0.0002	< 0.003 ± 0.000	< 0.04 ± 0.01	< 0.0004 ± 0.0001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Lutetium µg/L	Magnesium µg/L	Manganese µg/L	Mercury µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.0007 ± 0.0003	< 0.003 ± 0.001	< 0.04 ± 0.00	0.0025 ± 0.0001
Lab Blank	UF2 (1/1)	11/13/96	< 0.0007 ± 0.0001	< 0.003 ± 0.000	< 0.04 ± 0.02	0.0008 ± 0.0001
Lab Blank	UF3 (1/1)	11/13/96	< 0.0007 ± 0.0005	< 0.003 ± 0.000	< 0.04 ± 0.01	— ± —
Lab Blank	THB (1/1)	11/13/96	< 0.0007 ± 0.0001	< 0.003 ± 0.001	< 0.04 ± 0.02	— ± —
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	0.0007 ± 0.0001
Field Blank	DIW (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.003 ± 0.000	< 0.04 ± 0.01	0.0012 ± 0.0001
Field Blank	8LCh (1/1)	11/20/96	< 0.0007 ± 0.0002	< 0.003 ± 0.000	0.10 ± 0.01	0.0011 ± 0.0000
Field Blank	MemF (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.003 ± 0.000	0.09 ± 0.02	0.0012 ± 0.0002
Field Blank	CapF (1/1)	11/20/96	< 0.0007 ± 0.0002	< 0.003 ± 0.000	< 0.04 ± 0.01	0.0010 ± 0.0002
Field Blank	UF1 (1/1)	11/20/96	< 0.0007 ± 0.0005	< 0.0008 ± 0.0003	< 0.04 ± 0.02	0.0011 ± 0.0001
Field Blank	UF3 (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.0008 ± 0.0004	< 0.04 ± 0.01	0.0009 ± 0.0004
Field Blank	THB (1/1)	11/20/96	< 0.0007 ± 0.0003	0.0047 ± 0.0075	0.15 ± 0.04	0.0012 ± 0.0001
Field Blank	CapF (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.0011 ± 0.0003	< 0.04 ± 0.02	0.0012 ± 0.0001
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	0.0004 ± 0.0003
Lab Blank	DIW (1/1)	12/16/96	< 0.0002 ± 0.0002	< 0.009 ± 0.000	< 0.012 ± 0.001	0.0007 ± 0.0002
Lab Blank	MemF (1/1)	12/16/96	< 0.0002 ± 0.0000	< 0.018 ± 0.002	< 0.012 ± 0.019	< 0.0004 ± 0.0003
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	< 0.0004 ± 0.0001
Lab Blank	UF1 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.009 ± 0.001	< 0.012 ± 0.002	0.0014 ± 0.0001
Lab Blank	UF3 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.009 ± 0.001	< 0.012 ± 0.003	0.0010 ± 0.0002
Lab Blank	THB (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.018 ± 0.001	< 0.012 ± 0.003	— ± —
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.018 ± 0.004	0.022 ± 0.005	< 0.0004 ± 0.0002
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.0002 ± 0.0000	< 0.018 ± 0.008	< 0.012 ± 0.002	0.0005 ± 0.0003
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.009 ± 0.001	0.073 ± 0.009	0.0007 ± 0.0002
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.018 ± 0.001	< 0.012 ± 0.002	0.0010 ± 0.0000
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.018 ± 0.003	< 0.03 ± 0.03	0.0004 ± 0.0001
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.009 ± 0.000	< 0.012 ± 0.004	0.0008 ± 0.0004
Lab Blank	UF1 (1/1)	12/16/96	0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.012 ± 0.004	0.0006 ± 0.0002
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	0.0005 ± 0.0001
Field Blank	DIW (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.007 ± 0.001	< 0.012 ± 0.013	< 0.0004 ± 0.0003
Field Blank	8LCh (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.007 ± 0.000	0.036 ± 0.003	0.0012 ± 0.0002
Field Blank	MemF (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.009 ± 0.002	0.097 ± 0.006	0.0009 ± 0.0001
Field Blank	CapF (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.007 ± 0.000	0.024 ± 0.014	0.0005 ± 0.0001
Field Blank	UF2 (1/1)	12/17/96	< 0.0002 ± 0.0002	< 0.009 ± 0.000	< 0.012 ± 0.003	0.0007 ± 0.0001
Field Blank	THB (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.009 ± 0.000	0.178 ± 0.003	0.0015 ± 0.0001
Lab Blank	DIW (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.000	< 0.014 ± 0.003	< 0.0004 ± 0.0003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Lutetium µg/L	Magnesium µg/L	Manganese µg/L	Mercury µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.0005 ± 0.0002	< 0.007 ± 0.000	< 0.014 ± 0.002	< 0.0004 ± 0.0002
Lab Blank	MemF (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.000	< 0.014 ± 0.007	0.0005 ± 0.0002
Lab Blank	CapF (1/1)	01/06/97	< 0.0003 ± 0.0002	na ± na	0.02 ± 0.00	< 0.0004 ± 0.0001
Lab Blank	UF2 (1/2)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.000	< 0.014 ± 0.002	< 0.0004 ± 0.0002
Lab Blank	UF2 (2/2)	01/06/97	< 0.0005 ± 0.0003	< 0.004 ± 0.000	< 0.05 ± 0.01	— ± —
Lab Blank	UF3 (1/1)	01/06/97	< 0.0005 ± 0.0001	0.033 ± 0.000	1.49 ± 0.03	0.0007 ± 0.0003
Lab Blank	THB (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.002	< 0.014 ± 0.003	— ± —
Lab Blank	25LCb (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.000	< 0.014 ± 0.003	0.0006 ± 0.0002
Lab Blank	DIW (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.007 ± 0.001	0.016 ± 0.009	< 0.0004 ± 0.0004
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	0.0010 ± 0.0003
Field Blank	THB (1/1)	01/06/97	< 0.0005 ± 0.0000	< 0.007 ± 0.003	< 0.014 ± 0.008	0.0017 ± 0.0003
Lab Blank	UF2 (1/1)	05/28/97	< 0.0003 ± 0.0001	< 0.001 ± 0.000	< 0.01 ± 0.01	0.0007 ± 0.0004
Lab Blank	UF3 (1/1)	05/28/97	< 0.0003 ± 0.0002	0.002 ± 0.001	0.23 ± 0.02	— ± —
Lab Blank	THB (1/1)	05/28/97	< 0.0003 ± 0.0001	< 0.001 ± 0.000	0.06 ± 0.01	0.0017 ± 0.0003
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	0.0006 ± 0.0003
Field Blank	DIW (1/2)	06/05/97	< 0.0003 ± 0.0002	< 0.001 ± 0.000	0.04 ± 0.01	0.0018 ± 0.0001
Field Blank	DIW (2/2)	06/05/97	< 0.0003 ± 0.0001	< 0.001 ± 0.000	0.036 ± 0.002	0.0021 ± 0.0003
Field Blank	CapF (1/3)	06/05/97	< 0.0003 ± 0.0002	< 0.001 ± 0.001	0.07 ± 0.01	0.0021 ± 0.0002
Field Blank	UFVP (1/1)	06/05/97	< 0.0003 ± 0.0001	< 0.001 ± 0.000	< 0.006 ± 0.005	0.0005 ± 0.0002
Field Blank	JyCn (1/1)	06/05/97	< 0.0003 ± 0.0002	< 0.001 ± 0.000	0.55 ± 0.01	< 0.0004 ± 0.0003
Field Blank	CapF (2/3)	06/05/97	< 0.0002 ± 0.0002	< 0.001 ± 0.000	0.06 ± 0.00	0.0006 ± 0.0002
Field Blank	CapF (3/3)	06/05/97	0.0004 ± 0.0001	< 0.001 ± 0.000	0.08 ± 0.01	0.0012 ± 0.0005
Field Blank	SCDI (1/1)	06/05/97	< 0.0002 ± 0.0002	< 0.003 ± 0.002	0.018 ± 0.011	0.0034 ± 0.0005
Field Blank	SCADI (1/1)	06/05/97	< 0.0002 ± 0.0004	< 0.003 ± 0.002	0.13 ± 0.02	0.0025 ± 0.0003
Field Blank	TfTb (1/1)	06/05/97	0.0004 ± 0.0002	< 0.003 ± 0.001	< 0.008 ± 0.012	0.0039 ± 0.0001
Lab Blank	DIW (1/1)	05/28/97	< 0.0003 ± 0.0002	< 0.001 ± 0.000	< 0.01 ± 0.00	0.0005 ± 0.0001
Lab Blank	MemF (1/1)	05/28/97	< 0.0003 ± 0.0001	< 0.001 ± 0.000	0.071 ± 0.002	0.0011 ± 0.0002
Lab Blank	CapF (1/1)	05/28/97	< 0.0003 ± 0.0000	< 0.001 ± 0.000	< 0.006 ± 0.005	0.0012 ± 0.0000

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Molybdenum µg/L	Neodymium µg/L	Nickel µg/L	Potassium mg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.02 ± 0.01	< 0.0014 ± 0.0002	< 0.11 ± 0.04	< 0.01 ± 0.00
Lab Blank	8LCh (1/1)	07/10/96	< 0.02 ± 0.01	< 0.0014 ± 0.0006	0.12 ± 0.00	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	07/10/96	< 0.02 ± 0.01	< 0.0014 ± 0.0008	< 0.11 ± 0.05	< 0.01 ± 0.00
Lab Blank	CapF (1/1)	07/10/96	< 0.02 ± 0.01	< 0.0014 ± 0.0006	< 0.11 ± 0.05	< 0.01 ± 0.00
Lab Blank	UF1 (1/1)	07/10/96	< 0.017 ± 0.009	< 0.003 ± 0.002	< 0.02 ± 0.03	< 0.01 ± 0.00
Lab Blank	UF2 (1/1)	07/10/96	< 0.02 ± 0.01	< 0.0014 ± 0.0008	< 0.11 ± 0.04	< 0.01 ± 0.00
Lab Blank	UF3 (1/1)	07/12/96	< 0.017 ± 0.001	< 0.003 ± 0.002	0.14 ± 0.00	< 0.01 ± 0.00
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.02 ± 0.01	< 0.0014 ± 0.0008	< 0.11 ± 0.05	< 0.01 ± 0.00
Field Blank	8LCh (1/1)	07/17/96	< 0.017 ± 0.021	< 0.003 ± 0.002	0.25 ± 0.01	< 0.01 ± 0.00
Field Blank	MemF (1/1)	07/17/96	< 0.017 ± 0.013	< 0.003 ± 0.002	< 0.02 ± 0.05	< 0.01 ± 0.00
Field Blank	CapF (1/1)	07/17/96	< 0.02 ± 0.01	< 0.0014 ± 0.0004	< 0.11 ± 0.05	< 0.01 ± 0.00
Field Blank	UF2 (1/1)	07/17/96	< 0.02 ± 0.01	< 0.0014 ± 0.0002	< 0.11 ± 0.05	< 0.01 ± 0.00
Field Blank	UF3 (1/1)	07/17/96	< 0.02 ± 0.03	< 0.0014 ± 0.0005	< 0.11 ± 0.04	< 0.01 ± 0.00
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.04 ± 0.00	< 0.003 ± 0.003	< 0.02 ± 0.00	< 0.01 ± 0.00
Lab Blank	20LCh (1/1)	09/18/96	< 0.04 ± 0.02	< 0.003 ± 0.002	< 0.11 ± 0.00	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	09/18/96	< 0.05 ± 0.00	< 0.002 ± 0.001	0.019 ± 0.004	< 0.01 ± 0.01
Lab Blank	CapF (1/1)	09/18/96	< 0.05 ± 0.02	< 0.002 ± 0.000	0.027 ± 0.002	< 0.01 ± 0.00
Lab Blank	UF2 (1/1)	09/18/96	0.09 ± 0.00	< 0.003 ± 0.001	< 0.11 ± 0.01	0.01 ± 0.01
Lab Blank	UF3 (1/1)	09/18/96	< 0.04 ± 0.00	< 0.003 ± 0.001	0.03 ± 0.01	< 0.01 ± 0.00
Lab Blank	THB (1/1)	09/18/96	< 0.05 ± 0.01	< 0.002 ± 0.001	0.88 ± 0.01	< 0.01 ± 0.00
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	0.13 ± 0.00	< 0.003 ± 0.002	< 0.02 ± 0.01	< 0.01 ± 0.00
Field Blank	20LCh (1/1)	09/18/96	< 0.05 ± 0.00	< 0.002 ± 0.002	0.020 ± 0.020	< 0.01 ± 0.00
Field Blank	MemF (1/1)	09/18/96	< 0.04 ± 0.03	< 0.003 ± 0.003	< 0.02 ± 0.01	< 0.01 ± 0.00
Field Blank	CapF (1/1)	09/18/96	< 0.05 ± 0.01	< 0.002 ± 0.002	0.063 ± 0.021	< 0.01 ± 0.00
Field Blank	UF2 (1/1)	09/18/96	< 0.04 ± 0.02	< 0.003 ± 0.002	< 0.02 ± 0.01	< 0.01 ± 0.00
Field Blank	UF3 (1/1)	09/18/96	< 0.05 ± 0.02	< 0.002 ± 0.001	< 0.016 ± 0.010	< 0.01 ± 0.00
Field Blank	THB (1/1)	09/18/96	< 0.05 ± 0.04	< 0.002 ± 0.001	< 0.016 ± 0.012	< 0.01 ± 0.00
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.07 ± 0.04	< 0.003 ± 0.001	< 0.02 ± 0.01	< 0.01 ± 0.00
Lab Blank	8LCh (1/1)	11/13/96	< 0.07 ± 0.03	< 0.003 ± 0.001	< 0.02 ± 0.01	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	11/13/96	< 0.07 ± 0.02	< 0.003 ± 0.001	0.02 ± 0.01	< 0.01 ± 0.00

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Molybdenum µg/L	Neodymium µg/L	Nickel µg/L	Potassium mg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.07 ± 0.00	< 0.003 ± 0.001	0.03 ± 0.00	0.02 ± NA
Lab Blank	UF2 (1/1)	11/13/96	< 0.07 ± 0.02	< 0.003 ± 0.001	< 0.02 ± 0.01	< 0.01 ± 0.00
Lab Blank	UF3 (1/1)	11/13/96	< 0.07 ± 0.09	< 0.003 ± 0.001	0.04 ± 0.03	< 0.01 ± 0.00
Lab Blank	THB (1/1)	11/13/96	< 0.07 ± 0.05	< 0.003 ± 0.002	< 0.02 ± 0.00	< 0.01 ± 0.00
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.07 ± 0.04	< 0.003 ± 0.002	0.03 ± 0.01	< 0.01 ± 0.00
Field Blank	8LCh (1/1)	11/20/96	< 0.07 ± 0.03	< 0.003 ± 0.001	0.14 ± 0.01	< 0.01 ± 0.00
Field Blank	MemF (1/1)	11/20/96	< 0.07 ± 0.04	< 0.003 ± 0.001	0.11 ± 0.01	< 0.01 ± 0.00
Field Blank	CapF (1/1)	11/20/96	< 0.07 ± 0.02	< 0.003 ± 0.000	0.08 ± 0.01	< 0.01 ± 0.00
Field Blank	UF1 (1/1)	11/20/96	< 0.07 ± 0.02	< 0.003 ± 0.001	< 0.02 ± 0.00	< 0.01 ± 0.00
Field Blank	UF3 (1/1)	11/20/96	< 0.07 ± 0.02	< 0.003 ± 0.001	< 0.02 ± 0.00	< 0.01 ± 0.00
Field Blank	THB (1/1)	11/20/96	< 0.07 ± 0.04	< 0.003 ± 0.000	0.11 ± 0.00	< 0.01 ± 0.00
Field Blank	CapF (1/1)	11/20/96	< 0.07 ± 0.05	< 0.003 ± 0.000	< 0.02 ± 0.02	< 0.01 ± 0.00
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.03 ± 0.03	< 0.0019 ± 0.0003	< 0.012 ± 0.017	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	12/16/96	< 0.03 ± 0.02	< 0.0019 ± 0.0004	< 0.012 ± 0.001	< 0.01 ± 0.00
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	0.03 ± 0.02	< 0.0019 ± 0.0012	< 0.012 ± 0.008	0.02 ± 0.02
Lab Blank	UF3 (1/1)	12/16/96	< 0.03 ± 0.02	< 0.0019 ± 0.0009	< 0.012 ± 0.003	< 0.01 ± 0.00
Lab Blank	THB (1/1)	12/16/96	< 0.03 ± 0.01	< 0.0019 ± 0.0003	< 0.012 ± 0.019	< 0.01 ± 0.00
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.03 ± 0.01	< 0.0019 ± 0.0003	0.054 ± 0.011	< 0.01 ± 0.00
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.03 ± 0.00	< 0.0019 ± 0.0016	< 0.012 ± 0.014	< 0.01 ± 0.00
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.03 ± 0.01	< 0.0019 ± 0.0005	0.41 ± 0.03	< 0.01 ± 0.00
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.03 ± 0.00	< 0.0019 ± 0.0006	< 0.012 ± 0.006	< 0.01 ± 0.00
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.03 ± 0.02	< 0.0019 ± 0.0014	< 0.012 ± 0.006	< 0.01 ± 0.00
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.03 ± 0.00	< 0.0019 ± 0.0008	< 0.012 ± 0.017	< 0.01 ± 0.00
Lab Blank	UF1 (1/1)	12/16/96	< 0.03 ± 0.00	< 0.0019 ± 0.0003	< 0.012 ± 0.005	< 0.01 ± 0.00
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.03 ± 0.00	< 0.0019 ± 0.0007	0.019 ± 0.038	< 0.01 ± 0.00
Field Blank	8LCh (1/1)	12/17/96	< 0.03 ± 0.01	0.0021 ± 0.0011	0.025 ± 0.005	< 0.01 ± 0.00
Field Blank	MemF (1/1)	12/17/96	< 0.03 ± 0.00	< 0.0019 ± 0.0005	0.060 ± 0.007	< 0.01 ± 0.00
Field Blank	CapF (1/1)	12/17/96	0.03 ± 0.02	< 0.0019 ± 0.0006	0.04 ± 0.01	< 0.01 ± 0.00
Field Blank	UF2 (1/1)	12/17/96	< 0.03 ± 0.02	< 0.0019 ± 0.0010	< 0.012 ± 0.007	< 0.01 ± 0.00
Field Blank	THB (1/1)	12/17/96	< 0.03 ± 0.00	< 0.0019 ± 0.0002	0.069 ± 0.014	< 0.01 ± 0.00
Lab Blank	DIW (1/1)	01/06/97	< 0.04 ± 0.00	< 0.0013 ± 0.0002	< 0.04 ± 0.00	0.01 ± 0.02

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Molybdenum µg/L	Neodymium µg/L	Nickel µg/L	Potassium mg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.04 ± 0.00	< 0.0013 ± 0.0007	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0005	< 0.04 ± 0.01	< 0.01 ± 0.00
Lab Blank	CapF (1/1)	01/06/97	< 0.05 ± 0.01	< 0.002 ± 0.002	0.06 ± 0.01	±
Lab Blank	UF2 (1/2)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0003	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	UF2 (2/2)	01/06/97	< 0.04 ± 0.01	< 0.003 ± 0.001	< 0.09 ± 0.00	< 0.01 ± 0.00
Lab Blank	UF3 (1/1)	01/06/97	< 0.04 ± 0.01	0.0273 ± 0.0013	0.19 ± 0.01	0.01 ± 0.00
Lab Blank	THB (1/1)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0004	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	25LCb (1/1)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0007	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	DIW (1/1)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0004	< 0.04 ± 0.01	< 0.01 ± 0.00
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.04 ± 0.01	< 0.0013 ± 0.0008	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	UF2 (1/1)	05/28/97	< 0.05 ± 0.02	< 0.002 ± 0.001	< 0.007 ± 0.006	< 0.01 ± 0.00
Lab Blank	UF3 (1/1)	05/28/97	< 0.05 ± 0.02	0.002 ± 0.001	0.08 ± 0.03	0.05 ± 0.06
Lab Blank	THB (1/1)	05/28/97	< 0.05 ± 0.01	< 0.002 ± 0.001	0.06 ± 0.00	< 0.01 ± 0.00
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.05 ± 0.02	< 0.002 ± 0.001	0.04 ± 0.00	0.01 ± 0.01
Field Blank	DIW (2/2)	06/05/97	< 0.05 ± 0.03	< 0.002 ± 0.001	0.03 ± 0.00	< 0.01 ± 0.00
Field Blank	CapF (1/3)	06/05/97	< 0.05 ± 0.03	< 0.002 ± 0.000	0.45 ± 0.01	< 0.01 ± 0.00
Field Blank	UFVP (1/1)	06/05/97	< 0.05 ± 0.00	< 0.002 ± 0.000	< 0.007 ± 0.008	< 0.01 ± 0.00
Field Blank	JyCn (1/1)	06/05/97	< 0.05 ± 0.00	< 0.002 ± 0.001	0.007 ± 0.005	0.01 ± 0.03
Field Blank	CapF (2/3)	06/05/97	< 0.05 ± 0.00	< 0.002 ± 0.001	0.28 ± 0.01	< 0.01 ± 0.00
Field Blank	CapF (3/3)	06/05/97	< 0.05 ± 0.00	< 0.002 ± 0.001	0.47 ± 0.00	< 0.01 ± 0.00
Field Blank	SCDI (1/1)	06/05/97	< 0.05 ± 0.03	0.002 ± 0.004	< 0.01 ± 0.01	0.01 ± 0.00
Field Blank	SCADI (1/1)	06/05/97	< 0.05 ± 0.02	< 0.002 ± 0.002	1.1 ± 0.1	0.01 ± 0.01
Field Blank	TfTb (1/1)	06/05/97	< 0.05 ± 0.02	< 0.002 ± 0.001	0.02 ± 0.02	< 0.01 ± 0.00
Lab Blank	DIW (1/1)	05/28/97	< 0.05 ± 0.01	< 0.002 ± 0.000	< 0.007 ± 0.012	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	05/28/97	< 0.05 ± 0.01	< 0.002 ± 0.001	0.06 ± 0.00	< 0.01 ± 0.00
Lab Blank	CapF (1/1)	05/28/97	< 0.05 ± 0.01	< 0.002 ± 0.000	< 0.007 ± 0.007	< 0.01 ± 0.00

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Praseodymium µg/L	Rhenium µg/L	Rubidium µg/L	Samarium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.0002 ± 0.0002	< 0.0003 ± 0.0000	< 0.002 ± 0.000	< 0.0017 ± 0.0006
Lab Blank	8LCh (1/1)	07/10/96	< 0.0002 ± 0.0002	< 0.0003 ± 0.0001	< 0.002 ± 0.002	< 0.0017 ± 0.0003
Lab Blank	MemF (1/1)	07/10/96	< 0.0002 ± 0.0001	< 0.0003 ± 0.0002	< 0.002 ± 0.002	< 0.0017 ± 0.0003
Lab Blank	CapF (1/1)	07/10/96	< 0.0002 ± 0.0000	< 0.0003 ± 0.0000	< 0.002 ± 0.001	< 0.0017 ± 0.0003
Lab Blank	UF1 (1/1)	07/10/96	< 0.0004 ± 0.0005	< 0.0013 ± 0.0004	0.0033 ± 0.0014	< 0.003 ± 0.002
Lab Blank	UF2 (1/1)	07/10/96	< 0.0002 ± 0.0000	< 0.0003 ± 0.0000	< 0.002 ± 0.000	< 0.0017 ± 0.0003
Lab Blank	UF3 (1/1)	07/12/96	< 0.0004 ± 0.0001	< 0.0013 ± 0.0006	0.0029 ± 0.0003	< 0.003 ± 0.002
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.0002 ± 0.0000	< 0.0003 ± 0.0001	< 0.002 ± 0.000	< 0.0017 ± 0.0007
Field Blank	8LCh (1/1)	07/17/96	0.0005 ± 0.0002	< 0.0013 ± 0.0003	0.0028 ± 0.0608	< 0.003 ± 0.001
Field Blank	MemF (1/1)	07/17/96	< 0.0004 ± 0.0004	< 0.0013 ± 0.0007	< 0.0015 ± 0.0051	< 0.003 ± 0.001
Field Blank	CapF (1/1)	07/17/96	< 0.0002 ± 0.0001	< 0.0003 ± 0.0001	< 0.002 ± 0.000	< 0.0017 ± 0.0008
Field Blank	UF2 (1/1)	07/17/96	< 0.0002 ± 0.0002	< 0.0003 ± 0.0001	< 0.002 ± 0.001	< 0.0017 ± 0.0005
Field Blank	UF3 (1/1)	07/17/96	< 0.0002 ± 0.0001	< 0.0003 ± 0.0001	< 0.002 ± 0.001	< 0.0017 ± 0.0009
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	0.0004 ± 0.0004	< 0.0010 ± 0.0002	0.0020 ± 0.0016	< 0.006 ± 0.002
Lab Blank	20LCh (1/1)	09/18/96	< 0.0004 ± 0.0001	< 0.0008 ± 0.0004	< 0.004 ± 0.002	< 0.003 ± 0.000
Lab Blank	MemF (1/1)	09/18/96	< 0.0005 ± 0.0001	< 0.0006 ± 0.0003	< 0.003 ± 0.001	< 0.003 ± 0.002
Lab Blank	CapF (1/1)	09/18/96	< 0.0005 ± 0.0001	< 0.0006 ± 0.0008	< 0.003 ± 0.002	< 0.003 ± 0.001
Lab Blank	UF2 (1/1)	09/18/96	< 0.0004 ± 0.0003	< 0.0008 ± 0.0002	< 0.004 ± 0.001	< 0.003 ± 0.002
Lab Blank	UF3 (1/1)	09/18/96	0.0003 ± 0.0004	< 0.0010 ± 0.0000	< 0.0013 ± 0.0012	< 0.006 ± 0.003
Lab Blank	THB (1/1)	09/18/96	< 0.0005 ± 0.0002	< 0.0006 ± 0.0002	< 0.003 ± 0.002	< 0.003 ± 0.002
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.0003 ± 0.0002	< 0.0010 ± 0.0004	0.0018 ± 0.0023	< 0.006 ± 0.001
Field Blank	20LCh (1/1)	09/18/96	< 0.0005 ± 0.0001	< 0.0006 ± 0.0004	< 0.003 ± 0.003	< 0.003 ± 0.001
Field Blank	MemF (1/1)	09/18/96	< 0.0003 ± 0.0005	< 0.0010 ± 0.0011	< 0.0013 ± 0.0001	< 0.006 ± 0.002
Field Blank	CapF (1/1)	09/18/96	< 0.0005 ± 0.0001	< 0.0006 ± 0.0003	< 0.003 ± 0.002	< 0.003 ± 0.002
Field Blank	UF2 (1/1)	09/18/96	< 0.0003 ± 0.0002	< 0.0010 ± 0.0005	< 0.0013 ± 0.0012	< 0.006 ± 0.002
Field Blank	UF3 (1/1)	09/18/96	< 0.0005 ± 0.0001	< 0.0006 ± 0.0000	< 0.003 ± 0.002	< 0.003 ± 0.002
Field Blank	THB (1/1)	09/18/96	< 0.0005 ± 0.0003	< 0.0006 ± 0.0007	< 0.003 ± 0.000	0.003 ± 0.001
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0005	< 0.02 ± 0.00	< 0.004 ± 0.002
Lab Blank	8LCh (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0001	< 0.02 ± 0.00	< 0.004 ± 0.001
Lab Blank	MemF (1/1)	11/13/96	< 0.0007 ± 0.0004	< 0.0013 ± 0.0004	< 0.02 ± 0.00	< 0.004 ± 0.000

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Praseodymium µg/L	Rhenium µg/L	Rubidium µg/L	Samarium µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.0007 ± 0.0002	< 0.0013 ± 0.0001	< 0.02 ± 0.00	< 0.004 ± 0.000
Lab Blank	UF2 (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0005	< 0.02 ± 0.00	< 0.004 ± 0.002
Lab Blank	UF3 (1/1)	11/13/96	< 0.0007 ± 0.0002	< 0.0013 ± 0.0006	< 0.02 ± 0.00	< 0.004 ± 0.002
Lab Blank	THB (1/1)	11/13/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0008	< 0.02 ± 0.00	< 0.004 ± 0.001
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.0007 ± 0.0002	< 0.0013 ± 0.0005	< 0.02 ± 0.00	< 0.004 ± 0.001
Field Blank	8LCh (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0004	< 0.02 ± 0.00	< 0.004 ± 0.002
Field Blank	MemF (1/1)	11/20/96	< 0.0007 ± 0.0002	< 0.0013 ± 0.0008	< 0.02 ± 0.00	< 0.004 ± 0.003
Field Blank	CapF (1/1)	11/20/96	< 0.0007 ± 0.0001	< 0.0013 ± 0.0004	< 0.02 ± 0.00	< 0.004 ± 0.000
Field Blank	UF1 (1/1)	11/20/96	< 0.0007 ± 0.0004	< 0.0013 ± 0.0005	< 0.02 ± 0.00	< 0.004 ± 0.003
Field Blank	UF3 (1/1)	11/20/96	< 0.0007 ± 0.0002	< 0.0013 ± 0.0006	< 0.02 ± 0.00	< 0.004 ± 0.002
Field Blank	THB (1/1)	11/20/96	< 0.0007 ± 0.0003	< 0.0013 ± 0.0005	< 0.02 ± 0.00	< 0.004 ± 0.001
Field Blank	CapF (1/1)	11/20/96	< 0.0007 ± 0.0000	< 0.0013 ± 0.0004	< 0.02 ± 0.00	< 0.004 ± 0.002
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.0002 ± 0.0000	< 0.0006 ± 0.0003	< 0.0015 ± 0.0003	< 0.0016 ± 0.0009
Lab Blank	MemF (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0001	0.0018 ± 0.0019	< 0.0016 ± 0.0010
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.0002 ± 0.0002	< 0.0006 ± 0.0002	< 0.0015 ± 0.0005	< 0.0016 ± 0.0017
Lab Blank	UF3 (1/1)	12/16/96	< 0.0002 ± 0.0003	< 0.0006 ± 0.0002	0.0023 ± 0.0021	< 0.0016 ± 0.0002
Lab Blank	THB (1/1)	12/16/96	0.0002 ± 0.0002	< 0.0006 ± 0.0002	0.0018 ± 0.0031	< 0.0016 ± 0.0009
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0002	< 0.0015 ± 0.0006	< 0.0016 ± 0.0003
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0001	< 0.0015 ± 0.0015	< 0.0016 ± 0.0006
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0000	0.0038 ± 0.0018	0.0017 ± 0.0018
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.0002 ± 0.0003	< 0.0006 ± 0.0001	< 0.0015 ± 0.0005	< 0.0016 ± 0.0016
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0003	0.0022 ± 0.0005	< 0.0016 ± 0.0012
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0002	0.0017 ± 0.0002	< 0.0016 ± 0.0004
Lab Blank	UF1 (1/1)	12/16/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0003	< 0.0015 ± 0.0005	< 0.0016 ± 0.0006
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.0002 ± 0.0002	< 0.0006 ± 0.0001	0.0024 ± 0.0024	0.0016 ± 0.0007
Field Blank	8LCh (1/1)	12/17/96	< 0.0002 ± 0.0000	< 0.0006 ± 0.0001	0.0020 ± 0.0009	< 0.0016 ± 0.0010
Field Blank	MemF (1/1)	12/17/96	< 0.0002 ± 0.0000	< 0.0006 ± 0.0002	0.0047 ± 0.0005	< 0.0016 ± 0.0011
Field Blank	CapF (1/1)	12/17/96	< 0.0002 ± 0.0002	< 0.0006 ± 0.0001	0.0043 ± 0.0029	< 0.0016 ± 0.0009
Field Blank	UF2 (1/1)	12/17/96	< 0.0002 ± 0.0001	< 0.0006 ± 0.0001	0.0055 ± 0.0006	< 0.0016 ± 0.0013
Field Blank	THB (1/1)	12/17/96	0.0003 ± 0.0000	< 0.0006 ± 0.0003	0.0054 ± 0.0012	< 0.0016 ± 0.0003
Lab Blank	DIW (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0003	< 0.003 ± 0.001	< 0.003 ± 0.001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Praseodymium µg/L	Rhenium µg/L	Rubidium µg/L	Samarium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0002	< 0.003 ± 0.002	< 0.003 ± 0.001
Lab Blank	MemF (1/1)	01/06/97	< 0.0005 ± 0.0002	< 0.0006 ± 0.0002	< 0.003 ± 0.001	< 0.003 ± 0.001
Lab Blank	CapF (1/1)	01/06/97	< 0.0003 ± 0.0005	< 0.0007 ± 0.0003	< 0.002 ± 0.001	< 0.003 ± 0.002
Lab Blank	UF2 (1/2)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0001	< 0.003 ± 0.001	< 0.003 ± 0.002
Lab Blank	UF2 (2/2)	01/06/97	< 0.0006 ± 0.0003	< 0.0005 ± 0.0005	< 0.0018 ± 0.0019	< 0.003 ± 0.002
Lab Blank	UF3 (1/1)	01/06/97	0.0058 ± 0.0003	< 0.0006 ± 0.0001	0.093 ± 0.002	0.007 ± 0.004
Lab Blank	THB (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0002	< 0.003 ± 0.000	< 0.003 ± 0.002
Lab Blank	25LCb (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0001	< 0.003 ± 0.001	< 0.003 ± 0.001
Lab Blank	DIW (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0003	0.032 ± 0.002	< 0.003 ± 0.001
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.0005 ± 0.0001	< 0.0006 ± 0.0002	< 0.003 ± 0.001	< 0.003 ± 0.001
Lab Blank	UF2 (1/1)	05/28/97	< 0.0003 ± 0.0003	< 0.0007 ± 0.0002	0.003 ± 0.001	< 0.003 ± 0.001
Lab Blank	UF3 (1/1)	05/28/97	< 0.0003 ± 0.0002	< 0.0007 ± 0.0005	0.017 ± 0.005	< 0.003 ± 0.002
Lab Blank	THB (1/1)	05/28/97	< 0.0003 ± 0.0001	< 0.0007 ± 0.0003	0.003 ± 0.001	< 0.003 ± 0.001
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.0003 ± 0.0001	< 0.0007 ± 0.0002	0.002 ± 0.001	< 0.003 ± 0.001
Field Blank	DIW (2/2)	06/05/97	< 0.0003 ± 0.0001	< 0.0007 ± 0.0001	0.003 ± 0.001	< 0.003 ± 0.001
Field Blank	CapF (1/3)	06/05/97	< 0.0003 ± 0.0000	< 0.0007 ± 0.0003	0.053 ± 0.002	< 0.003 ± 0.000
Field Blank	UFVP (1/1)	06/05/97	< 0.0003 ± 0.0001	< 0.0007 ± 0.0001	< 0.002 ± 0.001	< 0.003 ± 0.001
Field Blank	JyCn (1/1)	06/05/97	< 0.0003 ± 0.0001	< 0.0007 ± 0.0001	0.14 ± 0.00	< 0.003 ± 0.001
Field Blank	CapF (2/3)	06/05/97	< 0.0003 ± 0.0003	< 0.0008 ± 0.0003	0.002 ± 0.001	< 0.003 ± 0.001
Field Blank	CapF (3/3)	06/05/97	< 0.0003 ± 0.0002	< 0.0008 ± 0.0003	0.003 ± 0.000	< 0.003 ± 0.000
Field Blank	SCDI (1/1)	06/05/97	< 0.0003 ± 0.0001	< 0.0008 ± 0.0005	0.048 ± 0.007	< 0.003 ± 0.001
Field Blank	SCADI (1/1)	06/05/97	< 0.0003 ± 0.0000	< 0.0008 ± 0.0002	0.053 ± 0.005	< 0.003 ± 0.004
Field Blank	TfTb (1/1)	06/05/97	< 0.0003 ± 0.0002	< 0.0008 ± 0.0007	< 0.001 ± 0.001	< 0.003 ± 0.001
Lab Blank	DIW (1/1)	05/28/97	< 0.0003 ± 0.0002	< 0.0007 ± 0.0001	< 0.002 ± 0.001	< 0.003 ± 0.000
Lab Blank	MemF (1/1)	05/28/97	< 0.0003 ± 0.0002	< 0.0007 ± 0.0003	< 0.002 ± 0.001	< 0.003 ± 0.001
Lab Blank	CapF (1/1)	05/28/97	< 0.0003 ± 0.0002	< 0.0007 ± 0.0002	< 0.002 ± 0.000	< 0.003 ± 0.001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Selenium µg/L	Silica mg/L	Silver µg/L	Sodium mg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.06 ± 0.04	0.04 ± 0.01	< 0.04 ± 0.01	< 0.01 ± 0.01
Lab Blank	8LCh (1/1)	07/10/96	< 0.06 ± 0.05	0.04 ± 0.01	< 0.04 ± 0.01	< 0.01 ± 0.00
Lab Blank	MemF (1/1)	07/10/96	< 0.06 ± 0.03	0.04 ± 0.01	< 0.04 ± 0.00	< 0.01 ± 0.00
Lab Blank	CapF (1/1)	07/10/96	< 0.06 ± 0.05	0.05 ± 0.01	< 0.04 ± 0.01	< 0.01 ± 0.00
Lab Blank	UF1 (1/1)	07/10/96	< 0.07 ± 0.00	0.08 ± 0.02	< 0.02 ± 0.01	< 0.01 ± 0.00
Lab Blank	UF2 (1/1)	07/10/96	< 0.06 ± 0.03	0.07 ± 0.01	< 0.04 ± 0.02	< 0.01 ± 0.01
Lab Blank	UF3 (1/1)	07/12/96	< 0.07 ± 0.02	0.04 ± 0.02	< 0.02 ± 0.01	< 0.01 ± 0.01
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	0.06 ± 0.03	< 0.18 ± 0.15	< 0.04 ± 0.02	< 0.01 ± 0.00
Field Blank	8LCh (1/1)	07/17/96	< 0.07 ± 0.07	< 0.18 ± 0.03	< 0.02 ± 0.01	0.01 ± 0.01
Field Blank	MemF (1/1)	07/17/96	< 0.07 ± 0.04	< 0.08 ± 0.09	< 0.02 ± 0.01	< 0.03 ± 0.03
Field Blank	CapF (1/1)	07/17/96	< 0.06 ± 0.02	< 0.18 ± 0.02	< 0.04 ± 0.01	< 0.01 ± 0.00
Field Blank	UF2 (1/1)	07/17/96	< 0.06 ± 0.05	< 0.08 ± 0.03	< 0.04 ± 0.00	< 0.03 ± 0.00
Field Blank	UF3 (1/1)	07/17/96	< 0.06 ± 0.03	< 0.18 ± 0.20	< 0.04 ± 0.01	< 0.01 ± 0.00
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.13 ± 0.04	0.04 ± 0.02	< 0.03 ± 0.03	< 0.05 ± 0.01
Lab Blank	20LCh (1/1)	09/18/96	< 0.3 ± 0.1	0.05 ± 0.03	< 0.02 ± 0.03	< 0.04 ± 0.02
Lab Blank	MemF (1/1)	09/18/96	< 0.2 ± 0.3	0.067 ± 0.011	< 0.02 ± 0.00	< 0.04 ± 0.02
Lab Blank	CapF (1/1)	09/18/96	< 0.2 ± 0.1	0.05 ± 0.01	< 0.02 ± 0.00	< 0.04 ± 0.01
Lab Blank	UF2 (1/1)	09/18/96	< 0.3 ± 0.0	0.10 ± 0.02	< 0.02 ± 0.01	< 0.05 ± 0.01
Lab Blank	UF3 (1/1)	09/18/96	< 0.13 ± 0.02	0.08 ± 0.01	< 0.03 ± 0.01	< 0.05 ± 0.01
Lab Blank	THB (1/1)	09/18/96	< 0.2 ± 0.2	0.17 ± 0.02	< 0.02 ± 0.01	< 0.04 ± 0.02
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.13 ± 0.04	0.052 ± 0.016	< 0.03 ± 0.03	< 0.04 ± 0.03
Field Blank	20LCh (1/1)	09/18/96	< 0.2 ± 0.1	0.063 ± 0.013	< 0.02 ± 0.00	< 0.04 ± 0.00
Field Blank	MemF (1/1)	09/18/96	< 0.13 ± 0.14	0.077 ± 0.014	< 0.03 ± 0.02	< 0.04 ± 0.02
Field Blank	CapF (1/1)	09/18/96	< 0.2 ± 0.1	0.081 ± 0.008	< 0.02 ± 0.01	< 0.04 ± 0.01
Field Blank	UF2 (1/1)	09/18/96	< 0.13 ± 0.05	0.080 ± 0.006	0.07 ± 0.01	< 0.04 ± 0.01
Field Blank	UF3 (1/1)	09/18/96	< 0.2 ± 0.1	0.086 ± 0.009	< 0.02 ± 0.00	< 0.04 ± 0.02
Field Blank	THB (1/1)	09/18/96	< 0.2 ± 0.1	0.063 ± 0.002	< 0.02 ± 0.01	< 0.04 ± 0.02
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.12 ± 0.07	0.06 ± 0.01	< 0.1 ± 0.04	< 0.03 ± 0.01
Lab Blank	8LCh (1/1)	11/13/96	0.16 ± 0.30	0.06 ± 0.01	< 0.1 ± 0.02	< 0.03 ± 0.02
Lab Blank	MemF (1/1)	11/13/96	0.13 ± 0.17	0.06 ± 0.02	< 0.1 ± 0.01	< 0.03 ± 0.01

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Selenium µg/L	Silica mg/L	Silver µg/L	Sodium mg/L
Lab Blank	CapF (1/1)	11/14/96	0.14 ± 0.20	< 0.06 ± 0.00	< 0.1 ± 0.03	< 0.03 ± 0.01
Lab Blank	UF2 (1/1)	11/13/96	< 0.12 ± 0.06	0.11 ± 0.01	< 0.15 ± 0.02	< 0.03 ± 0.01
Lab Blank	UF3 (1/1)	11/13/96	< 0.12 ± 0.08	0.07 ± 0.00	< 0.1 ± 0.05	< 0.03 ± 0.01
Lab Blank	THB (1/1)	11/13/96	< 0.12 ± 0.15	0.08 ± 0.00	< 0.1 ± 0.03	< 0.03 ± 0.01
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.12 ± 0.13	< 0.06 ± 0.01	< 0.1 ± 0.07	< 0.03 ± 0.01
Field Blank	8LCh (1/1)	11/20/96	< 0.12 ± 0.02	< 0.06 ± 0.01	< 0.1 ± 0.04	< 0.03 ± 0.01
Field Blank	MemF (1/1)	11/20/96	0.20 ± 0.03	< 0.06 ± 0.01	< 0.1 ± 0.03	< 0.03 ± 0.01
Field Blank	CapF (1/1)	11/20/96	0.17 ± 0.16	< 0.06 ± 0.01	< 0.1 ± 0.02	< 0.03 ± 0.01
Field Blank	UF1 (1/1)	11/20/96	< 0.12 ± 0.06	0.10 ± 0.06	< 0.1 ± 0.02	< 0.005 ± 0.003
Field Blank	UF3 (1/1)	11/20/96	< 0.12 ± 0.21	< 0.09 ± 0.05	< 0.1 ± 0.01	< 0.005 ± 0.010
Field Blank	THB (1/1)	11/20/96	< 0.12 ± 0.16	< 0.09 ± 0.04	< 0.1 ± 0.03	< 0.004 ± 0.014
Field Blank	CapF (1/1)	11/20/96	< 0.12 ± 0.10	< 0.09 ± 0.04	< 0.1 ± 0.03	< 0.004 ± 0.006
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.11 ± 0.08	0.12 ± 0.01	< 0.03 ± 0.02	< 0.06 ± 0.02
Lab Blank	MemF (1/1)	12/16/96	< 0.11 ± 0.04	0.08 ± 0.03	< 0.03 ± 0.00	< 0.08 ± 0.09
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.11 ± 0.08	0.10 ± 0.01	0.05 ± 0.01	< 0.06 ± 0.03
Lab Blank	UF3 (1/1)	12/16/96	< 0.11 ± 0.03	0.09 ± 0.04	0.03 ± 0.03	< 0.06 ± 0.03
Lab Blank	THB (1/1)	12/16/96	< 0.11 ± 0.04	0.08 ± 0.07	< 0.03 ± 0.01	< 0.08 ± 0.16
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.11 ± 0.03	0.06 ± 0.02	< 0.03 ± 0.00	< 0.08 ± 0.08
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.11 ± 0.07	0.03 ± 0.02	0.08 ± 0.04	< 0.08 ± 0.03
Lab Blank	20LCh-3 (1/1)	12/16/96	< 0.11 ± 0.06	0.09 ± 0.02	< 0.03 ± 0.01	< 0.06 ± 0.04
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.11 ± 0.02	0.07 ± 0.01	0.05 ± 0.04	< 0.08 ± 0.04
Lab Blank	20LCh-5 (1/1)	12/16/96	< 0.11 ± 0.06	0.06 ± 0.02	0.04 ± 0.04	< 0.08 ± 0.02
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.11 ± 0.06	0.06 ± 0.00	< 0.03 ± 0.00	< 0.06 ± 0.04
Lab Blank	UF1 (1/1)	12/16/96	< 0.11 ± 0.07	0.07 ± 0.00	< 0.03 ± 0.01	< 0.018 ± 0.016
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.11 ± 0.04	0.06 ± 0.01	< 0.03 ± 0.02	< 0.018 ± 0.004
Field Blank	8LCh (1/1)	12/17/96	< 0.11 ± 0.00	0.08 ± 0.01	< 0.03 ± 0.01	< 0.018 ± 0.016
Field Blank	MemF (1/1)	12/17/96	< 0.11 ± 0.05	0.06 ± 0.01	< 0.03 ± 0.00	< 0.06 ± 0.03
Field Blank	CapF (1/1)	12/17/96	< 0.11 ± 0.02	0.07 ± 0.01	0.07 ± 0.02	< 0.018 ± 0.009
Field Blank	UF2 (1/1)	12/17/96	< 0.11 ± 0.03	0.08 ± 0.01	< 0.03 ± 0.02	< 0.06 ± 0.04
Field Blank	THB (1/1)	12/17/96	< 0.11 ± 0.03	0.07 ± 0.02	< 0.03 ± 0.00	< 0.06 ± 0.03
Lab Blank	DIW (1/1)	01/06/97	< 0.2 ± 0.1	< 0.04 ± 0.00	0.07 ± 0.02	< 0.018 ± 0.005

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Selenium µg/L	Silica mg/L	Silver µg/L	Sodium mg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.2 ± 0.0	< 0.04 ± 0.01	< 0.02 ± 0.01	< 0.018 ± 0.014
Lab Blank	MemF (1/1)	01/06/97	< 0.2 ± 0.0	< 0.04 ± 0.01	< 0.02 ± 0.02	< 0.018 ± 0.004
Lab Blank	CapF (1/1)	01/06/97	< 0.3 ± 0.3	< 0.05 ± 0.01	< 0.2 ± 0.1	na ± na
Lab Blank	UF2 (1/2)	01/06/97	< 0.2 ± 0.1	0.05 ± 0.01	< 0.02 ± 0.02	< 0.018 ± 0.000
Lab Blank	UF2 (2/2)	01/06/97	< 0.09 ± 0.04	0.06 ± 0.02	< 0.04 ± 0.01	< 0.03 ± 0.01
Lab Blank	UF3 (1/1)	01/06/97	< 0.2 ± 0.1	0.31 ± 0.00	< 0.02 ± 0.00	< 0.018 ± 0.005
Lab Blank	THB (1/1)	01/06/97	< 0.2 ± 0.1	< 0.04 ± 0.01	< 0.02 ± 0.00	< 0.018 ± 0.003
Lab Blank	25LCb (1/1)	01/06/97	< 0.2 ± 0.0	< 0.04 ± 0.01	< 0.02 ± 0.00	< 0.018 ± 0.004
Lab Blank	DIW (1/1)	01/06/97	< 0.2 ± 0.1	< 0.04 ± 0.02	< 0.02 ± 0.00	< 0.018 ± 0.004
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.2 ± 0.1	< 0.04 ± 0.01	< 0.02 ± 0.00	< 0.018 ± 0.002
Lab Blank	UF2 (1/1)	05/28/97	< 0.3 ± 0.1	0.16 ± 0.03	< 0.2 ± 0.1	< 0.06 ± 0.02
Lab Blank	UF3 (1/1)	05/28/97	< 0.3 ± 0.1	< 0.05 ± 0.03	< 0.2 ± 0.1	< 0.06 ± 0.02
Lab Blank	THB (1/1)	05/28/97	< 0.3 ± 0.1	< 0.05 ± 0.02	< 0.2 ± 0.0	< 0.06 ± 0.00
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.3 ± 0.1	< 0.05 ± 0.02	< 0.2 ± 0.1	< 0.06 ± 0.01
Field Blank	DIW (2/2)	06/05/97	< 0.1 ± 0.1	< 0.05 ± 0.02	< 0.2 ± 0.2	< 0.06 ± 0.01
Field Blank	CapF (1/3)	06/05/97	< 0.3 ± 0.1	< 0.05 ± 0.03	< 0.2 ± 0.1	< 0.06 ± 0.03
Field Blank	UFVP (1/1)	06/05/97	< 0.1 ± 0.1	< 0.05 ± 0.02	< 0.2 ± 0.1	< 0.06 ± 0.01
Field Blank	JyCn (1/1)	06/05/97	< 0.3 ± 0.1	< 0.05 ± 0.03	< 0.2 ± 0.0	< 0.06 ± 0.01
Field Blank	CapF (2/3)	06/05/97	< 0.1 ± 0.0	< 0.07 ± 0.03	< 0.2 ± 0.1	< 0.05 ± 0.03
Field Blank	CapF (3/3)	06/05/97	< 0.1 ± 0.0	< 0.07 ± 0.04	< 0.2 ± 0.0	< 0.1 ± 0.1
Field Blank	SCDI (1/1)	06/05/97	< 0.2 ± 0.0	< 0.07 ± 0.03	< 0.2 ± 0.1	< 0.1 ± 0.1
Field Blank	SCADI (1/1)	06/05/97	< 0.2 ± 0.5	< 0.07 ± 0.02	< 0.2 ± 0.1	< 0.1 ± 0.1
Field Blank	TfTb (1/1)	06/05/97	< 0.2 ± 0.2	< 0.07 ± 0.04	< 0.2 ± 0.1	< 0.07 ± 0.01
Lab Blank	DIW (1/1)	05/28/97	< 0.3 ± 0.1	< 0.05 ± 0.03	< 0.2 ± 0.1	< 0.06 ± 0.02
Lab Blank	MemF (1/1)	05/28/97	< 0.1 ± 0.0	< 0.05 ± 0.03	< 0.2 ± 0.1	< 0.06 ± 0.02
Lab Blank	CapF (1/1)	05/28/97	< 0.1 ± 0.1	< 0.05 ± 0.01	< 0.2 ± 0.1	< 0.06 ± 0.02

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Strontium µg/L	Terbium µg/L	Thallium µg/L	Thulium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.04 ± 0.01	< 0.0002 ± 0.0000	< 0.0009 ± 0.0004	< 0.0003 ± 0.0000
Lab Blank	8LCh (1/1)	07/10/96	0.07 ± 0.06	< 0.0002 ± 0.0001	< 0.0009 ± 0.0003	< 0.0003 ± 0.0000
Lab Blank	MemF (1/1)	07/10/96	< 0.04 ± 0.01	< 0.0002 ± 0.0000	< 0.0009 ± 0.0001	< 0.0003 ± 0.0000
Lab Blank	CapF (1/1)	07/10/96	< 0.04 ± 0.00	< 0.0002 ± 0.0001	< 0.0009 ± 0.0004	< 0.0003 ± 0.0001
Lab Blank	UF1 (1/1)	07/10/96	< 0.08 ± 0.03	< 0.0003 ± 0.0001	< 0.0014 ± 0.0011	0.0005 ± 0.0001
Lab Blank	UF2 (1/1)	07/10/96	< 0.04 ± 0.01	< 0.0002 ± 0.0001	< 0.0009 ± 0.0002	< 0.0003 ± 0.0001
Lab Blank	UF3 (1/1)	07/12/96	< 0.08 ± 0.00	0.0006 ± 0.0001	< 0.0014 ± 0.0004	< 0.0003 ± 0.0002
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.04 ± 0.01	< 0.0002 ± 0.0001	< 0.0009 ± 0.0005	< 0.0003 ± 0.0000
Field Blank	8LCh (1/1)	07/17/96	< 0.08 ± 0.47	< 0.0003 ± 0.0005	< 0.0014 ± 0.0007	< 0.0003 ± 0.0002
Field Blank	MemF (1/1)	07/17/96	< 0.08 ± 0.25	< 0.0003 ± 0.0003	< 0.0014 ± 0.0018	< 0.0003 ± 0.0002
Field Blank	CapF (1/1)	07/17/96	< 0.04 ± 0.02	< 0.0002 ± 0.0001	< 0.0009 ± 0.0004	< 0.0003 ± 0.0000
Field Blank	UF2 (1/1)	07/17/96	< 0.04 ± 0.01	< 0.0002 ± 0.0000	< 0.0009 ± 0.0004	< 0.0003 ± 0.0001
Field Blank	UF3 (1/1)	07/17/96	< 0.04 ± 0.01	< 0.0002 ± 0.0000	< 0.0009 ± 0.0005	< 0.0003 ± 0.0001
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.007 ± 0.001	< 0.0005 ± 0.0003	< 0.002 ± 0.000	< 0.0005 ± 0.0001
Lab Blank	20LCh (1/1)	09/18/96	< 0.007 ± 0.003	< 0.0008 ± 0.0002	< 0.005 ± 0.001	< 0.0005 ± 0.0002
Lab Blank	MemF (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0004 ± 0.0003	< 0.0013 ± 0.0005	< 0.0006 ± 0.0000
Lab Blank	CapF (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0004 ± 0.0004	< 0.0013 ± 0.0004	< 0.0006 ± 0.0003
Lab Blank	UF2 (1/1)	09/18/96	< 0.007 ± 0.003	< 0.0008 ± 0.0002	< 0.005 ± 0.002	< 0.0005 ± 0.0001
Lab Blank	UF3 (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0005 ± 0.0001	< 0.002 ± 0.001	< 0.0005 ± 0.0002
Lab Blank	THB (1/1)	09/18/96	< 0.007 ± 0.001	< 0.0004 ± 0.0004	< 0.0013 ± 0.0011	< 0.0006 ± 0.0003
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0005 ± 0.0006	< 0.002 ± 0.000	< 0.0005 ± 0.0001
Field Blank	20LCh (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0004 ± 0.0002	< 0.0013 ± 0.0009	< 0.0006 ± 0.0001
Field Blank	MemF (1/1)	09/18/96	< 0.007 ± 0.003	< 0.0005 ± 0.0004	< 0.002 ± 0.001	< 0.0005 ± 0.0007
Field Blank	CapF (1/1)	09/18/96	< 0.007 ± 0.001	< 0.0004 ± 0.0001	< 0.0013 ± 0.0003	< 0.0006 ± 0.0003
Field Blank	UF2 (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0005 ± 0.0004	< 0.002 ± 0.001	< 0.0005 ± 0.0003
Field Blank	UF3 (1/1)	09/18/96	< 0.007 ± 0.001	< 0.0004 ± 0.0000	< 0.0013 ± 0.0010	< 0.0006 ± 0.0003
Field Blank	THB (1/1)	09/18/96	< 0.007 ± 0.002	< 0.0004 ± 0.0004	< 0.0013 ± 0.0017	< 0.0006 ± 0.0002
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.4 ± 0.1	< 0.0008 ± 0.0003	< 0.007 ± 0.002	< 0.0006 ± 0.0001
Lab Blank	8LCh (1/1)	11/13/96	< 0.4 ± 0.0	< 0.0008 ± 0.0002	< 0.007 ± 0.002	< 0.0006 ± 0.0001
Lab Blank	MemF (1/1)	11/13/96	< 0.4 ± 0.0	< 0.0008 ± 0.0002	< 0.007 ± 0.001	< 0.0006 ± 0.0001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Strontium µg/L	Terbium µg/L	Thallium µg/L	Thulium µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.4 ± 0.1	< 0.0008 ± 0.0004	< 0.007 ± 0.001	< 0.0006 ± 0.0001
Lab Blank	UF2 (1/1)	11/13/96	< 0.4 ± 0.1	< 0.0008 ± 0.0002	< 0.007 ± 0.001	< 0.0006 ± 0.0002
Lab Blank	UF3 (1/1)	11/13/96	< 0.4 ± 0.0	< 0.0008 ± 0.0002	< 0.007 ± 0.001	< 0.0006 ± 0.0003
Lab Blank	THB (1/1)	11/13/96	< 0.4 ± 0.0	< 0.0008 ± 0.0000	< 0.007 ± 0.002	< 0.0006 ± 0.0005
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	< 0.4 ± 0.0	< 0.0008 ± 0.0004	< 0.007 ± 0.001	< 0.0006 ± 0.0000
Field Blank	8LCh (1/1)	11/20/96	< 0.4 ± 0.0	< 0.0008 ± 0.0005	< 0.007 ± 0.000	< 0.0006 ± 0.0002
Field Blank	MemF (1/1)	11/20/96	< 0.4 ± 0.0	< 0.0008 ± 0.0002	< 0.007 ± 0.001	< 0.0006 ± 0.0002
Field Blank	CapF (1/1)	11/20/96	< 0.4 ± 0.0	< 0.0008 ± 0.0000	< 0.007 ± 0.001	< 0.0006 ± 0.0002
Field Blank	UF1 (1/1)	11/20/96	< 0.4 ± 0.1	< 0.0008 ± 0.0002	< 0.007 ± 0.001	< 0.0006 ± 0.0002
Field Blank	UF3 (1/1)	11/20/96	< 0.4 ± 0.1	< 0.0008 ± 0.0001	< 0.007 ± 0.000	< 0.0006 ± 0.0003
Field Blank	THB (1/1)	11/20/96	< 0.4 ± 0.1	< 0.0008 ± 0.0001	< 0.007 ± 0.000	< 0.0006 ± 0.0002
Field Blank	CapF (1/1)	11/20/96	< 0.4 ± 0.0	< 0.0008 ± 0.0001	< 0.007 ± 0.001	< 0.0006 ± 0.0003
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	< 0.02 ± 0.034	< 0.0003 ± 0.0002	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	MemF (1/1)	12/16/96	0.037 ± 0.035	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.02 ± 0.011	< 0.0003 ± 0.0001	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	UF3 (1/1)	12/16/96	< 0.02 ± 0.010	< 0.0003 ± 0.0002	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	THB (1/1)	12/16/96	0.023 ± 0.021	< 0.0003 ± 0.0000	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.02 ± 0.005	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.02 ± 0.027	< 0.0003 ± 0.0001	< 0.004 ± 0.002	< 0.0002 ± 0.0001
Lab Blank	20LCh-3 (1/1)	12/16/96	0.042 ± 0.028	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0002
Lab Blank	20LCh-4 (1/1)	12/16/96	0.020 ± 0.014	< 0.0003 ± 0.0002	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	20LCh-5 (1/1)	12/16/96	0.034 ± 0.010	< 0.0003 ± 0.0002	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	20LCh-6 (1/1)	12/16/96	< 0.02 ± 0.012	< 0.0003 ± 0.0000	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	UF1 (1/1)	12/16/96	< 0.02 ± 0.005	< 0.0003 ± 0.0003	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	0.028 ± 0.038	< 0.0003 ± 0.0000	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Field Blank	8LCh (1/1)	12/17/96	< 0.02 ± 0.019	< 0.0003 ± 0.0002	< 0.004 ± 0.001	< 0.0002 ± 0.0002
Field Blank	MemF (1/1)	12/17/96	0.039 ± 0.015	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Field Blank	CapF (1/1)	12/17/96	0.050 ± 0.026	< 0.0003 ± 0.0000	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Field Blank	UF2 (1/1)	12/17/96	0.024 ± 0.014	< 0.0003 ± 0.0001	< 0.004 ± 0.002	< 0.0002 ± 0.0002
Field Blank	THB (1/1)	12/17/96	0.071 ± 0.024	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	DIW (1/1)	01/06/97	< 0.02 ± 0.028	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Strontium µg/L	Terbium µg/L	Thallium µg/L	Thulium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.02 ± 0.026	< 0.0003 ± 0.0001	< 0.004 ± 0.001	< 0.0002 ± 0.0001
Lab Blank	MemF (1/1)	01/06/97	< 0.02 ± 0.031	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0000
Lab Blank	CapF (1/1)	01/06/97	< 0.06 ± 0.06	< 0.0004 ± 0.0002	< 0.007 ± 0.001	< 0.0004 ± 0.0001
Lab Blank	UF2 (1/2)	01/06/97	< 0.02 ± 0.026	< 0.0003 ± 0.0001	< 0.004 ± 0.001	< 0.0002 ± 0.0000
Lab Blank	UF2 (2/2)	01/06/97	< 0.05 ± 0.01	< 0.0004 ± 0.0002	< 0.007 ± 0.000	< 0.0005 ± 0.0001
Lab Blank	UF3 (1/1)	01/06/97	0.063 ± 0.005	0.0008 ± 0.0001	< 0.004 ± 0.000	0.0002 ± 0.0001
Lab Blank	THB (1/1)	01/06/97	< 0.02 ± 0.015	< 0.0003 ± 0.0000	< 0.004 ± 0.000	< 0.0002 ± 0.0000
Lab Blank	25LCb (1/1)	01/06/97	< 0.02 ± 0.018	< 0.0003 ± 0.0001	< 0.004 ± 0.001	< 0.0002 ± 0.0000
Lab Blank	DIW (1/1)	01/06/97	0.031 ± 0.032	< 0.0003 ± 0.0001	< 0.004 ± 0.000	< 0.0002 ± 0.0002
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.02 ± 0.018	< 0.0003 ± 0.0002	< 0.004 ± 0.000	< 0.0002 ± 0.0001
Lab Blank	UF2 (1/1)	05/28/97	< 0.06 ± 0.00	< 0.0004 ± 0.0002	< 0.007 ± 0.001	< 0.0004 ± 0.0001
Lab Blank	UF3 (1/1)	05/28/97	< 0.06 ± 0.02	< 0.0004 ± 0.0003	< 0.007 ± 0.001	< 0.0004 ± 0.0001
Lab Blank	THB (1/1)	05/28/97	< 0.06 ± 0.02	< 0.0004 ± 0.0002	< 0.007 ± 0.000	< 0.0004 ± 0.0001
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.06 ± 0.02	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0002
Field Blank	DIW (2/2)	06/05/97	< 0.06 ± 0.01	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0000
Field Blank	CapF (1/3)	06/05/97	< 0.06 ± 0.01	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0000
Field Blank	UFVP (1/1)	06/05/97	< 0.06 ± 0.02	< 0.0004 ± 0.0001	< 0.007 ± 0.000	< 0.0004 ± 0.0000
Field Blank	JyCn (1/1)	06/05/97	< 0.06 ± 0.01	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0001
Field Blank	CapF (2/3)	06/05/97	< 0.07 ± 0.03	< 0.0007 ± 0.0002	< 0.008 ± 0.001	< 0.0004 ± 0.0002
Field Blank	CapF (3/3)	06/05/97	0.09 ± 0.05	< 0.0007 ± 0.0001	< 0.008 ± 0.001	< 0.0004 ± 0.0003
Field Blank	SCDI (1/1)	06/05/97	< 0.07 ± 0.09	< 0.0007 ± 0.0002	< 0.008 ± 0.001	< 0.0004 ± 0.0004
Field Blank	SCADI (1/1)	06/05/97	0.07 ± 0.14	< 0.0007 ± 0.0004	< 0.008 ± 0.002	< 0.0004 ± 0.0004
Field Blank	TfTb (1/1)	06/05/97	< 0.07 ± 0.09	< 0.0007 ± 0.0003	< 0.008 ± 0.001	< 0.0004 ± 0.0002
Lab Blank	DIW (1/1)	05/28/97	< 0.06 ± 0.00	< 0.0004 ± 0.0002	< 0.007 ± 0.001	< 0.0004 ± 0.0002
Lab Blank	MemF (1/1)	05/28/97	< 0.06 ± 0.02	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0001
Lab Blank	CapF (1/1)	05/28/97	< 0.06 ± 0.01	< 0.0004 ± 0.0001	< 0.007 ± 0.001	< 0.0004 ± 0.0000

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Uranium µg/L	Vanadium µg/L	Ytterbium µg/L	Yttrium µg/L
Lab Blank	DIW (1/1)	07/10/96	< 0.0014 ± 0.0011	< 0.02 ± 0.01	< 0.0007 ± 0.0003	< 0.0004 ± 0.0002
Lab Blank	8LCh (1/1)	07/10/96	< 0.0014 ± 0.0002	< 0.02 ± 0.00	< 0.0007 ± 0.0002	< 0.0004 ± 0.0005
Lab Blank	MemF (1/1)	07/10/96	< 0.0014 ± 0.0006	< 0.02 ± 0.01	< 0.0007 ± 0.0003	< 0.0004 ± 0.0001
Lab Blank	CapF (1/1)	07/10/96	< 0.0014 ± 0.0004	< 0.02 ± 0.02	< 0.0007 ± 0.0002	< 0.0004 ± 0.0003
Lab Blank	UF1 (1/1)	07/10/96	< 0.0011 ± 0.0004	< 0.03 ± 0.03	0.0014 ± 0.0001	0.0002 ± 0.0006
Lab Blank	UF2 (1/1)	07/10/96	0.0030 ± 0.0044	< 0.02 ± 0.01	< 0.0007 ± 0.0003	< 0.0004 ± 0.0001
Lab Blank	UF3 (1/1)	07/12/96	< 0.0011 ± 0.0009	0.05 ± 0.03	< 0.001 ± 0.0004	0.0007 ± 0.0001
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	< 0.0014 ± 0.0014	< 0.02 ± 0.01	< 0.0007 ± 0.0003	< 0.0004 ± 0.0000
Field Blank	8LCh (1/1)	07/17/96	< 0.0011 ± 0.0061	< 0.03 ± 0.13	< 0.001 ± 0.0011	0.0017 ± 0.0014
Field Blank	MemF (1/1)	07/17/96	< 0.0011 ± 0.0015	< 0.03 ± 0.05	< 0.001 ± 0.0008	0.0003 ± 0.0001
Field Blank	CapF (1/1)	07/17/96	< 0.0014 ± 0.0002	< 0.02 ± 0.00	< 0.0007 ± 0.0001	< 0.0004 ± 0.0002
Field Blank	UF2 (1/1)	07/17/96	< 0.0014 ± 0.0021	< 0.02 ± 0.02	< 0.0007 ± 0.0001	< 0.0004 ± 0.0002
Field Blank	UF3 (1/1)	07/17/96	< 0.0014 ± 0.0002	< 0.02 ± 0.01	< 0.0007 ± 0.0006	< 0.0004 ± 0.0003
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	< 0.006 ± 0.001	0.09 ± 0.10	< 0.002 ± 0.0014	< 0.0004 ± 0.0004
Lab Blank	20LCh (1/1)	09/18/96	< 0.013 ± 0.000	< 0.04 ± 0.04	< 0.0008 ± 0.0000	< 0.0009 ± 0.0005
Lab Blank	MemF (1/1)	09/18/96	< 0.004 ± 0.000	< 0.03 ± 0.07	0.0009 ± 0.0006	< 0.0005 ± 0.0002
Lab Blank	CapF (1/1)	09/18/96	< 0.004 ± 0.001	< 0.03 ± 0.01	< 0.0006 ± 0.0002	< 0.0005 ± 0.0003
Lab Blank	UF2 (1/1)	09/18/96	< 0.013 ± 0.002	< 0.04 ± 0.03	0.0012 ± 0.0003	< 0.0009 ± 0.0006
Lab Blank	UF3 (1/1)	09/18/96	< 0.006 ± 0.003	0.10 ± 0.12	< 0.002 ± 0.0002	< 0.0004 ± 0.0005
Lab Blank	THB (1/1)	09/18/96	< 0.004 ± 0.001	< 0.03 ± 0.04	< 0.0006 ± 0.0007	< 0.0005 ± 0.0002
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	< 0.006 ± 0.002	< 0.09 ± 0.04	< 0.002 ± 0.0002	< 0.0004 ± 0.0003
Field Blank	20LCh (1/1)	09/18/96	< 0.004 ± 0.001	< 0.03 ± 0.02	0.0009 ± 0.0003	< 0.0005 ± 0.0002
Field Blank	MemF (1/1)	09/18/96	< 0.006 ± 0.001	< 0.09 ± 0.08	< 0.002 ± 0.0007	< 0.0004 ± 0.0004
Field Blank	CapF (1/1)	09/18/96	< 0.004 ± 0.001	< 0.03 ± 0.01	< 0.0006 ± 0.0011	< 0.0005 ± 0.0006
Field Blank	UF2 (1/1)	09/18/96	0.048 ± 0.011	< 0.09 ± 0.01	< 0.002 ± 0.0000	< 0.0004 ± 0.0003
Field Blank	UF3 (1/1)	09/18/96	< 0.004 ± 0.002	0.04 ± 0.02	< 0.0006 ± 0.0001	< 0.0005 ± 0.0002
Field Blank	THB (1/1)	09/18/96	< 0.004 ± 0.001	0.04 ± 0.01	< 0.0006 ± 0.0005	< 0.0005 ± 0.0001
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	< 0.003 ± 0.003	< 0.04 ± 0.02	< 0.0013 ± 0.0007	< 0.0006 ± 0.0002
Lab Blank	8LCh (1/1)	11/13/96	< 0.003 ± 0.001	< 0.04 ± 0.01	< 0.0013 ± 0.0005	0.0007 ± 0.0005
Lab Blank	MemF (1/1)	11/13/96	< 0.003 ± 0.005	< 0.04 ± 0.02	< 0.0013 ± 0.0010	< 0.0006 ± 0.0001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Uranium µg/L	Vanadium µg/L	Ytterbium µg/L	Yttrium µg/L
Lab Blank	CapF (1/1)	11/14/96	< 0.003 ± 0.001	< 0.04 ± 0.01	< 0.0013 ± 0.0010	< 0.0006 ± 0.0003
Lab Blank	UF2 (1/1)	11/13/96	< 0.003 ± 0.003	< 0.04 ± 0.01	< 0.0013 ± 0.0009	< 0.0006 ± 0.0005
Lab Blank	UF3 (1/1)	11/13/96	0.003 ± 0.003	< 0.04 ± 0.01	< 0.0013 ± 0.0007	0.0013 ± 0.0002
Lab Blank	THB (1/1)	11/13/96	< 0.003 ± 0.002	< 0.04 ± 0.01	< 0.0013 ± 0.0005	< 0.0006 ± 0.0006
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	0.004 ± 0.006	< 0.04 ± 0.01	< 0.0013 ± 0.0006	< 0.0006 ± 0.0003
Field Blank	8LCh (1/1)	11/20/96	< 0.003 ± 0.003	< 0.04 ± 0.01	< 0.0013 ± 0.0005	< 0.0006 ± 0.0002
Field Blank	MemF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.04 ± 0.01	< 0.0013 ± 0.0008	< 0.0006 ± 0.0002
Field Blank	CapF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.04 ± 0.01	< 0.0013 ± 0.0015	< 0.0006 ± 0.0002
Field Blank	UF1 (1/1)	11/20/96	< 0.003 ± 0.002	< 0.04 ± 0.01	< 0.0013 ± 0.0003	< 0.0006 ± 0.0003
Field Blank	UF3 (1/1)	11/20/96	< 0.003 ± 0.001	< 0.04 ± 0.01	< 0.0013 ± 0.0006	< 0.0006 ± 0.0005
Field Blank	THB (1/1)	11/20/96	< 0.003 ± 0.002	< 0.04 ± 0.00	< 0.0013 ± 0.0002	0.0009 ± 0.0008
Field Blank	CapF (1/1)	11/20/96	< 0.003 ± 0.001	< 0.04 ± 0.00	< 0.0013 ± 0.0001	< 0.0006 ± 0.0001
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	0.0008 ± 0.0010	< 0.011 ± 0.008	< 0.0008 ± 0.0003	< 0.0001 ± 0.0003
Lab Blank	MemF (1/1)	12/16/96	< 0.0005 ± 0.0004	< 0.011 ± 0.007	< 0.0008 ± 0.0001	< 0.0001 ± 0.0002
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	< 0.0005 ± 0.0003	< 0.011 ± 0.006	< 0.0008 ± 0.0002	< 0.0001 ± 0.0001
Lab Blank	UF3 (1/1)	12/16/96	0.0005 ± 0.0002	< 0.011 ± 0.006	< 0.0008 ± 0.0003	< 0.0001 ± 0.0003
Lab Blank	THB (1/1)	12/16/96	< 0.0005 ± 0.0001	< 0.011 ± 0.004	< 0.0008 ± 0.0002	0.0003 ± 0.0003
Lab Blank	20LCh-1 (1/1)	12/16/96	< 0.0005 ± 0.0004	< 0.011 ± 0.006	< 0.0008 ± 0.0001	0.0002 ± 0.0005
Lab Blank	20LCh-2 (1/1)	12/16/96	< 0.0005 ± 0.0001	< 0.011 ± 0.004	< 0.0008 ± 0.0002	< 0.0001 ± 0.0005
Lab Blank	20LCh-3 (1/1)	12/16/96	0.0006 ± 0.0007	< 0.011 ± 0.007	< 0.0008 ± 0.0004	0.0004 ± 0.0006
Lab Blank	20LCh-4 (1/1)	12/16/96	< 0.0005 ± 0.0004	< 0.011 ± 0.004	< 0.0008 ± 0.0003	0.0002 ± 0.0001
Lab Blank	20LCh-5 (1/1)	12/16/96	0.0007 ± 0.0009	< 0.012 ± 0.006	< 0.0008 ± 0.0002	0.0004 ± 0.0005
Lab Blank	20LCh-6 (1/1)	12/16/96	0.0005 ± 0.0002	< 0.011 ± 0.004	< 0.0008 ± 0.0002	< 0.0001 ± 0.0001
Lab Blank	UF1 (1/1)	12/16/96	< 0.0005 ± 0.0007	< 0.011 ± 0.010	< 0.0008 ± 0.0002	< 0.0001 ± 0.0002
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	< 0.0005 ± 0.0003	< 0.011 ± 0.001	< 0.0008 ± 0.0003	< 0.0001 ± 0.0000
Field Blank	8LCh (1/1)	12/17/96	< 0.0005 ± 0.0003	< 0.011 ± 0.003	< 0.0008 ± 0.0004	< 0.0001 ± 0.0004
Field Blank	MemF (1/1)	12/17/96	0.0006 ± 0.0013	< 0.011 ± 0.015	< 0.0008 ± 0.0007	0.0004 ± 0.0003
Field Blank	CapF (1/1)	12/17/96	< 0.0005 ± 0.0003	< 0.011 ± 0.014	< 0.0008 ± 0.0001	0.0007 ± 0.0001
Field Blank	UF2 (1/1)	12/17/96	< 0.0005 ± 0.0004	< 0.011 ± 0.006	< 0.0008 ± 0.0001	< 0.0001 ± 0.0002
Field Blank	THB (1/1)	12/17/96	< 0.0005 ± 0.0006	< 0.011 ± 0.002	< 0.0008 ± 0.0007	0.0006 ± 0.0003
Lab Blank	DIW (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.004	< 0.0007 ± 0.0007	< 0.0004 ± 0.0003

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Uranium µg/L	Vanadium µg/L	Ytterbium µg/L	Yttrium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.001 ± 0.000	< 0.008 ± 0.003	< 0.0007 ± 0.0000	< 0.0004 ± 0.0000
Lab Blank	MemF (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.008	< 0.0007 ± 0.0007	< 0.0004 ± 0.0002
Lab Blank	CapF (1/1)	01/06/97	< 0.002 ± 0.001	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0006
Lab Blank	UF2 (1/2)	01/06/97	< 0.001 ± 0.001	< 0.008 ± 0.000	< 0.0007 ± 0.0003	< 0.0004 ± 0.0002
Lab Blank	UF2 (2/2)	01/06/97	0.146 ± 0.036	< 0.011 ± 0.008	< 0.0016 ± 0.0005	< 0.0007 ± 0.0002
Lab Blank	UF3 (1/1)	01/06/97	< 0.001 ± 0.000	0.21 ± 0.00	0.0016 ± 0.0004	0.023 ± 0.001
Lab Blank	THB (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.002	< 0.0007 ± 0.0003	< 0.0004 ± 0.0001
Lab Blank	25LCb (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.003	< 0.0007 ± 0.0004	< 0.0004 ± 0.0002
Lab Blank	DIW (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.003	< 0.0007 ± 0.0001	< 0.0004 ± 0.0004
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.001 ± 0.000	< 0.008 ± 0.005	< 0.0007 ± 0.0003	< 0.0004 ± 0.0002
Lab Blank	UF2 (1/1)	05/28/97	< 0.002 ± 0.002	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0002
Lab Blank	UF3 (1/1)	05/28/97	< 0.002 ± 0.001	0.03 ± 0.01	< 0.001 ± 0.000	0.0024 ± 0.0010
Lab Blank	THB (1/1)	05/28/97	< 0.002 ± 0.000	< 0.02 ± 0.01	< 0.001 ± 0.001	< 0.0005 ± 0.0002
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	< 0.002 ± 0.001	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0003
Field Blank	DIW (2/2)	06/05/97	< 0.002 ± 0.001	< 0.02 ± 0.02	< 0.001 ± 0.000	< 0.0005 ± 0.0004
Field Blank	CapF (1/3)	06/05/97	< 0.002 ± 0.002	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0003
Field Blank	UFVP (1/1)	06/05/97	< 0.002 ± 0.001	< 0.02 ± 0.02	< 0.001 ± 0.000	< 0.0005 ± 0.0000
Field Blank	JyCn (1/1)	06/05/97	< 0.002 ± 0.001	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0002
Field Blank	CapF (2/3)	06/05/97	< 0.004 ± 0.008	< 0.03 ± 0.03	< 0.0008 ± 0.0008	< 0.0005 ± 0.0006
Field Blank	CapF (3/3)	06/05/97	< 0.004 ± 0.004	< 0.03 ± 0.01	< 0.0008 ± 0.0006	< 0.0005 ± 0.0001
Field Blank	SCDI (1/1)	06/05/97	< 0.004 ± 0.001	< 0.03 ± 0.02	0.0008 ± 0.0011	0.0007 ± 0.0010
Field Blank	SCADI (1/1)	06/05/97	< 0.004 ± 0.002	< 0.03 ± 0.03	< 0.0008 ± 0.0013	0.0006 ± 0.0008
Field Blank	TfTb (1/1)	06/05/97	< 0.004 ± 0.000	< 0.03 ± 0.05	< 0.0008 ± 0.0006	< 0.0005 ± 0.0004
Lab Blank	DIW (1/1)	05/28/97	< 0.002 ± 0.001	< 0.02 ± 0.01	< 0.001 ± 0.001	< 0.0005 ± 0.0004
Lab Blank	MemF (1/1)	05/28/97	< 0.002 ± 0.003	< 0.02 ± 0.01	< 0.001 ± 0.000	< 0.0005 ± 0.0000
Lab Blank	CapF (1/1)	05/28/97	< 0.002 ± 0.001	< 0.02 ± 0.01	< 0.001 ± 0.001	< 0.0005 ± 0.0001

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Zinc µg/L	Zirconium µg/L
Lab Blank	DIW (1/1)	07/10/96	0.20 ± 0.07	< 0.017 ± 0.001
Lab Blank	8LCh (1/1)	07/10/96	0.73 ± 0.02	< 0.017 ± 0.001
Lab Blank	MemF (1/1)	07/10/96	0.45 ± 0.04	< 0.017 ± 0.002
Lab Blank	CapF (1/1)	07/10/96	0.21 ± 0.07	< 0.017 ± 0.002
Lab Blank	UF1 (1/1)	07/10/96	0.57 ± 0.21	0.008 ± 0.005
Lab Blank	UF2 (1/1)	07/10/96	0.32 ± 0.06	< 0.017 ± 0.003
Lab Blank	UF3 (1/1)	07/12/96	0.86 ± 0.11	< 0.007 ± 0.001
Lab Blank	HgP (1/1)	07/12/96	— ± —	— ± —
Field Blank	DIW (1/1)	07/17/96	0.22 ± 0.09	< 0.017 ± 0.002
Field Blank	8LCh (1/1)	07/17/96	0.62 ± 0.13	< 0.007 ± 0.004
Field Blank	MemF (1/1)	07/17/96	0.98 ± 0.07	< 0.007 ± 0.011
Field Blank	CapF (1/1)	07/17/96	0.81 ± 0.13	< 0.017 ± 0.004
Field Blank	UF2 (1/1)	07/17/96	0.38 ± 0.05	< 0.017 ± 0.002
Field Blank	UF3 (1/1)	07/17/96	0.36 ± 0.06	< 0.017 ± 0.001
Field Blank	HgP (1/1)	07/17/96	— ± —	— ± —
Lab Blank	DIW (1/1)	09/18/96	0.16 ± 0.05	< 0.003 ± 0.002
Lab Blank	20LCh (1/1)	09/18/96	0.17 ± 0.12	< 0.008 ± 0.001
Lab Blank	MemF (1/1)	09/18/96	0.23 ± 0.08	< 0.009 ± 0.004
Lab Blank	CapF (1/1)	09/18/96	0.61 ± 0.03	< 0.009 ± 0.002
Lab Blank	UF2 (1/1)	09/18/96	0.31 ± 0.10	< 0.008 ± 0.002
Lab Blank	UF3 (1/1)	09/18/96	0.24 ± 0.03	< 0.003 ± 0.002
Lab Blank	THB (1/1)	09/18/96	0.31 ± 0.14	< 0.009 ± 0.005
Lab Blank	HgP (1/1)	09/18/96	— ± —	— ± —
Field Blank	DIW (1/1)	09/18/96	0.14 ± 0.02	< 0.003 ± 0.001
Field Blank	20LCh (1/1)	09/18/96	0.14 ± 0.04	< 0.009 ± 0.003
Field Blank	MemF (1/1)	09/18/96	2.3 ± 0.2	< 0.003 ± 0.003
Field Blank	CapF (1/1)	09/18/96	0.29 ± 0.07	< 0.009 ± 0.003
Field Blank	UF2 (1/1)	09/18/96	0.05 ± 0.01	< 0.003 ± 0.000
Field Blank	UF3 (1/1)	09/18/96	0.80 ± 0.03	< 0.009 ± 0.001
Field Blank	THB (1/1)	09/18/96	0.32 ± 0.05	< 0.009 ± 0.003
Field Blank	HgP (1/1)	09/18/96	— ± —	— ± —
Lab Blank	DIW (1/1)	11/13/96	0.20 ± 0.01	< 0.02 ± 0.01
Lab Blank	8LCh (1/1)	11/13/96	0.16 ± 0.00	< 0.02 ± 0.00
Lab Blank	MemF (1/1)	11/13/96	0.15 ± 0.12	< 0.02 ± 0.00

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Zinc µg/L	Zirconium µg/L
Lab Blank	CapF (1/1)	11/14/96	0.32 ± 0.01	< 0.02 ± 0.00
Lab Blank	UF2 (1/1)	11/13/96	0.36 ± 0.13	< 0.02 ± 0.00
Lab Blank	UF3 (1/1)	11/13/96	0.49 ± 0.02	< 0.02 ± 0.00
Lab Blank	THB (1/1)	11/13/96	1.15 ± 0.06	< 0.02 ± 0.01
Lab Blank	HgP (1/1)	11/13/96	— ± —	— ± —
Field Blank	DIW (1/1)	11/20/96	0.60 ± 0.04	< 0.02 ± 0.00
Field Blank	8LCh (1/1)	11/20/96	0.47 ± 0.05	< 0.02 ± 0.00
Field Blank	MemF (1/1)	11/20/96	0.41 ± 0.00	< 0.02 ± 0.00
Field Blank	CapF (1/1)	11/20/96	0.50 ± 0.01	< 0.02 ± 0.00
Field Blank	UF1 (1/1)	11/20/96	< 0.03 ± 0.05	< 0.02 ± 0.00
Field Blank	UF3 (1/1)	11/20/96	0.44 ± 0.05	< 0.02 ± 0.00
Field Blank	THB (1/1)	11/20/96	0.46 ± 0.08	< 0.02 ± 0.00
Field Blank	CapF (1/1)	11/20/96	< 0.03 ± 0.03	< 0.02 ± 0.00
Field Blank	HgP (1/1)	11/20/96	— ± —	— ± —
Lab Blank	DIW (1/1)	12/16/96	0.13 ± 0.18	< 0.003 ± 0.003
Lab Blank	MemF (1/1)	12/16/96	0.18 ± 0.02	0.012 ± 0.006
Lab Blank	CapF (1/1)	12/16/96	— ± —	— ± —
Lab Blank	HgP (1/2)	12/16/96	— ± —	— ± —
Lab Blank	UF1 (1/1)	12/16/96	0.18 ± 0.16	0.007 ± 0.006
Lab Blank	UF3 (1/1)	12/16/96	0.32 ± 0.09	0.006 ± 0.006
Lab Blank	THB (1/1)	12/16/96	0.17 ± 0.05	0.006 ± 0.003
Lab Blank	20LCh-1 (1/1)	12/16/96	0.15 ± 0.10	0.016 ± 0.003
Lab Blank	20LCh-2 (1/1)	12/16/96	0.05 ± 0.04	< 0.003 ± 0.002
Lab Blank	20LCh-3 (1/1)	12/16/96	0.43 ± 0.09	0.014 ± 0.011
Lab Blank	20LCh-4 (1/1)	12/16/96	0.12 ± 0.03	< 0.003 ± 0.003
Lab Blank	20LCh-5 (1/1)	12/16/96	0.29 ± 0.19	< 0.003 ± 0.003
Lab Blank	20LCh-6 (1/1)	12/16/96	0.54 ± 0.02	< 0.003 ± 0.003
Lab Blank	UF1 (1/1)	12/16/96	< 0.03 ± 0.05	< 0.003 ± 0.003
Lab Blank	HgP (2/2)	12/16/96	— ± —	— ± —
Field Blank	DIW (1/1)	12/17/96	0.28 ± 0.11	0.004 ± 0.003
Field Blank	8LCh (1/1)	12/17/96	1.08 ± 0.08	0.005 ± 0.005
Field Blank	MemF (1/1)	12/17/96	0.55 ± 0.00	0.012 ± 0.002
Field Blank	CapF (1/1)	12/17/96	0.57 ± 0.23	0.008 ± 0.002
Field Blank	UF2 (1/1)	12/17/96	0.17 ± 0.07	0.004 ± 0.000
Field Blank	THB (1/1)	12/17/96	0.70 ± 0.03	0.015 ± 0.009
Lab Blank	DIW (1/1)	01/06/97	< 0.08 ± 0.03	< 0.009 ± 0.002

Table A2-2. Results of laboratory and field blank s for water sample processing—*Continued*

Blank Type	Process Type	Date	Zinc µg/L	Zirconium µg/L
Lab Blank	UF1 (1/1)	01/05/97	< 0.08 ± 0.04	< 0.009 ± 0.001
Lab Blank	MemF (1/1)	01/06/97	< 0.08 ± 0.07	< 0.009 ± 0.001
Lab Blank	CapF (1/1)	01/06/97	0.50 ± 0.01	< 0.008 ± 0.004
Lab Blank	UF2 (1/2)	01/06/97	< 0.08 ± 0.05	< 0.009 ± 0.003
Lab Blank	UF2 (2/2)	01/06/97	0.15 ± 0.09	< 0.007 ± 0.002
Lab Blank	UF3 (1/1)	01/06/97	0.44 ± 0.15	< 0.009 ± 0.001
Lab Blank	THB (1/1)	01/06/97	0.24 ± 0.05	< 0.009 ± 0.002
Lab Blank	25LCb (1/1)	01/06/97	0.09 ± 0.10	< 0.009 ± 0.002
Lab Blank	DIW (1/1)	01/06/97	1.2 ± 0.0	< 0.009 ± 0.001
Lab Blank	HgP (1/1)	01/06/97	— ± —	— ± —
Field Blank	THB (1/1)	01/06/97	< 0.08 ± 0.03	< 0.009 ± 0.001
Lab Blank	UF2 (1/1)	05/28/97	0.07 ± 0.03	< 0.008 ± 0.004
Lab Blank	UF3 (1/1)	05/28/97	3.6 ± 1.1	< 0.008 ± 0.001
Lab Blank	THB (1/1)	05/28/97	1.1 ± 0.2	< 0.008 ± 0.003
Lab Blank	HgP (1/1)	05/28/97	— ± —	— ± —
Field Blank	DIW (1/2)	06/05/97	1.1 ± 0.0	< 0.008 ± 0.004
Field Blank	DIW (2/2)	06/05/97	1.1 ± 0.0	< 0.008 ± 0.003
Field Blank	CapF (1/3)	06/05/97	< 0.07 ± 0.02	< 0.008 ± 0.001
Field Blank	UFVP (1/1)	06/05/97	< 0.07 ± 0.06	< 0.008 ± 0.003
Field Blank	JyCn (1/1)	06/05/97	< 0.07 ± 0.02	< 0.008 ± 0.005
Field Blank	CapF (2/3)	06/05/97	0.68 ± 0.17	< 0.005 ± 0.002
Field Blank	CapF (3/3)	06/05/97	0.56 ± 0.01	< 0.005 ± 0.001
Field Blank	SCDI (1/1)	06/05/97	< 0.03 ± 0.07	< 0.005 ± 0.003
Field Blank	SCADI (1/1)	06/05/97	0.06 ± 0.04	< 0.005 ± 0.005
Field Blank	TfTb (1/1)	06/05/97	0.31 ± 0.07	< 0.005 ± 0.005
Lab Blank	DIW (1/1)	05/28/97	< 0.07 ± 0.02	< 0.008 ± 0.004
Lab Blank	MemF (1/1)	05/28/97	0.93 ± 0.03	< 0.008 ± 0.005
Lab Blank	CapF (1/1)	05/28/97	0.44 ± 0.07	< 0.008 ± 0.004

Table A2-2. Results of laboratory and field blanks for water sample processing—*Continued*

Blank Type	Process Type	Date (mm/dd/yy)	Lead (µg/L) ICP–MS
Blanks for lead grab samples			
Lab blank	Grab (1/1)	09/18/96	0.005 ± 0.002
Field blank	DWI (1/1)	09/27/96	<0.004 ± 0.003
Field blank	UF1 (1/1)	09/27/96	<0.004 ± 0.002
Field blank	Grab (1/1)	09/27/96	<0.004 ± 0.003
Lab blank	DWI (1/1)	11/13/96	<0.005 ± 0.007
Lab blank	Grab (1/1)	11/13/96	<0.005 ± 0.002
Lab blank	Mem F (1/1)	11/13/96	0.018 ± 0.013
Lab blank	UF1 (1/1)	11/13/96	<0.005 ± 0.008
Lab blank	Grab (1/1)	11/13/96	<0.005 ± 0.008
Field blank	DWI (1/1)	11/18/96	<0.005 ± 0.009
Field blank	Cap F (1/1)	11/18/96	0.012 ± 0.018
Field blank	UF1 (1/1)	11/18/96	0.008 ± 0.024
Field blank	Grab (1/1)	11/18/96	0.016 ± 0.031
Lab blank	DWI (1/1)	07/10/96	<0.004 ± 0.006
Lab blank	Cap F (1/1)	07/10/96	<0.004 ± 0.005
Lab blank	UF1 (1/1)	07/10/96	<0.004 ± 0.003
Lab blank	UF2 (1/1)	07/10/96	<0.004 ± 0.003
Lab blank	Grab (1/1)	07/10/96	<0.004 ± 0.004
Field blank	Grab (1/1)	07/17/96	<0.005 ± 0.003
Field blank	DWI (1/1)	07/17/96	<0.005 ± 0.001
Field blank	Cap F (1/1)	07/17/96	0.017 ± 0.003
Field blank	UF2 (1/1)	07/17/96	0.025 ± 0.002
Field blank	UF3 (1/1)	07/17/96	<0.005 ± 0.001
Field blank	Mem F (1/1)	07/17/96	0.03 ± 0.003
Field blank	DWI (1/1)	12/17/96	0.005 ± 0.007
Field blank	Grab (1/1)	12/17/96	0.007 ± 0.005
Lab blank	DWI (1/1)	01/06/97	<0.004 ± 0.003
Lab blank	UF2 (1/1)	01/06/97	<0.004 ± 0.001
Lab blank	DWI (1/1)	05/28/97	<0.01 ± 0
Lab blank	Mem F (1/1)	05/28/97	<0.008 ± 0.003
Lab blank	UF2 (1/1)	05/28/97	<0.01 ± 0
Lab blank	Cap F (1/1)	05/28/97	<0.01 ± 0
Field blank	DWI (1/1)	06/05/97	<0.01 ± 0
Field blank	Cap F (1/2)	06/05/97	<0.008 ± 0.001
Field blank	UF3 (Verona) (1/1)	06/05/97	<0.01 ± 0
Field blank	Grab (1/1)	06/05/97	<0.01 ± 0
Field blank	JyCn (1/1)	06/05/97	<0.01 ± 0
Field blank	Cap F (2/2)	06/05/97	<0.008 ± 0.001
Field blank	SCDI (1/1)	06/05/97	<0.01 ± 0
Field blank	TfTb	06/05/97	0.01 ± 0.01

Table A2-3. Observed metal concentrations and percentage recovery in biological reference materials processed using the same methods as caddisfly samples

[NIST, National Institute of Standards and Technology; SRM, Standard Reference Material. Dividing micrograms per sample by dry weight gives concentrations in micrograms per gram dry weight. Certified concentration values reported by the NIST for SRM 1566a–Oyster tissue and SRM 50–Albacore tuna are presented in Table 22. Percentage recovery is the measured value divided by the NIST certified value and multiplied by 100. g, gram; µg/sample, micogram per sample; —, no certified value

Reference material	Tissue	Dry weight (in g)	Aluminum	Cadmium	Copper	Iron	Lead	Zinc
			Observed Concentration (in µg/sample)					
NIST SRM1556	Oyster	0.3941	134.5	4.31	63.4	520	0.457	850
NIST SRM1556	Oyster	0.401	124.7	4.24	59.9	511	0.324	800
NIST SRM1566	Oyster	0.4133	142.8	4.36	65.3	549	0.339	811
NIST SRM1566	Oyster	0.4342	140.5	4.38	57.6	509	0.368	814
NIST SRM1566	Oyster	0.4125	138.2	4.61	63.0	499	0.339	819
NIST SRM50	Tuna	0.354	7.6	0.07	3.1	53.7	0.593	13.8
NIST SRM50	Tuna	0.4242	7.1	0.04	3.1	51.9	0.684	14.4
NIST SRM50	Tuna	0.3798	7.1	0.04	3.2	52.7	0.553	14.5
NIST SRM50	Tuna	0.434	5.1	0.05	2.8	50.7	0.392	13.1
NIST SRM50	Tuna	0.443	4.5	0.10	3.2	54.2	0.384	13.1
			Percentage Recovery					
NIST SRM1566	Oyster	0.3941	67	104	96	97	123	102
NIST SRM1566	Oyster	0.401	62	102	90	95	87	96
NIST SRM1566	Oyster	0.4133	71	105	99	102	91	98
NIST SRM1566	Oyster	0.4342	70	105	87	94	99	101
NIST SRM1566	Oyster	0.4125	68	111	95	93	91	99
NIST SRM50	Tuna	0.354	—	—	—	—	129	102
NIST SRM50	Tuna	0.4242	—	—	—	—	149	106
NIST SRM50	Tuna	0.3798	—	—	—	—	120	106
NIST SRM50	Tuna	0.434	—	—	—	—	85	97
NIST SRM50	Tuna	0.443	—	—	—	—	83	96

Table A2-4. Procedural blanks for caddisfly samples collected from the Sacramento River and Cottonwood Creek, October 21–23, 1996

[Blanks were processed with samples using identical methods; Br., Bridge; Cr., Creek; R., River; Sac., Sacramento; <, less than; µg/sample, microgram per sample]

Station	Sample ID	Sample Fraction	Aluminum (µg/sample)	Cadmium (µg/sample)	Copper (µg/sample)	Iron (µg/sample)	Lead (µg/sample)	Zinc (µg/sample)
Sac. R.–Rodeo	SRRBLK1wb	Whole Body	0.71	< 0.002	0.016	3	0.019	0.33
	SRRBLK1c	Cytosol	0.33	< 0.003	< 0.006	< 0.3	0.006	0.21
Sac. R.–Churn Cr.	SRABLK1wb	Whole Body	0.41	< 0.003	0.013	2	0.008	0.26
	SRABLK1c	Cytosol	0.35	< 0.003	< 0.006	< 1	0.005	< 0.18
Sac. R.–Balls Ferry	SRBFBLK1wb	Whole Body	0.8	0.041	< 0.006	1	0.005	< 0.18
	SRBFBLK1c	Cytosol	0.81	0.016	< 0.006	< 0.5	< 0.003	< 0.18
Sac. R.–Bend Br.	SRBBLK1wb	Whole Body	0.35	< 0.003	0.013	3	0.011	0.31
	SRBBLK1c	Cytosol	0.6	0.003	< 0.006	< 0.7	0.009	< 0.18
Sac. R.–Tehama	SRTBLK1wb	Whole Body	0.68	< 0.003	< 0.006	< 0.6	0.006	< 0.18
	SRTBLK1c	Cytosol	0.17	< 0.003	< 0.006	< 1	0.006	< 0.18
Cottonwood Cr.	SRCCBLK1wb	Whole Body	0.35	< 0.003	0.073	2	0.007	< 0.18
	SRCCBLK1c	Cytosol	0.26	< 0.003	< 0.006	< 0.6	0.19	0.52

Table A2-5. Concentration data for standard reference materials

[n, number of times standards were analyzed. Median, median value of all analysis; MAD, median absolute deviation of all observations (cf, Rousseeuw, 1990); NIST, National Institute of Standards and Technology; seq., sequential; SRM, Standard Reference Material;PUB, published concentration value for standard reference material. (All values for NIST standards are certified values unless indicated by "(i)" for "informational purposes;" all values for USGS standards are most probable values); PUB–SD, standard deviation of the published concentration value; USGS, U.S. Geological Survey; wt %, weight percent; *, standard diluted 1/10 for analysis; **, standard diluted 1/100 for analysis; —, not analyzed; nr, not reported. µg/g, microgram per gram, µg/L, microgram per liter; mg/L, milligram per liter]

Table A2-5. Concentration data for standard reference materials—*Continued*

	Aluminum						Antimony					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643d*	µg/L	618	129	5	127.6	3.5	µg/L	260	54.7	1.8	54.1	1.1
SRM 2704-total digestion	wt %	19	5.7	0.44	6.11	0.16	µg/g	19	3.9	0.15	3.79	0.15
SRM 2704-sum of seq. digestion	wt %	5	3.2	0.33	6.11	0.16	µg/g	5	3.9	0.3	3.79	0.15
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	28	2.2	51	nr
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	µg/L	50	132	6	127	38	µg/L	50	9.4	0.5	9.4	0.5
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	µg/L	42	85	2	83	30	—	—	—	—	—	—
T113	µg/L	201	317	8	317	31	µg/L	149	17.1	0.8	18.9	4.8
T117	µg/L	246	76	3	79	19.4	µg/L	153	5.7	0.3	5.5	0.96
T119	µg/L	75	167	5	171	30	µg/L	33	8.7	0.2	8.6	1.41
T125	µg/L	205	22	1	24	8.56	µg/L	114	6.2	0.2	6.24	1.305
T129	µg/L	94	47	1	50	11.9	µg/L	94	0.2	0.0	0.55	0.87
T131	µg/L	100	129	4	132	20	µg/L	17	56.3	0.7	56.2	6.7
T133	µg/L	60	52	1	52.1	8.1	µg/L	21	14.6	0.6	14.4	2.4
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	µg/L	42	31	1	30.5	6.9	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	µg/L	411	68	2	67.6	11	µg/L	89	8.8	0.2	8.8	0.96
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Arsenic						Barium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	57	76.2	3.8	76	7	µg/L	42	48	3	46	2
SRM 1643b*	µg/L	159	53.0	2.9	49	nr	µg/L	159	44	3	44	2
SRM 1643d*	µg/L	289	53.3	2.4	56.02	0.73	µg/L	306	502	18	506.5	8.9
SRM 2704-total digestion	—	—	—	—	—	—	µg/g	19	400	30	414	12
SRM 2704-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	230	22	414	12
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	µg/L	50	57	4	59.7	16
T103	µg/L	50	3.2	0.1	3.2	0.9	µg/L	50	42	1	40.5	3.2
T105	—	—	—	—	—	—	µg/L	155	7.5	0.9	7.6	7
T107	—	—	—	—	—	—	µg/L	202	186	9	192	11
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	µg/L	162	23.9	0.6	23.8	3	µg/L	149	70	3	70	7
T117	µg/L	167	7.4	0.3	6.9	1.4	µg/L	153	98	4	98.5	6.3
T119	µg/L	33	4.0	0.1	4.2	0.57	µg/L	33	44	2	44	3
T125	µg/L	126	10.3	0.4	10.2	1.54	µg/L	114	17	1	16.9	1.67
T129	µg/L	94	0.2	0.1	0.55	1.14	µg/L	94	34	2	34	1.9
T131	µg/L	22	54.8	2.2	56.6	5.4	µg/L	17	445	17	507	22
T133	µg/L	21	27.1	0.5	27.1	3.3	µg/L	21	148	4	148	9
T135	—	—	—	—	—	—	µg/L	110	66	5	67.8	4.3
T137	—	—	—	—	—	—	µg/L	111	63	7	65	4.8
T143	—	—	—	—	—	—	µg/L	40	82	10	81.9	4.5
T145	µg/L	101	9.7	0.3	9.88	1.04	µg/L	89	37	1	37.1	1.9
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Beryllium						Boron					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	42	19.4	1.1	19	2	—	—	—	—	—	—
SRM 1643b*	µg/L	159	18.8	0.8	19	2	µg/L	159	100	12	94	nr
SRM 1643d*	µg/L	260	11.9	0.6	12.53	0.28	µg/L	351	150	22	144.8	5.2
SRM 2704-total digestion	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	µg/L	33	491	22	495	9
T101	—	—	—	—	—	—	µg/L	50	332	18	370	21
T103	µg/L	50	5.0	0.1	4.8	1	µg/L	50	111	5	120	39
T105	—	—	—	—	—	—	µg/L	155	144	7	142	300
T107	—	—	—	—	—	—	µg/L	202	136	9	130	7
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	µg/L	149	10.5	0.5	10	0.9	µg/L	175	199	12	188	19
T117	µg/L	153	4.7	0.2	4.8	0.4	µg/L	218	147	8	151	20.8
T119	µg/L	33	13.2	0.3	13.6	1.7	µg/L	33	27	1	28	8.9
T125	µg/L	114	15.0	0.5	15	1.19	µg/L	182	18	3	19.4	8.02
T129	—	—	—	—	—	—	µg/L	94	10	4	11.6	2.8
T131	µg/L	17	12.2	0.3	12.2	0.8	µg/L	46	151	12	141	12
T133	µg/L	21	35.2	1.9	35	2.2	µg/L	21	299	15	297	16
T135	—	—	—	—	—	—	µg/L	110	10	3	13	11
T137	—	—	—	—	—	—	µg/L	111	14	4	16	4
T143	—	—	—	—	—	—	µg/L	40	33	6	35	5
T145	µg/L	89	9.0	0.2	9.04	0.7	µg/L	244	46	2	45.6	5.8
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Cadmium						Calcium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	159	11.5	0.4	10	1	—	—	—	—	—	—
SRM 1643b*	µg/L	159	20.2	0.8	20	1	mg/L	18	34.7	0.5	35	nr
SRM 1643d*	µg/L	622	6.50	0.62	6.47	0.37	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	3.70	0.15	3.45	0.22	wt %	19	2.70	0.15	2.60	0.03
SRM 2704-sum of seq. digestion	µg/g	5	3.5	0.23	3.45	0.22	wt %	5	2.78	0.17	2.6	0.03
SRM 1645-sum of seq. digestion	µg/g	5	7.7	0.44	10.2	1.5	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—		—	—	mg/L	33	184	8	202	15
T101	—	—	—	—		—	—	mg/L	50	71.4	2.5	72.5	0.7
T103	µg/L	50	1.78	0.06	1.7	0.4	mg/L	80	55.2	2.2	54.7	2
T105	—	—	—	—		—	—	mg/L	155	72.5	3.1	73	4.2
T107	—	—	—	—		—	—	mg/L	202	12.3	0.9	11.7	0.2
T111	µg/L	46	24.5	0.3	23	1.9	—	—	—	—	—	—	—
T113	µg/L	201	4.12	0.14	4.23	0.8	—	—	—	—	—	—	—
T117	µg/L	246	2.25	0.08	2.2	0.4	mg/L	55	20.9	0.4	20.9	1.2
T119	µg/L	79	2.94	0.08	2.8	0.44	—	—	—	—	—	—	—
T125	µg/L	205	7.43	0.16	7.2	0.75	mg/L	99	9.7	0.4	9.34	0.53
T129	µg/L	94	0.28	0.07	0.34	0.15	—	—	—	—	—	—	—
T131	µg/L	104	6.13	0.18	6.1	0.47	mg/L	41	31.4	1.2	30.6	1.2
T133	µg/L	63	22.8	0.4	23	2.1	mg/L	38	7.5	1.0	7.04	0.33
T135	—	—	—	—		—	—	mg/L	110	11.0	0.7	10.4	0.6
T137	µg/L	46	6.96	0.09	6.8	0.52	mg/L	111	38.7	2.8	38.1	1.5
T143	—	—	—	—		—	—	mg/L	40	53.1	3.6	53.7	2.2
T145	µg/L	435	9.29	0.17	9.33	0.82	mg/L	46	31.2	3.9	30.7	1.3
Hg7*	—	—	—	—		—	—	—	—	—	—	—	—
Hg10**	—	—	—	—		—	—	—	—	—	—	—	—
Hg12**	—	—	—	—		—	—	—	—	—	—	—	—
Hg15**	—	—	—	—		—	—	—	—	—	—	—	—
Hg24**	—	—	—	—		—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Cerium						Chromium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	µg/L	87	19.0	1.6	17	2
SRM 1643b*	—	—	—	—	—	—	µg/L	159	19.6	1.7	18.6	0.4
SRM 1643d*	—	—	—	—	—	—	µg/L	323	19.0	1.3	18.53	0.2
SRM 2704-total digestion	µg/g	19	55	10	72(i)	nr	µg/g	19	130	15	135	5
SRM 2704-sum of seq. digestion	µg/g	5	0.24	11	72(i)	nr	µg/g	5	140	10	135	5
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	wt %	5	2.6	0.31	2.96	0.28
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	—	—	—	—	—	—	µg/L	50	5.6	1.5	5.5	1.3
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	µg/L	8	26.0	1.0	25.8	3.7
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	µg/L	193	10.3	0.4	10.3	1.59
T119	—	—	—	—	—	—	µg/L	41	18.5	0.7	18.6	2.2
T125	—	—	—	—	—	—	µg/L	150	4.2	0.3	3.99	0.71
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	µg/L	39	19.3	0.8	18.6	2.1
T133	—	—	—	—	—	—	µg/L	28	38.1	1.5	38	3.2
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	µg/L	8	19.3	0.1	19.4	2
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	—	—	—	—	—	—	µg/L	181	15.1	0.6	15.3	1.4
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Cobalt						Copper					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	86	21.9	1.0	19	2	µg/L	159	20.7	1.5	18	2
SRM 1643b*	µg/L	159	26.1	0.9	26	1	µg/L	159	23.9	1.9	21.9	0.4
SRM 1643d*	µg/L	366	24.8	0.7	25	0.59	µg/L	622	21.3	1.5	20.5	3.8
SRM 2704-total digestion	µg/g	19	14.0	1.5	14.0	0.6	µg/g	19	96.0	5.9	98.6	5.0
SRM 2704-sum of seq. digestion	µg/g	5	12.5	1.2	14	0.6	µg/g	5	98	10	98.6	5
SRM 1645-sum of seq. digestion	µg/g	5	6.9	0.6	8	nr	µg/g	5	92	6	109	19
USGS Standards												
T99	—	—	—	—	—	—	µg/L	33	26	2	28	5
T101	—	—	—	—	—	—	µg/L	50	47	4	50	7
T103	µg/L	50	3.1	0.1	5.2	3.1	µg/L	50	82.6	2.0	83.3	5.7
T105	—	—	—	—	—	—	µg/L	155	19.2	1.7	20	4
T107	—	—	—	—	—	—	µg/L	202	30.0	2	30	2
T111	µg/L	46	9.0	0.2	9	1.7	µg/L	46	10.7	0.3	10.9	2.1
T113	µg/L	175	10.4	0.4	10.2	1.3	µg/L	201	46.1	1.3	47	5
T117	µg/L	180	4.1	0.2	4.3	0.74	µg/L	246	6.0	0.2	6	1.76
T119	µg/L	79	5.2	0.1	5.1	0.96	µg/L	79	2.1	0.1	2	1
T125	µg/L	148	9.7	0.3	9.45	0.78	µg/L	205	18.1	0.5	17.4	2.1
T129	—	—	—	—	—	—	µg/L	94	2.3	0.1	2.7	1.4
T131	µg/L	80	24.7	0.6	24.6	1.9	µg/L	104	20.5	0.6	20.2	2
T133	µg/L	63	20.0	0.4	20	1.5	µg/L	63	85.3	2.2	85.3	4.5
T135	—	—	—	—	—	—	µg/L	110	62	5	62.0	4.2
T137	—	—	—	—	—	—	µg/L	46	1.7	0.1	1.9	1.2
T143	—	—	—	—	—	—	µg/L	40	21.7	4.4	22.3	1.9
T145	µg/L	325	10.0	0.2	10	0.9	µg/L	435	11.0	0.2	11	1.4
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Dysprosium						Europium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	
SRM 1643b*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	4.6	0.3	6(i)	nr	µg/g	19	1.1	0.1	1.3(i)	nr
SRM 2704-sum of seq. digestion	µg/g	5	2.9	0.3	6(i)	nr	µg/g	5	0.65	0.05	1.3(i)	nr
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	—	—	—	—	—	—	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	—	—	—	—	—	—
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	—	—	—	—	—	—	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	—	—	—	—	—	—
T133	—	—	—	—	—	—	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	—	—	—	—	—	—	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Iron						Lanthanum					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	mg/L	18	0.106	0.004	0.099	0.008	—	—	—	—	—	—
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	wt %	19	4.20	0.15	4.11	0.10	µg/g	19	24	4	29(i)	nr
SRM 2704-sum of seq. digestion	wt %	5	4.34	0.21	4.11	0.1	µg/g	5	8.9	3.9	29(i)	nr
SRM 1645-sum of seq. digestion	wt %	5	9.8	0.04	11.3	1.2	µg/g	5	6.7	0	9	nr
USGS Standards												
T99	mg/L	33	0.138	0.006	0.137	0.007	—	—	—	—	—	—
T101	mg/L	50	0.189	0.014	0.191	0.005	—	—	—	—	—	—
T103	mg/L	80	0.042	0.005	0.041	0.0076	—	—	—	—	—	—
T105	mg/L	155	0.019	0.006	0.024	0.012	—	—	—	—	—	—
T107	mg/L	202	0.055	0.007	0.052	0.002	—	—	—	—	—	—
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	mg/L	55	0.475	0.008	0.474	0.0182	—	—	—	—	—	—
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	mg/L	99	0.099	0.006	0.0979	0.0073	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	mg/L	41	0.085	0.008	0.0907	0.0089	—	—	—	—	—	—
T133	mg/L	38	0.035	0.009	0.0314	0.0067	—	—	—	—	—	—
T135	mg/L	110	0.228	0.015	0.228	0.011	—	—	—	—	—	—
T137	mg/L	111	0.066	0.013	0.071	0.009	—	—	—	—	—	—
T143	mg/L	40	0.220	0.026	0.222	0.014	—	—	—	—	—	—
T145	mg/L	46	0.104	0.018	0.101	0.008	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Lead						Lithium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	159	28.0	1.2	27	1	—	—	—	—	—	—
SRM 1643b*	µg/L	159	23.6	0.9	23.7	0.7	—	—	—	—	—	—
SRM 1643d*	µg/L	622	18.2	0.7	18.15	0.64	µg/L	364	16.8	1.0	16.5	0.55
SRM 2704-total digestion	µg/g	19	150	10	161	17	µg/g	19	45.0	1.5	47.5	4.1
SRM 2704-sum of seq. digestion	µg/g	5	160	7	161	17	µg/g	5	44.1	1.9	47.5	4.1
SRM 1645-sum of seq. digestion	µg/g	5	610	15	714	28	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	µg/L	50	8.4	0.4	7.7	2.1	µg/L	50	29.8	1.1	32.5	3.1
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	µg/L	46	19.9	0.6	18.8	5.8	µg/L	8	12.0	0.4	11.4	3.9
T113	—	—	—	—	—	—	µg/L	149	45.5	1.7	45	7
T117	µg/L	246	4.8	0.2	5	1.33	µg/L	204	20.4	0.7	20	2.48
T119	µg/L	79	7.0	0.3	6.7	1.12	µg/L	41	60.3	2.0	60.5	4.2
T125	µg/L	205	8.2	0.3	8.11	1.21	µg/L	160	15.9	0.7	16.2	1.58
T129	—	—	—	—	—	—	µg/L	94	18.0	0.6	18	2.6
T131	µg/L	104	16.5	0.9	18.1	2.7	µg/L	43	17.4	0.6	17	1.5
T133	µg/L	63	27.5	0.8	27.8	2.7	µg/L	28	51.2	2.0	51	3.5
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	µg/L	46	6.3	0.2	6.3	1	µg/L	8	9.0	0.2	8.7	1.5
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	µg/L	435	12.7	0.3	12.7	1.2	µg/L	225	27.2	0.7	27.3	2.5
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Lutetium						Magnesium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	—	—	—	—	—	—	mg/L	18	8.4	0.1	8.5	nr
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	0.4	0.0	0.6(i)	nr	wt %	19	1.10	0.15	1.20	0.02
SRM 2704-sum of seq. digestion	µg/g	5	0.19	0.03	0.6(i)	nr	wt %	5	0.75	0.11	1.2	0.02
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	mg/L	33	113	5	113	2
T101	—	—	—	—	—	—	mg/L	50	52.6	1.4	52.6	0.6
T103	—	—	—	—	—	—	mg/L	80	30.5	1.0	30.5	1.2
T105	—	—	—	—	—	—	mg/L	155	65.5	2.8	66.8	2.7
T107	—	—	—	—	—	—	mg/L	202	2.2	0.1	2.1	0.03
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	mg/L	55	10.1	0.1	10.05	0.44
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	—	—	—	—	—	—	mg/L	99	2.0	0.1	2	0.11
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	mg/L	41	7.9	0.2	8	0.28
T133	—	—	—	—	—	—	mg/L	38	6.0	0.4	5.82	0.21
T135	—	—	—	—	—	—	mg/L	110	2.0	0.1	2	0.09
T137	—	—	—	—	—	—	mg/L	111	10.2	0.8	10.1	0.5
T143	—	—	—	—	—	—	mg/L	40	10.2	0.9	10.4	0.5
T145	—	—	—	—	—	—	mg/L	46	8.7	0.8	8.68	0.45
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Manganese						Mercury					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	70	34.6	2.5	31	2	—	—	—	—	—	—
SRM 1643b*	µg/L	159	32.6	2.0	28	2	—	—	—	—	—	—
SRM 1643d*	µg/L	334	39.2	1.8	37.66	0.83	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	570	15	555	19	µg/g	18	1.55	0.10	1.47	0.07
SRM 2704-sum of seq. digestion	µg/g	5	560	13	555	19	µg/g	5	1.42	0.06	1.47	0.07
SRM 1645-sum of seq. digestion	µg/g	5	690	44	785	97	—	—	—	—	—	—
USGS Standards												
T99	µg/L	33	82	4	82	14	—	—	—	—	—	—
T101	µg/L	50	48	2	50	4	—	—	—	—	—	—
T103	µg/L	80	1.5	0.5	9	2.1	—	—	—	—	—	—
T105	µg/L	155	73	3	73	7	—	—	—	—	—	—
T107	µg/L	202	47	2	45	6	—	—	—	—	—	—
T111	µg/L	46	556	25	619	54	—	—	—	—	—	—
T113	µg/L	149	65	2	65	5	—	—	—	—	—	—
T117	µg/L	178	214	8	220	14.9	—	—	—	—	—	—
T119	µg/L	79	35.2	0.8	35	2.9	—	—	—	—	—	—
T125	µg/L	137	18.4	0.7	18	1.22	—	—	—	—	—	—
T129	µg/L	94	25.6	1.0	25.2	2.2	—	—	—	—	—	—
T131	µg/L	74	38.6	1.2	37.8	3	—	—	—	—	—	—
T133	µg/L	63	119	3	121	7	—	—	—	—	—	—
T135	µg/L	110	423	22	423	20	—	—	—	—	—	—
T137	µg/L	46	95	2	98	5	—	—	—	—	—	—
T143	µg/L	40	17.9	2.2	18.2	1.9	—	—	—	—	—	—
T145	µg/L	311	21.0	0.5	20.9	1.5	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	µg/L	302	0.024	0.004	0.022	0.008
Hg10**	—	—	—	—	—	—	µg/L	70	1.42	0.12	1.40	0.30
Hg12**	—	—	—	—	—	—	µg/L	220	1.39	0.08	1.44	0.25
Hg15**	—	—	—	—	—	—	µg/L	3	0.44	0.06	0.41	0.20
Hg24**	—	—	—	—	—	—	µg/L	10	0.42	0.03	0.42	0.05

Table A2-5. Concentration data for standard reference materials—*Continued*

	Molybdenum						Nickel					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	57	108	6	95	6	µg/L	99	55.7	1.7	55	3
SRM 1643b*	µg/L	159	97	3	85	3	µg/L	159	50.1	2.9	49	3
SRM 1643d*	µg/L	273	115	4	112.9	1.7	µg/L	377	58.3	1.7	58.1	2.7
SRM 2704-total digestion	—	—	—	—	—	—	µg/g	19	45.0	4.4	44.1	3.0
SRM 2704-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	40.6	7.0	44.1	3
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	39	3	45.8	2.9
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	µg/L	50	38.0	0.9	36.5	4.6	µg/L	50	6.8	0.3	6.7	2.5
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	µg/L	46	15.4	0.4	15.5	4.1
T113	µg/L	149	33.5	1.1	34	5	µg/L	175	2.3	0.2	2.1	1.2
T117	µg/L	166	11.1	0.5	11.8	2	µg/L	192	9.1	0.5	10	2.45
T119	µg/L	33	10.8	0.3	11.9	2.4	µg/L	79	22.5	0.5	21.8	2.2
T125	µg/L	126	19.1	0.7	20.1	1.78	µg/L	160	11.5	0.4	11.2	1.04
T129	µg/L	94	19.9	0.8	20.3	2.1	µg/L	94	1.7	0.2	1.7	1.7
T131	µg/L	21	120	3	112	10	µg/L	83	56.8	1.5	56.3	4.7
T133	µg/L	21	47.9	0.6	46	4.2	µg/L	63	27.0	0.7	27.2	3.1
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	µg/L	46	14.7	0.3	15	2.5
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	µg/L	118	8.8	0.3	9.23	1.29	µg/L	352	10.8	0.4	11	1.3
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Rubidium						Samarium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643d*	µg/L	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	64	24	100	nr	µg/g	19	5.7	0.7	6.7	nr
SRM 2704-sum of seq. digestion	µg/g	5	33.8	10	100	nr	µg/g	5	3.8	0.7	6.7	nr
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	—	—	—	—	—	—	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	—	—	—	—	—	—
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	—	—	—	—	—	—	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	—	—	—	—	—	—
T133	—	—	—	—	—	—	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	—	—	—	—	—	—	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Selenium						Silica					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	114	9.0	2.3	11	1	—	—	—	—	—	—
SRM 1643b*	µg/L	159	7.9	1.4	9.7	0.5	—	—	—	—	—	—
SRM 1643d*	µg/L	389	9.7	1.4	11.43	0.17	—	—	—	—	—	—
SRM 2704-total digestion	wt %	—	—	—	—	—	wt %	19	29.9	2.1	29.08	0.13
SRM 2704-sum of seq. digestion	wt %	—	—	—	—	—	wt %	5	31.1	1.5	29.08	0.13
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	mg/L	33	11.1	0.5	10.9	0.3
T101	—	—	—	—	—	—	mg/L	50	6.86	0.24	6.97	0.177
T103	µg/L	50	3.2	0.3	2.9	1	mg/L	80	7.46	0.34	7.5	0.2
T105	—	—	—	—	—	—	mg/L	155	25.4	1.0	25.4	1.5
T107	—	—	—	—	—	—	mg/L	202	7.92	0.39	7.7	0.2
T111	µg/L	46	3.7	0.2	3.3	1	—	—	—	—	—	—
T113	µg/L	175	19.2	0.6	19	3.7	—	—	—	—	—	—
T117	µg/L	205	6.0	0.5	6	1.46	mg/L	55	11.8	0.2	11.85	0.64
T119	µg/L	79	9.9	0.4	9.8	1.33	—	—	—	—	—	—
T125	µg/L	172	9.7	0.4	9.78	1.85	mg/L	99	5.19	0.17	5.18	0.32
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	µg/L	88	9.9	0.5	11.2	2	mg/L	41	5.83	0.26	5.8	0.9
T133	µg/L	63	20.2	0.9	21.4	3.7	mg/L	38	10.2	0.9	10.1	0.7
T135	—	—	—	—	—	—	mg/L	110	4.39	0.42	4.28	0.31
T137	—	—	—	—	—	—	mg/L	111	6.89	0.57	6.96	0.56
T143	—	—	—	—	—	—	mg/L	40	23.2	1.6	23.4	1.7
T145	µg/L	381	10.0	0.4	10.1	1.3	mg/L	46	11.5	1.3	11.3	0.7
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Silver						Sodium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	µg/L	159	10.1	1.0	9.8	0.8	mg/L	18	8.4	0.1	8	nr
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	—	—	—	—	—	—	wt %	19	0.620	0.089	0.547	0.014
SRM 2704-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	mg/L	33	328	22	323	5
T101	—	—	—	—	—	—	mg/L	50	100	6	96.8	1.2
T103	µg/L	50	3.2	0.5	3.3	0.9	mg/L	80	108	6	107	5
T105	—	—	—	—	—	—	mg/L	155	295	22	298	17
T107	—	—	—	—	—	—	mg/L	202	21.7	2.4	20.7	0.3
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	µg/L	188	4.1	1.5	5	1	—	—	—	—	—	—
T117	µg/L	232	1.5	0.4	1.4	0.64	mg/L	55	19.9	0.6	20	1.26
T119	µg/L	33	2.4	0.6	4	1.31	—	—	—	—	—	—
T125	µg/L	194	3.1	1.2	3.83	0.604	mg/L	99	22.6	1.1	22.3	1.2
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	µg/L	51	0.9	0.5	1.26	0.24	mg/L	41	22.7	2.6	21.4	0.8
T133	µg/L	21	8.3	1.7	7.44	0.89	mg/L	38	31.9	4.9	29.4	1.2
T135	—	—	—	—	—	—	mg/L	110	31.5	3.2	30.8	1.2
T137	—	—	—	—	—	—	mg/L	111	22.8	3.4	22	1.1
T143	—	—	—	—	—	—	mg/L	40	33.9	4.8	34	1.6
T145	µg/L	256	7.6	0.3	7.55	0.92	mg/L	46	41.8	7.3	41.2	1.9
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Strontium						Thallium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	42	234	23	239	5	—	—	—	—	—	—
SRM 1643b*	µg/L	159	233	7	227	6	µg/L	159	7.9	0.4	8.0	0.2
SRM 1643d*	µg/L	306	296	10	294.8	3.4	µg/L	260	7.3	0.3	7.28	0.25
SRM 2704-total digestion	µg/g	19	120	15	130(i)	nr	µg/g	19	1.00	0.03	1.06	0.07
SRM 2704-sum of seq. digestion	µg/g	5	84	9	130(i)	nr	µg/g	5	1.05	0.04	1.06	0.07
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	1.1	0.1	1.44	0.07
USGS Standards												
T99	µg/L	33	3,900	200	3,900	100	—	—	—	—	—	—
T101	µg/L	50	1,200	0	1,200	36	—	—	—	—	—	—
T103	µg/L	50	753	13	743	34	µg/L	50	2.4	0.1	2	nr
T105	µg/L	155	1,600	0	1,560	80	—	—	—	—	—	—
T107	µg/L	202	63	4	61	4	—	—	—	—	—	—
T111	µg/L	—	—	—	—	—	—	—	—	—	—	—
T113	µg/L	149	33	1	31.9	3.7	—	—	—	—	—	—
T117	µg/L	153	266	4	265	11.1	—	—	—	—	—	—
T119	µg/L	33	74	3	73	5.4	—	—	—	—	—	—
T125	µg/L	114	46	2	46	2.3	—	—	—	—	—	—
T129	µg/L	94	182	3	181	11	—	—	—	—	—	—
T131	µg/L	17	301	6	295	14	—	—	—	—	—	—
T133	µg/L	21	127	3	123	6	—	—	—	—	—	—
T135	µg/L	110	47	3	46	2	—	—	—	—	—	—
T137	µg/L	111	231	17	230	14	—	—	—	—	—	—
T143	µg/L	40	301	21	306	15	—	—	—	—	—	—
T145	µg/L	89	203	5	203	9	µg/L	89	15.3	0.4	15.3	2.7
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Thorium						Tin					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	8.1	0.9	9.2	nr	µg/g	18	14.5	8.7	9.5	nr
SRM 2704-sum of seq. digestion	µg/g	5	3.6	0.6	9.2	nr	µg/g	5	20.15	0.4	9.5	nr
SRM 1645-sum of seq. digestion	µg/g	5	1.6	0.1	1.62	0.22	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	—	—	—	—	—	—	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	—	—	—	—	—	—
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	—	—	—	—	—	—	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	—	—	—	—	—	—
T133	—	—	—	—	—	—	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	—	—	—	—	—	—	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Titanium						Uranium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643b*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 1643d*	—	—	—	—	—	—	—	—	—	—	—	—
SRM 2704-total digestion	wt %	19	0.460	0.015	0.457	0.018	µg/g	19	3.10	0.15	3.13	0.13
SRM 2704-sum of seq. digestion	wt %	5	0.4629	0.015	0.457	0.018	µg/g	5	3	0.1	3.13	0.13
SRM 1645-sum of seq. digestion	—	—	—	—	—	—	µg/g	5	1.1	0.1	1.11	0.05
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	—	—	—	—	—	—	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	—	—	—	—	—	—	—	—	—	—	—	—
T113	—	—	—	—	—	—	—	—	—	—	—	—
T117	—	—	—	—	—	—	—	—	—	—	—	—
T119	—	—	—	—	—	—	—	—	—	—	—	—
T125	—	—	—	—	—	—	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	—	—	—	—	—	—	—	—	—	—	—	—
T133	—	—	—	—	—	—	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	—	—	—	—	—	—	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	—	—	—	—	—	—	µg/g	101	1.11	0.04	1.1	0.1
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Vanadium						Ytterbium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	57	57.1	2.7	53	3	—	—	—	—	—	—
SRM 1643b*	µg/L	159	45.8	2.3	45.2	0.4	—	—	—	—	—	—
SRM 1643d*	µg/L	282	35.3	1.3	35.1	1.4	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	89	3	95	4	µg/g	19	2.6	0.1	2.8	nr
SRM 2704-sum of seq. digestion	µg/g	5	93.9	1	95	4	µg/g	5	1.26	0.39	2.8	nr
SRM 1645-sum of seq. digestion	µg/g	5	8.5	1.8	23.5	6.9	µg/g	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	µg/L	50	40.2	1.0	40.4	4.1	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	µg/L	9	27.8	0.4	27	3.3	—	—	—	—	—	—
T113	µg/L	149	9.4	0.4	9.4	1.5	—	—	—	—	—	—
T117	µg/L	166	4.6	0.2	4.7	1.8	—	—	—	—	—	—
T119	µg/L	42	3.9	0.1	3.8	0.9	—	—	—	—	—	—
T125	µg/L	126	6.8	0.3	6.56	0.89	—	—	—	—	—	—
T129	—	—	—	—	—	—	—	—	—	—	—	—
T131	µg/L	31	35.7	2.0	34.2	3.2	—	—	—	—	—	—
T133	µg/L	29	13.0	0.5	13	1.7	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	µg/L	9	13.3	0.1	14	1.6	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	µg/L	144	11.3	0.5	11.7	1.7	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

Table A2-5. Concentration data for standard reference materials—*Continued*

	Zinc						Zirconium					
	Units	n	Median	MAD	PUB	PUB-SD	Units	n	Median	MAD	PUB	PUB-SD
NIST Standards												
SRM 1643a*	µg/L	159	66	4	72	4	—	—	—	—	—	—
SRM 1643b*	µg/L	159	65	5	66	2	—	—	—	—	—	—
SRM 1643d*	µg/L	622	72	3	72.48	0.65	—	—	—	—	—	—
SRM 2704-total digestion	µg/g	19	440	15	438	12	µg/g	19	350	44	300	nr
SRM 2704-sum of seq. digestion	µg/g	5	414	25	438	12	µg/g	5	302.8	14	300	nr
SRM 1645-sum of seq. digestion	µg/g	5	1560	100	1720	169	—	—	—	—	—	—
USGS Standards												
T99	—	—	—	—	—	—	—	—	—	—	—	—
T101	—	—	—	—	—	—	—	—	—	—	—	—
T103	µg/L	50	19	1	26.5	4.1	—	—	—	—	—	—
T105	—	—	—	—	—	—	—	—	—	—	—	—
T107	—	—	—	—	—	—	—	—	—	—	—	—
T111	µg/L	46	295	6	320	23	—	—	—	—	—	—
T113	µg/L	201	57	2	55.5	6.1	—	—	—	—	—	—
T117	µg/L	246	176	5	176	9.3	—	—	—	—	—	—
T119	µg/L	79	25	1	24.8	4.7	—	—	—	—	—	—
T125	µg/L	205	4.5	0.5	5.95	4.01	—	—	—	—	—	—
T129	µg/L	94	71	3	72	4.8	—	—	—	—	—	—
T131	µg/L	104	68	5	72	4.4	—	—	—	—	—	—
T133	µg/L	63	51	1	53	4.4	—	—	—	—	—	—
T135	—	—	—	—	—	—	—	—	—	—	—	—
T137	µg/L	46	48	1	49.5	4.2	—	—	—	—	—	—
T143	—	—	—	—	—	—	—	—	—	—	—	—
T145	µg/L	435	10	0	10	2.4	—	—	—	—	—	—
Hg7*	—	—	—	—	—	—	—	—	—	—	—	—
Hg10**	—	—	—	—	—	—	—	—	—	—	—	—
Hg12**	—	—	—	—	—	—	—	—	—	—	—	—
Hg15**	—	—	—	—	—	—	—	—	—	—	—	—
Hg24**	—	—	—	—	—	—	—	—	—	—	—	—

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Appendix 3. Data for Field Parameters, Anions, Nutrients, Organic Carbon, and Sampling Sites

Table A3-1. Field measurements and concentrations of anions, nutrients, and organic carbon.

Table A3-2. Sampling site numbers, names, and locations.

Table A3-1. Field measurements and concentrations of anions, nutrients, and organic carbon

[Br., bridge; C, carbon, °C, degrees Celsius; $CaCO_3$, calcium carbonate; Cr., creek; N, nitrogen; P, phosphorus; R., River; Sac., Sacramento; SO_4, sulfate; est, estimated value. mm/dd/yy, month/day/year; ft^3/s, cubic foot per second; mg/L, milligram per liter; µS/cm, microsiemen per centimeter at 25 degrees Celsius; <, less than; —, no data available]

Site	Date (mm/dd/yy)	Time	Stream discharge, daily mean (ft^3/s)	Water temperature (°C)	Specific conductance, unfiltered (µS/cm)	Dissolved oxygen (mg/L)	pH, standarad units	Alkalinity, filtered (mg/L as $CaCO_3$)	Chloride, filtered (mg/L)	Sulfate, filtered (mg/L)	Fluoride, filtered (mg/L)	Nitrogen, ammonia, filtered (mg/L as N)
Sac. R.–Shasta	07/12/96	1130	12,085	11	110	12.1	7.8	52	1.7	3.2	<0.10	<0.015
Sac. R.–Shasta	09/19/96	1100	6,946	12	112	12.5	7.7	49	1.5	3.4	<0.10	<0.015
Sac. R.–Shasta	11/19/96	1030	4,297	13	120	7.6	7.4	5.5	1.8	3.1	<0.10	<0.015
Sac. R.–Shasta	12/12/96	1030	31,632	12.5	124	11.8	7.3	56	—	—	—	—
Sac. R.–Shasta	05/29/97	1030	6,513	8.5	107	12.4	7.7	—	1.6	3.4	<0.10	<0.015
Sac. R.–Keswick	07/11/96	900	14,815	11	100	10.8	7.7	46	1.4	2.6	<0.10	0.04
Sac. R.–Keswick	09/19/96	1800	9,503	12.5	98	11.9	7.6	43	1.2	2.8	<0.10	0.02
Sac. R.–Keswick	11/21/96	1200	5,294	13	108	8.7	7.4	49	1.6	3.9	<0.10	0.11
Sac. R.–Keswick	12/11/96	1730	35,269	—	111	—	7.8	—	—	—	—	—
Sac. R.–Keswick	01/02/97	1900	42,161	10	111	13.2	7.6	19	—	—	—	<0.015
Sac. R.–Keswick	05/28/97	1730	9,938	9.5	99	10.6	7.7	—	—	—	—	<0.015
Sac. R.–Bend Br.	07/11/96	1430	15,100	13.5	106	11.5	7.9	47	1.8	2.8	<0.10	0.02
Sac. R.–Bend Br.	09/20/96	1300	9,500	13	106	10.7	7.8	46	1.7	3.3	<010	<0.015
Sac. R.–Bend Br.	11/22/96	1330	7,660	13	129	9.7	7.8	52	4.4	5.4	<0.10	0.09
Sac. R.–Bend Br.	12/12/96	1700	43,900	12	111	11	7.8	50	2.2	4.6	<0.10	0.02
Sac. R.–Bend Br.	01/03/97	1230	91,000	10.5	104	11.4	7.9	43	1.7	4	<0.10	<0.015
Sac. R.–Bend Br.	05/30/97	1200	10,200	12,5	111	10,4	7.7	46	1,9	3,2	<0.10	<0.015
Sac. R.–Colusa	07/16/96	1300	11,300	19	117	9.3	8.1	52	2.2	3.3	<0.10	0.03
Sac. R.–Colusa	09/25/96	1300	9,240	17.5	123	9.4	7.8	54	2.5	4	<0.10	<0.015
Sac. R.–Colusa	11/14/96	1120	5,810	13.5	144	10.3	7.8	58	4.2	5.3	<0.10	<0.015
Sac. R.–Colusa	12/16/96	1330	33,400	11	130	10.6	7.9	55	3.4	4.8	<0.10	0.03
Sac. R.–Colusa	01/04/97	1300	50,200	11	100	9.5	7.7	42	1.9	4.2	<0.10	<0.015
Sac. R.–Colusa	06/03/97	1250	8,180	18	121	9.4	7.9	48	2.8	4.6	<0.10	<0.015
Sac. R.–Verona	07/18/96	1240	16,400	20.5	112	9.3	8	47	2.2	3.2	<0.10	0.03
Sac. R.–Verona	09/26/96	1200	12,300	19	147	9	7.8	63	4.1	5.9	<0.10	<0.015
Sac. R.–Verona	11/13/96	1030	9,990	13.5	146	10.8	7.8	57	5.8	5.3	<0.10	0.05
Sac. R.–Verona	12/18/96	1100	58,900	10.5	117	10.4	7.9	50	3	4.2	<0.10	<0.015
Sac. R.–Verona	01/28/97	1230	71,200	10	62	11	7.5	24	1.4	2.6	<0.10	0.03

Table A3-1. Field measurements and concentrations of anions, nutrients, and organic carbon—*Continued*

Site	Date (mm/dd/yy)	Time	Stream discharge, daily mean (ft^3/s)	Water temperature (°C)	Specific conductance, unfiltered (µS/cm)	Dissolved oxygen (mg/L)	pH, standarad units	Alkalinity, filtered (mg/L as $CaCO_3$)	Chloride, filtered (mg/L)	Sulfate, filtered (mg/L)	Fluoride, filtered (mg/L)	Nitrogen, ammonia,, filtered (mg/L as N)
Sac. R.–Verona	06/04/97	1130	10,800	20	138	8.2	7.9	54	4.4	5.9	<0.10	<0.015
Sac. R.–Freeport	07/17/96	1100	20,200	20	101	9.2	7.8	—	2.3	3	<0.10	0.03
Sac. R.–Freeport	09/24/96	1130	14,900	19.5	149	8.8	7.8	62	5.9	6	<0.10	<0.015
Sac. R.–Freeport	11/15/96	1030	12,800	13	128	10.4	7.9	49	4.2	4.8	<0.10	<0.015
Sac. R.–Freeport	12/17/96	1130	75,400	11	98	10.5	7.6	42	2.4	3.4	<0.10	0.03
Sac. R.–Freeport	01/06/97	1100	93,700	9.5	51	7.7	7	21	1.1	1.7	<0.10	0.02
Sac. R.–Freeport	06/05/97	1030	13,200	20	115	8.6	8	46	3.9	4.3	<0.10	<0.015
Flat Cr.	12/11/96	1530	11	—	40	—	—	69	0.49	9.2	<0.10	<0.015
Flat Cr.	05/29/97	1600	1	25.5	175	6.4	6.7	—	1.5	55	0.11	<0.015
Spring Cr.–Weir	12/11/96	1400	200	11.5	129	10	4.4	—	0.5	57	<0.10	0.032
Spring Cr.–Weir	05/28/97	1100	10	20.5	495	8.7	4	—	0.57	230	<0.10	0.069
Spring Cr.–Road	01/02/97	1730	850	13	237	—	3.7	—	0.14	15	<0.10	0.048
Whiskeytown	12/11/96	1330	3,900	—	—	—	—	—	—	—	—	—
Whiskeytown	05/29/97	1410	2,720	—	—	—	—	—	—	—	—	—
Spring Cr. arm	07/12/96	1730	2,690	12	74	—	7.5	38	1	1.4	<0.10	<0.015
Spring Cr. arm	09/18/96	1500	2,460	11.5	75	10.2	7.6	35	1	1.6	<0.10	<0.015
Spring Cr. arm	11/20/96	1200	1,450	11.5	92	9.7	7.3	36	1.2	4.7	<0.10	0.02
Spring Cr. arm	12/11/96	1635	4,100	10.5	22	10.2	7.4	30	—	—	—	—
Spring Cr. arm	05/28/97	1400	2,725	11	81	9.6	7.5	—	1.1	2.8	<0.10	<0.015
Colusa Basin Drain	06/06/97	1110	500 (est)	23	712	6	8,1	200	37	92	0.4	—
Yolo Bypass	01/07/97	1400	160,000	9.5	93	—	7.2	41	2.2	3.5	<0.10	<0.015

Table A3-1. Field measurements and concentrations of anions, nutrients, and organic carbon—*Continued*

Site	Date (mm/dd/yy)	Time	Stream discharge, daily mean (ft^3/s)	Nitrogen, ammonia plus organic, unfiltered (mg/L as N)	Nitrogen, ammonia plus organic, filtered (mg/L as N)	Nitrogen, nitrite, filtered (mg/L as N)	Nitrogen, nitrate plus nitrite, filtered (mg/L as N)	Phosphorus, unfiltered (mg/L as P)	Phosphorus, filtered (mg/L as P)	Phosphorus, ortho, filtered (mg/L as P)	Carbon, organic, filtered (mg/L as C)	Carbon, organic, suspended (mg/L as C)
Sac. R.–Shasta	07/12/96	1130	12,085	<0.20	<0.20	<0.01	0.13	0.03	0.02	0.03	1.2	0.4
Sac. R.–Shasta	09/19/96	1100	6,946	<0.20	<0.20	<0.01	0.13	0.02	0.02	0.03	1.1	0.2
Sac. R.–Shasta	11/19/96	1030	4,297	<0.20	<0.20	<0.01	0.1	0.03	0.01	0.02	0.9	0.2
Sac. R.–Shasta	12/12/96	1030	31,632	—	—	—	—	—	—	—	—	—
Sac. R.–Shasta	05/29/97	1030	6,513	<0.20	<0.20	<0.01	0.094	<0.010	<0.01	0.025	—	—
Sac. R.–Keswick	07/11/96	900	14,815	<0.20	<0.20	<0.01	0.12	<0.010	0.02	0.02	1.3	0.2
Sac. R.–Keswick	09/19/96	1800	9,503	<0.20	<0.20	<0.01	0.1	0.010	<0.01	0.02	1.1	<0.10
Sac. R.–Keswick	11/21/96	1200	5,294	<0.20	<0.20	0.01	0.1	0.020	<0.01	0.02	1.2	0.1
Sac. R.–Keswick	12/11/96	1730	35,269	—	—	—	—	—	—	—	—	—
Sac. R.–Keswick	01/02/97	1900	42,161	<0.20	<0.20	<0.01	0.09	<0.010	<0.01	<0.010	2.4	2.4
Sac. R.–Keswick	05/28/97	1730	9,938	<0.20	0.21	<0.01	0.079	<0.010	<0.01	0.016	—	—
Sac. R.–Bend Br.	07/11/96	1430	15,100	<0.20	<0.20	<0.01	0.12	0.130	<0.01	0.02	1.4	0.8
Sac. R.–Bend Br.	09/20/96	1300	9,500	<0.20	<0.20	<0.01	0.1	0.04	0.01	0.02	1.2	0.3
Sac. R.–Bend Br.	11/22/96	1330	7,660	<0.20	<0.20	0.02	0.25	0.03	0.03	0.03	1.6	0.3
Sac. R.–Bend Br.	12/12/96	1700	43,900	<0.20	<0.20	0.02	0.14	0.050	<0.01	0.02	1.5	0.4
Sac. R.–Bend Br.	01/03/97	1230	91,000	0.3	<0.20	<0.01	0.1	0.230	<0.01	<0.010	1.5	1.0
Sac. R.–Bend Br.	05/30/97	1200	10,200	<0.20	<0.20	<0.01	0.098	0.062	0.018	0.02	—	—
Sac. R.–Colusa	07/16/96	1300	11,300	<0.20	<0.20	<0.01	0.13	0.02	0.02	0.03	1.3	—
Sac. R.–Colusa	09/25/96	1300	9,240	<0.20	<0.20	0.02	0.13	0.040	<0.01	0.02	1.2	0.4
Sac. R.–Colusa	11/14/96	1120	5,810	<0.20	<0.20	<0.01	0.16	0.03	0.02	0.02	1.3	0.2
Sac. R.–Colusa	12/16/96	1330	33,400	<0.20	<0.20	<0.01	0.15	0.070	<0.01	0.02	1.4	—
Sac. R.–Colusa	01/14/97	1300	50,200	0.5	<0.20	<0.01	0.13	0.25	0.02	0.02	1.2	0.3
Sac. R.–Colusa	06/03/97	1250	8,180	<0.20	<0.20	<0.01	0.094	0.045	0.01	0.019	—	—
Sac. R.–Verona	07/18/96	1240	16,400	<0.20	<0.20	<0.01	0.11	0.020	<0.01	0.02	1.4	0.2
Sac. R.–Verona	09/26/96	1200	12,300	<0.20	<0.20	<0.01	0.1	0.04	0.02	0.02	1.4	0.4
Sac. R.–Verona	11/13/96	1030	9,990	<0.20	<0.20	0.03	0.17	0.04	0.04	0.03	1.9	0.4
Sac. R.–Verona	123/18/96	1100	58,900	<0.20	<0.20	0.01	0.13	0.050	<0.01	0.02	2	0.4
Sac. R.–Verona	01/28/97	1230	7l,200	0.4	<0.20	<0.01	0.14	0.17	0.11	0.02	2.6	—
Sac. R.–Verona	06/04/97	1130	10,800	<0.20	<0.20	<0.01	0.12	0.040	<0.01	0.029	—	—

Table A3-1. Field measurements and concentrations of anions, nutrients, and organic carbon—*Continued*

Site	Date (mm/dd/yy)	Time	Stream discharge, daily mean (ft^3/s)	Nitrogen, ammonia plus organic, unfilterted (mg/L as N)	Nitrogen, ammonia plus organic, filtered (mg/L as N)	Nitrogen, nitrite, filtered (mg/L as N)	Nitrogen, nitrate plus nitrite, filtered (mg/L as N)	Phosphorus, unfiltered (mg/L as P)	Phosphorus, filtered (mg/L as P)	Phosphorus, ortho, filtered (mg/L as P)	Carbon, organic, filtered (mg/L as C)	Carbon, organic, suspended (mg/L as C)
Sac. R.–Freeport	07/17/96	1100	20,200	<0.20	<0.20	<0.01	0.11	0.02	0.01	0.02	1.3	0.3
Sac. R.–Freeport	09/24/96	1130	14,900	<0.20	<0.20	0.02	0.14	0.040	<0.01	0.03	1.5	0.6
Sac. R.–Freeport	11/15/96	1030	12,800	<0.20	<0.20	<0.01	0.1	0.03	0.04	0.02	1.7	0.2
Sac. R.–Freeport	12/17/96	1130	75,400	<0.20	<0.20	<0.01	0.14	0.030	<0.01	0.01	2.2	0.6
Sac. R.–Freeport	01/06/97	1100	93,700	0.2	<0.20	<0.01	0.12	0.21	0.01	<0.010	2.1	1.4
Sac. R.–Freeport	06/05/97	1030	13,200	<0.20	<0.20	<0.01	0.23	0.033	<0.01	0.028	1.4	0.2
Flat Cr.	12/11/96	1530	11	<0.20	<0.20	0.014	0.063	<0.010	<0.01	<0.010	1.2	—
Flat Cr.	05/29/97	1600	1	<0.20	<0.20	<0.01	<0.05	<0.010	<0.01	<0.010	1.0	<0.10
Spring Cr.–Weir	12/11/96	1400	200	<0.20	<0.20	0.011	0.06	<0.010	<0.01	<0.010	1.2	—
Spring Cr.–Weir	12/18/96	1100	10	<0.20	<0.20	<0.01	<0.05	<0.010	<0.01	<0.010	0.4	—
Spring Cr.–Road	01/02/97	1730	850	<0.20	<0.20	<0.01	0.087	<0.010	<0.01	<0.010	0.9	0.2
Whiskeytown	12/11/96	1330	3,900	—	—	—	—	—	—	—	—	—
Whiskeytown	05/29/97	1410	2,720	—	—	—	—	—	—	—	—	—
Spring Cr. arm	07/12/96	1730	2,690	<0.20	<0.20	<0.01	<0.05	<0.010	<0.01	<0.010	1.4	0.2
Spring Cr. arm	09/18/96	1500	2,460	<0.20	<0.20	<0.01	0.07	<0.010	<0.01	0.01	1.2	0.2
Spring Cr. arm	11/20/96	1200	1,450	<0.20	<0.20	<0.01	<0.05	<0.010	<0.01	<0.010	1.1	0.3
Spring Cr. arm	12/11/96	1635	4,100	—	—	—	—	—	—	—	—	—
Spring Cr. arm	05/28/97	1400	2,725	<0.20	<0.20	<0.01	<0.05	<0.010	<0.01	<0.010	—	—
Colusa Basin Drain	06/06/97	1110	500 (est)	—	—	—	—	—	—	—	4.8	1.2
Yolo Bypass	01/07/97	1400	160,000	<0.20	<0.20	<0.01	0.13	0.070	<0.01	0.02	2.0	1.3

Table A3-2. Sampling site numbers, names, and locations

[Report site numbers refer to figure 8 and table 1; deg, degrees; min, minutes; sec, seconds; latitude and longitude referenced to NAD27; NAD27, North American Datum 1927; USGS, U.S. Geological Survey. All latitude values are N of the equator and all longitude values W of the central meridian]

Report site number	Site Name	USGS site identification number	Site latitude (deg min sec)	Site longitude (deg min sec)
1	Sacramento River below Shasta Dam, California	404259122252501	40°42′59″	122°25′25″
2	Sacramento River below Keswick Dam, California	403633122264301	40°36′33″	122°26′43″
3	Sacramento River at Rodeo Park, near Redding, California	403528122224301	40°35′28″	122°22′43″
4	Sacramento River above Churn Creek, near Anderson, California	402827122185801	40°28′27″	122°18′58″
5	Sacramento River at Balls Ferry	402507122113201	40°25′07″	122°11′32″
6	Sacramento River above Bend Bridge near Red Bluff, California	11377100	40°17′19″	122°11′08″
7	Sacramento River at Tehama, California	400139122070301	40°01′39″	122°07′03″
8	Sacramento River at Colusa, California	11389500	39°12′51″	121°59′57″
9	Sacramento River at Verona, California	11425500	38°46′28″	121°35′50″
10	Sacramento River at Tower Bridge at Sacramento, California	383430121302001	38°34′30″	121°30′20″
11	Sacramento River at Freeport, California	11447650	38°27′20″	121°30′07″
12	Flat Creek near Keswick, California	403824122264601	40°38′24″	122°26′46″
13	Spring Creek below Spring Creek Debris Dam near Keswick, California	403746122281201	40°37′46″	122°28′12″
14	Spring Creek below Iron Mountain Road near Keswick, California	403746122280301	40°37′46″	122°28′03″
15	Whiskeytown Lake at Spring Creek Power Plant near Keswick, California	403741122275901	40°37′41″	122°27′59″
16	Keswick Reservoir, Spring Creek arm, near Keswick, California	403750122272301	40°37′50″	122°27′23″
17	Cottonwood Creek near Cottonwood, California	11376000	40°23′14″	122°14′15″
18	Colusa Basin Drain at Road 99E near Knights Landing, California	11390890	38°48′45″	121°46′23″
19	Yolo Bypass at Interstate 80 near West Sacramento, California	11453120	38°34′01″	121°36′51″

Appendix 4. Metal Concentrations in Water Samples

Table A4-1. Concentrations of major cations and trace elements in filtered water samples.

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples.

Table A4-3. Lead concentrations in filtered water samples collected at a single point in the stream cross section.

Table A4-4. Lead concentrations in unfiltered (whole) water samples collected at a single point in the stream cross section.

Table A4-1. Concentrations of major cations and trace elements in filtered water samples

[Ax, axial; Br., bridge; Cap, capsule filter (Gelman); Cr., creek; CV–AFS, cold–vapor/atomic fluorescence spectrometry; comp., composite sample; dup, duplicate; ICP–AES, inductively coupled plasma–atomic emission spectrometry; ICP–MS, inductively coupled plasma–mass spectrometry; Mem, membrane filter (Nuclepore); R., river; Sac., Sacramento; Split replicate (1/2), first number identifies which replicate was analyzed, second number represents number of replicate samples; Tan, tangential-flow ultrafilter (Millipore Minitan); UV–VIS, ultraviolet–visible spectroscopy. kd, kilodalton; mm/dd/yy, month-day-year; µg/L, microgram per liter; µm, micrometer; mg/L, milligram per liter; —, no data available; <, less than indicated detection limit]

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	9.2 ± 0.2	0.040 ± 0.003	1.1 ± 0.0	15 ± 0	< 0.018 ± 0.007
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	5.8 ± 0.1	0.037 ± 0.005	1.1 ± 0.0	15 ± 1	0.0040 ± 0.0023
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	2.4 ± 0.0	0.033 ± 0.002	1.1 ± 0.0	14 ± 0	< 0.01 ± 0.00
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	2.2 ± 0.1	0.033 ± 0.003	1.0 ± 0.0	15 ± 0	< 0.004 ± 0.003
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	1.7 ± 0.1	0.033 ± 0.002	1.1 ± 0.0	14 ± 0	< 0.01 ± 0.00
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	1.6 ± 0.1	0.030 ± 0.003	0.99 ± 0.02	14 ± 0	< 0.018 ± 0.008
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	14 ± 1	0.051 ± 0.007	1.1 ± 0.0	14 ± 0	0.015 ± 0.017
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	15 ± 0	0.056 ± 0.002	1.1 ± 0.1	14 ± 0	0.014 ± 0.009
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	2.8 ± 0.1	0.051 ± 0.005	1.1 ± 0.0	14 ± 0	< 0.013 ± 0.008
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	2.6 ± 0.1	0.034 ± 0.008	1.0 ± 0.0	14 ± 0	< 0.03 ± 0.02
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	2.1 ± 0.2	0.028 ± 0.004	0.86 ± 0.02	13 ± 0	< 0.03 ± 0.03
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	1.8 ± 0.0	0.050 ± 0.012	0.81 ± 0.03	12 ± 0	< 0.013 ± 0.004
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	3.0 ± 0.1	0.037 ± 0.004	1.5 ± 0.0	13 ± 0	< 0.02 ± 0.01
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	3.0 ± 0.1	0.042 ± 0.003	1.5 ± 0.0	13 ± 0	< 0.02 ± 0.00
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	2.0 ± 0.1	0.029 ± 0.003	1.5 ± 0.0	13 ± 0	< 0.02 ± 0.00
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	1.4 ± 0.0	0.030 ± 0.005	1.5 ± 0.1	13 ± 0	< 0.02 ± 0.02
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	0.94 ± 0.06	0.032 ± 0.006	1.1 ± 0.0	12 ± 0	< 0.02 ± 0.00
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	0.94 ± 0.02	0.032 ± 0.012	1.1 ± 0.0	11 ± 1	< 0.02 ± 0.01
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	11 ± 0	0.040 ± 0.006	1.6 ± 0.0	14 ± 0	< 0.02 ± 0.01
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	10 ± 0	0.050 ± 0.011	1.8 ± 0.0	13 ± 0	< 0.02 ± 0.01
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	6.8 ± 0.2	0.051 ± 0.008	1.7 ± 0.0	13 ± 0	< 0.014 ± 0.003
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	6.6 ± 0.1	0.053 ± 0.006	1.7 ± 0.0	14 ± 0	< 0.014 ± 0.006
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	5.3 ± 0.1	0.048 ± 0.005	1.2 ± 0.0	12 ± 1	< 0.014 ± 0.006
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	4.9 ± 0.1	0.032 ± 0.001	1.2 ± 0.0	11 ± 1	< 0.02 ± 0.02
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	43 ± 1	0.034 ± 0.012	1.1 ± 0.0	14 ± 0	< 0.04 ± 0.01
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	14 ± 1	0.036 ± 0.010	1.1 ± 0.0	14 ± 0	< 0.04 ± 0.00
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	2.8 ± 0.2	0.029 ± 0.016	1.1 ± 0.0	13 ± 0	< 0.04 ± 0.02
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	2.8 ± 0.1	0.030 ± 0.010	1.0 ± 0.0	14 ± 0	< 0.04 ± 0.02
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	1.7 ± 0.1	0.026 ± 0.010	0.66 ± 0.03	11 ± 0	< 0.04 ± 0.02
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	1.7 ± 0.1	0.024 ± 0.017	0.63 ± 0.02	11 ± 0	< 0.04 ± 0.01
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	3.5 ± 0.0	0.032 ± 0.002	0.84 ± 0.02	12 ± 0	< 0.004 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	3.3 ± 0.1	0.030 ± 0.000	0.82 ± 0.02	12 ± 0	< 0.004 ± 0.002
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	2.8 ± 0.0	0.033 ± 0.001	0.84 ± 0.01	13 ± 0	< 0.004 ± 0.003
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	3.0 ± 0.0	0.035 ± 0.003	0.85 ± 0.01	13 ± 0	0.0054 ± 0.0020
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	2.0 ± 0.1	0.032 ± 0.002	0.78 ± 0.02	12 ± 0	< 0.004 ± 0.002
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	2.2 ± 0.1	0.031 ± 0.003	0.82 ± 0.02	13 ± 0	0.0043 ± 0.0004
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	2.1 ± 0.2	0.030 ± 0.005	0.76 ± 0.02	12 ± 0	< 0.004 ± 0.001
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	8.7 ± 0.0	0.041 ± 0.005	0.69 ± 0.06	11 ± 0	< 0.013 ± 0.007
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	8.4 ± 0.1	0.021 ± 0.006	0.77 ± 0.03	11 ± 0	< 0.03 ± 0.01
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	6.8 ± 0.2	0.031 ± 0.009	0.74 ± 0.01	11 ± 0	< 0.03 ± 0.02
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	6.6 ± 0.1	0.028 ± 0.007	0.72 ± 0.02	11 ± 0	< 0.03 ± 0.01
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	5.1 ± 0.1	0.048 ± 0.010	0.47 ± 0.02	8.9 ± 0.1	< 0.013 ± 0.001
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	4.8 ± 0.0	0.048 ± 0.007	0.50 ± 0.04	9.1 ± 0.1	< 0.013 ± 0.017
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	5.0 ± 0.0	0.038 ± 0.006	0.51 ± 0.04	9.2 ± 0.1	0.016 ± 0.004
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	19 ± 0	0.056 ± 0.006	1.7 ± 0.0	11 ± 0	< 0.02 ± 0.01
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	18 ± 0	0.057 ± 0.006	1.5 ± 0.1	11 ± 0	< 0.02 ± 0.01
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	12 ± 0	0.054 ± 0.002	1.5 ± 0.1	11 ± 0	< 0.02 ± 0.01
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	13 ± 0	0.056 ± 0.007	1.4 ± 0.0	11 ± 0	< 0.02 ± 0.00
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	11 ± 0	0.044 ± 0.007	0.98 ± 0.05	9.3 ± 0.5	< 0.02 ± 0.01
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	11 ± 0	0.056 ± 0.018	0.97 ± 0.03	8.9 ± 0.0	< 0.02 ± 0.01
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	38 ± 1	0.041 ± 0.003	1.6 ± 0.0	13 ± 0	< 0.02 ± 0.00
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	31 ± 0	0.045 ± 0.005	1.6 ± 0.1	13 ± 1	< 0.02 ± 0.01
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	23 ± 0	0.059 ± 0.021	1.6 ± 0.0	13 ± 0	< 0.014 ± 0.002
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	23 ± 1	0.041 ± 0.006	1.5 ± 0.0	13 ± 0	< 0.02 ± 0.00
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	20 ± 0	0.032 ± 0.002	0.92 ± 0.01	11 ± 0	< 0.02 ± 0.01
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	20 ± 0	0.036 ± 0.005	0.87 ± 0.05	10 ± 0	< 0.02 ± 0.01
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	17 ± 1	0.040 ± 0.006	1.1 ± 0.0	13 ± 0	< 0.014 ± 0.001
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	16 ± 0	0.047 ± 0.006	1.1 ± 0.0	12 ± 1	< 0.014 ± 0.003
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	15 ± 0	0.047 ± 0.007	1.1 ± 0.0	14 ± 0	< 0.014 ± 0.005
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	15 ± 0	0.043 ± 0.004	1.1 ± 0.1	13 ± 0	< 0.014 ± 0.006
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	12 ± 0	0.044 ± 0.005	0.87 ± 0.03	12 ± 1	< 0.014 ± 0.008
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	12 ± 0	0.044 ± 0.020	0.91 ± 0.02	12 ± 0	< 0.014 ± 0.006
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	13 ± 0	0.047 ± 0.002	0.93 ± 0.03	13 ± 0	< 0.015 ± 0.019
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	6.9 ± 0.4	0.038 ± 0.008	0.88 ± 0.06	12 ± 0	< 0.04 ± 0.01
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	35 ± 2	0.035 ± 0.012	0.87 ± 0.04	12 ± 0	< 0.04 ± 0.01

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	5.4 ± 0.3	0.034 ± 0.008	0.86 ± 0.03	12 ± 0	< 0.04 ± 0.02
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	5.3 ± 0.1	0.032 ± 0.013	0.88 ± 0.06	12 ± 0	< 0.04 ± 0.03
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	4.1 ± 0.1	0.028 ± 0.014	0.60 ± 0.03	10 ± 0	< 0.04 ± 0.01
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	4.2 ± 0.1	0.045 ± 0.015	0.65 ± 0.01	10 ± 0	< 0.04 ± 0.01
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	5.9 ± 0.0	0.039 ± 0.005	0.90 ± 0.01	15 ± 0	< 0.018 ± 0.001
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	6.3 ± 0.3	0.030 ± 0.006	0.93 ± 0.01	14 ± 1	< 0.01 ± 0.00
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	3.9 ± 0.1	0.039 ± 0.005	0.86 ± 0.02	14 ± 0	< 0.004 ± 0.001
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	3.7 ± 0.0	0.033 ± 0.003	0.94 ± 0.02	14 ± 0	< 0.01 ± 0.00
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	2.2 ± 0.0	0.040 ± 0.002	0.98 ± 0.02	15 ± 0	< 0.01 ± 0.00
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	2.0 ± 0.0	0.033 ± 0.000	0.78 ± 0.01	13 ± 1	< 0.004 ± 0.002
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	4.7 ± 0.1	0.035 ± 0.010	0.77 ± 0.01	13 ± 0	< 0.007 ± 0.02
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	5.7 ± 0.5	0.051 ± 0.002	0.80 ± 0.01	14 ± 1	< 0.008 ± 0.014
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	4.4 ± 0.1	0.047 ± 0.009	0.75 ± 0.06	13 ± 0	< 0.009 ± 0.011
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	4.6 ± 0.1	0.059 ± 0.001	0.80 ± 0.02	13 ± 1	< 0.010 ± 0.013
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	2.7 ± 0.0	0.043 ± 0.003	0.48 ± 0.04	11 ± 0	< 0.011 ± 0.015
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	2.5 ± 0.1	0.038 ± 0.003	0.50 ± 0.06	11 ± 0	< 0.012 ± 0.005
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	12 ± 0	0.056 ± 0.001	1.3 ± 0.1	17 ± 0	< 0.013 ± 0.01
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	12 ± 0	0.059 ± 0.008	1.3 ± 0.1	16 ± 0	< 0.014 ± 0.01
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	9.7 ± 0.2	0.058 ± 0.008	1.3 ± 0.1	16 ± 0	< 0.015 ± 0.01
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	9.6 ± 0.3	0.057 ± 0.007	1.3 ± 0.0	16 ± 0	< 0.016 ± 0.00
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	6.9 ± 0.2	0.042 ± 0.004	0.72 ± 0.02	13 ± 0	< 0.017 ± 0.00
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	6.8 ± 0.4	0.048 ± 0.012	0.76 ± 0.03	13 ± 0	< 0.018 ± 0.01
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	14 ± 1	0.047 ± 0.005	1.3 ± 0.0	17 ± 0	< 0.019 ± 0.01
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	19 ± 0	0.059 ± 0.009	1.3 ± 0.0	17 ± 0	< 0.020 ± 0.01
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	12 ± 0	0.059 ± 0.002	1.3 ± 0.0	16 ± 0	< 0.021 ± 0.02
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	12 ± 0	0.053 ± 0.005	1.2 ± 0.1	16 ± 0	< 0.022 ± 0.00
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	9.4 ± 0.1	0.046 ± 0.011	0.79 ± 0.03	13 ± 0	< 0.023 ± 0.01
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	9.8 ± 0.2	0.043 ± 0.010	0.78 ± 0.01	14 ± 1	< 0.024 ± 0.01
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	80 ± 1	0.050 ± 0.004	0.89 ± 0.04	16 ± 1	< 0.025 ± 0.004
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	7.1 ± 0.0	0.077 ± 0.034	0.89 ± 0.03	16 ± 0	< 0.026 ± 0.005
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	10 ± 0	0.060 ± 0.007	0.91 ± 0.04	16 ± 0	< 0.027 ± 0.003
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	9.8 ± 0.2	0.061 ± 0.009	0.90 ± 0.03	16 ± 0	< 0.028 ± 0.007

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	4.0 ± 0.1	0.049 ± 0.002	0.70 ± 0.04	14 ± 1	< 0.029 ± 0.002
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	3.9 ± 0.1	0.043 ± 0.001	0.68 ± 0.03	13 ± 0	< 0.030 ± 0.005
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	17 ± 1	0.038 ± 0.005	0.85 ± 0.03	14 ± 0	< 0.031 ± 0.01
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	6.1 ± 0.3	0.033 ± 0.011	0.83 ± 0.01	14 ± 0	< 0.032 ± 0.02
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	5.1 ± 0.7	0.040 ± 0.008	0.83 ± 0.03	14 ± 0	< 0.033 ± 0.01
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	5.0 ± 0.3	0.040 ± 0.006	0.79 ± 0.00	14 ± 0	< 0.034 ± 0.00
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	3.6 ± 0.3	0.045 ± 0.000	0.62 ± 0.04	12 ± 0	< 0.035 ± 0.02
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	3.6 ± 0.1	0.029 ± 0.017	0.62 ± 0.04	12 ± 0	< 0.036 ± 0.01
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	14 ± 0	0.057 ± 0.002	1.3 ± 0.0	18 ± 0	< 0.037 ± 0.00
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	23 ± 0	0.049 ± 0.003	1.3 ± 0.0	17 ± 0	< 0.038 ± 0.00
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	5.4 ± 0.1	0.058 ± 0.004	1.1 ± 0.0	16 ± 1	< 0.039 ± 0.005
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	< 0.040 ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	< 0.041 ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	3.9 ± 0.1	0.065 ± 0.006	1.2 ± 0.1	17 ± 0	< 0.042 ± 0.011
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	3.1 ± 0.0	0.058 ± 0.007	1.2 ± 0.0	17 ± 0	< 0.043 ± 0.012
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	2.9 ± 0.1	0.065 ± 0.005	1.2 ± 0.1	17 ± 0	< 0.044 ± 0.005
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	2.9 ± 0.1	0.054 ± 0.001	1.2 ± 0.1	19 ± 0	< 0.045 ± 0.003
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	1.5 ± 0.0	0.069 ± 0.003	0.94 ± 0.07	15 ± 0	< 0.046 ± 0.006
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	1.5 ± 0.1	0.054 ± 0.007	0.96 ± 0.05	15 ± 0	< 0.047 ± 0.009
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	3.7 ± 0.1	0.058 ± 0.001	1.8 ± 0.1	18 ± 0	< 0.048 ± 0.01
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	3.5 ± 0.1	0.066 ± 0.009	1.8 ± 0.1	18 ± 0	< 0.049 ± 0.01
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	2.5 ± 0.1	0.054 ± 0.016	1.8 ± 0.1	19 ± 0	< 0.050 ± 0.01
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	2.2 ± 0.1	0.063 ± 0.019	1.7 ± 0.1	19 ± 0	< 0.051 ± 0.01
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	1.4 ± 0.1	0.049 ± 0.005	1.3 ± 0.1	17 ± 0	< 0.052 ± 0.00
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	2.0 ± 0.1	0.051 ± 0.002	1.4 ± 0.0	17 ± 0	< 0.053 ± 0.00
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	8.9 ± 0.3	0.069 ± 0.015	1.6 ± 0.0	22 ± 0	< 0.054 ± 0.01
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	7.4 ± 0.1	0.065 ± 0.009	1.5 ± 0.0	21 ± 0	< 0.055 ± 0.00
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	6.8 ± 0.1	0.074 ± 0.003	1.5 ± 0.1	21 ± 1	< 0.056 ± 0.002
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	6.2 ± 0.1	0.072 ± 0.008	1.5 ± 0.1	20 ± 0	< 0.057 ± 0.01
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	3.7 ± 0.2	0.063 ± 0.005	1.0 ± 0.0	18 ± 0	< 0.058 ± 0.000
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	3.9 ± 0.1	0.053 ± 0.005	1.1 ± 0.0	18 ± 0	< 0.059 ± 0.01
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	5.8 ± 0.1	0.13 ± 0.03	1.0 ± 0.0	16 ± 0	< 0.060 ± 0.008
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	5.8 ± 0.3	0.12 ± 0.01	0.99 ± 0.02	16 ± 1	< 0.061 ± 0.008

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	17 ± 0	0.13 ± 0.00	1.0 ± 0.0	17 ± 1	< 0.062 ± 0.008
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	14 ± 1	0.12 ± 0.01	1.0 ± 0.0	17 ± 0	< 0.063 ± 0.005
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	4.4 ± 0.2	0.13 ± 0.01	0.98 ± 0.01	15 ± 0	< 0.064 ± 0.006
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	4.4 ± 0.1	0.13 ± 0.01	0.96 ± 0.03	15 ± 0	< 0.065 ± 0.006
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	19 ± 0	0.073 ± 0.007	1.3 ± 0.0	17 ± 0	< 0.066 ± 0.02
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	44 ± 2	0.070 ± 0.006	1.3 ± 0.0	17 ± 0	< 0.067 ± 0.01
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	3.8 ± 0.2	0.067 ± 0.008	1.4 ± 0.0	17 ± 0	< 0.068 ± 0.01
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	3.8 ± 0.1	0.066 ± 0.011	1.3 ± 0.0	17 ± 0	< 0.069 ± 0.01
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	2.5 ± 0.0	0.060 ± 0.011	1.1 ± 0.0	15 ± 0	< 0.070 ± 0.02
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	2.6 ± 0.2	0.066 ± 0.001	1.2 ± 0.0	15 ± 0	< 0.071 ± 0.02
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	8.9 ± 0.2	0.052 ± 0.003	1.1 ± 0.0	17 ± 0	< 0.072 ± 0.001
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	24 ± 0	0.050 ± 0.003	1.0 ± 0.0	17 ± 0	< 0.073 ± 0.001
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	4.8 ± 0.1	0.049 ± 0.001	1.1 ± 0.0	17 ± 0	< 0.074 ± 0.001
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	4.4 ± 0.0	0.049 ± 0.004	1.0 ± 0.0	16 ± 0	< 0.075 ± 0.005
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	3.1 ± 0.0	0.047 ± 0.005	1.0 ± 0.0	14 ± 0	< 0.076 ± 0.00
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	2.7 ± 0.1	0.048 ± 0.006	0.97 ± 0.02	16 ± 0	< 0.077 ± 0.002
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	< 0.078 ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	33 ± 0	0.068 ± 0.000	1.4 ± 0.0	22 ± 1	< 0.079 ± 0.005
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	6.5 ± 0.2	0.077 ± 0.010	1.4 ± 0.0	21 ± 0	< 0.080 ± 0.004
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	2.0 ± 0.2	0.063 ± 0.002	1.4 ± 0.0	23 ± 0	< 0.081 ± 0.002
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	2.1 ± 0.1	0.075 ± 0.001	1.4 ± 0.0	22 ± 3	< 0.082 ± 0.006
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	1.1 ± 0.0	0.066 ± 0.003	1.1 ± 0.0	19 ± 0	< 0.083 ± 0.020
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	1.1 ± 0.0	0.090 ± 0.005	1.2 ± 0.1	19 ± 0	< 0.084 ± 0.007
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	< 0.085 ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	14 ± 1	0.059 ± 0.008	1.7 ± 0.1	21 ± 0	< 0.086 ± 0.01
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	16 ± 0	0.054 ± 0.003	1.8 ± 0.0	22 ± 0	< 0.087 ± 0.01
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	< 0.088 ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	11 ± 1	0.075 ± 0.006	1.2 ± 0.0	19 ± 0	< 0.089 ± 0.007
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	5.0 ± 0.2	0.057 ± 0.009	1.1 ± 0.0	19 ± 0	< 0.090 ± 0.01
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	4.4 ± 0.1	0.065 ± 0.010	1.1 ± 0.0	19 ± 0	< 0.091 ± 0.00
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	4.4 ± 0.3	0.062 ± 0.000	1.2 ± 0.0	19 ± 0	< 0.092 ± 0.01
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	2.0 ± 0.1	0.046 ± 0.007	1.1 ± 0.0	17 ± 1	< 0.093 ± 0.00
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	2.1 ± 0.1	0.059 ± 0.005	1.0 ± 0.1	18 ± 1	< 0.094 ± 0.02

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	8.9 ± 0.3	0.078 ± 0.012	1.6 ± 0.0	20 ± 0	< 0.095 ± 0.03
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	3.7 ± 0.2	0.076 ± 0.009	1.6 ± 0.1	21 ± 0	< 0.096 ± 0.01
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	3.2 ± 0.2	0.074 ± 0.009	1.6 ± 0.0	21 ± 1	< 0.097 ± 0.01
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	3.1 ± 0.1	0.071 ± 0.009	1.6 ± 0.0	21 ± 0	< 0.098 ± 0.01
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	1.6 ± 0.1	0.060 ± 0.011	1.0 ± 0.0	18 ± 1	< 0.099 ± 0.05
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	1.7 ± 0.1	0.066 ± 0.010	1.0 ± 0.0	18 ± 0	< 0.100 ± 0.04
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	7.4 ± 0.1	0.041 ± 0.003	1.0 ± 0.0	16 ± 0	< 0.101 ± 0.00
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	6.9 ± 0.1	0.044 ± 0.002	1.0 ± 0.0	15 ± 0	< 0.102 ± 0.01
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	9.4 ± 0.1	0.054 ± 0.011	1.0 ± 0.0	16 ± 0	< 0.103 ± 0.021
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	9.3 ± 0.3	0.045 ± 0.005	1.1 ± 0.0	16 ± 0	< 0.104 ± 0.00
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	2.1 ± 0.1	0.043 ± 0.005	0.68 ± 0.02	13 ± 0	< 0.105 ± 0.001
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	2.5 ± 0.0	0.048 ± 0.004	1.1 ± 0.0	16 ± 0	< 0.106 ± 0.001
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	< 0.107 ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	2.6 ± 0.1	0.083 ± 0.003	1.3 ± 0.0	21 ± 0	< 0.108 ± 0.007
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	1.9 ± 0.1	0.090 ± 0.002	1.4 ± 0.0	21 ± 0	< 0.109 ± 0.011
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	2.0 ± 0.1	0.058 ± 0.010	1.4 ± 0.0	22 ± 0	< 0.110 ± 0.01
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	2.0 ± 0.0	0.072 ± 0.018	1.4 ± 0.0	21 ± 0	< 0.111 ± 0.001
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	1.3 ± 0.1	0.051 ± 0.000	0.87 ± 0.01	18 ± 1	< 0.112 ± 0.008
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	1.2 ± 0.0	0.049 ± 0.007	0.90 ± 0.04	19 ± 0	< 0.113 ± 0.03
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	2.9 ± 0.1	0.048 ± 0.005	1.3 ± 0.0	19 ± 0	< 0.114 ± 0.01
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	2.2 ± 0.2	0.040 ± 0.005	1.2 ± 0.0	19 ± 0	< 0.115 ± 0.01
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	1.7 ± 0.2	0.038 ± 0.004	1.2 ± 0.0	19 ± 1	< 0.116 ± 0.01
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	1.9 ± 0.1	0.039 ± 0.004	1.2 ± 0.0	19 ± 0	< 0.117 ± 0.01
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	0.78 ± 0.09	0.032 ± 0.007	0.74 ± 0.05	16 ± 0	< 0.118 ± 0.01
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	0.80 ± 0.05	0.034 ± 0.008	0.74 ± 0.03	15 ± 0	< 0.119 ± 0.00
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	6.9 ± 0.1	0.051 ± 0.008	0.90 ± 0.00	17 ± 0	< 0.120 ± 0.00
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	10 ± 0	0.054 ± 0.005	0.90 ± 0.01	17 ± 0	< 0.121 ± 0.01
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	6.9 ± 0.1	0.060 ± 0.015	0.91 ± 0.02	17 ± 0	< 0.122 ± 0.00
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	6.8 ± 0.3	0.064 ± 0.023	0.89 ± 0.02	17 ± 0	< 0.123 ± 0.01
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	3.3 ± 0.2	0.052 ± 0.010	0.84 ± 0.01	16 ± 1	< 0.124 ± 0.01
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	3.4 ± 0.2	0.057 ± 0.015	0.79 ± 0.03	15 ± 0	< 0.125 ± 0.01
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	13 ± 0	0.036 ± 0.003	0.48 ± 0.04	9.3 ± 0.0	< 0.126 ± 0.003
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	11 ± 0	0.034 ± 0.002	0.46 ± 0.03	9.2 ± 0.3	< 0.127 ± 0.004

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	30 ± 1	0.034 ± 0.006	0.48 ± 0.06	10 ± 0	< 0.128 ± 0.005
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	30 ± 1	0.030 ± 0.000	0.49 ± 0.03	11 ± 0	< 0.129 ± 0.005
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	6.6 ± 0.0	0.035 ± 0.006	0.38 ± 0.06	7.4 ± 0.2	< 0.130 ± 0.005
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	6.8 ± 0.2	0.035 ± 0.006	0.36 ± 0.02	8.0 ± 0.3	< 0.131 ± 0.014
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	4.2 ± 0.2	0.073 ± 0.008	1.3 ± 0.0	19 ± 0	< 0.132 ± 0.02
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	5.1 ± 0.1	0.076 ± 0.012	1.2 ± 0.1	19 ± 0	< 0.133 ± 0.03
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	3.1 ± 0.1	0.068 ± 0.011	1.2 ± 0.0	18 ± 1	< 0.134 ± 0.02
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	3.1 ± 0.0	0.073 ± 0.011	1.2 ± 0.0	18 ± 1	< 0.135 ± 0.01
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	2.0 ± 0.0	0.059 ± 0.013	0.76 ± 0.05	15 ± 1	< 0.136 ± 0.05
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	1.9 ± 0.0	0.061 ± 0.021	0.79 ± 0.03	15 ± 0	< 0.137 ± 0.02
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	15 ± 1	0.067 ± 0.005	1.4 ± 0.1	19 ± 1	< 0.138 ± 0.01
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	29 ± 0	0.073 ± 0.010	1.4 ± 0.1	19 ± 0	< 0.139 ± 0.016
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	3.4 ± 0.4	0.072 ± 0.002	1.3 ± 0.1	19 ± 0	< 0.140 ± 0.016
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	3.1 ± 0.1	0.079 ± 0.004	1.3 ± 0.0	18 ± 1	< 0.141 ± 0.014
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	1.4 ± 0.2	0.054 ± 0.008	0.81 ± 0.04	15 ± 0	< 0.142 ± 0.01
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	1.5 ± 0.2	0.069 ± 0.032	0.81 ± 0.06	15 ± 0	< 0.143 ± 0.01
Flat Cr.	12/11/96	0.40 µm Mem	1/2	64 ± 2	0.041 ± 0.007	0.10 ± 0.02	5.0 ± 0.1	< 0.144 ± 0.006
Flat Cr.	12/11/96	0.40 µm Mem	2/2	63 ± 3	0.041 ± 0.005	0.10 ± 0.01	4.9 ± 0.1	< 0.145 ± 0.006
Flat Cr.	12/11/96	0.45 µm Cap	1/2	43 ± 1	0.034 ± 0.002	0.094 ± 0.011	4.9 ± 0.2	< 0.146 ± 0.01
Flat Cr.	12/11/96	0.45 µm Cap	2/2	43 ± 1	0.038 ± 0.004	0.090 ± 0.001	5.0 ± 0.0	< 0.147 ± 0.001
Flat Cr.	12/11/96	10 kd Tan	1/2	30 ± 0	0.030 ± 0.002	0.14 ± 0.02	3.9 ± 0.2	< 0.148 ± 0.00
Flat Cr.	12/11/96	10 kd Tan	2/2	31 ± 1	0.038 ± 0.001	0.18 ± 0.04	3.8 ± 0.0	< 0.149 ± 0.005
Flat Cr.	05/29/97	0.40 µm Mem	1/2	2.1 ± 0.0	0.052 ± 0.008	0.49 ± 0.03	7.9 ± 0.2	< 0.150 ± 0.01
Flat Cr.	05/29/97	0.40 µm Mem	2/2	2.2 ± 0.3	0.057 ± 0.006	0.48 ± 0.04	8.1 ± 0.2	< 0.151 ± 0.01
Flat Cr.	05/29/97	0.45 µm Cap	1/2	1.7 ± 0.2	0.059 ± 0.004	0.43 ± 0.01	8.0 ± 0.2	< 0.152 ± 0.03
Flat Cr.	05/29/97	0.45 µm Cap	2/2	1.8 ± 0.1	0.061 ± 0.004	0.43 ± 0.03	7.8 ± 0.1	< 0.153 ± 0.02
Flat Cr.	05/29/97	10 kd Tan	1/2	1.1 ± 0.1	0.056 ± 0.010	0.38 ± 0.03	6.7 ± 0.4	< 0.154 ± 0.01
Flat Cr.	05/29/97	10 kd Tan	2/2	1.1 ± 0.1	0.054 ± 0.010	0.39 ± 0.02	6.8 ± 0.1	< 0.155 ± 0.02
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	2,370 ± 180	0.019 ± 0.003	0.17 ± 0.03	8.5 ± 0.1	< 0.156 ± 0.010
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	2,540 ± 530	< 0.017 ± 0.006	0.21 ± 0.01	9.1 ± 0.4	< 0.157 ± 0.013
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	3,190 ± 90	< 0.017 ± 0.006	0.20 ± 0.00	8.9 ± 0.3	< 0.158 ± 0.003
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	2,590 ± 510	0.018 ± 0.002	0.16 ± 0.01	8.5 ± 0.1	< 0.159 ± 0.009
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	2,520 ± 40	0.024 ± 0.001	0.24 ± 0.03	8.4 ± 0.0	< 0.160 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	2,530 ± 130	< 0.017 ± 0.006	0.21 ± 0.01	8.8 ± 0.3	0.44 ± 0.005
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	4,480 ± 260	< 0.02 ± 0.01	0.12 ± 0.01	24 ± 1	0.12 ± 0.01
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	4,520 ± 80	< 0.02 ± 0.00	0.12 ± 0.02	24 ± 0	0.11 ± 0.01
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	4,080 ± 130	< 0.02 ± 0.00	0.14 ± 0.01	24 ± 0	0.12 ± 0.01
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	4,240 ± 40	< 0.02 ± 0.00	0.14 ± 0.02	24 ± 0	0.12 ± 0.01
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	3,980 ± 180	< 0.02 ± 0.01	0.18 ± 0.02	23 ± 0	0.14 ± 0.00
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	3,930 ± 50	< 0.02 ± 0.01	0.12 ± 0.02	23 ± 0	0.11 ± 0.01
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	2,140 ± 80	< 0.13 ± 0.01	3.8 ± 0.0	20 ± 0	0.051 ± 0.12
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	2,040 ± 0	0.14 ± 0.01	4.0 ± 0.0	20 ± 0	0.058 ± 0.003
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	2,050 ± 30	0.14 ± 0.01	4.0 ± 0.0	21 ± 0	0.045 ± 0.008
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	2,040 ± 30	0.15 ± 0.01	4.2 ± 0.0	20 ± 0	0.055 ± 0.007
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	2,070 ± 10	0.13 ± 0.00	4.1 ± 0.0	19 ± 1	0.048 ± 0.000
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	1,930 ± 100	0.14 ± 0.01	3.7 ± 0.0	19 ± 0	0.056 ± 0.002
Whiskeytown	12/11/96	0.40 µm Mem	1/2	6.5 ± 0.1	0.028 ± 0.004	0.36 ± 0.01	7.1 ± 0.3	< 0.02 ± 0.01
Whiskeytown	12/11/96	0.40 µm Mem	2/2	6.9 ± 0.2	0.037 ± 0.010	0.39 ± 0.04	7.1 ± 0.0	< 0.175 ± 0.003
Whiskeytown	12/11/96	0.45 µm Cap	1/2	3.0 ± 0.2	0.043 ± 0.005	0.38 ± 0.03	6.6 ± 0.3	< 0.176 ± 0.005
Whiskeytown	12/11/96	0.45 µm Cap	2/2	2.9 ± 0.1	0.037 ± 0.005	0.38 ± 0.03	7.0 ± 0.3	< 0.177 ± 0.01
Whiskeytown	12/11/96	10 kd Tan	1/2	2.2 ± 0.4	0.035 ± 0.006	0.42 ± 0.04	6.5 ± 0.0	< 0.178 ± 0.003
Whiskeytown	12/11/96	10 kd Tan	2/2	2.2 ± 0.2	0.032 ± 0.005	0.42 ± 0.02	6.3 ± 0.2	< 0.179 ± 0.01
Whiskeytown	05/29/97	0.40 µm Mem	1/2	5.0 ± 0.4	0.032 ± 0.002	0.38 ± 0.05	6.2 ± 0.3	< 0.180 ± 0.03
Whiskeytown	05/29/97	0.40 µm Mem	2/2	29 ± 0	0.029 ± 0.003	0.38 ± 0.04	6.0 ± 0.2	< 0.181 ± 0.03
Whiskeytown	05/29/97	0.45 µm Cap	1/2	2.9 ± 0.1	0.031 ± 0.003	0.35 ± 0.01	6.2 ± 0.2	< 0.182 ± 0.02
Whiskeytown	05/29/97	0.45 µm Cap	2/2	3.5 ± 0.3	0.033 ± 0.005	0.37 ± 0.03	6.2 ± 0.1	< 0.183 ± 0.01
Whiskeytown	05/29/97	10 kd Tan	1/2	2.5 ± 0.2	0.025 ± 0.004	0.28 ± 0.02	5.2 ± 0.1	< 0.184 ± 0.01
Whiskeytown	05/29/97	10 kd Tan	2/2	2.4 ± 0.1	0.023 ± 0.005	0.28 ± 0.01	5.1 ± 0.1	< 0.185 ± 0.01
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	4.5 ± 0.3	0.020 ± 0.001	0.27 ± 0.01	7.0 ± 0.1	< 0.186 ± 0.00
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	4.3 ± 0.1	0.023 ± 0.004	0.23 ± 0.01	6.6 ± 0.3	< 0.187 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	3.7 ± 0.2	0.029 ± 0.003	0.27 ± 0.02	6.7 ± 0.2	< 0.188 ± 0.004
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	4.9 ± 0.4	0.025 ± 0.002	0.28 ± 0.02	7.2 ± 0.4	< 0.189 ± 0.005
Spring Cr. arm	07/12/96	10 kd Tan	1/3	4.1 ± 0.4	0.022 ± 0.006	0.25 ± 0.03	6.6 ± 0.2	< 0.190 ± 0.004
Spring Cr. arm	07/12/96	10 kd Tan	2/3	3.5 ± 0.1	0.018 ± 0.002	0.26 ± 0.02	6.4 ± 0.4	< 0.191 ± 0.00
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	< 0.192 ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	9.3 ± 0.1	0.037 ± 0.006	0.23 ± 0.04	6.4 ± 0.1	< 0.193 ± 0.017
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	9.1 ± 0.2	0.040 ± 0.005	0.22 ± 0.03	6.4 ± 0.0	< 0.194 ± 0.010

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Aluminum (µg/L) ICP–MS	Antimony (µg/L) ICP–MS	Arsenic (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	8.3 ± 0.2	0.040 ± 0.006	0.18 ± 0.00	6.3 ± 0.2	< 0.195 ± 0.010
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	8.1 ± 0.1	0.038 ± 0.005	0.21 ± 0.02	6.3 ± 0.1	< 0.196 ± 0.012
Spring Cr. arm	09/18/96	10 kd Tan	1/2	7.6 ± 0.1	0.035 ± 0.007	0.16 ± 0.01	5.5 ± 0.1	< 0.197 ± 0.001
Spring Cr. arm	09/18/96	10 kd Tan	2/2	7.6 ± 0.2	0.038 ± 0.003	0.18 ± 0.03	5.5 ± 0.1	< 0.198 ± 0.005
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	61 ± 2	0.020 ± 0.003	0.29 ± 0.01	6.8 ± 0.2	< 0.199 ± 0.00
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	48 ± 1	0.024 ± 0.004	0.28 ± 0.01	6.7 ± 0.3	< 0.200 ± 0.00
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	33 ± 2	0.020 ± 0.008	0.23 ± 0.03	6.5 ± 0.2	< 0.201 ± 0.01
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	32 ± 1	0.029 ± 0.012	0.26 ± 0.03	6.8 ± 0.1	< 0.202 ± 0.00
Spring Cr. arm	11/20/96	10 kd Tan	1/2	36 ± 2	< 0.018 ± 0.009	0.22 ± 0.02	5.6 ± 0.4	< 0.203 ± 0.01
Spring Cr. arm	11/20/96	10 kd Tan	2/2	35 ± 1	< 0.018 ± 0.004	0.21 ± 0.02	5.5 ± 0.2	< 0.204 ± 0.00
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	67 ± 2	0.033 ± 0.001	0.19 ± 0.01	7.0 ± 0.2	< 0.205 ± 0.003
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	56 ± 1	0.028 ± 0.003	0.18 ± 0.01	7.3 ± 0.0	< 0.206 ± 0.006
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	53 ± 0	0.022 ± 0.007	0.17 ± 0.01	7.2 ± 0.3	< 0.207 ± 0.02
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	52 ± 1	0.028 ± 0.006	0.18 ± 0.02	7.3 ± 0.3	< 0.208 ± 0.01
Spring Cr. arm	12/11/96	10 kd Tan	1/2	57 ± 2	< 0.017 ± 0.003	0.13 ± 0.02	5.5 ± 0.3	< 0.209 ± 0.01
Spring Cr. arm	12/11/96	10 kd Tan	2/2	58 ± 1	0.025 ± 0.007	0.15 ± 0.02	5.8 ± 0.0	< 0.210 ± 0.003
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	28 ± 1	0.033 ± 0.004	0.40 ± 0.02	6.5 ± 0.5	< 0.211 ± 0.01
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	21 ± 0	0.028 ± 0.004	0.37 ± 0.04	6.2 ± 0.5	< 0.212 ± 0.01
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	12 ± 0	0.030 ± 0.004	0.35 ± 0.00	6.1 ± 0.2	< 0.213 ± 0.01
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	12 ± 0	0.031 ± 0.003	0.37 ± 0.01	6.2 ± 0.4	< 0.214 ± 0.01
Spring Cr. arm	05/28/97	10 kd Tan	1/2	12 ± 0	0.020 ± 0.005	0.23 ± 0.01	5.0 ± 0.2	< 0.215 ± 0.00
Spring Cr. arm	05/28/97	10 kd Tan	2/2	13 ± 1	0.020 ± 0.005	0.21 ± 0.01	5.0 ± 0.2	< 0.216 ± 0.01
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	9.8 ± 0.3	0.29 ± 0.02	3.6 ± 0.0	97 ± 3	< 0.217 ± 0.01
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	2.2 ± 0.3	0.30 ± 0.00	3.8 ± 0.3	100 ± 3	< 0.218 ± 0.00
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	1.2 ± 0.1	0.29 ± 0.00	3.4 ± 0.1	106 ± 4	< 0.219 ± 0.01
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	1.1 ± 0.2	0.27 ± 0.00	3.6 ± 0.0	105 ± 5	< 0.220 ± 0.01
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	0.90 ± 0.18	0.26 ± 0.01	2.8 ± 0.0	89 ± 1	< 0.221 ± 0.01
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	0.88 ± 0.26	0.26 ± 0.01	2.7 ± 0.0	94 ± 0	< 0.222 ± 0.01
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	45 ± 1	0.095 ± 0.005	1.1 ± 0.0	16 ± 0	< 0.223 ± 0.004
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	5.4 ± 0.5	0.091 ± 0.001	1.0 ± 0.0	16 ± 1	< 0.224 ± 0.005
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	19 ± 1	0.11 ± 0.00	0.99 ± 0.03	17 ± 0	< 0.225 ± 0.004
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	18 ± 0	0.12 ± 0.00	1.0 ± 0.0	17 ± 0	< 0.226 ± 0.006
Yolo Bypass	01/07/97	10 kd Tan	1/2	2.6 ± 0.1	0.075 ± 0.005	0.76 ± 0.03	13 ± 1	< 0.227 ± 0.002
Yolo Bypass	01/07/97	10 kd Tan	2/2	2.8 ± 0.2	0.075 ± 0.010	0.79 ± 0.01	13 ± 1	< 0.228 ± 0.004

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	< 0.005 ± 0.001	33 ± 1	0.025 ± 0.006	10 ± 0	0.019 ± 0.000
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	< 0.004 ± 0.001	31 ± 0	0.031 ± 0.001	10 ± 0	0.016 ± 0.000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	< 0.005 ± 0.000	31 ± 1	0.016 ± 0.004	10 ± 0	0.014 ± 0.000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	< 0.004 ± 0.000	30 ± 0	0.018 ± 0.000	10 ± 0	0.017 ± 0.000
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	< 0.005 ± 0.000	32 ± 1	0.017 ± 0.003	10 ± 0	0.0068 ± 0.0006
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	< 0.005 ± 0.002	31 ± 0	0.021 ± 0.008	9.7 ± 0.0	0.0060 ± 0.0011
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	34 ± 1	0.032 ± 0.001	12 ± 0	0.024 ± 0.003
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	34 ± 3	0.034 ± 0.007	12 ± 1	0.030 ± 0.001
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	36 ± 1	0.030 ± 0.004	12 ± 1	0.012 ± 0.001
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	< 0.006 ± 0.000	31 ± 1	0.024 ± 0.003	11 ± 0	0.011 ± 0.000
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	< 0.006 ± 0.003	33 ± 1	0.023 ± 0.006	11 ± 0	0.0033 ± 0.0008
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	< 0.01 ± 0.00	32 ± 1	0.021 ± 0.003	11 ± 1	0.0045 ± 0.0004
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	< 0.007 ± 0.001	41 ± 1	< 0.009 ± 0.001	12 ± 0	0.0046 ± 0.0006
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	< 0.007 ± 0.003	41 ± 2	< 0.007 ± 0.001	12 ± 0	0.0051 ± 0.0004
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	< 0.007 ± 0.000	39 ± 1	< 0.007 ± 0.003	12 ± 0	0.0056 ± 0.0009
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	41 ± 1	< 0.007 ± 0.006	12 ± 0	0.0036 ± 0.0005
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	< 0.007 ± 0.001	40 ± 1	0.0087 ± 0.0033	11 ± 0	0.0011 ± 0.0004
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	< 0.007 ± 0.000	41 ± 2	< 0.007 ± 0.006	11 ± 0	0.00094 ± 0.00079
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	50 ± 6	0.036 ± 0.004	11 ± 1	0.011 ± 0.001
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	53 ± 9	0.040 ± 0.009	11 ± 0	0.0090 ± 0.0015
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	< 0.011 ± 0.001	45 ± 3	0.041 ± 0.006	11 ± 1	0.013 ± 0.001
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	< 0.011 ± 0.002	47 ± 4	0.034 ± 0.011	11 ± 1	0.0090 ± 0.0004
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	< 0.011 ± 0.001	46 ± 3	0.039 ± 0.008	9.6 ± 0.6	0.0027 ± 0.0004
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	< 0.01 ± 0.00	56 ± 2	0.028 ± 0.004	9.4 ± 0.7	0.0018 ± 0.0004
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	< 0.001 ± 0.001	32 ± 1	0.027 ± 0.010	10 ± 0	0.034 ± 0.001
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	32 ± 1	0.021 ± 0.006	10 ± 0	0.017 ± 0.001
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	< 0.001 ± 0.000	31 ± 1	0.012 ± 0.002	9.8 ± 0.6	0.015 ± 0.000
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	31 ± 1	0.0062 ± 0.0047	9.9 ± 0.5	0.015 ± 0.000
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	< 0.001 ± 0.000	32 ± 3	< 0.006 ± 0.002	8.3 ± 0.4	0.0019 ± 0.0005
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	< 0.001 ± 0.001	31 ± 1	< 0.006 ± 0.003	8.1 ± 0.3	0.0020 ± 0.0005
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	< 0.004 ± 0.000	25 ± 0	0.017 ± 0.002	8.7 ± 0.1	0.012 ± 0.000

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	< 0.004 ± 0.001	26 ± 1	0.017 ± 0.001	8.7 ± 0.0	0.013 ± 0.000
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	< 0.004 ± 0.001	25 ± 0	0.017 ± 0.001	8.5 ± 0.1	0.019 ± 0.000
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	< 0.004 ± 0.001	25 ± 0	0.019 ± 0.003	8.7 ± 0.1	0.019 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	< 0.004 ± 0.000	25 ± 1	0.018 ± 0.001	8.4 ± 0.1	0.0076 ± 0.0015
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	< 0.004 ± 0.001	25 ± 0	0.016 ± 0.001	8.4 ± 0.1	0.0091 ± 0.0002
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	< 0.004 ± 0.000	24 ± 1	0.014 ± 0.003	8.4 ± 0.1	0.0075 ± 0.0010
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	24 ± 2	0.031 ± 0.007	8.2 ± 0.1	0.019 ± 0.003
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	< 0.006 ± 0.001	24 ± 0	0.026 ± 0.004	8.6 ± 0.4	0.014 ± 0.000
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	< 0.006 ± 0.002	25 ± 0	0.025 ± 0.002	9.0 ± 0.1	0.013 ± 0.000
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	< 0.006 ± 0.001	24 ± 1	0.018 ± 0.002	8.2 ± 0.2	0.016 ± 0.001
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	< 0.01 ± 0.00	24 ± 2	0.018 ± 0.007	8.0 ± 0.0	0.0045 ± 0.0006
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	< 0.01 ± 0.00	24 ± 1	0.015 ± 0.002	7.3 ± 0.1	0.0024 ± 0.0002
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	< 0.01 ± 0.00	24 ± 2	0.021 ± 0.007	7.4 ± 0.3	0.0032 ± 0.0002
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	< 0.007 ± 0.001	33 ± 1	0.048 ± 0.010	10 ± 0	0.023 ± 0.000
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	< 0.007 ± 0.001	32 ± 1	0.049 ± 0.012	10 ± 0	0.022 ± 0.001
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	< 0.007 ± 0.000	31 ± 1	0.040 ± 0.004	9.9 ± 0.4	0.018 ± 0.003
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	33 ± 1	0.049 ± 0.005	9.8 ± 0.3	0.017 ± 0.001
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	< 0.007 ± 0.001	32 ± 1	0.039 ± 0.003	8.2 ± 0.2	0.0021 ± 0.0008
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	< 0.007 ± 0.001	31 ± 2	0.039 ± 0.005	8.3 ± 0.2	0.0024 ± 0.0003
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	52 ± 11	0.070 ± 0.006	10 ± 0	0.031 ± 0.004
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	43 ± 7	0.064 ± 0.005	10 ± 0	0.023 ± 0.004
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	< 0.011 ± 0.005	39 ± 0	0.076 ± 0.006	10 ± 0	0.028 ± 0.002
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	47 ± 5	0.071 ± 0.005	10 ± 0	0.028 ± 0.001
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	< 0.01 ± 0.00	54 ± 8	0.050 ± 0.004	8.2 ± 0.5	0.0034 ± 0.0008
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	< 0.01 ± 0.00	47 ± 11	0.052 ± 0.003	8.1 ± 0.3	0.0042 ± 0.0008
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	34 ± 1	0.11 ± 0.00	9.5 ± 0.5	0.020 ± 0.003
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	< 0.008 ± 0.000	37 ± 1	0.10 ± 0.01	9.9 ± 0.5	0.019 ± 0.002
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	< 0.008 ± 0.000	38 ± 1	0.16 ± 0.02	9.5 ± 0.4	0.039 ± 0.002
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	< 0.008 ± 0.001	35 ± 0	0.14 ± 0.02	9.8 ± 0.4	0.040 ± 0.001
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	< 0.008 ± 0.001	34 ± 1	0.084 ± 0.024	9.1 ± 0.6	0.0072 ± 0.0011
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	< 0.008 ± 0.000	34 ± 1	0.085 ± 0.002	8.9 ± 0.3	0.0064 ± 0.0005
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	< 0.014 ± 0.002	35 ± 1	0.085 ± 0.012	9.1 ± 0.1	0.0056 ± 0.0003
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	26 ± 1	0.016 ± 0.007	8.7 ± 0.4	0.011 ± 0.001
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	26 ± 1	0.036 ± 0.004	8.7 ± 0.4	0.026 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	25 ± 0	0.015 ± 0.003	8.5 ± 0.5	0.016 ± 0.000
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	26 ± 1	0.018 ± 0.004	8.3 ± 0.2	0.015 ± 0.001
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	< 0.001 ± 0.000	27 ± 2	0.011 ± 0.005	7.5 ± 0.6	0.0040 ± 0.0001
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	< 0.001 ± 0.001	27 ± 2	0.012 ± 0.006	7.6 ± 0.4	0.0031 ± 0.0007
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	< 0.005 ± 0.000	28 ± 0	0.042 ± 0.003	9.1 ± 0.1	0.012 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	< 0.005 ± 0.000	27 ± 0	0.026 ± 0.001	9.2 ± 0.0	0.012 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	< 0.004 ± 0.001	27 ± 0	0.023 ± 0.001	9.0 ± 0.1	0.015 ± 0.001
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	< 0.005 ± 0.000	28 ± 1	0.016 ± 0.003	8.9 ± 0.0	0.015 ± 0.000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	< 0.005 ± 0.001	29 ± 0	0.023 ± 0.001	9.2 ± 0.1	0.0022 ± 0.0000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	< 0.004 ± 0.001	26 ± 0	0.020 ± 0.001	8.8 ± 0.1	0.0038 ± 0.0002
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	< 0.006 ± 0.001	28 ± 1	0.026 ± 0.008	8.7 ± 0.1	0.0076 ± 0.0007
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	< 0.006 ± 0.001	29 ± 1	0.022 ± 0.010	9.3 ± 0.3	0.0081 ± 0.0011
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	28 ± 2	0.019 ± 0.001	8.5 ± 0.3	0.015 ± 0.001
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	< 0.006 ± 0.002	28 ± 1	0.017 ± 0.006	9.2 ± 0.6	0.011 ± 0.003
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	< 0.01 ± 0.00	27 ± 1	0.014 ± 0.004	8.0 ± 0.3	< 0.0011 ± 0.0004
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	< 0.01 ± 0.00	26 ± 1	0.015 ± 0.005	8.0 ± 0.6	< 0.0011 ± 0.0006
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	< 0.007 ± 0.001	39 ± 2	0.022 ± 0.012	11 ± 1	0.020 ± 0.002
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	< 0.007 ± 0.000	39 ± 2	0.029 ± 0.006	11 ± 0	0.019 ± 0.001
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	< 0.007 ± 0.001	38 ± 1	0.020 ± 0.005	11 ± 0	0.015 ± 0.000
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	38 ± 1	0.021 ± 0.008	11 ± 0	0.017 ± 0.002
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	< 0.007 ± 0.001	40 ± 2	0.021 ± 0.008	9.1 ± 0.4	0.0011 ± 0.0001
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	< 0.007 ± 0.002	38 ± 1	0.020 ± 0.003	9.1 ± 0.4	0.0023 ± 0.0007
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	44 ± 5	0.018 ± 0.007	11 ± 0	0.020 ± 0.002
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	45 ± 11	0.022 ± 0.004	11 ± 0	0.023 ± 0.002
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	40 ± 10	0.023 ± 0.002	10 ± 0	0.021 ± 0.002
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	39 ± 11	0.030 ± 0.004	10 ± 0	0.020 ± 0.002
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	< 0.01 ± 0.00	41 ± 10	0.021 ± 0.005	8.8 ± 0.4	0.0027 ± 0.0008
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	< 0.01 ± 0.00	39 ± 11	0.019 ± 0.004	8.7 ± 0.5	0.0021 ± 0.0003
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	28 ± 1	0.0093 ± 0.0014	9.4 ± 0.2	0.088 ± 0.003
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	< 0.008 ± 0.000	29 ± 2	< 0.005 ± 0.002	9.1 ± 0.0	0.027 ± 0.001
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	< 0.008 ± 0.001	30 ± 3	0.014 ± 0.006	8.8 ± 0.4	0.038 ± 0.002
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	< 0.008 ± 0.000	28 ± 1	0.016 ± 0.006	9.3 ± 0.4	0.040 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	< 0.008 ± 0.001	28 ± 2	< 0.005 ± 0.002	7.9 ± 0.1	0.010 ± 0.001
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	< 0.008 ± 0.001	30 ± 4	0.0078 ± 0.0035	8.5 ± 0.3	0.0087 ± 0.0014
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	28 ± 0	0.013 ± 0.010	9.2 ± 0.2	0.017 ± 0.001
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	< 0.001 ± 0.000	28 ± 1	0.015 ± 0.012	9.2 ± 0.2	0.0086 ± 0.0008
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	< 0.001 ± 0.000	29 ± 1	0.013 ± 0.004	9.2 ± 0.5	0.012 ± 0.000
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	< 0.001 ± 0.000	27 ± 1	0.013 ± 0.004	8.9 ± 0.5	0.014 ± 0.001
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	< 0.001 ± 0.000	27 ± 1	< 0.006 ± 0.003	7.9 ± 0.4	0.0029 ± 0.0008
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	< 0.001 ± 0.001	28 ± 1	0.0072 ± 0.0024	7.9 ± 0.4	0.0030 ± 0.0008
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	< 0.005 ± 0.000	34 ± 1	0.0095 ± 0.0017	10 ± 0	0.016 ± 0.000
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	< 0.005 ± 0.000	34 ± 0	0.011 ± 0.004	10 ± 0	0.026 ± 0.000
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	< 0.005 ± 0.002	34 ± 0	0.016 ± 0.001	9.9 ± 0.1	0.018 ± 0.000
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	41 ± 2	0.014 ± 0.003	11 ± 1	0.011 ± 0.001
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	40 ± 2	0.010 ± 0.003	12 ± 0	0.0076 ± 0.0018
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	40 ± 1	0.011 ± 0.004	11 ± 0	0.017 ± 0.000
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	< 0.006 ± 0.001	41 ± 5	0.0072 ± 0.0055	12 ± 0	0.014 ± 0.000
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	< 0.01 ± 0.00	41 ± 2	< 0.006 ± 0.003	11 ± 0	0.0019 ± 0.0005
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	< 0.01 ± 0.00	40 ± 1	0.010 ± 0.005	10 ± 1	0.0018 ± 0.0006
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	< 0.007 ± 0.002	57 ± 2	0.0060 ± 0.0023	13 ± 0	0.013 ± 0.001
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	< 0.007 ± 0.000	57 ± 2	0.0095 ± 0.0043	13 ± 0	0.014 ± 0.001
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	< 0.007 ± 0.001	57 ± 2	0.0063 ± 0.0038	13 ± 0	0.011 ± 0.001
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	58 ± 1	< 0.005 ± 0.004	13 ± 0	0.013 ± 0.001
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	< 0.007 ± 0.001	55 ± 2	0.0062 ± 0.0013	11 ± 0	0.0014 ± 0.0010
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	< 0.007 ± 0.001	55 ± 1	0.0060 ± 0.0014	12 ± 0	0.0019 ± 0.0002
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	50 ± 2	0.0056 ± 0.0025	11 ± 2	0.015 ± 0.000
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	50 ± 1	0.012 ± 0.005	13 ± 0	0.015 ± 0.000
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	< 0.011 ± 0.001	49 ± 3	0.024 ± 0.006	13 ± 2	0.019 ± 0.001
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	50 ± 2	< 0.013 ± 0.003	9.5 ± 0.8	0.016 ± 0.002
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	< 0.011 ± 0.001	49 ± 1	< 0.005 ± 0.002	10 ± 2	0.0030 ± 0.0007
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	< 0.01 ± 0.00	48 ± 4	0.0079 ± 0.0035	9.7 ± 2.0	0.0034 ± 0.0022
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	30 ± 0	< 0.005 ± 0.004	9.6 ± 0.3	0.026 ± 0.001
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	< 0.008 ± 0.001	27 ± 1	< 0.005 ± 0.001	9.6 ± 0.4	0.024 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	< 0.008 ± 0.000	29 ± 2	0.013 ± 0.003	9.7 ± 0.5	0.051 ± 0.001
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	< 0.008 ± 0.001	29 ± 2	< 0.005 ± 0.003	9.8 ± 0.4	0.053 ± 0.004
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	< 0.008 ± 0.001	31 ± 2	0.0061 ± 0.0019	9.1 ± 0.3	0.014 ± 0.002
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	< 0.008 ± 0.001	28 ± 2	< 0.005 ± 0.003	8.9 ± 0.5	0.014 ± 0.003
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	< 0.001 ± 0.001	39 ± 0	< 0.008 ± 0.002	11 ± 0	0.016 ± 0.001
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	< 0.001 ± 0.000	38 ± 0	< 0.008 ± 0.002	10 ± 0	0.034 ± 0.001
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	38 ± 1	< 0.008 ± 0.003	10 ± 0	0.015 ± 0.000
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	38 ± 0	< 0.008 ± 0.003	10 ± 0	0.013 ± 0.001
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	< 0.001 ± 0.001	37 ± 0	< 0.008 ± 0.002	9.5 ± 0.1	0.0028 ± 0.0004
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	< 0.001 ± 0.001	38 ± 0	< 0.008 ± 0.002	9.4 ± 0.4	0.0024 ± 0.0005
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	< 0.005 ± 0.002	29 ± 1	0.0070 ± 0.0023	9.0 ± 0.1	0.015 ± 0.001
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	< 0.004 ± 0.001	27 ± 1	0.024 ± 0.001	9.3 ± 0.4	0.034 ± 0.001
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	< 0.004 ± 0.001	27 ± 0	0.013 ± 0.002	9.1 ± 0.3	0.022 ± 0.000
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	< 0.004 ± 0.001	27 ± 1	< 0.006 ± 0.000	9.2 ± 0.4	0.019 ± 0.000
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	< 0.005 ± 0.000	28 ± 0	< 0.004 ± 0.006	9.7 ± 0.1	0.0092 ± 0.0002
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	< 0.004 ± 0.000	26 ± 0	< 0.006 ± 0.000	9.6 ± 0.2	0.0078 ± 0.0000
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	< 0.006 ± 0.000	47 ± 0	0.015 ± 0.002	12 ± 1	0.039 ± 0.001
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	< 0.006 ± 0.001	45 ± 1	0.0089 ± 0.0044	13 ± 0	0.011 ± 0.000
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	< 0.006 ± 0.002	47 ± 2	0.018 ± 0.003	12 ± 0	0.014 ± 0.001
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	< 0.006 ± 0.002	45 ± 1	0.014 ± 0.003	12 ± 0	0.015 ± 0.004
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	< 0.01 ± 0.00	46 ± 2	0.0069 ± 0.0026	11 ± 0	0.0014 ± 0.0004
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	< 0.01 ± 0.00	44 ± 0	0.0066 ± 0.0043	11 ± 0	0.0035 ± 0.0001
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	< 0.007 ± 0.000	46 ± 1	0.0057 ± 0.0037	14 ± 0	0.037 ± 0.001
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	48 ± 1	0.011 ± 0.002	14 ± 0	0.035 ± 0.001
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	< 0.011 ± 0.003	35 ± 2	0.011 ± 0.006	9.4 ± 1.2	0.031 ± 0.001
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	35 ± 0	< 0.004 ± 0.005	9.8 ± 0.3	0.021 ± 0.002
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	34 ± 0	0.0085 ± 0.0052	9.8 ± 0.0	0.030 ± 0.002
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	34 ± 2	< 0.004 ± 0.003	9.2 ± 1.2	0.028 ± 0.005
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	< 0.01 ± 0.00	33 ± 2	0.0070 ± 0.0059	9.0 ± 0.3	0.0081 ± 0.0011
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	< 0.01 ± 0.00	32 ± 2	< 0.004 ± 0.000	9.2 ± 0.2	0.0086 ± 0.0014

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	< 0.001 ± 0.001	41 ± 1	0.0089 ± 0.0038	12 ± 0	0.011 ± 0.000
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	42 ± 0	< 0.008 ± 0.001	12 ± 1	0.0063 ± 0.0007
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	41 ± 2	0.011 ± 0.004	11 ± 1	0.013 ± 0.000
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	< 0.001 ± 0.000	41 ± 1	0.011 ± 0.007	12 ± 0	0.014 ± 0.000
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	< 0.001 ± 0.001	42 ± 3	< 0.008 ± 0.004	10 ± 0	0.0018 ± 0.0005
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	< 0.001 ± 0.001	41 ± 1	< 0.008 ± 0.011	9.8 ± 0.5	0.0011 ± 0.0001
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	< 0.005 ± 0.001	24 ± 1	0.042 ± 0.002	8.5 ± 0.1	0.015 ± 0.000
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	< 0.005 ± 0.001	24 ± 1	0.013 ± 0.003	8.7 ± 0.1	0.014 ± 0.001
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	< 0.005 ± 0.001	26 ± 1	< 0.006 ± 0.002	9.0 ± 0.1	0.024 ± 0.000
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	< 0.005 ± 0.000	24 ± 0	< 0.004 ± 0.003	8.8 ± 0.4	0.023 ± 0.000
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	< 0.004 ± 0.000	24 ± 0	0.0067 ± 0.0002	7.7 ± 0.4	0.0025 ± 0.0008
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	< 0.004 ± 0.000	24 ± 1	0.010 ± 0.010	9.1 ± 0.3	0.0031 ± 0.0003
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	43 ± 2	0.011 ± 0.005	11 ± 0	0.011 ± 0.001
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	43 ± 5	0.0071 ± 0.0034	12 ± 1	0.0055 ± 0.0008
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	< 0.006 ± 0.004	41 ± 0	0.014 ± 0.006	12 ± 0	0.016 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	43 ± 2	0.027 ± 0.003	11 ± 0	0.017 ± 0.000
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	< 0.006 ± 0.003	40 ± 1	0.0086 ± 0.0029	9.8 ± 0.5	0.0014 ± 0.0005
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	< 0.006 ± 0.001	42 ± 1	< 0.006 ± 0.003	11 ± 0	0.0018 ± 0.0003
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	< 0.007 ± 0.000	35 ± 3	0.0062 ± 0.0032	11 ± 0	0.013 ± 0.001
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	< 0.007 ± 0.003	35 ± 1	0.0059 ± 0.0020	11 ± 0	0.0081 ± 0.0011
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	< 0.007 ± 0.002	35 ± 1	0.0061 ± 0.0022	11 ± 0	0.012 ± 0.000
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	< 0.007 ± 0.000	35 ± 1	< 0.005 ± 0.004	11 ± 0	0.011 ± 0.000
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	< 0.007 ± 0.000	35 ± 1	< 0.005 ± 0.007	9.4 ± 0.1	0.00068 ± 0.00049
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	< 0.007 ± 0.000	35 ± 1	< 0.005 ± 0.002	9.0 ± 0.4	0.00073 ± 0.00010
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	25 ± 3	0.0042 ± 0.0046	8.5 ± 0.1	0.029 ± 0.003
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	28 ± 5	< 0.004 ± 0.003	8.7 ± 2.2	0.028 ± 0.002
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	24 ± 3	< 0.013 ± 0.003	8.8 ± 2.3	0.040 ± 0.001
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	25 ± 2	< 0.013 ± 0.012	8.5 ± 1.9	0.044 ± 0.000
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	< 0.01 ± 0.00	24 ± 2	< 0.004 ± 0.001	7.9 ± 1.5	0.012 ± 0.002
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	< 0.01 ± 0.00	23 ± 1	0.0058 ± 0.0046	7.5 ± 1.6	0.012 ± 0.002
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	5.0 ± 1.1	< 0.005 ± 0.006	4.5 ± 0.1	0.11 ± 0.00
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	< 0.008 ± 0.001	5.6 ± 1.0	< 0.005 ± 0.002	4.7 ± 0.0	0.098 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	< 0.008 ± 0.000	5.6 ± 0.5	< 0.005 ± 0.004	4.5 ± 0.2	0.14 ± 0.00
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	< 0.008 ± 0.001	7.1 ± 0.5	< 0.005 ± 0.001	4.7 ± 0.3	0.16 ± 0.00
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	< 0.008 ± 0.001	5.6 ± 1.8	< 0.005 ± 0.004	3.8 ± 0.2	0.020 ± 0.002
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	< 0.008 ± 0.001	5.3 ± 2.4	< 0.005 ± 0.007	3.7 ± 0.1	0.022 ± 0.001
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	< 0.001 ± 0.001	32 ± 2	0.0090 ± 0.0021	9.9 ± 0.5	0.0088 ± 0.0001
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	< 0.001 ± 0.000	34 ± 0	< 0.008 ± 0.007	10 ± 0	0.0091 ± 0.0011
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	< 0.001 ± 0.000	31 ± 1	< 0.008 ± 0.003	9.9 ± 0.6	0.014 ± 0.002
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	31 ± 1	< 0.008 ± 0.003	10 ± 1	0.014 ± 0.000
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	< 0.001 ± 0.001	32 ± 2	< 0.008 ± 0.005	8.1 ± 0.3	0.0022 ± 0.0005
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	< 0.001 ± 0.000	32 ± 1	< 0.008 ± 0.002	8.2 ± 0.5	0.0021 ± 0.0001
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	< 0.002 ± 0.000	31 ± 1	0.012 ± 0.001	10 ± 0	0.018 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	< 0.002 ± 0.001	32 ± 1	< 0.005 ± 0.003	10 ± 0	0.029 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	< 0.002 ± 0.000	31 ± 1	0.0074 ± 0.0030	10 ± 0	0.013 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	< 0.002 ± 0.000	34 ± 0	0.0055 ± 0.0035	10 ± 1	0.015 ± 0.001
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	< 0.002 ± 0.000	31 ± 1	< 0.005 ± 0.002	8.5 ± 0.3	0.0015 ± 0.0004
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	< 0.002 ± 0.000	32 ± 2	0.0048 ± 0.0034	8.3 ± 0.3	0.0011 ± 0.0002
Flat Cr.	12/11/96	0.40 µm Mem	1/2	< 0.011 ± 0.001	2.2 ± 0.3	0.17 ± 0.02	2.5 ± 0.2	0.072 ± 0.001
Flat Cr.	12/11/96	0.40 µm Mem	2/2	< 0.011 ± 0.002	3.1 ± 1.0	0.17 ± 0.01	2.6 ± 0.2	0.070 ± 0.003
Flat Cr.	12/11/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	2.2 ± 0.8	0.16 ± 0.01	2.8 ± 0.4	0.055 ± 0.001
Flat Cr.	12/11/96	0.45 µm Cap	2/2	< 0.011 ± 0.001	2.0 ± 0.1	0.16 ± 0.02	2.8 ± 0.2	0.049 ± 0.000
Flat Cr.	12/11/96	10 kd Tan	1/2	< 0.01 ± 0.00	2.3 ± 0.8	0.15 ± 0.01	2.3 ± 0.2	0.024 ± 0.001
Flat Cr.	12/11/96	10 kd Tan	2/2	< 0.011 ± 0.001	2.1 ± 0.8	0.13 ± 0.00	2.4 ± 0.1	0.025 ± 0.001
Flat Cr.	05/29/97	0.40 µm Mem	1/2	< 0.002 ± 0.000	5.6 ± 1.1	0.071 ± 0.003	13 ± 1	0.028 ± 0.002
Flat Cr.	05/29/97	0.40 µm Mem	2/2	< 0.002 ± 0.001	8.6 ± 3.5	0.074 ± 0.003	13 ± 1	0.028 ± 0.002
Flat Cr.	05/29/97	0.45 µm Cap	1/2	< 0.002 ± 0.001	8.8 ± 4.0	0.062 ± 0.004	13 ± 0	0.018 ± 0.001
Flat Cr.	05/29/97	0.45 µm Cap	2/2	< 0.002 ± 0.001	8.3 ± 4.0	0.073 ± 0.006	13 ± 1	0.016 ± 0.001
Flat Cr.	05/29/97	10 kd Tan	1/2	< 0.002 ± 0.000	8.4 ± 4.3	0.053 ± 0.002	11 ± 1	0.0059 ± 0.0010
Flat Cr.	05/29/97	10 kd Tan	2/2	< 0.002 ± 0.000	5.9 ± 1.1	0.054 ± 0.007	11 ± 1	0.0061 ± 0.0010
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	< 4 ± 2.00	3.5 ± 0.0	8.3 ± 0.5	4.6 ± 0.0
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	< 4 ± 1.00	3.5 ± 0.1	8.0 ± 1.4	4.9 ± 0.2
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	3.2 ± 0.5	3.5 ± 0.1	9.5 ± 0.5	4.7 ± 0.1
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	< 4 ± 4.00	3.4 ± 0.0	8.0 ± 1.4	4.7 ± 0.0
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	< 0.011 ± 0.001	< 2 ± 0.69	3.5 ± 0.0	8.3 ± 0.6	4.6 ± 0.1

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	< 0.01 ± 0.00	< 4 ± 2.00	3.5 ± 0.1	8.3 ± 0.6	4.8 ± 0.3
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	< 0.002 ± 0.000	7.5 ± 1.1	6.2 ± 0.2	44 ± 1	9.2 ± 0.1
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	< 0.002 ± 0.000	6.9 ± 0.5	6.2 ± 0.0	46 ± 2	9.4 ± 0.0
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	< 0.002 ± 0.000	6.7 ± 0.2	6.0 ± 0.1	43 ± 0	9.4 ± 0.1
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	< 0.002 ± 0.001	6.5 ± 0.2	6.3 ± 0.1	45 ± 0	9.2 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	< 0.002 ± 0.000	6.9 ± 0.2	5.9 ± 0.1	44 ± 0	9.3 ± 0.1
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	< 0.002 ± 0.000	6.7 ± 0.2	5.8 ± 0.0	43 ± 2	9.1 ± 0.1
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	<5 ± 1.75	9.1 ± 0.0	6.7 ± 0.1	3.2 ± 0.0
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	< 0.008 ± 0.001	< 5 ± 1.75	8.9 ± 0.2	6.5 ± 0.1	3.3 ± 0.0
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	< 0.008 ± 0.000	< 5 ± 0.50	8.7 ± 0.0	6.4 ± 0.0	3.2 ± 0.1
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	< 0.008 ± 0.001	< 5 ± 1.06	9.2 ± 0.2	6.6 ± 0.2	3.2 ± 0.2
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	< 0.008 ± 0.000	< 3 ± 0.74	8.5 ± 0.2	6.2 ± 0.1	3.1 ± 0.0
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	< 0.008 ± 0.001	< 5 ± 2.74	8.5 ± 0.1	6.2 ± 0.0	3.0 ± 0.0
Whiskeytown	12/11/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	8.2 ± 1.7	0.0044 ± 0.0038	4.2 ± 0.2	0.011 ± 0.001
Whiskeytown	12/11/96	0.40 µm Mem	2/2	< 0.011 ± 0.001	8.6 ± 2.9	0.0062 ± 0.0023	4.2 ± 0.2	0.010 ± 0.001
Whiskeytown	12/11/96	0.45 µm Cap	1/2	< 0.011 ± 0.001	9.0 ± 1.0	0.011 ± 0.003	4.5 ± 0.8	0.0081 ± 0.0003
Whiskeytown	12/11/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	14 ± 1	0.013 ± 0.007	5.1 ± 0.1	0.0076 ± 0.0008
Whiskeytown	12/11/96	10 kd Tan	1/2	< 0.011 ± 0.002	8.7 ± 1.3	0.0063 ± 0.0031	4.0 ± 0.1	0.0045 ± 0.0004
Whiskeytown	12/11/96	10 kd Tan	2/2	< 0.01 ± 0.00	7.4 ± 1.0	0.011 ± 0.007	4.3 ± 0.5	0.0031 ± 0.0012
Whiskeytown	05/29/97	0.40 µm Mem	1/2	< 0.002 ± 0.001	8.9 ± 1.4	< 0.004 ± 0.003	4.5 ± 0.3	0.0070 ± 0.0010
Whiskeytown	05/29/97	0.40 µm Mem	2/2	< 0.002 ± 0.001	9.4 ± 2.1	< 0.004 ± 0.001	4.5 ± 0.3	0.015 ± 0.001
Whiskeytown	05/29/97	0.45 µm Cap	1/2	< 0.002 ± 0.001	9.5 ± 1.7	0.0044 ± 0.0030	4.5 ± 0.3	0.0099 ± 0.0009
Whiskeytown	05/29/97	0.45 µm Cap	2/2	< 0.002 ± 0.001	9.2 ± 1.8	0.011 ± 0.001	4.4 ± 0.3	0.010 ± 0.000
Whiskeytown	05/29/97	10 kd Tan	1/2	< 0.002 ± 0.000	8.1 ± 0.2	< 0.004 ± 0.002	3.9 ± 0.2	0.0019 ± 0.0007
Whiskeytown	05/29/97	10 kd Tan	2/2	< 0.002 ± 0.001	9.0 ± 1.4	< 0.004 ± 0.003	3.9 ± 0.1	0.0020 ± 0.0005
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	< 0.005 ± 0.000	9.2 ± 0.3	0.019 ± 0.003	— ± —	0.0064 ± 0.0002
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	< 0.004 ± 0.000	8.9 ± 0.2	0.0092 ± 0.0023	4.2 ± 0.0	0.0073 ± 0.0013
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	< 0.005 ± 0.001	10 ± 1	0.0074 ± 0.0049	4.3 ± 0.1	0.0073 ± 0.0004
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	< 0.005 ± 0.002	10 ± 1	0.015 ± 0.001	4.3 ± 0.1	0.0088 ± 0.0008
Spring Cr. arm	07/12/96	10 kd Tan	1/3	< 0.005 ± 0.000	11 ± 0	0.017 ± 0.005	4.1 ± 0.1	0.0031 ± 0.0008
Spring Cr. arm	07/12/96	10 kd Tan	2/3	< 0.005 ± 0.000	9.6 ± 0.2	0.0052 ± 0.0044	4.2 ± 0.0	0.0031 ± 0.0003
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	< 0.01 ± 0.00	12 ± 2	0.016 ± 0.001	4.3 ± 0.0	0.023 ± 0.000
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	< 0.01 ± 0.00	12 ± 3	0.015 ± 0.007	4.6 ± 0.1	0.020 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Bismuth (µg/L) ICP–MS	Boron (µg/L) ICP–MS	Cadmium (µg/L) ICP–MS	Calcium (mg/L) ICP–AES	Cerium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	11 ± 2	0.015 ± 0.003	4.6 ± 0.3	0.018 ± 0.000
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	11 ± 1	0.016 ± 0.006	4.4 ± 0.4	0.020 ± 0.004
Spring Cr. arm	09/18/96	10 kd Tan	1/2	< 0.01 ± 0.00	9.8 ± 0.0	0.012 ± 0.003	4.0 ± 0.2	0.0054 ± 0.0005
Spring Cr. arm	09/18/96	10 kd Tan	2/2	< 0.01 ± 0.00	11 ± 1	0.010 ± 0.004	3.8 ± 0.3	0.0054 ± 0.0012
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	< 0.007 ± 0.000	8.6 ± 0.3	0.11 ± 0.01	5.4 ± 0.2	0.090 ± 0.001
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	< 0.007 ± 0.000	9.0 ± 0.9	0.10 ± 0.01	5.4 ± 0.2	0.064 ± 0.000
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	< 0.007 ± 0.001	8.6 ± 0.6	0.090 ± 0.003	5.4 ± 0.2	0.079 ± 0.006
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	< 0.007 ± 0.001	8.7 ± 0.9	0.10 ± 0.01	5.6 ± 0.3	0.081 ± 0.003
Spring Cr. arm	11/20/96	10 kd Tan	1/2	< 0.007 ± 0.000	8.3 ± 0.7	0.082 ± 0.008	4.5 ± 0.2	0.0095 ± 0.0027
Spring Cr. arm	11/20/96	10 kd Tan	2/2	< 0.007 ± 0.001	8.5 ± 1.9	0.095 ± 0.011	4.4 ± 0.1	0.011 ± 0.000
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	< 0.011 ± 0.002	7.2 ± 1.4	0.40 ± 0.01	5.6 ± 0.3	0.10 ± 0.01
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	< 0.011 ± 0.001	8.1 ± 3.5	0.39 ± 0.02	5.6 ± 0.3	0.079 ± 0.000
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	< 0.01 ± 0.00	8.4 ± 0.9	0.43 ± 0.03	5.7 ± 0.4	0.17 ± 0.00
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	< 0.01 ± 0.00	9.3 ± 1.2	0.42 ± 0.00	5.5 ± 0.3	0.17 ± 0.01
Spring Cr. arm	12/11/96	10 kd Tan	1/2	< 0.01 ± 0.00	8.8 ± 1.6	0.32 ± 0.01	4.4 ± 0.3	0.023 ± 0.001
Spring Cr. arm	12/11/96	10 kd Tan	2/2	< 0.011 ± 0.000	8.1 ± 2.8	0.32 ± 0.02	4.4 ± 0.2	0.025 ± 0.000
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	< 0.002 ± 0.001	9.4 ± 0.7	0.029 ± 0.005	4.9 ± 0.1	0.020 ± 0.001
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	< 0.002 ± 0.001	9.0 ± 0.8	0.019 ± 0.003	4.9 ± 0.2	0.018 ± 0.001
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	< 0.002 ± 0.001	8.6 ± 0.6	0.023 ± 0.004	4.8 ± 0.2	0.023 ± 0.002
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	< 0.002 ± 0.000	9.2 ± 0.7	0.023 ± 0.007	4.8 ± 0.1	0.024 ± 0.001
Spring Cr. arm	05/28/97	10 kd Tan	1/2	< 0.002 ± 0.001	8.9 ± 0.2	0.017 ± 0.002	3.8 ± 0.1	0.0033 ± 0.0013
Spring Cr. arm	05/28/97	10 kd Tan	2/2	< 0.002 ± 0.001	8.7 ± 0.5	0.016 ± 0.004	3.8 ± 0.1	0.0019 ± 0.0005
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	< 0.002 ± 0.001	334 ± 1	0.0078 ± 0.0050	37 ± 1	0.017 ± 0.001
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	< 0.002 ± 0.002	334 ± 1	0.0093 ± 0.0098	37 ± 1	0.016 ± 0.000
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	< 0.002 ± 0.000	332 ± 5	0.0061 ± 0.0019	36 ± 0	0.023 ± 0.000
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	< 0.002 ± 0.000	341 ± 16	0.0069 ± 0.0025	38 ± 2	0.025 ± 0.001
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	< 0.002 ± 0.000	336 ± 13	< 0.005 ± 0.004	33 ± 1	0.0068 ± 0.0006
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	< 0.002 ± 0.001	340 ± 6	0.0069 ± 0.0045	34 ± 0	0.0070 ± 0.0004
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	< 0.008 ± 0.001	23 ± 0	< 0.005 ± 0.004	8.7 ± 0.2	0.056 ± 0.001
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	< 0.008 ± 0.001	24 ± 1	< 0.005 ± 0.002	8.8 ± 0.0	0.031 ± 0.001
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	< 0.008 ± 0.001	24 ± 2	0.0057 ± 0.0032	8.6 ± 0.3	0.072 ± 0.000
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	< 0.008 ± 0.001	23 ± 0	0.0050 ± 0.0036	8.5 ± 0.2	0.072 ± 0.003
Yolo Bypass	01/07/97	10 kd Tan	1/2	< 0.008 ± 0.001	24 ± 0	0.0054 ± 0.0062	6.9 ± 0.1	0.010 ± 0.002
Yolo Bypass	01/07/97	10 kd Tan	2/2	< 0.008 ± 0.001	24 ± 1	< 0.005 ± 0.002	7.0 ± 0.1	0.012 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	0.44 ± 0.35	< 0.005 ± 0.000	1.5 ± 0.0	0.011 ± 0.000	0.0047 ± 0.0033
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	0.33 ± 0.06	< 0.003 ± 0.002	1.4 ± 0.0	0.011 ± 0.001	0.0043 ± 0.0012
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	0.28 ± 0.02	< 0.004 ± 0.003	2.2 ± 0.0	0.0071 ± 0.0008	0.0056 ± 0.0000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	0.18 ± 0.03	< 0.003 ± 0.001	1.4 ± 0.1	0.0087 ± 0.0020	0.0053 ± 0.0005
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	0.27 ± 0.03	< 0.004 ± 0.001	1.0 ± 0.0	0.0051 ± 0.0007	0.0032 ± 0.0006
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	< 0.2 ± 0.37	< 0.005 ± 0.003	1.0 ± 0.8	0.0046 ± 0.0012	0.0031 ± 0.0011
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	0.41 ± 0.14	< 0.011 ± 0.004	1.2 ± 0.0	0.010 ± 0.001	0.010 ± 0.001
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	0.53 ± 0.02	0.012 ± 0.010	1.2 ± 0.0	0.011 ± 0.004	0.0065 ± 0.0029
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	0.41 ± 0.15	< 0.011 ± 0.001	1.2 ± 0.0	0.0050 ± 0.0016	0.0070 ± 0.0007
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	0.43 ± 0.10	< 0.008 ± 0.005	1.2 ± 0.1	0.0061 ± 0.0001	0.0037 ± 0.0004
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	0.50 ± 0.09	< 0.008 ± 0.007	0.60 ± 0.04	0.0044 ± 0.0025	< 0.003 ± 0.001
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	0.28 ± 0.05	< 0.011 ± 0.005	0.53 ± 0.02	0.0024 ± 0.0013	0.0037 ± 0.0017
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	0.45 ± 0.07	< 0.009 ± 0.009	0.95 ± 0.06	0.0049 ± 0.0028	< 0.0013 ± 0.0017
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	0.33 ± 0.07	< 0.009 ± 0.002	0.84 ± 0.05	0.0038 ± 0.0006	< 0.0013 ± 0.0002
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.37 ± 0.12	< 0.009 ± 0.007	0.75 ± 0.03	0.0032 ± 0.0012	0.0022 ± 0.0007
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	0.44 ± 0.03	< 0.009 ± 0.001	0.75 ± 0.07	0.0045 ± 0.0000	0.0030 ± 0.0005
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	0.23 ± 0.10	< 0.009 ± 0.002	0.40 ± 0.06	< 0.002 ± 0.000	0.0019 ± 0.0012
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	0.25 ± 0.04	< 0.009 ± 0.003	0.41 ± 0.04	< 0.002 ± 0.001	< 0.0013 ± 0.0020
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	0.46 ± 0.08	< 0.007 ± 0.002	2.7 ± 0.1	0.0054 ± 0.0007	< 0.0019 ± 0.0012
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	0.46 ± 0.02	< 0.007 ± 0.003	2.7 ± 0.1	0.0051 ± 0.0025	0.0039 ± 0.0017
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	0.41 ± 0.00	< 0.009 ± 0.002	3.1 ± 0.1	0.0049 ± 0.0009	0.0037 ± 0.0007
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	0.38 ± 0.03	< 0.009 ± 0.005	2.9 ± 0.0	0.0031 ± 0.0004	0.0052 ± 0.0008
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	0.35 ± 0.09	< 0.009 ± 0.001	1.1 ± 0.1	< 0.0015 ± 0.0010	< 0.002 ± 0.001
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	0.28 ± 0.06	< 0.007 ± 0.004	1.1 ± 0.0	< 0.003 ± 0.001	< 0.0019 ± 0.0011
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	0.44 ± 0.04	0.017 ± 0.004	1.3 ± 0.0	0.0093 ± 0.0016	0.0052 ± 0.0003
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	0.41 ± 0.10	< 0.006 ± 0.002	1.1 ± 0.0	0.0066 ± 0.0010	0.0036 ± 0.0009
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	0.22 ± 0.01	0.0066 ± 0.0027	0.98 ± 0.04	0.0060 ± 0.0014	0.0041 ± 0.0011
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	0.34 ± 0.13	< 0.006 ± 0.003	0.97 ± 0.04	0.0061 ± 0.0013	0.0039 ± 0.0004
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	0.25 ± 0.11	< 0.006 ± 0.002	0.36 ± 0.02	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	0.16 ± 0.08	< 0.006 ± 0.002	0.35 ± 0.02	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	0.26 ± 0.03	0.0042 ± 0.0015	1.1 ± 0.0	0.0081 ± 0.0020	0.0037 ± 0.0005

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	0.24 ± 0.06	< 0.003 ± 0.000	1.1 ± 0.0	0.0083 ± 0.0005	0.0036 ± 0.0001
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	0.35 ± 0.09	0.0042 ± 0.0010	1.2 ± 0.0	0.0093 ± 0.0001	0.0032 ± 0.0006
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	0.35 ± 0.11	0.0042 ± 0.0024	1.1 ± 0.0	0.010 ± 0.001	0.0056 ± 0.0010
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	0.40 ± 0.07	< 0.003 ± 0.002	0.78 ± 0.02	0.0040 ± 0.0002	0.0033 ± 0.0006
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	0.30 ± 0.08	< 0.003 ± 0.001	0.82 ± 0.04	0.0045 ± 0.0010	0.0036 ± 0.0008
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	0.16 ± 0.04	< 0.003 ± 0.002	0.77 ± 0.04	0.0036 ± 0.0002	0.0027 ± 0.0008
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	0.55 ± 0.04	< 0.011 ± 0.005	1.2 ± 0.0	0.010 ± 0.001	0.0086 ± 0.0027
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	0.55 ± 0.11	0.017 ± 0.003	1.2 ± 0.0	0.0099 ± 0.0005	0.0058 ± 0.0033
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	0.80 ± 0.10	0.015 ± 0.008	1.4 ± 0.0	0.0099 ± 0.0017	0.0070 ± 0.0006
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	0.54 ± 0.07	0.014 ± 0.007	1.3 ± 0.0	0.0083 ± 0.0010	0.0039 ± 0.0009
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	0.40 ± 0.09	< 0.011 ± 0.004	0.49 ± 0.05	< 0.0018 ± 0.0006	< 0.0018 ± 0.0014
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	0.39 ± 0.03	< 0.011 ± 0.008	0.52 ± 0.02	0.0019 ± 0.0017	0.0032 ± 0.0013
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	0.39 ± 0.05	< 0.011 ± 0.007	0.51 ± 0.03	< 0.0018 ± 0.0020	< 0.0018 ± 0.0010
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	0.29 ± 0.00	0.029 ± 0.007	2.5 ± 0.0	0.014 ± 0.003	0.011 ± 0.002
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	0.39 ± 0.07	0.026 ± 0.006	2.4 ± 0.0	0.015 ± 0.000	0.0071 ± 0.0003
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	0.37 ± 0.14	0.031 ± 0.006	1.9 ± 0.0	0.013 ± 0.003	0.010 ± 0.003
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	0.43 ± 0.05	0.027 ± 0.004	2.0 ± 0.1	0.017 ± 0.001	0.0096 ± 0.0009
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	0.25 ± 0.05	0.015 ± 0.002	0.72 ± 0.08	< 0.002 ± 0.001	< 0.0013 ± 0.0009
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	0.29 ± 0.12	0.018 ± 0.005	0.70 ± 0.09	0.0025 ± 0.0011	< 0.0013 ± 0.0019
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	0.43 ± 0.06	0.029 ± 0.003	4.7 ± 0.1	0.013 ± 0.001	0.0063 ± 0.0014
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	0.36 ± 0.03	0.026 ± 0.003	4.6 ± 0.0	0.013 ± 0.002	0.0099 ± 0.0023
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	0.38 ± 0.01	0.048 ± 0.004	5.1 ± 0.0	0.011 ± 0.002	0.0076 ± 0.0008
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	0.37 ± 0.03	0.047 ± 0.001	5.1 ± 0.1	0.015 ± 0.001	0.0082 ± 0.0041
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	0.18 ± 0.03	0.010 ± 0.004	1.6 ± 0.1	< 0.003 ± 0.001	0.0030 ± 0.0012
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	0.22 ± 0.04	0.011 ± 0.005	1.5 ± 0.0	< 0.003 ± 0.002	0.0025 ± 0.0011
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	0.35 ± 0.02	0.10 ± 0.01	4.0 ± 0.2	0.0093 ± 0.0020	0.0059 ± 0.0008
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	0.32 ± 0.08	0.097 ± 0.003	3.9 ± 0.1	0.0087 ± 0.0004	0.0068 ± 0.0023
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	0.32 ± 0.02	0.16 ± 0.01	6.7 ± 0.2	0.018 ± 0.002	0.0071 ± 0.0007
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	0.34 ± 0.05	0.17 ± 0.00	9.4 ± 0.1	0.018 ± 0.001	0.0079 ± 0.0014
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	0.28 ± 0.05	0.082 ± 0.004	2.5 ± 0.1	0.0044 ± 0.0009	0.0036 ± 0.0009
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	0.31 ± 0.06	0.088 ± 0.004	2.5 ± 0.0	0.0041 ± 0.0017	0.0032 ± 0.0006
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	0.37 ± 0.15	0.077 ± 0.011	2.5 ± 0.1	0.0071 ± 0.0009	0.0039 ± 0.0028
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	0.36 ± 0.09	0.011 ± 0.004	1.3 ± 0.0	0.0074 ± 0.0021	0.0027 ± 0.0009
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	0.52 ± 0.07	0.026 ± 0.002	1.2 ± 0.0	0.0053 ± 0.0008	0.0036 ± 0.0005

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	0.34 ± 0.05	0.017 ± 0.007	2.1 ± 0.1	0.0067 ± 0.0002	0.0050 ± 0.0012
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	0.31 ± 0.13	0.017 ± 0.001	1.9 ± 0.0	0.0069 ± 0.0011	0.0038 ± 0.0000
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	0.25 ± 0.13	< 0.006 ± 0.003	0.62 ± 0.04	< 0.002 ± 0.000	< 0.002 ± 0.001
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	0.36 ± 0.09	< 0.006 ± 0.002	0.57 ± 0.02	< 0.002 ± 0.000	0.0019 ± 0.0005
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	0.38 ± 0.16	0.042 ± 0.002	1.2 ± 0.0	0.0068 ± 0.0008	0.0028 ± 0.0009
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	0.34 ± 0.01	0.041 ± 0.003	1.3 ± 0.0	0.0049 ± 0.0007	0.0028 ± 0.0003
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	0.42 ± 0.01	0.052 ± 0.002	0.94 ± 0.0	0.0058 ± 0.0000	0.0045 ± 0.0015
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	0.32 ± 0.03	0.040 ± 0.006	1.3 ± 0	0.0044 ± 0.0005	0.0049 ± 0.0002
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	0.42 ± 0.03	0.041 ± 0.004	0.94 ± 0.00	0.0023 ± 0.0001	0.0027 ± 0.0017
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	3.1 ± 0.12	0.056 ± 0.002	0.82 ± 0.06	0.0010 ± 0.0003	0.0019 ± 0.0006
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	0.73 ± 0.21	0.016 ± 0.005	1.1 ± 0.0	< 0.003 ± 0.000	< 0.003 ± 0.000
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	0.45 ± 0.06	< 0.006 ± 0.002	1.2 ± 0.1	0.0036 ± 0.0026	0.0027 ± 0.0015
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	0.47 ± 0.10	< 0.011 ± 0.006	1.3 ± 0.0	0.0048 ± 0.0015	0.0047 ± 0.0017
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	0.40 ± 0.04	< 0.006 ± 0.004	1.2 ± 0.1	0.0049 ± 0.0016	0.0045 ± 0.0010
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	0.31 ± 0.12	< 0.011 ± 0.002	0.33 ± 0.04	< 0.0018 ± 0.0011	< 0.0018 ± 0.0007
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	0.35 ± 0.07	< 0.011 ± 0.012	0.33 ± 0.02	< 0.0018 ± 0.0000	< 0.0018 ± 0.0014
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	0.35 ± 0.06	0.012 ± 0.006	2.0 ± 0.0	0.011 ± 0.002	0.0053 ± 0.0013
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	0.30 ± 0.07	0.0098 ± 0.0023	2.0 ± 0.1	0.011 ± 0.005	0.0077 ± 0.0012
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	0.29 ± 0.10	0.018 ± 0.011	1.8 ± 0.1	0.010 ± 0.002	0.0058 ± 0.0000
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	0.27 ± 0.07	0.013 ± 0.004	1.8 ± 0.1	0.0094 ± 0.0008	0.0061 ± 0.0020
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	< 0.12 ± 0.04	< 0.009 ± 0.003	0.57 ± 0.04	< 0.002 ± 0.001	0.0014 ± 0.0004
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	0.20 ± 0.11	< 0.009 ± 0.007	0.63 ± 0.02	< 0.002 ± 0.001	< 0.0013 ± 0.0012
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	0.38 ± 0.02	< 0.007 ± 0.005	3.0 ± 0.1	0.0067 ± 0.0005	0.0071 ± 0.0009
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	0.47 ± 0.05	< 0.007 ± 0.005	3.0 ± 0.1	0.0051 ± 0.0012	0.0056 ± 0.0010
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	0.44 ± 0.06	< 0.007 ± 0.009	3.2 ± 0.1	0.0073 ± 0.0011	0.0024 ± 0.0010
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	0.27 ± 0.03	< 0.007 ± 0.003	4.4 ± 0.0	0.0098 ± 0.0012	0.0072 ± 0.0007
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	0.21 ± 0.04	< 0.007 ± 0.003	0.84 ± 0.04	< 0.003 ± 0.001	< 0.0019 ± 0.0022
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	0.20 ± 0.03	< 0.007 ± 0.006	0.87 ± 0.01	< 0.003 ± 0.003	0.0025 ± 0.0016
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.54 ± 0.08	0.054 ± 0.006	2.0 ± 0.0	0.017 ± 0.001	0.0085 ± 0.0008
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.34 ± 0.03	0.016 ± 0.004	1.8 ± 0.0	0.0077 ± 0.0018	0.0052 ± 0.0019
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	0.37 ± 0.05	0.032 ± 0.002	3.6 ± 0.0	0.013 ± 0.000	0.0083 ± 0.0003
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.33 ± 0.01	0.036 ± 0.001	2.1 ± 0.1	0.011 ± 0.004	0.0063 ± 0.0011

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	0.26 ± 0.04	< 0.006 ± 0.003	1.0 ± 0.0	0.0040 ± 0.0016	0.0044 ± 0.0012
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.24 ± 0.06	0.0083 ± 0.0030	1.0 ± 0.0	0.0037 ± 0.0007	0.0040 ± 0.0008
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	0.45 ± 0.07	0.022 ± 0.001	1.3 ± 0.0	0.0062 ± 0.0007	0.0031 ± 0.0004
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	0.55 ± 0.10	0.016 ± 0.004	1.2 ± 0.0	0.0057 ± 0.0017	0.0031 ± 0.0002
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	0.40 ± 0.04	0.017 ± 0.003	1.5 ± 0.1	0.0053 ± 0.0009	0.0049 ± 0.0009
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	0.36 ± 0.06	0.019 ± 0.002	1.7 ± 0.0	0.0049 ± 0.0006	0.0039 ± 0.0012
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	0.23 ± 0.04	0.0098 ± 0.0027	0.57 ± 0.02	< 0.002 ± 0.001	< 0.002 ± 0.000
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	0.27 ± 0.08	0.010 ± 0.003	0.58 ± 0.07	< 0.002 ± 0.002	< 0.002 ± 0.001
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	0.35 ± 0.03	< 0.004 ± 0.002	1.3 ± 0.0	0.0036 ± 0.0002	0.0025 ± 0.0007
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	0.35 ± 0.01	0.0054 ± 0.0021	1.4 ± 0.0	0.0048 ± 0.0011	0.0030 ± 0.0001
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	0.59 ± 0.33	< 0.005 ± 0.002	1.8 ± 0.0	0.0051 ± 0.0028	0.0063 ± 0.0003
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	0.52 ± 0.16	0.011 ± 0.005	1.2 ± 0.0	0.0030 ± 0.0006	< 0.0018 ± 0.0005
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	0.33 ± 0.15	0.015 ± 0.003	1.2 ± 0.1	< 0.0018 ± 0.0017	< 0.0018 ± 0.0000
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	0.47 ± 0.14	0.013 ± 0.004	1.5 ± 0.0	0.0022 ± 0.0015	0.0033 ± 0.0021
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	0.39 ± 0.03	0.0084 ± 0.0106	1.3 ± 0.0	0.0042 ± 0.0005	0.0025 ± 0.0005
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	0.41 ± 0.15	< 0.011 ± 0.007	0.54 ± 0.01	< 0.0018 ± 0.0016	< 0.0018 ± 0.0001
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	0.34 ± 0.11	< 0.011 ± 0.006	0.54 ± 0.03	< 0.0018 ± 0.0010	< 0.0018 ± 0.0003
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	0.25 ± 0.04	0.016 ± 0.002	1.4 ± 0.0	0.0023 ± 0.0004	0.0022 ± 0.0001
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	0.29 ± 0.11	0.018 ± 0.002	1.3 ± 0.0	< 0.002 ± 0.001	< 0.0013 ± 0.0004
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	0.30 ± 0.04	0.015 ± 0.001	1.3 ± 0.1	< 0.002 ± 0.001	< 0.0013 ± 0.0003
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	0.31 ± 0.17	0.0096 ± 0.0040	1.3 ± 0.0	0.0040 ± 0.0015	0.0013 ± 0.0019
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	0.20 ± 0.02	< 0.009 ± 0.005	0.57 ± 0.05	< 0.002 ± 0.000	< 0.0013 ± 0.0004
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	0.16 ± 0.04	< 0.009 ± 0.002	0.62 ± 0.03	< 0.002 ± 0.001	0.0014 ± 0.0009
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	0.39 ± 0.05	< 0.007 ± 0.005	1.9 ± 0.0	0.0049 ± 0.0014	0.0051 ± 0.0023
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	0.36 ± 0.08	< 0.007 ± 0.002	2.0 ± 0.1	0.0054 ± 0.0019	0.0063 ± 0.0026
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	0.37 ± 0.05	0.021 ± 0.000	3.9 ± 0.2	0.0070 ± 0.0006	0.0051 ± 0.0005
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	0.53 ± 0.12	0.023 ± 0.000	2.1 ± 0.1	0.0063 ± 0.0023	0.0046 ± 0.0018
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	0.19 ± 0.02	< 0.009 ± 0.003	0.53 ± 0.03	0.0017 ± 0.0013	< 0.002 ± 0.001
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	0.26 ± 0.03	< 0.007 ± 0.007	0.61 ± 0.05	< 0.003 ± 0.002	< 0.0019 ± 0.0012
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	0.27 ± 0.06	0.017 ± 0.004	1.7 ± 0.0	0.0098 ± 0.0011	0.0077 ± 0.0033
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	0.27 ± 0.07	0.023 ± 0.008	1.9 ± 0.1	0.010 ± 0.002	0.0078 ± 0.0019

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	0.30 ± 0.03	0.044 ± 0.004	2.5 ± 0.1	0.014 ± 0.002	0.010 ± 0.002
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	0.28 ± 0.01	0.044 ± 0.006	1.8 ± 0.0	0.012 ± 0.001	0.0089 ± 0.0022
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	0.29 ± 0.06	0.024 ± 0.007	1.4 ± 0.0	0.0066 ± 0.0006	0.0059 ± 0.0001
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	0.26 ± 0.08	0.023 ± 0.004	1.4 ± 0.0	0.0081 ± 0.0033	0.0041 ± 0.0010
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	0.42 ± 0.04	0.020 ± 0.004	1.3 ± 0.0	0.0041 ± 0.0012	0.0033 ± 0.0006
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	0.50 ± 0.06	0.032 ± 0.006	1.3 ± 0.0	0.0065 ± 0.0023	0.0048 ± 0.0012
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	0.42 ± 0.03	0.016 ± 0.003	1.6 ± 0.0	0.0034 ± 0.0010	0.0029 ± 0.0002
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	0.33 ± 0.05	0.012 ± 0.003	1.3 ± 0.0	0.0032 ± 0.0020	0.0018 ± 0.0008
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	0.25 ± 0.08	< 0.005 ± 0.001	0.72 ± 0.03	< 0.002 ± 0.001	< 0.002 ± 0.000
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	0.26 ± 0.11	0.0059 ± 0.0019	0.83 ± 0.08	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	0.46 ± 0.30	< 0.005 ± 0.002	1.2 ± 0.1	0.0038 ± 0.0011	< 0.002 ± 0.002
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	0.36 ± 0.09	0.023 ± 0.002	1.2 ± 0.0	0.0044 ± 0.0008	0.0039 ± 0.0002
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.24 ± 0.03	0.0054 ± 0.0014	1.3 ± 0.1	0.0061 ± 0.0001	0.0024 ± 0.0002
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.27 ± 0.01	0.0062 ± 0.0026	1.1 ± 0.0	0.0041 ± 0.0003	0.0026 ± 0.0014
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	< 0.12 ± 0.00	< 0.004 ± 0.003	0.79 ± 0.01	0.0026 ± 0.0002	< 0.0011 ± 0.0003
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	0.20 ± 0.06	0.0055 ± 0.0017	0.75 ± 0.05	0.0021 ± 0.0001	0.0017 ± 0.0005
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	0.40 ± 0.19	0.024 ± 0.008	1.3 ± 0.0	0.0082 ± 0.0017	0.0022 ± 0.0008
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	0.41 ± 0.05	0.0089 ± 0.0005	1.2 ± 0.0	0.0032 ± 0.0010	< 0.0015 ± 0.0005
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	0.35 ± 0.14	0.0069 ± 0.0081	1.4 ± 0.0	0.0039 ± 0.0010	0.0031 ± 0.0027
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	0.24 ± 0.03	< 0.006 ± 0.011	1.3 ± 0.1	0.0030 ± 0.0019	0.0024 ± 0.0008
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	0.25 ± 0.08	< 0.011 ± 0.002	0.61 ± 0.01	0.0019 ± 0.0009	< 0.0018 ± 0.0005
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	0.32 ± 0.09	< 0.011 ± 0.004	0.61 ± 0.03	< 0.0018 ± 0.0021	< 0.0018 ± 0.0009
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	< 0.12 ± 0.05	0.027 ± 0.003	1.3 ± 0.0	0.0071 ± 0.0023	0.0039 ± 0.0011
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	< 0.12 ± 0.01	0.028 ± 0.008	1.4 ± 0.0	0.0063 ± 0.0007	0.0025 ± 0.0014
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.23 ± 0.06	0.026 ± 0.005	1.5 ± 0.0	0.0078 ± 0.0005	0.0050 ± 0.0005
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.28 ± 0.08	0.024 ± 0.010	1.5 ± 0.1	0.0072 ± 0.0018	0.0048 ± 0.0021
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.27 ± 0.06	0.022 ± 0.002	1.3 ± 0.0	0.0051 ± 0.0024	0.0020 ± 0.0011
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.26 ± 0.07	0.027 ± 0.013	1.3 ± 0.1	0.0069 ± 0.0047	0.0062 ± 0.0003
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	0.25 ± 0.08	0.017 ± 0.006	0.83 ± 0.12	0.0035 ± 0.0024	0.0034 ± 0.0012
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	0.24 ± 0.05	0.014 ± 0.005	0.81 ± 0.03	< 0.003 ± 0.002	0.0031 ± 0.0007

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	0.34 ± 0.08	0.011 ± 0.005	1.3 ± 0.0	0.0033 ± 0.0008	0.0027 ± 0.0004
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	0.27 ± 0.07	0.0074 ± 0.0026	1.3 ± 0.0	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	0.26 ± 0.01	0.011 ± 0.004	1.8 ± 0.1	0.0027 ± 0.0018	0.0018 ± 0.0008
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	0.42 ± 0.20	0.012 ± 0.006	1.3 ± 0.0	0.0026 ± 0.0012	0.0021 ± 0.0004
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	0.15 ± 0.18	< 0.005 ± 0.003	0.56 ± 0.03	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	< 0.1 ± 0.11	< 0.005 ± 0.003	0.59 ± 0.03	< 0.002 ± 0.002	< 0.002 ± 0.001
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.15 ± 0.03	0.0059 ± 0.0010	1.1 ± 0.0	0.0035 ± 0.0003	0.0028 ± 0.0009
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	0.13 ± 0.01	< 0.004 ± 0.002	1.0 ± 0.0	0.0034 ± 0.0016	0.0018 ± 0.0007
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	< 0.2 ± 0.38	< 0.005 ± 0.006	1.3 ± 0.0	0.0045 ± 0.0000	0.0049 ± 0.0007
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.13 ± 0.02	< 0.004 ± 0.003	1.1 ± 0.0	0.0052 ± 0.0004	0.0021 ± 0.0000
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	< 0.11 ± 0.05	0.0053 ± 0.0012	0.79 ± 0.02	0.00099 ± 0.00048	0.0011 ± 0.0002
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	0.34 ± 0.06	0.0099 ± 0.0013	0.81 ± 0.02	0.0015 ± 0.0002	< 0.0011 ± 0.0002
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	0.33 ± 0.09	< 0.011 ± 0.008	1.2 ± 0.0	0.0032 ± 0.0011	0.0039 ± 0.0006
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	0.35 ± 0.15	< 0.011 ± 0.005	1.2 ± 0.1	< 0.0018 ± 0.0008	< 0.0018 ± 0.0001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	0.57 ± 0.11	0.011 ± 0.007	1.3 ± 0.0	< 0.003 ± 0.001	< 0.003 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	0.31 ± 0.11	< 0.011 ± 0.006	1.2 ± 0.0	0.0048 ± 0.0024	< 0.0018 ± 0.0007
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	< 0.17 ± 0.06	< 0.006 ± 0.005	0.45 ± 0.04	< 0.0018 ± 0.0013	< 0.0015 ± 0.0004
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	0.46 ± 0.13	0.0092 ± 0.0055	0.45 ± 0.03	< 0.003 ± 0.002	< 0.003 ± 0.001
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	0.12 ± 0.05	0.014 ± 0.004	1.2 ± 0.0	0.0028 ± 0.0007	0.0028 ± 0.0024
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	0.14 ± 0.00	0.012 ± 0.007	1.2 ± 0.1	0.0027 ± 0.0007	0.0025 ± 0.0021
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	0.14 ± 0.04	0.013 ± 0.001	1.2 ± 0.0	< 0.002 ± 0.001	< 0.0013 ± 0.0001
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	0.15 ± 0.08	< 0.009 ± 0.002	1.1 ± 0.1	0.0041 ± 0.0004	< 0.0013 ± 0.0017
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	< 0.12 ± 0.02	< 0.009 ± 0.005	0.38 ± 0.01	< 0.002 ± 0.001	< 0.0013 ± 0.0011
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	0.12 ± 0.10	< 0.009 ± 0.004	0.34 ± 0.01	< 0.002 ± 0.000	< 0.0013 ± 0.0006
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	0.23 ± 0.05	0.019 ± 0.004	1.5 ± 0.0	0.0075 ± 0.0026	0.0065 ± 0.0011
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.21 ± 0.07	0.018 ± 0.006	1.5 ± 0.0	0.0058 ± 0.0022	0.0074 ± 0.0038
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.25 ± 0.07	0.033 ± 0.006	1.3 ± 0.0	0.0077 ± 0.0016	0.0070 ± 0.0015
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.23 ± 0.08	0.029 ± 0.008	1.3 ± 0.0	0.0069 ± 0.0012	0.0062 ± 0.0021
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	0.16 ± 0.05	0.019 ± 0.004	0.76 ± 0.03	0.0037 ± 0.0019	0.0025 ± 0.0005
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.15 ± 0.02	0.019 ± 0.003	0.82 ± 0.08	< 0.003 ± 0.002	0.0041 ± 0.0022
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.19 ± 0.04	0.053 ± 0.002	1.0 ± 0.1	0.013 ± 0.000	0.012 ± 0.001
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.20 ± 0.06	0.046 ± 0.002	1.0 ± 0.0	0.017 ± 0.002	0.011 ± 0.000

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	0.20 ± 0.05	0.059 ± 0.003	1.8 ± 0.1	0.018 ± 0.001	0.013 ± 0.004
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.18 ± 0.04	0.058 ± 0.001	1.1 ± 0.0	0.020 ± 0.002	0.014 ± 0.002
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	0.17 ± 0.15	0.031 ± 0.003	2.0 ± 0.0	0.0041 ± 0.0006	0.0034 ± 0.0013
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.11 ± 0.05	0.029 ± 0.002	0.49 ± 0.04	0.0042 ± 0.0017	0.0029 ± 0.0015
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	0.16 ± 0.08	0.013 ± 0.003	1.2 ± 0.0	< 0.002 ± 0.001	< 0.002 ± 0.001
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	0.14 ± 0.10	0.013 ± 0.003	1.2 ± 0.0	< 0.002 ± 0.002	< 0.002 ± 0.002
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	0.15 ± 0.09	0.015 ± 0.003	1.2 ± 0.0	0.0026 ± 0.0004	0.0026 ± 0.0011
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	0.27 ± 0.13	0.016 ± 0.005	1.2 ± 0.0	0.0037 ± 0.0019	0.0036 ± 0.0025
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	< 0.1 ± 0.13	0.0054 ± 0.0033	0.51 ± 0.02	< 0.002 ± 0.002	< 0.002 ± 0.000
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	< 0.1 ± 0.00	0.0052 ± 0.0018	0.49 ± 0.04	< 0.002 ± 0.002	< 0.002 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	0.27 ± 0.11	0.019 ± 0.004	1.2 ± 0.1	0.0049 ± 0.0006	0.0026 ± 0.0014
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.30 ± 0.09	0.023 ± 0.005	1.2 ± 0.1	0.0048 ± 0.0004	0.0025 ± 0.0020
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	< 0.2 ± 0.14	0.010 ± 0.002	1.1 ± 0.0	0.0059 ± 0.0012	0.0026 ± 0.0024
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	0.33 ± 0.19	0.016 ± 0.002	1.1 ± 0.0	0.0046 ± 0.0018	0.0032 ± 0.0007
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	< 0.2 ± 0.12	< 0.003 ± 0.004	0.39 ± 0.05	0.0019 ± 0.0017	< 0.002 ± 0.002
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	< 0.2 ± 0.26	0.0053 ± 0.0030	0.41 ± 0.03	< 0.002 ± 0.001	< 0.002 ± 0.001
Flat Cr.	12/11/96	0.40 µm Mem	1/2	0.14 ± 0.06	0.26 ± 0.00	5.8 ± 0.2	0.044 ± 0.002	0.033 ± 0.000
Flat Cr.	12/11/96	0.40 µm Mem	2/2	0.13 ± 0.05	0.25 ± 0.00	5.7 ± 0.2	0.040 ± 0.000	0.033 ± 0.007
Flat Cr.	12/11/96	0.45 µm Cap	1/2	0.12 ± 0.04	0.23 ± 0.00	4.7 ± 0.3	0.031 ± 0.002	0.020 ± 0.002
Flat Cr.	12/11/96	0.45 µm Cap	2/2	0.097 ± 0.036	0.22 ± 0.00	4.6 ± 0.2	0.030 ± 0.000	0.025 ± 0.002
Flat Cr.	12/11/96	10 kd Tan	1/2	< 0.05 ± 0.05	0.18 ± 0.02	3.0 ± 0.1	0.020 ± 0.006	0.0098 ± 0.0024
Flat Cr.	12/11/96	10 kd Tan	2/2	0.065 ± 0.021	0.18 ± 0.00	3.0 ± 0.1	0.015 ± 0.002	0.013 ± 0.003
Flat Cr.	05/29/97	0.40 µm Mem	1/2	< 0.05 ± 0.06	0.36 ± 0.01	1.5 ± 0.0	0.028 ± 0.002	0.022 ± 0.002
Flat Cr.	05/29/97	0.40 µm Mem	2/2	< 0.05 ± 0.03	0.37 ± 0.01	1.4 ± 0.0	0.027 ± 0.004	0.024 ± 0.003
Flat Cr.	05/29/97	0.45 µm Cap	1/2	< 0.05 ± 0.05	0.36 ± 0.01	0.79 ± 0.03	0.025 ± 0.003	0.020 ± 0.001
Flat Cr.	05/29/97	0.45 µm Cap	2/2	< 0.05 ± 0.05	0.36 ± 0.01	1.2 ± 0.0	0.023 ± 0.002	0.019 ± 0.002
Flat Cr.	05/29/97	10 kd Tan	1/2	< 0.05 ± 0.04	0.32 ± 0.01	0.44 ± 0.03	0.0075 ± 0.0015	0.0052 ± 0.0016
Flat Cr.	05/29/97	10 kd Tan	2/2	< 0.05 ± 0.03	0.33 ± 0.01	0.47 ± 0.02	0.0079 ± 0.0029	0.0060 ± 0.0019
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	0.19 ± 0.04	4.7 ± 0.1	426 ± 23	2.2 ± 0.0	1.2 ± 0.0
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	0.15 ± 0.07	4.5 ± 0.0	454 ± 24	2.3 ± 0.0	1.2 ± 0.0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	0.24 ± 0.04	4.5 ± 0.0	470 ± 9	2.2 ± 0.1	1.1 ± 0.0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	0.18 ± 0.08	4.6 ± 0.0	452 ± 20	2.1 ± 0.0	1.1 ± 0.0
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	0.25 ± 0.06	4.5 ± 0.1	429 ± 30	2.0 ± 0.0	1.2 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	0.26 ± 0.04	4.5 ± 0.0	429 ± 32	2.2 ± 0.1	1.1 ± 0.0
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	< 0.2 ± 0.07	13 ± 1	476 ± 17	3.3 ± 0.0	1.9 ± 0.0
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	< 0.2 ± 0.06	13 ± 1	496 ± 16	3.4 ± 0.0	1.9 ± 0.0
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	< 0.2 ± 0.04	12 ± 1	464 ± 21	3.3 ± 0.0	1.8 ± 0.1
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	< 0.2 ± 0.06	13 ± 0	471 ± 17	3.3 ± 0.0	1.8 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	0.29 ± 0.14	13 ± 1	456 ± 45	3.3 ± 0.0	1.8 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	0.31 ± 0.12	13 ± 0	451 ± 25	3.3 ± 0.0	1.8 ± 0.0
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	0.49 ± 0.04	6.9 ± 0.0	472 ± 23	1.3 ± 0.0	0.75 ± 0.06
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	0.50 ± 0.04	7.1 ± 0.0	563 ± 23	1.4 ± 0.1	0.77 ± 0.01
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	0.53 ± 0.06	6.9 ± 0.2	549 ± 5	1.5 ± 0.0	0.75 ± 0.00
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	0.58 ± 0.08	7.0 ± 0.0	556 ± 9	1.4 ± 0.1	0.75 ± 0.00
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	0.51 ± 0.06	6.9 ± 0.1	535 ± 6	1.3 ± 0.1	0.65 ± 0.03
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	0.60 ± 0.09	6.5 ± 0.0	522 ± 17	1.3 ± 0.1	0.70 ± 0.02
Whiskeytown	12/11/96	0.40 µm Mem	1/2	0.48 ± 0.07	< 0.007 ± 0.002	0.86 ± 0.02	0.0053 ± 0.0024	0.0057 ± 0.0014
Whiskeytown	12/11/96	0.40 µm Mem	2/2	0.41 ± 0.08	< 0.007 ± 0.007	0.90 ± 0.03	0.0073 ± 0.0015	0.0054 ± 0.0020
Whiskeytown	12/11/96	0.45 µm Cap	1/2	0.46 ± 0.03	< 0.007 ± 0.005	0.94 ± 0.05	0.0053 ± 0.0009	0.0048 ± 0.0009
Whiskeytown	12/11/96	0.45 µm Cap	2/2	0.48 ± 0.02	< 0.007 ± 0.004	1.1 ± 0.0	0.0088 ± 0.0047	0.0024 ± 0.0011
Whiskeytown	12/11/96	10 kd Tan	1/2	0.41 ± 0.01	< 0.009 ± 0.001	0.70 ± 0.02	0.0025 ± 0.0022	0.0024 ± 0.0022
Whiskeytown	12/11/96	10 kd Tan	2/2	0.36 ± 0.03	< 0.007 ± 0.004	0.59 ± 0.05	< 0.003 ± 0.001	< 0.0019 ± 0.0008
Whiskeytown	05/29/97	0.40 µm Mem	1/2	0.58 ± 0.05	0.016 ± 0.005	0.86 ± 0.05	0.0052 ± 0.0030	0.0050 ± 0.0033
Whiskeytown	05/29/97	0.40 µm Mem	2/2	0.88 ± 0.03	0.040 ± 0.003	0.86 ± 0.04	0.0058 ± 0.0012	0.0036 ± 0.0019
Whiskeytown	05/29/97	0.45 µm Cap	1/2	0.57 ± 0.08	0.012 ± 0.002	0.90 ± 0.02	0.0058 ± 0.0008	0.0053 ± 0.0028
Whiskeytown	05/29/97	0.45 µm Cap	2/2	0.51 ± 0.04	0.016 ± 0.004	1.5 ± 0.1	0.0046 ± 0.0009	0.0028 ± 0.0005
Whiskeytown	05/29/97	10 kd Tan	1/2	0.38 ± 0.04	0.0059 ± 0.0006	0.39 ± 0.01	0.0029 ± 0.0020	< 0.002 ± 0.001
Whiskeytown	05/29/97	10 kd Tan	2/2	0.37 ± 0.05	0.0039 ± 0.0014	0.42 ± 0.04	< 0.002 ± 0.001	< 0.002 ± 0.001
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	0.43 ± 0.04	< 0.004 ± 0.002	0.72 ± 0.01	0.0035 ± 0.0006	0.0036 ± 0.0005
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	0.37 ± 0.01	0.0067 ± 0.0016	0.63 ± 0.00	0.0051 ± 0.0002	0.0040 ± 0.0002
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	0.67 ± 0.04	< 0.005 ± 0.001	1.1 ± 0.0	0.0073 ± 0.0012	< 0.002 ± 0.002
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	0.48 ± 0.22	< 0.005 ± 0.002	0.96 ± 0.10	0.0053 ± 0.0011	0.0045 ± 0.0007
Spring Cr. arm	07/12/96	10 kd Tan	1/3	0.60 ± 0.32	< 0.005 ± 0.002	2.5 ± 0.0	0.0038 ± 0.0007	0.0042 ± 0.0005
Spring Cr. arm	07/12/96	10 kd Tan	2/3	0.42 ± 0.02	< 0.004 ± 0.003	0.43 ± 0.01	0.0025 ± 0.0003	0.0014 ± 0.0007
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	0.67 ± 0.09	0.021 ± 0.002	1.1 ± 0.0	0.010 ± 0.001	0.0054 ± 0.0012
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	0.65 ± 0.05	0.017 ± 0.009	1.1 ± 0.0	0.0064 ± 0.0004	0.0078 ± 0.0010

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Chromium (µg/L) ICP–MS	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	0.70 ± 0.12	0.013 ± 0.006	1.3 ± 0.0	0.0092 ± 0.0019	0.0029 ± 0.0003
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	0.64 ± 0.01	0.017 ± 0.003	1.1 ± 0.0	0.011 ± 0.004	0.0084 ± 0.0001
Spring Cr. arm	09/18/96	10 kd Tan	1/2	0.51 ± 0.08	0.013 ± 0.007	0.48 ± 0.03	0.0029 ± 0.0003	0.0025 ± 0.0019
Spring Cr. arm	09/18/96	10 kd Tan	2/2	0.53 ± 0.04	0.012 ± 0.009	0.48 ± 0.03	0.0028 ± 0.0009	0.0019 ± 0.0016
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	0.45 ± 0.03	0.29 ± 0.01	5.8 ± 0.1	0.036 ± 0.005	0.014 ± 0.000
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	0.33 ± 0.07	0.27 ± 0.01	4.9 ± 0.1	0.025 ± 0.003	0.013 ± 0.002
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	0.40 ± 0.06	0.26 ± 0.00	3.2 ± 0.1	0.028 ± 0.007	0.014 ± 0.001
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	0.36 ± 0.10	0.27 ± 0.00	3.3 ± 0.1	0.030 ± 0.008	0.014 ± 0.000
Spring Cr. arm	11/20/96	10 kd Tan	1/2	0.38 ± 0.22	0.24 ± 0.00	2.3 ± 0.1	0.0052 ± 0.0008	0.0042 ± 0.0018
Spring Cr. arm	11/20/96	10 kd Tan	2/2	0.26 ± 0.01	0.22 ± 0.01	2.1 ± 0.1	0.0033 ± 0.0022	0.0018 ± 0.0019
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	0.19 ± 0.01	0.55 ± 0.01	16 ± 0	0.034 ± 0.001	0.020 ± 0.001
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	0.17 ± 0.01	0.56 ± 0.03	14 ± 0	0.023 ± 0.003	0.015 ± 0.002
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	0.22 ± 0.06	0.57 ± 0.01	23 ± 0	0.053 ± 0.005	0.028 ± 0.001
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	0.30 ± 0.02	0.57 ± 0.02	23 ± 0	0.057 ± 0.003	0.040 ± 0.001
Spring Cr. arm	12/11/96	10 kd Tan	1/2	0.098 ± 0.076	0.44 ± 0.01	9.1 ± 0.1	0.0075 ± 0.0026	0.0056 ± 0.0036
Spring Cr. arm	12/11/96	10 kd Tan	2/2	0.11 ± 0.01	0.43 ± 0.00	8.9 ± 0.1	0.0069 ± 0.0014	0.0055 ± 0.0015
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	0.74 ± 0.14	0.068 ± 0.002	1.7 ± 0.1	0.0083 ± 0.0023	0.0054 ± 0.0004
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	0.66 ± 0.03	0.058 ± 0.009	1.6 ± 0.0	0.0077 ± 0.0020	0.0069 ± 0.0022
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	0.53 ± 0.06	0.077 ± 0.004	2.1 ± 0.1	0.012 ± 0.003	0.0067 ± 0.0025
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	0.50 ± 0.05	0.070 ± 0.004	1.9 ± 0.0	0.010 ± 0.001	0.0076 ± 0.0013
Spring Cr. arm	05/28/97	10 kd Tan	1/2	0.34 ± 0.08	0.039 ± 0.004	0.54 ± 0.02	0.0021 ± 0.0006	< 0.002 ± 0.001
Spring Cr. arm	05/28/97	10 kd Tan	2/2	0.36 ± 0.08	0.038 ± 0.002	0.53 ± 0.04	< 0.002 ± 0.000	< 0.002 ± 0.000
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	< 0.2 ± 0.02	0.084 ± 0.004	3.0 ± 0.0	0.011 ± 0.002	0.013 ± 0.002
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	< 0.2 ± 0.08	0.081 ± 0.007	3.0 ± 0.1	0.011 ± 0.003	0.014 ± 0.000
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	< 0.2 ± 0.35	0.15 ± 0.01	2.8 ± 0.0	0.0097 ± 0.0006	0.011 ± 0.002
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	< 0.2 ± 0.15	0.15 ± 0.01	2.7 ± 0.1	0.012 ± 0.003	0.012 ± 0.002
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	< 0.2 ± 0.11	0.036 ± 0.002	1.3 ± 0.0	0.0082 ± 0.0018	0.0097 ± 0.0021
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	< 0.2 ± 0.17	0.036 ± 0.003	1.3 ± 0.1	0.0080 ± 0.0025	0.0097 ± 0.0029
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	0.30 ± 0.09	0.055 ± 0.004	1.7 ± 0.0	0.0082 ± 0.0014	0.0089 ± 0.0005
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	0.22 ± 0.01	0.026 ± 0.004	1.6 ± 0.1	0.0074 ± 0.0027	0.0063 ± 0.0012
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	0.27 ± 0.05	0.045 ± 0.005	1.7 ± 0.1	0.015 ± 0.001	0.0082 ± 0.0007
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	0.28 ± 0.06	0.039 ± 0.003	1.7 ± 0.0	0.015 ± 0.002	0.0083 ± 0.0021
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.12 ± 0.01	0.022 ± 0.008	0.92 ± 0.03	0.0042 ± 0.0015	0.0024 ± 0.0004
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.12 ± 0.04	0.021 ± 0.004	0.90 ± 0.06	0.0038 ± 0.0013	0.0026 ± 0.0008

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	0.0029 ± 0.0004	0.012 ± 0.001	0.0017 ± 0.0002	14 ± —	56 ± 1
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	0.0076 ± 0.0001	0.012 ± 0.000	0.0014 ± 0.0000	10 ± —	— ± —
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	0.0023 ± 0.0003	0.011 ± 0.000	0.0019 ± 0.0001	6.6 ± —	19 ± —
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	0.0081 ± 0.0004	0.012 ± 0.001	0.0022 ± 0.0000	8.2 ± —	— ± —
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	0.0018 ± 0.0009	0.0043 ± 0.0003	0.0010 ± 0.0001	18 ± —	72 ± —
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	0.0032 ± 0.0004	0.0080 ± 0.0002	0.00087 ± 0.00022	< 0.2 ± —	— ± —
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	0.0027 ± 0.0012	0.016 ± 0.003	0.0017 ± 0.0009	21 ± 2	13 ± 0
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	< 0.001 ± 0.000	0.0097 ± 0.0022	0.0026 ± 0.0007	25 ± 1	— ± —
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	0.0035 ± 0.0018	0.016 ± 0.001	0.0013 ± 0.0001	7.5 ± 0.7	15 ± 1
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	0.0027 ± 0.0006	0.0069 ± 0.0009	0.0015 ± 0.0004	6.5 ± 0.3	— ± —
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	0.0030 ± 0.0002	0.0048 ± 0.0018	0.00089 ± 0.00029	6.4 ± —	7.5 ± —
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	0.0015 ± 0.0028	0.0059 ± 0.0009	0.00045 ± 0.00007	4.6 ± —	— ± —
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0041 ± 0.0013	0.00059 ± 0.00019	8.0 ± 4.1	— ± —
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	0.00081 ± 0.00042	0.0053 ± 0.0029	0.00049 ± 0.00025	5.5 ± —	6.5 ± —
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.0013 ± 0.0008	0.0051 ± 0.0007	0.00047 ± 0.00010	5.0 ± 2.5	4.1 ± —
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0042 ± 0.0019	0.00081 ± 0.00045	4.3 ± 2.1	— ± —
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.0016 ± 0.0013	0.00048 ± 0.00037	2.0 ± 1.3	2.9 ± —
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	< 0.001 ± 0.001	0.0029 ± 0.0011	0.00048 ± 0.00017	2.0 ± 0.5	— ± —
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.0076 ± 0.0029	0.0011 ± 0.0002	10 ± —	9.9 ± —
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	0.00099 ± 0.00026	0.0078 ± 0.0050	0.0013 ± 0.0004	14 ± 6	— ± —
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.011 ± 0.001	0.0013 ± 0.0001	4.9 ± —	5.8 ± —
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.0091 ± 0.0011	0.0014 ± 0.0005	7.2 ± 3.1	— ± —
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	< 0.001 ± 0.000	0.0032 ± 0.0012	< 0.0004 ± 0.0002	2.9 ± 2.3	1.3 ± —
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	< 0.001 ± 0.000	< 0.002 ± 0.001	< 0.0007 ± 0.0004	2.7 ± 2.0	— ± —
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	0.0014 ± 0.0009	0.013 ± 0.003	0.0015 ± 0.0001	26 ± —	24 ± 1
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0084 ± 0.0009	0.00080 ± 0.00008	18 ± 8	— ± —
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.010 ± 0.004	0.0014 ± 0.0001	11 ± 3	5.3 ± 1.7
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.010 ± 0.003	0.0013 ± 0.0002	8.6 ± 0.3	— ± —
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.002 ± 0.001	< 0.0005 ± 0.0000	3.6 ± —	3.0 ± 0.4
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.003	< 0.0005 ± 0.0001	1.6 ± 1.2	— ± —
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	0.0061 ± 0.0007	0.0074 ± 0.0004	0.0013 ± 0.0001	6.8 ± —	28 ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	0.0067 ± 0.0001	0.0081 ± 0.0015	0.0016 ± 0.0001	11 ± —	— ± —
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	0.0063 ± 0.0002	0.014 ± 0.001	0.0015 ± 0.0000	6.3 ± —	19 ± —
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	0.0072 ± 0.0013	0.011 ± 0.000	0.0023 ± 0.0001	6.6 ± —	— ± —
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	0.0052 ± 0.0004	0.0052 ± 0.0002	0.00073 ± 0.00008	1.6 ± —	12 ± —
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	0.0048 ± 0.0002	0.0065 ± 0.0001	0.00088 ± 0.00003	2.3 ± —	— ± —
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	0.0054 ± 0.0003	0.0058 ± 0.0007	0.00074 ± 0.00020	2.6 ± —	— ± —
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	0.0028 ± 0.0019	0.012 ± 0.003	0.0022 ± 0.0002	10 ± 0	16 ± —
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	0.0023 ± 0.0012	0.013 ± 0.002	0.0013 ± 0.0008	8.4 ± —	— ± —
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	0.0018 ± 0.0019	0.015 ± 0.001	0.0020 ± 0.0005	9.7 ± 1.6	11 ± 0
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	0.0032 ± 0.0017	0.011 ± 0.005	0.0017 ± 0.0005	11 ± 3	— ± —
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	< 0.001 ± 0.001	< 0.003 ± 0.001	0.00074 ± 0.00053	2.4 ± 0.8	7.7 ± 0.5
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	< 0.001 ± 0.002	0.0035 ± 0.0015	0.0011 ± 0.0008	1.8 ± 0.3	— ± —
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	< 0.001 ± 0.001	0.0026 ± 0.0010	0.00064 ± 0.00025	1.6 ± 0.1	— ± —
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	0.0019 ± 0.0006	0.013 ± 0.002	0.0031 ± 0.0005	21 ± —	18 ± 0
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	0.0014 ± 0.0009	0.018 ± 0.004	0.0037 ± 0.0005	20 ± 1	— ± —
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	0.0019 ± 0.0005	0.016 ± 0.002	0.0028 ± 0.0001	9.8 ± 0.8	12 ± —
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	0.0013 ± 0.0010	0.017 ± 0.002	0.0027 ± 0.0003	9.6 ± 0.8	— ± —
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	0.00077 ± 0.00056	0.0022 ± 0.0027	0.00063 ± 0.00006	1.6 ± 0.0	5.3 ± —
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	< 0.001 ± 0.000	0.0031 ± 0.0011	0.00055 ± 0.00013	2.6 ± —	— ± —
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	0.0014 ± 0.0005	0.016 ± 0.003	0.0028 ± 0.0002	21 ± 1	13 ± —
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	< 0.001 ± 0.000	0.023 ± 0.001	0.0026 ± 0.0002	14 ± —	— ± —
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	0.0012 ± 0.0000	0.019 ± 0.001	0.0026 ± 0.0001	13 ± 3	13 ± —
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	0.0014 ± 0.0014	0.019 ± 0.002	0.0027 ± 0.0007	13 ± 1	— ± —
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	< 0.001 ± 0.000	0.0044 ± 0.0034	< 0.0007 ± 0.0001	3.5 ± —	2.3 ± —
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	< 0.001 ± 0.000	0.0053 ± 0.0025	< 0.0007 ± 0.0002	1.9 ± 1.0	— ± —
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	0.0015 ± 0.0008	0.013 ± 0.003	0.0028 ± 0.0006	26 ± —	31 ± —
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	0.0011 ± 0.0006	0.015 ± 0.003	0.0024 ± 0.0003	31 ± 5	— ± —
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	0.0019 ± 0.0008	0.028 ± 0.003	0.0034 ± 0.0003	86 ± 2	74 ± —
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	0.0022 ± 0.0006	0.030 ± 0.000	0.0036 ± 0.0007	84 ± 4	— ± —
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	< 0.001 ± 0.000	0.0088 ± 0.0037	0.0012 ± 0.0002	6.3 ± 2.5	2.3 ± —
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	0.00052 ± 0.00018	0.0056 ± 0.0009	0.0012 ± 0.0003	4.9 ± —	— ± —
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	< 0.001 ± 0.001	0.0083 ± 0.0013	0.0011 ± 0.0003	4.9 ± 0.7	— ± —
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0083 ± 0.0022	0.00088 ± 0.00024	4.9 ± 0.2	7.3 ± 0.9
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	0.0025 ± 0.0011	0.012 ± 0.001	0.0014 ± 0.0002	22 ± —	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	0.0014 ± 0.0008	0.013 ± 0.002	0.0013 ± 0.0003	8.0 ± 3.5	5.7 ± 3.0
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0094 ± 0.0019	0.0012 ± 0.0001	6.4 ± 0.7	— ± —
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	< 0.001 ± 0.000	0.0023 ± 0.0012	< 0.0005 ± 0.0000	4.0 ± 3.2	5.4 ± 2.8
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	< 0.001 ± 0.000	0.0039 ± 0.0015	< 0.0005 ± 0.0003	1.8 ± —	— ± —
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	0.0023 ± 0.0003	0.0060 ± 0.0012	0.0023 ± 0.0001	11 ± —	94 ± —
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	0.0010 ± 0.0004	0.0096 ± 0.0022	0.0011 ± 0.0001	12 ± —	— ± —
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	0.0061 ± 0.0006	0.0096 ± 0.0005	0.0014 ± 0.0001	11 ± —	19 ± 0
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	0.0023 ± 0.0001	0.0064 ± 0.0002	0.00092 ± 0.00011	11 ± —	— ± —
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	0.00034 ± 0.00013	0.0027 ± 0.0006	0.00045 ± 0.00008	2.4 ± —	15 ± —
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	0.0044 ± 0.0003	0.0023 ± 0.0008	0.00047 ± 0.00006	3.5 ± —	— ± —
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	0.0044 ± 0.0017	0.0048 ± 0.0032	< 0.0008 ± 0.0002	8.1 ± —	11 ± 0
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0090 ± 0.0005	0.00090 ± 0.00009	7.8 ± 0.5	— ± —
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	0.0013 ± 0.0016	0.0044 ± 0.0018	0.00087 ± 0.00060	11 ± 0	19 ± —
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.0075 ± 0.0019	0.0010 ± 0.0003	12 ± 0	— ± —
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.003 ± 0.001	< 0.0003 ± 0.0004	1.7 ± 0.3	12 ± 1
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	0.0023 ± 0.0003	< 0.003 ± 0.002	< 0.0003 ± 0.0000	1.2 ± 0.6	— ± —
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	0.0020 ± 0.0006	0.015 ± 0.002	0.0027 ± 0.0005	21 ± 0	74 ± 3
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.016 ± 0.002	0.0021 ± 0.0002	21 ± 0	— ± —
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.013 ± 0.001	0.0022 ± 0.0004	24 ± 4	16 ± —
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.014 ± 0.001	0.0021 ± 0.0002	18 ± 0	— ± —
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.0016 ± 0.0017	< 0.0004 ± 0.0002	4.2 ± 3.0	5.9 ± —
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	< 0.001 ± 0.000	< 0.0016 ± 0.0005	< 0.0004 ± 0.0000	1.7 ± —	— ± —
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.0098 ± 0.0056	0.0012 ± 0.0006	9.0 ± 0.5	9.7 ± —
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	0.0014 ± 0.0001	0.021 ± 0.000	0.0018 ± 0.0002	17 ± 1	— ± —
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.018 ± 0.002	0.0014 ± 0.0004	10 ± —	11 ± —
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	0.0015 ± 0.0017	0.013 ± 0.003	0.0020 ± 0.0002	12 ± 3	— ± —
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0007 ± 0.0004	2.9 ± 0.1	2.0 ± —
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	< 0.001 ± 0.000	0.0028 ± 0.0022	< 0.0007 ± 0.0002	2.3 ± —	— ± —
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.0024 ± 0.0012	0.026 ± 0.004	0.0030 ± 0.0002	116 ± 1	9.8 ± —
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.0011 ± 0.0008	0.018 ± 0.000	0.0024 ± 0.0001	11 ± —	— ± —
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	0.0020 ± 0.0004	0.019 ± 0.002	0.0022 ± 0.0005	25 ± 2	19 ± —
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.0026 ± 0.0007	0.020 ± 0.001	0.0030 ± 0.0006	24 ± 1	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	< 0.001 ± 0.000	0.0057 ± 0.0019	0.0011 ± 0.0001	6.4 ± 2.8	2.3 ± —
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.00060 ± 0.00039	0.0060 ± 0.0012	0.0013 ± 0.0005	3.6 ± —	— ± —
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	0.0015 ± 0.0007	0.0077 ± 0.0011	0.0012 ± 0.0001	20 ± 3	78 ± 2
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0088 ± 0.0002	0.00094 ± 0.00039	8.7 ± 1.6	— ± —
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.011 ± 0.002	0.00098 ± 0.00009	10 ± —	8.6 ± 2.4
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.0071 ± 0.0003	0.0012 ± 0.0002	8.1 ± 1.0	— ± —
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.002 ± 0.000	< 0.0005 ± 0.0001	< 0.9 ± 0.07	2.6 ± 1.7
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0005 ± 0.0002	1.1 ± 0.0	— ± —
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	0.00096 ± 0.00010	0.0040 ± 0.0005	0.00089 ± 0.00009	26 ± —	43 ± —
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	0.0015 ± 0.0000	0.0051 ± 0.0000	0.0013 ± 0.0001	46 ± —	— ± —
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	0.0021 ± 0.0010	0.0062 ± 0.0004	0.0011 ± 0.0003	15 ± —	31 ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	< 0.001 ± 0.002	0.0056 ± 0.0009	0.00041 ± 0.00020	12 ± 0	64 ± 2
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	0.0013 ± 0.0013	0.0068 ± 0.0022	0.00054 ± 0.00059	8.1 ± 0.2	— ± —
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	0.0020 ± 0.0003	0.0056 ± 0.0034	0.00064 ± 0.00042	19 ± 1	23 ± —
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0052 ± 0.0009	0.00093 ± 0.00033	18 ± 3	— ± —
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	0.0019 ± 0.0013	< 0.003 ± 0.002	< 0.0003 ± 0.0002	3.7 ± 1.2	8.0 ± —
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.003 ± 0.001	< 0.0003 ± 0.0004	1.7 ± —	— ± —
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	0.0012 ± 0.0009	0.0039 ± 0.0017	0.00068 ± 0.00040	19 ± —	19 ± —
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0056 ± 0.0011	0.00056 ± 0.00023	20 ± 2	— ± —
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.0053 ± 0.0016	0.00054 ± 0.00025	20 ± 4	14 ± 0
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	0.00082 ± 0.00030	0.0065 ± 0.0016	0.00058 ± 0.00037	15 ± 1	— ± —
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.0016 ± 0.0012	< 0.0004 ± 0.0003	2.1 ± 0.0	5.6 ± 1.4
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	< 0.001 ± 0.000	< 0.0016 ± 0.0018	< 0.0004 ± 0.0001	2.9 ± 1.0	— ± —
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.0049 ± 0.0024	0.0015 ± 0.0002	12 ± 0	12 ± —
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.010 ± 0.002	0.0012 ± 0.0006	10 ± 0	— ± —
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.011 ± 0.003	0.0017 ± 0.0006	9.5 ± 0.5	8.6 ± —
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.013 ± 0.001	0.0011 ± 0.0002	12 ± 1	— ± —
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	< 0.001 ± 0.000	0.0020 ± 0.0009	< 0.0004 ± 0.0001	3.8 ± 3.4	1.0 ± —
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.004	< 0.0007 ± 0.0003	0.70 ± —	— ± —
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	0.0018 ± 0.0004	0.016 ± 0.004	0.0026 ± 0.0002	12 ± —	14 ± —
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	0.0013 ± 0.0001	0.015 ± 0.002	0.0018 ± 0.0003	14 ± 3	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	0.0029 ± 0.0010	0.021 ± 0.004	0.0030 ± 0.0004	25 ± 1	17 ± —
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	0.0025 ± 0.0003	0.027 ± 0.004	0.0024 ± 0.0007	25 ± 0	— ± —
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	0.0012 ± 0.0009	0.012 ± 0.002	0.0018 ± 0.0004	7.1 ± 2.8	3.7 ± —
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	0.0010 ± 0.0010	0.0090 ± 0.0018	0.0013 ± 0.0003	4.6 ± —	— ± —
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.0062 ± 0.0008	0.00063 ± 0.00018	26 ± 6	28 ± 3
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	0.0014 ± 0.0006	0.012 ± 0.002	0.0011 ± 0.0001	45 ± 2	— ± —
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.0047 ± 0.0013	0.00059 ± 0.00031	11 ± 0	9.4 ± 2.7
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0054 ± 0.0023	0.00062 ± 0.00028	8.3 ± —	— ± —
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0005 ± 0.0002	1.1 ± 0.2	4.4 ± 3.4
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	< 0.001 ± 0.000	0.0023 ± 0.0011	< 0.0005 ± 0.0003	1.1 ± 0.5	— ± —
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	0.0024 ± 0.0002	0.0027 ± 0.0011	0.0010 ± 0.0004	17 ± —	47 ± 2
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	0.0084 ± 0.0010	0.0073 ± 0.0001	0.00090 ± 0.00011	54 ± —	— ± —
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.0069 ± 0.0002	0.0050 ± 0.0010	0.00073 ± 0.00009	15 ± —	23 ± —
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.0076 ± 0.0007	0.0046 ± 0.0000	0.00064 ± 0.00009	14 ± —	— ± —
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	0.00048 ± 0.00044	0.0019 ± 0.0002	0.00054 ± 0.00006	2.5 ± —	12 ± —
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	0.0064 ± 0.0008	0.0018 ± 0.0002	0.00053 ± 0.00004	3.0 ± —	— ± —
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.0092 ± 0.0003	0.0011 ± 0.0001	83 ± 11	58 ± 5
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0052 ± 0.0016	0.00056 ± 0.00003	19 ± 1	— ± —
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	< 0.001 ± 0.003	0.0033 ± 0.0008	0.00076 ± 0.00024	22 ± 12	18 ± —
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	< 0.001 ± 0.002	0.0037 ± 0.0011	0.00056 ± 0.00031	12 ± 1	— ± —
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.003 ± 0.000	< 0.0003 ± 0.0004	1.7 ± 0.6	9.8 ± —
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	0.0021 ± 0.0011	< 0.003 ± 0.001	< 0.0003 ± 0.0001	1.6 ± 0.3	— ± —
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	25 ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	0.0016 ± 0.0000	0.0089 ± 0.0008	0.0014 ± 0.0005	60 ± 2	55 ± 0
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	0.00087 ± 0.00095	0.0099 ± 0.0003	0.0012 ± 0.0004	61 ± 0	— ± —
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.0014 ± 0.0000	0.016 ± 0.001	0.0015 ± 0.0004	21 ± 1	26 ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.0019 ± 0.0013	0.012 ± 0.004	0.00079 ± 0.00042	13 ± 0	— ± —
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.0018 ± 0.0010	0.013 ± 0.003	0.0017 ± 0.0004	15 ± 0	16 ± —
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.0020 ± 0.0010	0.012 ± 0.006	0.0014 ± 0.0003	15 ± 0	— ± —
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	0.0010 ± 0.0009	0.0050 ± 0.0034	< 0.0007 ± 0.0001	3.1 ± —	3.2 ± —
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	< 0.001 ± 0.001	0.0068 ± 0.0024	< 0.0007 ± 0.0001	5.4 ± 1.2	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0054 ± 0.0034	0.00056 ± 0.00028	11 ± —	7.0 ± 1.1
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0023 ± 0.0027	< 0.0005 ± 0.0001	4.2 ± 0.6	— ± —
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.0041 ± 0.0003	< 0.0005 ± 0.0001	8.7 ± 0.0	55 ± 1
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0069 ± 0.0012	< 0.0005 ± 0.0002	7.5 ± 0.1	— ± —
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	< 0.001 ± 0.000	< 0.002 ± 0.002	< 0.0005 ± 0.0003	1.1 ± —	2.7 ± 0.6
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0005 ± 0.0001	4.8 ± 1.9	— ± —
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.0016 ± 0.0002	0.0043 ± 0.0007	0.00045 ± 0.00003	17 ± —	21 ± —
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	0.0010 ± 0.0002	0.0046 ± 0.0006	0.00045 ± 0.00001	16 ± —	— ± —
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	0.0025 ± 0.0000	0.0074 ± 0.0007	0.0015 ± 0.0002	19 ± —	28 ± —
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.0018 ± 0.0001	0.0052 ± 0.0000	0.00090 ± 0.00039	20 ± —	— ± —
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	0.0043 ± 0.0006	0.0019 ± 0.0003	< 0.0002 ± 0.0001	7.3 ± —	11 ± —
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	0.0059 ± 0.0003	0.0015 ± 0.0007	< 0.0002 ± 0.0001	1.5 ± —	— ± —
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	0.0024 ± 0.0010	0.0062 ± 0.0042	0.00039 ± 0.00002	7.9 ± 1.9	15 ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	< 0.003 ± 0.001	< 0.0003 ± 0.0001	3.6 ± 1.0	— ± —
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	0.0026 ± 0.0007	0.0063 ± 0.0040	< 0.0008 ± 0.0003	15 ± 0	18 ± —
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	0.0012 ± 0.0030	0.0051 ± 0.0014	0.00058 ± 0.00029	15 ± 1	— ± —
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	< 0.001 ± 0.001	< 0.002 ± 0.001	< 0.0004 ± 0.0001	2.6 ± 1.5	14 ± —
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0008 ± 0.0005	6.6 ± 1.5	— ± —
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0062 ± 0.0006	0.00074 ± 0.00044	25 ± 1	24 ± —
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	< 0.001 ± 0.001	0.0034 ± 0.0012	0.00049 ± 0.00017	15 ± —	— ± —
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.0041 ± 0.0024	0.00059 ± 0.00047	16 ± 1	13 ± —
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.0039 ± 0.0007	0.00051 ± 0.00022	15 ± 0	— ± —
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	< 0.001 ± 0.000	< 0.0016 ± 0.0012	< 0.0004 ± 0.0003	0.93 ± 0.13	3.3 ± —
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	< 0.001 ± 0.000	< 0.0016 ± 0.0004	< 0.0004 ± 0.0003	1.1 ± 0.8	— ± —
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	< 0.001 ± 0.001	0.011 ± 0.002	0.0015 ± 0.0005	14 ± 1	18 ± —
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.0028 ± 0.0007	0.0088 ± 0.0044	0.0019 ± 0.0003	21 ± 4	— ± —
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.0036 ± 0.0000	0.018 ± 0.005	0.0021 ± 0.0003	22 ± 0	20 ± —
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.0013 ± 0.0009	0.013 ± 0.003	0.0031 ± 0.0002	22 ± 2	— ± —
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	< 0.001 ± 0.001	0.0058 ± 0.0020	< 0.0007 ± 0.0005	4.1 ± —	3.2 ± —
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.0013 ± 0.0010	0.0067 ± 0.0028	< 0.0007 ± 0.0000	3.4 ± 0.5	— ± —
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.0032 ± 0.0007	0.030 ± 0.007	0.0038 ± 0.0002	21 ± 1	18 ± —
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.0027 ± 0.0001	0.026 ± 0.006	0.0039 ± 0.0003	19 ± 4	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	0.0033 ± 0.0007	0.032 ± 0.001	0.0039 ± 0.0005	29 ± —	27 ± —
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.0038 ± 0.0006	0.038 ± 0.003	0.0037 ± 0.0006	31 ± 1	— ± —
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	0.00079 ± 0.00021	0.0057 ± 0.0010	0.00097 ± 0.00008	4.9 ± 1.1	2.6 ± —
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.00065 ± 0.00048	0.0075 ± 0.0015	0.00081 ± 0.00020	8.6 ± —	— ± —
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0029 ± 0.0010	< 0.0005 ± 0.0002	9.5 ± 0.1	7.7 ± 5.2
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	< 0.001 ± 0.000	< 0.002 ± 0.003	< 0.0005 ± 0.0004	6.5 ± —	— ± —
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.0035 ± 0.0013	0.00066 ± 0.00015	10 ± 3	11 ± 4
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0048 ± 0.0032	< 0.0005 ± 0.0004	10 ± 0	— ± —
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	< 0.001 ± 0.000	< 0.002 ± 0.003	< 0.0005 ± 0.0003	3.7 ± 2.9	5.5 ± 0.4
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.002	< 0.0005 ± 0.0002	0.90 ± —	— ± —
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0061 ± 0.0028	0.00062 ± 0.00017	18 ± 0	7.2 ± 2.0
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.0015 ± 0.0005	0.0076 ± 0.0015	0.0012 ± 0.0006	32 ± 2	— ± —
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	< 0.001 ± 0.001	0.0040 ± 0.0010	0.0010 ± 0.0003	8.8 ± —	10 ± 2
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	< 0.001 ± 0.001	0.0053 ± 0.0020	0.00061 ± 0.00041	7.5 ± 0.4	— ± —
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	< 0.001 ± 0.000	< 0.002 ± 0.001	< 0.0003 ± 0.0002	< 0.7 ± 0.00	4.0 ± 2.2
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.001	< 0.0003 ± 0.0001	< 0.9 ± 0.29	— ± —
Flat Cr.	12/11/96	0.40 µm Mem	1/2	0.0045 ± 0.0003	0.061 ± 0.002	0.0091 ± 0.0014	41 ± 1	20 ± —
Flat Cr.	12/11/96	0.40 µm Mem	2/2	0.0044 ± 0.0002	0.053 ± 0.001	0.0088 ± 0.0001	52 ± 17	— ± —
Flat Cr.	12/11/96	0.45 µm Cap	1/2	0.0042 ± 0.0006	0.042 ± 0.001	0.0060 ± 0.0001	13 ± 2	6.5 ± —
Flat Cr.	12/11/96	0.45 µm Cap	2/2	0.0027 ± 0.0001	0.045 ± 0.005	0.0066 ± 0.0000	10 ± 0	— ± —
Flat Cr.	12/11/96	10 kd Tan	1/2	0.0024 ± 0.0007	0.022 ± 0.001	0.0040 ± 0.0001	3.4 ± —	7.7 ± —
Flat Cr.	12/11/96	10 kd Tan	2/2	0.0016 ± 0.0005	0.029 ± 0.001	0.0038 ± 0.0002	3.6 ± 0.3	— ± —
Flat Cr.	05/29/97	0.40 µm Mem	1/2	0.0040 ± 0.0010	0.030 ± 0.001	0.0061 ± 0.0005	190 ± 5	273 ± 2
Flat Cr.	05/29/97	0.40 µm Mem	2/2	0.0030 ± 0.0012	0.031 ± 0.001	0.0057 ± 0.0002	166 ± 3	— ± —
Flat Cr.	05/29/97	0.45 µm Cap	1/2	0.0034 ± 0.0010	0.028 ± 0.001	0.0049 ± 0.0003	167 ± 5	178 ± 3
Flat Cr.	05/29/97	0.45 µm Cap	2/2	0.0029 ± 0.0007	0.024 ± 0.001	0.0050 ± 0.0005	159 ± 8	— ± —
Flat Cr.	05/29/97	10 kd Tan	1/2	< 0.001 ± 0.000	0.0072 ± 0.0013	0.0016 ± 0.0002	97 ± 19	75 ± 5
Flat Cr.	05/29/97	10 kd Tan	2/2	< 0.001 ± 0.001	0.0082 ± 0.0011	0.0018 ± 0.0003	75 ± 2	— ± —
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	0.26 ± 0.00	2.9 ± 0.1	0.39 ± 0.01	878 ± 1	930 ± 6
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	0.22 ± 0.01	2.9 ± 0.0	0.41 ± 0.01	978 ± 44	— ± —
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	0.25 ± 0.04	3.0 ± 0.1	0.39 ± 0.02	1,080 ± 50	970 ± 4
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	0.24 ± 0.05	2.8 ± 0.1	0.38 ± 0.02	1,010 ± 30	— ± —
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	0.18 ± 0.00	2.8 ± 0.2	0.40 ± 0.02	978 ± 26	930 ± 4

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	0.23 ± 0.01	2.9 ± 0.1	0.39 ± 0.02	973 ± 78	— ± —
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	0.56 ± 0.06	4.6 ± 0.2	0.60 ± 0.00	1,030 ± 150	1,070 ± 10
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	0.52 ± 0.01	4.7 ± 0.0	0.59 ± 0.00	1,120 ± 50	— ± —
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	0.50 ± 0.02	4.5 ± 0.1	0.57 ± 0.01	1,420 ± 10	1,430 ± 50
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	0.51 ± 0.01	4.6 ± 0.0	0.58 ± 0.01	1,500 ± 0	— ± —
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	0.51 ± 0.00	4.6 ± 0.0	0.57 ± 0.02	595 ± 2	657 ± 36
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	0.50 ± 0.00	4.5 ± 0.1	0.58 ± 0.00	586 ± 20	— ± —
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	0.14 ± 0.01	1.9 ± 0.0	0.25 ± 0.00	12,000 ± 400	12,700 ± 64
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	0.14 ± 0.01	1.9 ± 0.0	0.24 ± 0.02	12,100 ± 100	— ± —
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	0.15 ± 0.00	2.0 ± 0.0	0.25 ± 0.00	12,000 ± 100	— ± —
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	0.14 ± 0.01	2.0 ± 0.0	0.27 ± 0.00	11,900 ± 300	13,100 ± 100
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	0.13 ± 0.00	1.9 ± 0.1	0.24 ± 0.02	11,600 ± 0	12,300 ± 100
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	0.14 ± 0.00	1.8 ± 0.0	0.23 ± 0.01	11,000 ± 600	— ± —
Whiskeytown	12/11/96	0.40 µm Mem	1/2	0.0013 ± 0.0002	0.0096 ± 0.0049	0.0012 ± 0.0001	20 ± 7	13 ± —
Whiskeytown	12/11/96	0.40 µm Mem	2/2	< 0.001 ± 0.000	0.0080 ± 0.0018	0.0014 ± 0.0002	17 ± 1	13 ± —
Whiskeytown	12/11/96	0.45 µm Cap	1/2	< 0.001 ± 0.000	0.0064 ± 0.0002	0.0019 ± 0.0005	14 ± 2	281 ±
Whiskeytown	12/11/96	0.45 µm Cap	2/2	< 0.001 ± 0.000	0.0089 ± 0.0007	0.0023 ± 0.0006	11 ± —	281 ±
Whiskeytown	12/11/96	10 kd Tan	1/2	< 0.001 ± 0.000	0.0051 ± 0.0014	< 0.0004 ± 0.0001	2.1 ± 0.0	3.3 ± —
Whiskeytown	12/11/96	10 kd Tan	2/2	< 0.001 ± 0.001	0.0033 ± 0.0018	< 0.0007 ± 0.0005	2.4 ± 0.5	3.3 ± —
Whiskeytown	05/29/97	0.40 µm Mem	1/2	< 0.001 ± 0.000	0.0066 ± 0.0018	0.00070 ± 0.00022	9.1 ± —	13 ± 2
Whiskeytown	05/29/97	0.40 µm Mem	2/2	0.0015 ± 0.0008	0.0053 ± 0.0007	0.00089 ± 0.00010	34 ± 2	— ± —
Whiskeytown	05/29/97	0.45 µm Cap	1/2	0.0015 ± 0.0002	0.0091 ± 0.0020	0.0010 ± 0.0002	12 ± 1	5.8 ± 1.4
Whiskeytown	05/29/97	0.45 µm Cap	2/2	0.0014 ± 0.0004	0.0065 ± 0.0032	0.0011 ± 0.0003	9.4 ± —	— ± —
Whiskeytown	05/29/97	10 kd Tan	1/2	< 0.001 ± 0.001	0.0030 ± 0.0024	0.00045 ± 0.00026	1.8 ± 0.3	2.2 ± 0.3
Whiskeytown	05/29/97	10 kd Tan	2/2	< 0.001 ± 0.000	0.0024 ± 0.0023	0.00036 ± 0.00013	3.8 ± 3.9	— ± —
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	0.00081 ± 0.00011	0.0060 ± 0.0007	0.00095 ± 0.00009	9.6 ± —	22 ± —
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	0.0036 ± 0.0002	0.0071 ± 0.0004	0.0011 ± 0.0002	11 ± —	22 ± —
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	0.0022 ± 0.0010	0.0069 ± 0.0012	0.0014 ± 0.0003	25 ± —	30 ± —
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	0.0024 ± 0.0001	0.0065 ± 0.0001	0.0013 ± 0.0000	7.2 ± —	30 ± —
Spring Cr. arm	07/12/96	10 kd Tan	1/3	0.0020 ± 0.0006	0.0038 ± 0.0012	0.00050 ± 0.00036	1.6 ± —	19 ± —
Spring Cr. arm	07/12/96	10 kd Tan	2/3	0.00050 ± 0.00026	0.0029 ± 0.0003	0.00055 ± 0.00013	1.5 ± —	19 ± —
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	0.0026 ± 0.0009	0.023 ± 0.003	0.0016 ± 0.0009	8.7 ± 0.5	15 ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	0.0022 ± 0.0016	0.014 ± 0.004	0.0024 ± 0.0006	7.8 ± 0.7	15 ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Europium (µg/L) ICP–MS	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES-Ax	Iron (µg/L) UV–vis
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	0.0016 ± 0.0004	0.016 ± 0.003	0.0021 ± 0.0005	8.3 ± —	12 ± —
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	0.0022 ± 0.0010	0.014 ± 0.001	0.0014 ± 0.0007	11 ± 2	— ± —
Spring Cr. arm	09/18/96	10 kd Tan	1/2	< 0.001 ± 0.001	0.0066 ± 0.0026	0.00040 ± 0.00043	3.8 ± —	9.9 ± —
Spring Cr. arm	09/18/96	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.003 ± 0.001	0.00090 ± 0.00057	2.7 ± 0.4	— ± —
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	0.0040 ± 0.0003	0.049 ± 0.008	0.0060 ± 0.0013	61 ± 0	45 ± —
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	0.0021 ± 0.0001	0.035 ± 0.000	0.0038 ± 0.0002	40 ± 0	— ± —
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	0.0039 ± 0.0002	0.041 ± 0.001	0.0062 ± 0.0006	43 ± 1	42 ± 0
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	0.0020 ± 0.0001	0.050 ± 0.003	0.0054 ± 0.0012	48 ± 3	— ± —
Spring Cr. arm	11/20/96	10 kd Tan	1/2	< 0.001 ± 0.000	0.0071 ± 0.0022	0.0010 ± 0.0003	5.2 ± 1.3	3.4 ± 0.2
Spring Cr. arm	11/20/96	10 kd Tan	2/2	< 0.001 ± 0.001	0.0079 ± 0.0013	0.0014 ± 0.0001	1.9 ± —	— ± —
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	0.0032 ± 0.0004	0.050 ± 0.001	0.0064 ± 0.0005	20 ± 0	11 ± —
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	0.0025 ± 0.0000	0.038 ± 0.003	0.0050 ± 0.0003	7.9 ± —	— ± —
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	0.0078 ± 0.0006	0.084 ± 0.004	0.011 ± 0.001	22 ± 0	21 ± —
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	0.0080 ± 0.0031	0.093 ± 0.003	0.010 ± 0.000	22 ± 0	— ± —
Spring Cr. arm	12/11/96	10 kd Tan	1/2	0.00099 ± 0.00121	0.011 ± 0.006	0.0019 ± 0.0005	3.5 ± 2.3	3.3 ± —
Spring Cr. arm	12/11/96	10 kd Tan	2/2	0.0011 ± 0.0002	0.010 ± 0.003	0.0013 ± 0.0005	11 ± 14	— ± —
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	0.0021 ± 0.0006	0.015 ± 0.001	0.0015 ± 0.0002	19 ± 1	37 ± 0
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	0.0016 ± 0.0003	0.012 ± 0.003	0.0020 ± 0.0005	11 ± 1	— ± —
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	0.0020 ± 0.0006	0.0099 ± 0.0017	0.0016 ± 0.0001	7.3 ± —	32 ± 29
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	0.0028 ± 0.0007	0.015 ± 0.002	0.0021 ± 0.0004	7.9 ± 1.2	— ± —
Spring Cr. arm	05/28/97	10 kd Tan	1/2	< 0.001 ± 0.001	0.0042 ± 0.0022	< 0.0003 ± 0.0003	2.8 ± 2.9	3.8 ± 2.2
Spring Cr. arm	05/28/97	10 kd Tan	2/2	< 0.001 ± 0.001	< 0.002 ± 0.001	< 0.0003 ± 0.0003	6.4 ± —	— ± —
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	0.0026 ± 0.0042	0.010 ± 0.002	0.0027 ± 0.0002	14 ± 4	17 ± 1
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	< 0.001 ± 0.000	0.010 ± 0.002	0.0029 ± 0.0002	< 10 ± 9.60	— ± —
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	0.0071 ± 0.0001	0.012 ± 0.003	0.0028 ± 0.0001	5.2 ± —	7.4 ± 1.6
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	0.0037 ± 0.0005	0.010 ± 0.001	0.0025 ± 0.0000	7.3 ± 2.1	— ± —
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	< 0.001 ± 0.001	0.0066 ± 0.0038	0.0020 ± 0.0002	4.5 ± 2.2	5.7 ± 2.6
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	0.0035 ± 0.0014	0.0067 ± 0.0015	0.0023 ± 0.0007	1.9 ± —	— ± —
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	0.0016 ± 0.0002	0.018 ± 0.000	0.0027 ± 0.0004	90 ± —	11 ± —
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	0.0010 ± 0.0004	0.014 ± 0.002	0.0021 ± 0.0007	13 ± —	— ± —
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	0.0024 ± 0.0003	0.019 ± 0.005	0.0029 ± 0.0004	46 ± 14	22 ± —
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	0.0016 ± 0.0001	0.020 ± 0.001	0.0029 ± 0.0003	33 ± —	— ± —
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.00085 ± 0.00103	0.0056 ± 0.0019	0.0011 ± 0.0001	5.2 ± —	3.4 ± —
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.00073 ± 0.00003	0.0054 ± 0.0020	0.00082 ± 0.00026	6.8 ± 1.0	— ± —

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	33 ± 0	0.016 ± 0.000	0.023 ± 0.003	1.7 ± 0.0	0.00084 ± 0.00026
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	— ± —	0.015 ± 0.000	0.012 ± 0.002	1.7 ± 0.0	0.00076 ± 0.00009
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	13 ± —	0.017 ± 0.001	0.060 ± 0.002	1.7 ± 0.0	0.00043 ± 0.00009
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	— ± —	0.018 ± 0.001	0.0083 ± 0.0018	1.6 ± 0.0	0.00080 ± 0.00005
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	41 ± —	0.0086 ± 0.0003	< 0.005 ± 0.001	1.7 ± 0.0	0.00050 ± 0.00007
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	— ± —	0.011 ± 0.000	< 0.005 ± 0.005	1.6 ± 0.1	0.0011 ± 0.0001
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	13 ± 2	0.021 ± 0.001	0.031 ± 0.005	1.7 ± 0.1	0.00064 ± 0.00019
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	— ± —	0.022 ± 0.000	0.010 ± 0.002	1.7 ± 0.0	0.00097 ± 0.00058
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	12 ± 1	0.017 ± 0.000	0.027 ± 0.005	1.7 ± 0.1	0.00083 ± 0.00066
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	— ± —	0.015 ± 0.000	0.0085 ± 0.0008	1.4 ± 0.3	0.00083 ± 0.00042
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	6.3 ± —	0.0052 ± 0.0002	0.0046 ± 0.0027	1.6 ± 0.5	< 0.0008 ± 0.0005
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	— ± —	0.0054 ± 0.0022	0.0067 ± 0.0035	1.6 ± 0.0	< 0.0004 ± 0.0001
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	5.9 ± —	0.0061 ± 0.0011	0.0089 ± 0.0024	2.3 ± 0.1	< 0.0005 ± 0.0002
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	— ± —	0.0065 ± 0.0011	< 0.005 ± 0.003	2.4 ± 0.0	0.00071 ± 0.00008
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	2.6 ± —	0.0074 ± 0.0010	< 0.005 ± 0.003	2.3 ± 0.1	0.00053 ± 0.00057
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	— ± —	0.0059 ± 0.0005	< 0.005 ± 0.003	2.3 ± 0.1	< 0.0005 ± 0.0000
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	1.5 ± —	0.0030 ± 0.0008	< 0.013 ± 0.012	2.2 ± 0.0	0.00057 ± 0.00017
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	— ± —	0.0022 ± 0.0011	< 0.005 ± 0.002	2.2 ± 0.1	< 0.0005 ± 0.0003
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	9.7 ± —	0.0079 ± 0.0011	0.017 ± 0.003	2.7 ± 0.1	0.00050 ± 0.00042
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	— ± —	0.0074 ± 0.0010	0.014 ± 0.002	2.8 ± 0.2	< 0.0004 ± 0.0001
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	5.5 ± —	0.011 ± 0.000	0.014 ± 0.003	2.7 ± 0.0	0.00055 ± 0.00030
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	— ± —	0.0090 ± 0.0005	0.012 ± 0.003	2.7 ± 0.0	0.00022 ± 0.00015
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	0.90 ± —	0.0028 ± 0.0010	0.0064 ± 0.0049	2.5 ± 0.0	0.00024 ± 0.00011
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	— ± —	0.0022 ± 0.0007	0.0045 ± 0.0020	2.6 ± 0.1	0.00051 ± 0.00065
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	21 ± 1	0.021 ± 0.001	0.011 ± 0.004	1.7 ± 0.0	0.00095 ± 0.00040
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	— ± —	0.013 ± 0.001	< 0.006 ± 0.002	1.6 ± 0.1	0.0012 ± 0.0001
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	5.4 ± 3.4	0.013 ± 0.000	< 0.006 ± 0.003	1.5 ± 0.2	0.00088 ± 0.00050
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	— ± —	0.014 ± 0.001	< 0.006 ± 0.001	1.5 ± 0.2	0.00075 ± 0.00023
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	2.4 ± 0.2	0.0019 ± 0.0007	< 0.006 ± 0.006	1.4 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	— ± —	0.0024 ± 0.0001	< 0.006 ± 0.003	1.4 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	21 ± —	0.013 ± 0.000	0.0085 ± 0.0041	1.4 ± 0.0	0.00058 ± 0.00009

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	— ± —	0.012 ± 0.000	0.0051 ± 0.0001	1.4 ± 0.0	0.00096 ± 0.00006
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	14 ± —	0.017 ± 0.000	0.0042 ± 0.0040	1.4 ± 0.0	0.00079 ± 0.00029
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	— ± —	0.017 ± 0.000	0.0097 ± 0.0006	1.4 ± 0.0	0.00058 ± 0.00003
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	7.0 ± —	0.0076 ± 0.0007	0.0048 ± 0.0043	1.4 ± 0.0	< 0.0003 ± 0.0002
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	— ± —	0.0078 ± 0.0004	0.012 ± 0.003	1.4 ± 0.0	0.00056 ± 0.00000
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	— ± —	0.0079 ± 0.0004	0.0067 ± 0.0017	1.3 ± 0.0	0.00039 ± 0.00008
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	14 ± —	0.015 ± 0.003	0.0079 ± 0.0026	1.3 ± 0.1	0.00068 ± 0.00044
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	— ± —	0.012 ± 0.001	0.0095 ± 0.0016	< 1.2 ± 0.01	< 0.0008 ± 0.0000
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	11 ± 1	0.014 ± 0.002	0.022 ± 0.003	< 1.2 ± 0.25	0.0011 ± 0.0001
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	— ± —	0.013 ± 0.001	0.011 ± 0.005	< 1.2 ± 0.28	0.0011 ± 0.0003
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	4.6 ± 1.7	0.0032 ± 0.0001	0.015 ± 0.004	1.2 ± 0.0	< 0.0004 ± 0.0000
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	— ± —	0.0028 ± 0.0013	< 0.004 ± 0.002	1.2 ± 0.0	< 0.0004 ± 0.0001
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	— ± —	0.0032 ± 0.0004	0.0097 ± 0.0070	1.2 ± 0.0	< 0.0004 ± 0.0003
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	18 ± 4	0.015 ± 0.001	0.024 ± 0.008	1.9 ± 0.0	0.0015 ± 0.0001
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	— ± —	0.013 ± 0.001	0.028 ± 0.006	1.9 ± 0.0	0.00091 ± 0.00055
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	11 ± —	0.013 ± 0.001	0.011 ± 0.000	1.8 ± 0.1	0.00053 ± 0.00004
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	— ± —	0.012 ± 0.001	0.0084 ± 0.0012	1.9 ± 0.0	0.0010 ± 0.0003
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	2.6 ± —	0.0021 ± 0.0004	< 0.005 ± 0.005	1.7 ± 0.0	< 0.0005 ± 0.0003
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	— ± —	0.0023 ± 0.0003	0.012 ± 0.003	1.7 ± 0.1	0.00054 ± 0.00031
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	9.2 ± —	0.017 ± 0.001	0.025 ± 0.008	2.5 ± 0.1	0.0012 ± 0.0006
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	— ± —	0.015 ± 0.002	0.023 ± 0.009	2.4 ± 0.1	0.00097 ± 0.00024
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	9.0 ± —	0.017 ± 0.001	0.010 ± 0.002	2.4 ± 0.0	0.00073 ± 0.00051
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	— ± —	0.015 ± 0.001	0.038 ± 0.003	2.5 ± 0.1	0.00073 ± 0.00035
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	0.50 ± —	0.0027 ± 0.0010	0.0078 ± 0.0055	2.3 ± 0.0	0.00078 ± 0.00026
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	— ± —	0.0023 ± 0.0009	0.062 ± 0.010	2.2 ± 0.0	< 0.0004 ± 0.0004
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	14 ± —	0.013 ± 0.000	0.015 ± 0.004	1.9 ± 0.0	0.0011 ± 0.0004
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	— ± —	0.015 ± 0.002	0.012 ± 0.002	1.9 ± 0.0	0.00072 ± 0.00021
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	21 ± —	0.032 ± 0.002	0.041 ± 0.002	1.9 ± 0.0	0.0011 ± 0.0004
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	— ± —	0.028 ± 0.002	0.027 ± 0.003	2.0 ± 0.0	0.00093 ± 0.00019
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	1.2 ± —	0.0057 ± 0.0011	< 0.005 ± 0.003	1.9 ± 0.0	0.00059 ± 0.00017
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	— ± —	0.0052 ± 0.0011	0.0052 ± 0.0022	1.9 ± 0.1	0.00067 ± 0.00045
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	1.2 ± —	0.0061 ± 0.0007	0.0079 ± 0.0089	2.0 ± 0.0	0.0012 ± 0.0003
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	4.7 ± 2.7	0.0095 ± 0.0009	< 0.006 ± 0.010	1.4 ± 0.1	0.00071 ± 0.00019
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	— ± —	0.015 ± 0.001	0.0070 ± 0.0028	1.4 ± 0.2	0.0010 ± 0.0004

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	4.2 ± 0.9	0.014 ± 0.000	0.012 ± 0.006	1.3 ± 0.1	0.0010 ± 0.0002
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	— ± —	0.012 ± 0.000	0.026 ± 0.008	1.4 ± 0.1	0.00048 ± 0.00024
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	3.8 ± 2.0	0.0031 ± 0.0005	< 0.006 ± 0.004	1.2 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	— ± —	0.0033 ± 0.0005	< 0.006 ± 0.009	1.3 ± 0.2	0.00052 ± 0.00031
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	53 ± —	0.0094 ± 0.0004	0.015 ± 0.004	1.4 ± 0.0	< 0.0006 ± 0.0002
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	— ± —	0.011 ± 0.000	0.046 ± 0.001	1.5 ± 0.0	0.00045 ± 0.00008
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	16 ± 2	0.011 ± 0.000	0.022 ± 0.004	1.4 ± 0.0	0.00051 ± 0.00020
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	— ± —	0.011 ± 0.001	0.011 ± 0.002	1.5 ± 0.1	0.00080 ± 0.00014
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	13 ± —	0.0034 ± 0.0006	0.0053 ± 0.0010	1.5 ± 0.1	< 0.0003 ± 0.0000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	— ± —	0.0034 ± 0.0004	0.0067 ± 0.0007	1.4 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	10 ± 0	0.0085 ± 0.0003	0.011 ± 0.002	< 1.2 ± 0.11	< 0.0008 ± 0.0005
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	— ± —	0.0081 ± 0.0012	< 0.008 ± 0.002	1.4 ± 0.1	0.0010 ± 0.0001
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	17 ± —	0.010 ± 0.001	0.022 ± 0.005	1.3 ± 0.0	0.0013 ± 0.0001
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	— ± —	0.0092 ± 0.0013	0.0059 ± 0.0023	1.3 ± 0.0	0.00036 ± 0.00005
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	5.8 ± 1.9	0.0012 ± 0.0006	0.0051 ± 0.0022	1.3 ± 0.0	< 0.0004 ± 0.0000
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	— ± —	0.0019 ± 0.0004	< 0.005 ± 0.006	1.3 ± 0.0	< 0.0004 ± 0.0002
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	70 ± 0	0.014 ± 0.000	0.021 ± 0.004	1.9 ± 0.0	0.00087 ± 0.00015
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	— ± —	0.012 ± 0.001	0.027 ± 0.007	1.9 ± 0.0	0.0011 ± 0.0007
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	15 ± —	0.011 ± 0.000	0.017 ± 0.009	1.9 ± 0.0	0.00097 ± 0.00003
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	— ± —	0.012 ± 0.001	0.014 ± 0.006	1.9 ± 0.1	0.00093 ± 0.00019
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	3.3 ± —	0.0015 ± 0.0005	0.017 ± 0.011	1.8 ± 0.0	< 0.0005 ± 0.0000
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	— ± —	0.0019 ± 0.0007	< 0.013 ± 0.005	1.7 ± 0.0	< 0.0005 ± 0.0002
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	10 ± —	0.013 ± 0.001	0.0052 ± 0.0021	2.1 ± 0.1	0.0015 ± 0.0003
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	— ± —	0.014 ± 0.001	0.014 ± 0.003	2.1 ± 0.1	0.0011 ± 0.0007
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	9.8 ± —	0.015 ± 0.001	0.013 ± 0.005	2.0 ± 0.1	0.00078 ± 0.00039
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	— ± —	0.013 ± 0.002	0.025 ± 0.004	1.9 ± 0.1	0.00072 ± 0.00029
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	3.3 ± —	0.0022 ± 0.0009	0.0038 ± 0.0017	1.9 ± 0.1	< 0.0004 ± 0.0003
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	— ± —	0.0020 ± 0.0010	0.0079 ± 0.0080	1.9 ± 0.1	< 0.0004 ± 0.0003
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	13 ± —	0.041 ± 0.002	0.042 ± 0.012	1.5 ± 0.0	0.00096 ± 0.00005
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	— ± —	0.018 ± 0.001	0.0059 ± 0.0008	1.4 ± 0.1	0.0012 ± 0.0004
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	18 ± —	0.027 ± 0.001	0.045 ± 0.005	1.4 ± 0.0	0.0012 ± 0.0002
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	— ± —	0.026 ± 0.001	0.015 ± 0.006	1.5 ± 0.0	0.00093 ± 0.00038

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	3.0 ± —	0.0074 ± 0.0018	0.0052 ± 0.0017	1.4 ± 0.0	< 0.0004 ± 0.0001
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	— ± —	0.0090 ± 0.0008	< 0.005 ± 0.002	1.4 ± 0.1	0.00045 ± 0.00029
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	37 ± 5	0.0090 ± 0.0007	0.0090 ± 0.0029	1.4 ± 0.1	0.00063 ± 0.00017
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	— ± —	0.0075 ± 0.0005	< 0.006 ± 0.006	1.5 ± 0.2	0.00038 ± 0.00024
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	6.8 ± 1.5	0.011 ± 0.000	0.020 ± 0.010	1.4 ± 0.2	0.00079 ± 0.00023
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	— ± —	0.011 ± 0.000	0.015 ± 0.008	1.3 ± 0.1	0.00060 ± 0.00023
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	1.1 ± 0.4	0.0027 ± 0.0005	< 0.006 ± 0.011	1.2 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	— ± —	0.0025 ± 0.0008	< 0.006 ± 0.006	1.2 ± 0.1	0.00029 ± 0.00038
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	34 ± —	0.0088 ± 0.0001	0.019 ± 0.003	1.7 ± 0.0	< 0.0003 ± 0.0000
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	— ± —	0.013 ± 0.002	0.020 ± 0.001	1.7 ± 0.0	0.00047 ± 0.00003
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	24 ± —	0.011 ± 0.000	0.055 ± 0.007	1.6 ± 0.1	< 0.0006 ± 0.0001
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	49 ± 0	0.0066 ± 0.0002	0.012 ± 0.005	1.8 ± 0.0	< 0.0004 ± 0.0002
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	— ± —	0.0034 ± 0.0006	0.0087 ± 0.0040	1.7 ± 0.0	< 0.0004 ± 0.0007
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	22 ± —	0.0090 ± 0.0017	0.032 ± 0.005	1.7 ± 0.0	0.00067 ± 0.00025
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	— ± —	0.0097 ± 0.0007	0.020 ± 0.006	1.6 ± 0.1	< 0.0003 ± 0.0002
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	8.7 ± —	0.0013 ± 0.0003	0.0085 ± 0.0037	1.7 ± 0.0	< 0.0004 ± 0.0003
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	— ± —	0.0017 ± 0.0002	0.0048 ± 0.0053	1.7 ± 0.0	< 0.0004 ± 0.0003
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	19 ± —	0.0080 ± 0.0006	0.016 ± 0.002	2.6 ± 0.0	0.00054 ± 0.00021
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	— ± —	0.0072 ± 0.0009	0.014 ± 0.001	2.6 ± 0.1	< 0.0005 ± 0.0002
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	14 ± 1	0.0076 ± 0.0010	0.0090 ± 0.0002	2.6 ± 0.1	< 0.0005 ± 0.0000
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	— ± —	0.0086 ± 0.0008	0.011 ± 0.001	2.7 ± 0.0	< 0.0005 ± 0.0003
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	4.2 ± 0.9	0.0013 ± 0.0004	< 0.005 ± 0.002	2.5 ± 0.1	< 0.0005 ± 0.0003
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	— ± —	0.0018 ± 0.0002	0.022 ± 0.003	2.5 ± 0.0	< 0.0005 ± 0.0002
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	14 ± —	0.011 ± 0.002	< 0.006 ± 0.009	2.5 ± 0.0	0.00065 ± 0.00053
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	— ± —	0.0081 ± 0.0022	< 0.006 ± 0.008	2.5 ± 0.0	< 0.0004 ± 0.0005
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	8.2 ± —	0.012 ± 0.001	0.17 ± 0.01	2.3 ± 0.0	0.00067 ± 0.00039
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	— ± —	0.0099 ± 0.0006	0.013 ± 0.006	2.5 ± 0.1	< 0.0004 ± 0.0004
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	2.4 ± —	0.0022 ± 0.0008	0.0069 ± 0.0070	2.3 ± 0.1	0.00029 ± 0.00002
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	— ± —	0.0025 ± 0.0002	0.0060 ± 0.0109	2.4 ± 0.0	< 0.0004 ± 0.0004
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	20 ± —	0.019 ± 0.001	0.019 ± 0.003	1.2 ± 0.1	0.00094 ± 0.00028
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	— ± —	0.019 ± 0.001	0.0087 ± 0.0035	1.2 ± 0.1	0.0011 ± 0.0006

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	17 ± —	0.034 ± 0.002	0.055 ± 0.016	1.1 ± 0.0	0.0012 ± 0.0001
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	— ± —	0.032 ± 0.003	0.037 ± 0.013	1.2 ± 0.0	0.0011 ± 0.0002
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	4.9 ± —	0.013 ± 0.002	0.0064 ± 0.0022	1.2 ± 0.0	0.00092 ± 0.00027
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	— ± —	0.011 ± 0.001	0.0053 ± 0.0036	1.2 ± 0.0	0.00050 ± 0.00008
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	20 ± 8	0.0081 ± 0.0007	0.015 ± 0.003	1.8 ± 0.1	0.00045 ± 0.00036
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	— ± —	0.014 ± 0.001	0.024 ± 0.004	1.9 ± 0.1	0.00081 ± 0.00024
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	8.8 ± 6.3	0.0079 ± 0.0007	0.013 ± 0.007	1.9 ± 0.0	0.00046 ± 0.00024
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	— ± —	0.0081 ± 0.0002	0.010 ± 0.003	1.8 ± 0.0	0.00058 ± 0.00011
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	4.7 ± 6.2	0.0019 ± 0.0004	< 0.005 ± 0.002	1.7 ± 0.2	0.00026 ± 0.00023
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	— ± —	0.0021 ± 0.0000	0.0095 ± 0.0105	1.8 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	39 ± 2	0.0076 ± 0.0002	0.013 ± 0.002	1.2 ± 0.0	< 0.0006 ± 0.0003
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	— ± —	0.014 ± 0.000	0.038 ± 0.002	1.2 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	20 ± —	0.011 ± 0.000	0.028 ± 0.004	1.1 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	— ± —	0.010 ± 0.000	0.024 ± 0.002	1.1 ± 0.0	0.00037 ± 0.00027
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	11 ± —	0.0060 ± 0.0009	0.017 ± 0.001	1.1 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	— ± —	0.0053 ± 0.0004	0.0081 ± 0.0013	1.1 ± 0.0	< 0.0003 ± 0.0000
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	47 ± 1	0.019 ± 0.001	0.027 ± 0.003	1.6 ± 0.0	0.00099 ± 0.00011
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	— ± —	0.0064 ± 0.0006	0.012 ± 0.004	1.7 ± 0.0	0.00063 ± 0.00029
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	19 ± —	0.0089 ± 0.0022	0.014 ± 0.004	1.7 ± 0.1	0.00079 ± 0.00006
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	— ± —	0.0070 ± 0.0007	0.017 ± 0.005	1.6 ± 0.1	0.00037 ± 0.00023
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	9.9 ± —	0.0015 ± 0.0012	< 0.005 ± 0.002	1.7 ± 0.0	< 0.0004 ± 0.0002
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	— ± —	0.0019 ± 0.0004	< 0.005 ± 0.004	1.6 ± 0.0	< 0.0004 ± 0.0004
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	23 ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	50 ± 1	0.020 ± 0.001	0.028 ± 0.015	1.8 ± 0.0	0.00084 ± 0.00023
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	— ± —	0.019 ± 0.002	0.031 ± 0.012	1.8 ± 0.0	< 0.0005 ± 0.0004
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	16 ± —	0.015 ± 0.001	0.018 ± 0.006	1.5 ± 0.0	0.0014 ± 0.0001
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	— ± —	0.012 ± 0.002	0.025 ± 0.009	1.5 ± 0.1	0.00074 ± 0.00083
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	19 ± —	0.015 ± 0.001	0.0061 ± 0.0085	1.5 ± 0.1	0.00061 ± 0.00055
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	— ± —	0.017 ± 0.001	0.0086 ± 0.0059	1.5 ± 0.1	0.00066 ± 0.00016
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	4.1 ± —	0.0055 ± 0.0004	0.013 ± 0.008	1.5 ± 0.1	0.00047 ± 0.00008
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	— ± —	0.0043 ± 0.0007	< 0.006 ± 0.007	1.4 ± 0.1	< 0.0004 ± 0.0002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	7.5 ± 6.5	0.0053 ± 0.0004	0.013 ± 0.010	1.7 ± 0.0	0.00045 ± 0.00019
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	— ± —	0.0037 ± 0.0007	0.0051 ± 0.0010	1.6 ± 0.1	0.00049 ± 0.00028
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	53 ± 3	0.0077 ± 0.0003	0.020 ± 0.003	1.6 ± 0.2	0.00051 ± 0.00028
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	— ± —	0.0072 ± 0.0005	0.018 ± 0.013	1.7 ± 0.2	0.00055 ± 0.00008
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	1.6 ± 0.7	0.0012 ± 0.0004	< 0.005 ± 0.005	1.3 ± 0.4	0.00045 ± 0.00001
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	— ± —	0.0019 ± 0.0007	0.0097 ± 0.0047	1.5 ± 0.3	0.00030 ± 0.00032
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	19 ± —	0.0083 ± 0.0006	0.037 ± 0.003	1.1 ± 0.0	0.00036 ± 0.00014
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	— ± —	0.0088 ± 0.0005	0.027 ± 0.001	1.1 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	23 ± —	0.014 ± 0.000	0.031 ± 0.007	1.1 ± 0.1	< 0.0006 ± 0.0001
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	— ± —	0.014 ± 0.000	0.026 ± 0.001	1.1 ± 0.0	0.00073 ± 0.00008
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	9.0 ± —	0.0018 ± 0.0002	0.029 ± 0.001	1.0 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	— ± —	0.0021 ± 0.0006	0.015 ± 0.001	1.1 ± 0.0	< 0.0003 ± 0.0001
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	17 ± —	0.0066 ± 0.0009	0.0093 ± 0.0046	1.5 ± 0.0	< 0.0004 ± 0.0002
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	— ± —	0.0036 ± 0.0012	0.0042 ± 0.0020	1.5 ± 0.1	0.00057 ± 0.00032
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	18 ± —	0.0089 ± 0.0006	0.017 ± 0.001	< 1.2 ± 0.23	< 0.0008 ± 0.0001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	— ± —	0.0087 ± 0.0016	0.019 ± 0.004	1.5 ± 0.0	0.00048 ± 0.00001
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	13 ± —	0.00053 ± 0.00055	0.011 ± 0.001	1.3 ± 0.1	< 0.0003 ± 0.0002
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	— ± —	0.0020 ± 0.0007	0.0069 ± 0.0009	< 1.2 ± 0.20	0.00085 ± 0.00022
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	24 ± —	0.0067 ± 0.0004	0.014 ± 0.010	1.5 ± 0.0	< 0.0005 ± 0.0003
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	— ± —	0.0054 ± 0.0021	0.0086 ± 0.0006	1.5 ± 0.0	< 0.0005 ± 0.0000
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	12 ± —	0.0070 ± 0.0007	0.010 ± 0.001	1.5 ± 0.1	< 0.0005 ± 0.0001
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	— ± —	0.0076 ± 0.0006	0.017 ± 0.003	1.5 ± 0.1	< 0.0005 ± 0.0002
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	3.3 ± —	0.0012 ± 0.0004	< 0.005 ± 0.003	1.4 ± 0.0	< 0.0005 ± 0.0002
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	— ± —	0.0011 ± 0.0005	0.013 ± 0.007	1.4 ± 0.0	< 0.0005 ± 0.0003
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	— ± —	0.013 ± 0.002	0.0077 ± 0.0046	1.1 ± 0.1	0.00074 ± 0.00058
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	19 ± —	0.015 ± 0.002	0.020 ± 0.010	1.1 ± 0.1	< 0.0004 ± 0.0005
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	— ± —	0.024 ± 0.001	0.012 ± 0.014	1.1 ± 0.0	0.0013 ± 0.0000
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	16 ± —	0.023 ± 0.002	0.010 ± 0.012	1.1 ± 0.1	0.0016 ± 0.0006
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	— ± —	0.0061 ± 0.0012	< 0.006 ± 0.007	1.0 ± 0.1	< 0.0004 ± 0.0006
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	3.0 ± —	0.0067 ± 0.0006	< 0.006 ± 0.008	1.1 ± 0.0	0.00072 ± 0.00012
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	— ± —	0.081 ± 0.004	0.0098 ± 0.0046	0.31 ± 0.01	0.00094 ± 0.00014
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	18 ± —	0.075 ± 0.002	0.013 ± 0.002	0.33 ± 0.04	0.0015 ± 0.0003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	2.0 ± —	0.099 ± 0.006	0.057 ± 0.011	0.31 ± 0.02	0.0018 ± 0.0002
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	— ± —	0.11 ± 0.00	0.026 ± 0.005	0.33 ± 0.03	0.0028 ± 0.0002
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	3.5 ± —	0.018 ± 0.002	0.0071 ± 0.0020	0.29 ± 0.03	0.00063 ± 0.00008
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	— ± —	0.017 ± 0.002	0.0062 ± 0.0044	0.27 ± 0.01	0.00054 ± 0.00030
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	5.7 ± 1.7	0.0039 ± 0.0007	0.0070 ± 0.0035	1.3 ± 0.1	< 0.0002 ± 0.0002
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	— ± —	0.0052 ± 0.0007	0.0071 ± 0.0029	1.2 ± 0.2	0.00036 ± 0.00011
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	12 ± 8	0.0074 ± 0.0006	0.012 ± 0.002	1.2 ± 0.1	0.00034 ± 0.00022
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	— ± —	0.0074 ± 0.0003	0.0085 ± 0.0035	1.3 ± 0.0	0.00066 ± 0.00038
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	4.0 ± 0.6	0.0017 ± 0.0002	0.0063 ± 0.0030	1.2 ± 0.4	< 0.0002 ± 0.0003
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	— ± —	0.0012 ± 0.0003	0.0066 ± 0.0040	1.3 ± 0.3	< 0.0002 ± 0.0001
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	7.6 ± 3.2	0.0083 ± 0.0013	0.015 ± 0.004	1.4 ± 0.2	< 0.0005 ± 0.0003
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	— ± —	0.013 ± 0.001	0.018 ± 0.003	1.4 ± 0.0	< 0.0005 ± 0.0001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	7.8 ± 0.8	0.0077 ± 0.0011	0.013 ± 0.006	1.3 ± 0.1	< 0.0005 ± 0.0005
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	— ± —	0.0087 ± 0.0016	0.0078 ± 0.0024	1.4 ± 0.2	< 0.0005 ± 0.0001
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	3.0 ± 1.2	0.0014 ± 0.0005	< 0.005 ± 0.002	1.2 ± 0.1	< 0.0005 ± 0.0003
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	— ± —	0.0014 ± 0.0003	< 0.005 ± 0.005	1.2 ± 0.1	< 0.0005 ± 0.0000
Flat Cr.	12/11/96	0.40 µm Mem	1/2	14 ± —	0.028 ± 0.001	0.022 ± 0.011	0.27 ± 0.03	0.0039 ± 0.0000
Flat Cr.	12/11/96	0.40 µm Mem	2/2	— ± —	0.025 ± 0.000	0.013 ± 0.002	0.30 ± 0.01	0.0040 ± 0.0005
Flat Cr.	12/11/96	0.45 µm Cap	1/2	6.3 ± —	0.022 ± 0.000	< 0.012 ± 0.005	0.26 ± 0.01	0.0029 ± 0.0012
Flat Cr.	12/11/96	0.45 µm Cap	2/2	— ± —	0.020 ± 0.001	< 0.012 ± 0.004	0.27 ± 0.02	0.0030 ± 0.0001
Flat Cr.	12/11/96	10 kd Tan	1/2	6.8 ± —	0.010 ± 0.002	< 0.012 ± 0.005	0.24 ± 0.04	0.0017 ± 0.0003
Flat Cr.	12/11/96	10 kd Tan	2/2	— ± —	0.011 ± 0.001	< 0.012 ± 0.020	0.22 ± 0.04	0.0021 ± 0.0004
Flat Cr.	05/29/97	0.40 µm Mem	1/2	75 ± 22	0.013 ± 0.002	0.0088 ± 0.0037	< 0.06 ± 0.02	0.0037 ± 0.0002
Flat Cr.	05/29/97	0.40 µm Mem	2/2	— ± —	0.013 ± 0.001	0.0099 ± 0.0018	< 0.06 ± 0.01	0.0039 ± 0.0006
Flat Cr.	05/29/97	0.45 µm Cap	1/2	122 ± 13	0.0093 ± 0.0004	< 0.003 ± 0.002	< 0.06 ± 0.01	0.0031 ± 0.0005
Flat Cr.	05/29/97	0.45 µm Cap	2/2	— ± —	0.0088 ± 0.0003	0.0084 ± 0.0017	< 0.06 ± 0.01	0.0033 ± 0.0014
Flat Cr.	05/29/97	10 kd Tan	1/2	75 ± 2	0.0030 ± 0.0008	< 0.005 ± 0.002	< 0.06 ± 0.03	0.0015 ± 0.0003
Flat Cr.	05/29/97	10 kd Tan	2/2	— ± —	0.0033 ± 0.0006	< 0.005 ± 0.004	< 0.06 ± 0.03	0.0012 ± 0.0004
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	730 ± 16	2.1 ± 0.0	1.1 ± 0.0	3.2 ± 0.1	0.11 ± 0.00
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	— ± —	2.2 ± 0.0	1.1 ± 0.0	3.2 ± 0.0	0.11 ± 0.00
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	850 ± 6	2.1 ± 0.0	1.2 ± 0.0	3.2 ± 0.2	0.11 ± 0.00
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	— ± —	2.1 ± 0.0	1.1 ± 0.1	3.3 ± 0.0	0.11 ± 0.01
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	790 ± 18	2.1 ± 0.1	1.1 ± 0.1	3.1 ± 0.0	0.11 ± 0.00

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	— ± —	2.1 ± 0.1	1.1 ± 0.0	3.1 ± 0.1	0.11 ± 0.00
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	711 ± 17	3.7 ± 0.2	3.4 ± 0.1	8.9 ± 0.1	0.18 ± 0.00
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	— ± —	3.7 ± 0.1	3.3 ± 0.1	9.2 ± 0.1	0.18 ± 0.00
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	994 ± 81	3.5 ± 0.0	3.5 ± 0.1	9.2 ± 0.1	0.18 ± 0.00
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	— ± —	3.7 ± 0.0	3.6 ± 0.1	9.1 ± 0.1	0.18 ± 0.00
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	196 ± 2	3.6 ± 0.2	3.0 ± 0.0	9.1 ± 0.3	0.18 ± 0.01
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	— ± —	3.7 ± 0.1	3.0 ± 0.1	9.1 ± 0.4	0.18 ± 0.00
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	11,500 ± 200	1.6 ± 0.0	3.5 ± 0.2	1.6 ± 0.1	0.65 ± 0.002
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	— ± —	1.6 ± 0.0	3.6 ± 0.2	1.7 ± 0.0	0.070 ± 0.006
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	11,600 ± 100	1.6 ± 0.0	3.7 ± 0.0	1.6 ± 0.0	0.070 ± 0.007
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	— ± —	1.6 ± 0.1	3.6 ± 0.0	1.6 ± 0.1	0.066 ± 0.002
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	11,100 ± 200	1.5 ± 0.0	3.3 ± 0.1	1.6 ± 0.1	0.066 ± 0.007
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	— ± —	1.5 ± 0.0	3.3 ± 0.1	1.5 ± 0.0	0.068 ± 0.000
Whiskeytown	12/11/96	0.40 µm Mem	1/2	10 ± —	0.0057 ± 0.0009	0.017 ± 0.004	0.65 ± 0.01	0.00061 ± 0.00075
Whiskeytown	12/11/96	0.40 µm Mem	2/2	— ± —	0.0072 ± 0.0009	0.014 ± 0.005	0.71 ± 0.02	0.00063 ± 0.00022
Whiskeytown	12/11/96	0.45 µm Cap	1/2	267 ± —	0.0077 ± 0.0003	0.053 ± 0.008	0.71 ± 0.02	0.00047 ± 0.00024
Whiskeytown	12/11/96	0.45 µm Cap	2/2	— ± —	0.0068 ± 0.0015	0.036 ± 0.004	0.66 ± 0.04	0.00085 ± 0.00033
Whiskeytown	12/11/96	10 kd Tan	1/2	2.2 ± —	0.0027 ± 0.0002	< 0.012 ± 0.016	0.67 ± 0.06	< 0.0002 ± 0.0001
Whiskeytown	12/11/96	10 kd Tan	2/2	— ± —	0.0025 ± 0.0003	< 0.006 ± 0.014	0.69 ± 0.09	< 0.0004 ± 0.0004
Whiskeytown	05/29/97	0.40 µm Mem	1/2	9.6 ± 2.8	0.0067 ± 0.0012	< 0.005 ± 0.008	0.64 ± 0.02	0.00065 ± 0.00109
Whiskeytown	05/29/97	0.40 µm Mem	2/2	— ± —	0.0084 ± 0.0010	0.0077 ± 0.0032	0.66 ± 0.07	0.00062 ± 0.00039
Whiskeytown	05/29/97	0.45 µm Cap	1/2	3.9 ± 2.9	0.0086 ± 0.0005	0.0034 ± 0.0026	0.60 ± 0.02	< 0.0005 ± 0.0005
Whiskeytown	05/29/97	0.45 µm Cap	2/2	— ± —	0.010 ± 0.000	0.016 ± 0.003	0.61 ± 0.03	< 0.0005 ± 0.0002
Whiskeytown	05/29/97	10 kd Tan	1/2	0.89 ± 0.24	0.0022 ± 0.0006	< 0.005 ± 0.004	0.64 ± 0.03	< 0.0005 ± 0.0003
Whiskeytown	05/29/97	10 kd Tan	2/2	— ± —	0.0021 ± 0.0002	< 0.005 ± 0.005	0.57 ± 0.04	< 0.0005 ± 0.0003
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	15 ± —	0.0065 ± 0.0004	0.014 ± 0.000	0.64 ± 0.00	0.00068 ± 0.00028
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	— ± —	0.0075 ± 0.0002	0.018 ± 0.002	0.59 ± 0.01	0.00047 ± 0.00011
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	15 ± —	0.0066 ± 0.0008	0.0072 ± 0.0014	0.62 ± 0.05	0.00069 ± 0.00015
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	— ± —	0.0087 ± 0.0013	0.015 ± 0.003	0.78 ± 0.05	< 0.0006 ± 0.0002
Spring Cr. arm	07/12/96	10 kd Tan	1/3	10 ± —	0.0032 ± 0.0013	0.011 ± 0.001	0.59 ± 0.04	0.00073 ± 0.00019
Spring Cr. arm	07/12/96	10 kd Tan	2/3	— ± —	0.0031 ± 0.0001	< 0.005 ± 0.000	0.66 ± 0.02	< 0.0003 ± 0.0000
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	13 ± —	0.013 ± 0.001	0.0075 ± 0.0057	0.63 ± 0.02	0.00089 ± 0.00035
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	— ± —	0.0097 ± 0.0003	0.0099 ± 0.0031	0.62 ± 0.04	0.00098 ± 0.00042

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Iron (II) (µg/L) UV–vis	Lanthanum (µg/L) ICP–MS	Lead (comp.) (µg/L) ICP–MS	Lithium (µg/L) ICP–MS	Lutetium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	9.6 ± —	0.0091 ± 0.0010	0.048 ± 0.004	0.62 ± 0.02	0.00062 ± 0.00021
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	— ± —	0.012 ± 0.001	0.020 ± 0.002	0.61 ± 0.02	0.00060 ± 0.00005
Spring Cr. arm	09/18/96	10 kd Tan	1/2	6.9 ± —	0.0025 ± 0.0004	< 0.005 ± 0.002	0.58 ± 0.03	< 0.0004 ± 0.0005
Spring Cr. arm	09/18/96	10 kd Tan	2/2	— ± —	0.0031 ± 0.0009	0.025 ± 0.019	0.60 ± 0.03	< 0.0004 ± 0.0000
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	25 ± —	0.036 ± 0.002	0.028 ± 0.013	0.75 ± 0.02	0.0016 ± 0.0003
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	— ± —	0.024 ± 0.001	0.024 ± 0.004	0.72 ± 0.03	0.0016 ± 0.0001
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	22 ± 3	0.031 ± 0.001	0.029 ± 0.005	0.74 ± 0.05	0.0019 ± 0.0001
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	— ± —	0.036 ± 0.002	0.024 ± 0.008	0.74 ± 0.01	0.0020 ± 0.0001
Spring Cr. arm	11/20/96	10 kd Tan	1/2	1.0 ± 0.9	0.0053 ± 0.0005	0.0089 ± 0.0117	0.68 ± 0.04	< 0.0005 ± 0.0000
Spring Cr. arm	11/20/96	10 kd Tan	2/2	— ± —	0.0052 ± 0.0004	< 0.005 ± 0.003	0.70 ± 0.03	< 0.0005 ± 0.0001
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	8.5 ± —	0.050 ± 0.001	0.024 ± 0.005	1.0 ± 0.0	0.0023 ± 0.0002
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	— ± —	0.043 ± 0.003	0.0074 ± 0.0056	1.0 ± 0.0	0.0017 ± 0.0002
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	13 ± —	0.087 ± 0.003	0.037 ± 0.005	1.0 ± 0.0	0.0038 ± 0.0006
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	— ± —	0.089 ± 0.001	0.060 ± 0.003	0.98 ± 0.06	0.0028 ± 0.0001
Spring Cr. arm	12/11/96	10 kd Tan	1/2	2.0 ± —	0.012 ± 0.001	0.011 ± 0.008	0.90 ± 0.06	0.00063 ± 0.00052
Spring Cr. arm	12/11/96	10 kd Tan	2/2	— ± —	0.012 ± 0.000	0.0054 ± 0.0033	0.93 ± 0.06	0.00077 ± 0.00053
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	19 ± 2	0.011 ± 0.000	0.021 ± 0.006	0.66 ± 0.03	0.00079 ± 0.00047
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	— ± —	0.011 ± 0.001	0.0064 ± 0.0070	0.69 ± 0.05	0.00086 ± 0.00050
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	12 ± 2	0.015 ± 0.000	0.0045 ± 0.0028	0.63 ± 0.03	0.00079 ± 0.00008
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	— ± —	0.013 ± 0.000	< 0.003 ± 0.002	0.72 ± 0.05	0.00094 ± 0.00033
Spring Cr. arm	05/28/97	10 kd Tan	1/2	0.59 ± 0.24	0.0024 ± 0.0002	0.0052 ± 0.0016	0.65 ± 0.07	< 0.0005 ± 0.0002
Spring Cr. arm	05/28/97	10 kd Tan	2/2	— ± —	0.0022 ± 0.0008	0.0091 ± 0.0074	0.65 ± 0.00	< 0.0005 ± 0.0003
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	14 ± 1	0.011 ± 0.000	0.017 ± 0.004	9.2 ± 0.4	0.0025 ± 0.0003
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	— ± —	0.013 ± 0.001	0.013 ± 0.012	9.5 ± 0.5	0.0025 ± 0.0005
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	6.4 ± 1.5	0.013 ± 0.001	0.014 ± 0.001	9.3 ± 0.2	0.0023 ± 0.0005
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	— ± —	0.012 ± 0.001	0.017 ± 0.009	9.4 ± 0.1	0.0027 ± 0.0005
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	4.0 ± —	0.0075 ± 0.0011	0.0069 ± 0.0061	8.8 ± 0.1	0.0027 ± 0.0006
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	— ± —	0.0079 ± 0.0004	0.012 ± 0.007	8.7 ± 0.3	0.0022 ± 0.0005
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	12 ± —	0.026 ± 0.002	0.021 ± 0.002	0.91 ± 0.01	0.0014 ± 0.0001
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	— ± —	0.018 ± 0.002	0.010 ± 0.002	0.84 ± 0.03	0.00091 ± 0.00009
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	20 ± —	0.037 ± 0.002	0.042 ± 0.008	0.77 ± 0.01	0.0015 ± 0.0002
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	— ± —	0.038 ± 0.003	0.039 ± 0.007	0.80 ± 0.02	0.0013 ± 0.0003
Yolo Bypass	01/07/97	10 kd Tan	1/2	3.9 ± —	0.0074 ± 0.0008	0.019 ± 0.003	0.82 ± 0.05	< 0.0004 ± 0.0001
Yolo Bypass	01/07/97	10 kd Tan	2/2	— ± —	0.0087 ± 0.0007	0.0060 ± 0.0030	0.74 ± 0.04	0.00061 ± 0.00027

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	4.3 ± 0.0	0.40 ± 0.03	0.00080 ± 0.00010	0.38 ± 0.02	0.028 ± 0.000
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	4.2 ± 0.0	0.33 ± 0.01	0.00090 ± 0.00020	0.36 ± 0.01	0.024 ± 0.001
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	4.2 ± 0.0	0.22 ± 0.01	0.0014 ± 0.0002	0.35 ± 0.01	0.035 ± 0.000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	4.2 ± 0.0	0.24 ± 0.01	— ± —	0.37 ± 0.02	0.027 ± 0.000
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	4.2 ± 0.0	0.25 ± 0.01	0.0015 ± 0.0001	0.32 ± 0.01	0.013 ± 0.001
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	4.1 ± 0.0	0.30 ± 0.01	0.00070 ± 0.00040	0.31 ± 0.02	0.018 ± 0.003
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	0.00050 ± 0.00030	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	4.3 ± 0.2	1.2 ± 0.0	< 0.0004 ± 0.0001	0.38 ± 0.01	0.028 ± 0.004
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	4.4 ± 0.2	1.8 ± 0.0	0.00054 ± 0.00018	0.37 ± 0.03	0.033 ± 0.002
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	4.4 ± 0.3	0.74 ± 0.04	0.00051 ± 0.00016	0.31 ± 0.04	0.023 ± 0.004
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	4.2 ± 0.1	0.70 ± 0.01	0.00042 ± 0.00017	0.33 ± 0.02	0.025 ± 0.002
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	4.1 ± 0.1	0.70 ± 0.04	0.00074 ± 0.00004	0.27 ± 0.00	0.0087 ± 0.0030
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	4.0 ± 0.1	0.65 ± 0.01	< 0.0004 ± 0.0000	0.30 ± 0.04	0.0061 ± 0.0005
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	4.7 ± 0.1	0.38 ± 0.01	0.00056 ± 0.00025	0.45 ± 0.03	0.013 ± 0.001
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	4.7 ± 0.0	0.36 ± 0.02	< 0.0004 ± 0.0001	0.49 ± 0.00	0.011 ± 0.002
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	4.6 ± 0.0	0.35 ± 0.02	0.00093 ± 0.00023	0.50 ± 0.03	0.0085 ± 0.0022
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	4.6 ± 0.0	0.36 ± 0.02	0.0013 ± 0.0001	0.47 ± 0.03	0.0075 ± 0.0034
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	4.3 ± 0.0	0.28 ± 0.00	0.00058 ± 0.00014	0.32 ± 0.02	< 0.002 ± 0.001
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	4.3 ± 0.1	0.29 ± 0.00	0.00063 ± 0.00013	0.31 ± 0.01	0.0021 ± 0.0020
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	5.0 ± 0.2	1.3 ± 0.0	0.00043 ± 0.00019	0.58 ± 0.00	0.016 ± 0.002
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	5.2 ± 0.1	1.3 ± 0.0	0.00080 ± 0.00001	0.65 ± 0.11	0.014 ± 0.001
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	4.9 ± 0.3	1.4 ± 0.0	0.0011 ± 0.0001	0.53 ± 0.04	0.019 ± 0.002
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	5.0 ± 0.3	1.3 ± 0.0	0.0011 ± 0.0001	0.56 ± 0.02	0.020 ± 0.003
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	4.5 ± 0.2	1.1 ± 0.0	0.0014 ± 0.0003	0.34 ± 0.03	0.0059 ± 0.0003
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	4.4 ± 0.2	1.1 ± 0.0	0.00081 ± 0.00012	0.30 ± 0.01	0.0052 ± 0.0011
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	4.3 ± 0.1	0.67 ± 0.03	0.0018 ± 0.0004	0.37 ± 0.03	0.029 ± 0.002
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	4.2 ± 0.2	0.35 ± 0.01	0.0017 ± 0.0001	0.36 ± 0.04	0.020 ± 0.003
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	4.2 ± 0.2	0.36 ± 0.01	0.0022 ± 0.0006	0.36 ± 0.04	0.021 ± 0.001
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	4.3 ± 0.1	0.21 ± 0.00	0.0020 ± 0.0007	0.35 ± 0.06	0.024 ± 0.002
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	3.6 ± 0.1	0.18 ± 0.00	0.0013 ± 0.0003	0.18 ± 0.05	0.0039 ± 0.0012
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	3.6 ± 0.1	0.18 ± 0.01	0.0011 ± 0.0002	0.17 ± 0.06	0.0046 ± 0.0004
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	4.6 ± 0.0	0.72 ± 0.00	0.0012 ± 0.0001	0.31 ± 0.02	0.017 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	4.6 ± 0.0	0.71 ± 0.01	0.0011 ± 0.0000	0.37 ± 0.00	0.018 ± 0.002
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	4.6 ± 0.0	0.79 ± 0.03	0.0019 ± 0.0002	0.31 ± 0.01	0.027 ± 0.001
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	4.6 ± 0.0	0.80 ± 0.00	0.0010 ± 0.0003	0.33 ± 0.01	0.023 ± 0.001
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	4.5 ± 0.0	0.69 ± 0.02	0.0011 ± 0.0001	0.27 ± 0.00	0.012 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	4.5 ± 0.1	0.73 ± 0.01	0.00090 ± 0.00020	0.29 ± 0.00	0.012 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	4.5 ± 0.1	0.70 ± 0.01	0.00070 ± 0.00030	0.29 ± 0.01	0.012 ± 0.002
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	4.9 ± 0.1	1.7 ± 0.0	0.00047 ± 0.00013	0.25 ± 0.03	0.027 ± 0.003
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	5.2 ± 0.1	1.9 ± 0.1	< 0.0004 ± 0.0001	0.23 ± 0.03	0.021 ± 0.005
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	5.3 ± 0.0	1.7 ± 0.0	0.00046 ± 0.00010	0.24 ± 0.04	0.027 ± 0.006
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	4.9 ± 0.1	1.6 ± 0.0	< 0.0004 ± 0.0003	0.23 ± 0.03	0.027 ± 0.002
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	4.8 ± 0.0	1.5 ± 0.0	0.00064 ± 0.00008	0.18 ± 0.07	0.0050 ± 0.0011
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	4.6 ± 0.2	1.5 ± 0.0	< 0.0004 ± 0.0003	0.19 ± 0.02	0.0048 ± 0.0015
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	4.5 ± 0.1	1.5 ± 0.0	— ± —	0.18 ± 0.02	< 0.003 ± 0.003
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	4.8 ± 0.1	4.2 ± 0.1	0.0015 ± 0.0002	0.38 ± 0.01	0.026 ± 0.001
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	4.7 ± 0.1	4.2 ± 0.0	0.0012 ± 0.0001	0.46 ± 0.01	0.038 ± 0.002
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	4.6 ± 0.1	4.4 ± 0.0	0.0013 ± 0.0001	0.38 ± 0.03	0.031 ± 0.002
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	4.7 ± 0.1	4.4 ± 0.0	0.0014 ± 0.0005	0.41 ± 0.04	0.029 ± 0.005
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	4.0 ± 0.0	2.9 ± 0.1	0.0011 ± 0.0001	0.25 ± 0.03	0.0036 ± 0.0014
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	4.1 ± 0.0	3.0 ± 0.0	0.0010 ± 0.0000	0.20 ± 0.03	0.0029 ± 0.0017
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	5.1 ± 0.1	3.0 ± 0.0	0.00043 ± 0.00015	0.43 ± 0.01	0.036 ± 0.001
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	5.1 ± 0.1	2.8 ± 0.1	0.00063 ± 0.00021	0.47 ± 0.02	0.029 ± 0.003
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	5.1 ± 0.1	3.4 ± 0.0	0.00075 ± 0.00005	0.55 ± 0.05	0.033 ± 0.001
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	5.0 ± 0.1	3.4 ± 0.0	0.00079 ± 0.00009	0.50 ± 0.01	0.035 ± 0.008
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	4.2 ± 0.1	2.2 ± 0.1	0.0010 ± 0.0000	0.26 ± 0.03	0.0072 ± 0.0006
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	4.2 ± 0.1	2.2 ± 0.0	0.00071 ± 0.00011	0.25 ± 0.01	0.0070 ± 0.0031
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	4.4 ± 0.5	7.3 ± 0.2	0.00086 ± 0.00009	0.41 ± 0.03	0.031 ± 0.001
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	4.1 ± 0.8	7.7 ± 0.4	0.00085 ± 0.00035	0.45 ± 0.00	0.025 ± 0.002
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	4.1 ± 0.8	8.9 ± 0.3	0.00085 ± 0.00040	0.39 ± 0.01	0.059 ± 0.002
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	3.9 ± 0.7	9.4 ± 0.2	0.0015 ± 0.0001	0.41 ± 0.01	0.055 ± 0.003
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	4.1 ± 0.8	6.6 ± 0.2	0.00053 ± 0.00032	0.35 ± 0.01	0.013 ± 0.003
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	4.2 ± 0.6	6.6 ± 0.2	< 0.0004 ± 0.0002	0.33 ± 0.01	0.016 ± 0.005
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	4.1 ± 0.1	6.7 ± 0.0	— ± —	0.39 ± 0.00	0.014 ± 0.001
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	4.6 ± 0.2	1.0 ± 0.0	0.0011 ± 0.0002	0.32 ± 0.04	0.017 ± 0.003
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	4.7 ± 0.2	1.4 ± 0.0	0.0037 ± 0.0003	0.30 ± 0.02	0.024 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	4.6 ± 0.2	1.2 ± 0.0	0.0019 ± 0.0003	0.29 ± 0.03	0.020 ± 0.002
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	4.7 ± 0.1	1.2 ± 0.0	0.0010 ± 0.0002	0.30 ± 0.04	0.022 ± 0.002
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	4.2 ± 0.2	0.91 ± 0.04	0.00066 ± 0.00020	0.18 ± 0.03	0.0023 ± 0.0003
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	4.3 ± 0.1	0.90 ± 0.02	0.00085 ± 0.00024	0.25 ± 0.04	0.0058 ± 0.0020
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	4.8 ± 0.0	2.2 ± 0.0	0.0011 ± 0.0002	0.33 ± 0.02	0.013 ± 0.002
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	4.8 ± 0.0	1.8 ± 0.0	0.0014 ± 0.0002	0.30 ± 0.02	0.015 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	4.7 ± 0.0	1.9 ± 0.0	0.00080 ± 0.00030	0.32 ± 0.01	0.017 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	4.8 ± 0.1	1.7 ± 0.0	— ± —	0.33 ± 0.02	0.016 ± 0.001
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	4.8 ± 0.0	2.2 ± 0.0	0.00040 ± 0.00010	0.44 ± 0.00	0.0059 ± 0.0019
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	4.7 ± 0.0	2.2 ± 0.1	0.0014 ± 0.0000	0.36 ± 0.00	0.0051 ± 0.0009
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	0.0010 ± 0.0002	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	4.9 ± 0.1	2.6 ± 0.0	0.00043 ± 0.00004	0.28 ± 0.01	0.010 ± 0.000
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	5.3 ± 0.1	2.6 ± 0.0	0.00068 ± 0.00009	0.28 ± 0.03	0.0095 ± 0.0006
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	4.8 ± 0.1	2.7 ± 0.0	0.00053 ± 0.00018	0.32 ± 0.05	0.015 ± 0.002
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	5.4 ± 0.1	2.7 ± 0.1	< 0.0004 ± 0.0001	0.32 ± 0.04	0.018 ± 0.001
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	4.6 ± 0.1	2.1 ± 0.0	< 0.0004 ± 0.0001	0.18 ± 0.02	0.0037 ± 0.0013
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	4.6 ± 0.2	2.1 ± 0.0	< 0.0004 ± 0.0001	0.17 ± 0.01	< 0.003 ± 0.000
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	5.3 ± 0.2	2.2 ± 0.0	0.0015 ± 0.0002	0.50 ± 0.15	0.026 ± 0.000
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	5.2 ± 0.1	2.1 ± 0.0	0.00086 ± 0.00034	0.42 ± 0.02	0.025 ± 0.002
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	5.2 ± 0.2	3.0 ± 0.1	0.0015 ± 0.0001	0.40 ± 0.03	0.023 ± 0.004
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	5.2 ± 0.2	3.0 ± 0.0	0.0015 ± 0.0002	0.44 ± 0.02	0.023 ± 0.001
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	4.5 ± 0.2	1.1 ± 0.0	0.00061 ± 0.00018	0.20 ± 0.04	0.0026 ± 0.0010
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	4.5 ± 0.2	1.2 ± 0.1	0.0010 ± 0.0002	0.18 ± 0.02	0.0027 ± 0.0006
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	5.0 ± 0.1	1.4 ± 0.0	0.00099 ± 0.00013	0.46 ± 0.04	0.018 ± 0.003
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	5.0 ± 0.1	1.6 ± 0.0	0.00060 ± 0.00014	0.41 ± 0.01	0.027 ± 0.003
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	4.9 ± 0.1	0.75 ± 0.01	0.0012 ± 0.0001	0.43 ± 0.01	0.019 ± 0.003
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	4.7 ± 0.1	0.73 ± 0.01	0.00090 ± 0.00022	0.42 ± 0.01	0.023 ± 0.005
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	4.2 ± 0.2	0.99 ± 0.02	0.0010 ± 0.0002	0.23 ± 0.01	< 0.003 ± 0.001
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	4.2 ± 0.2	0.94 ± 0.02	0.00080 ± 0.00012	0.23 ± 0.01	< 0.003 ± 0.002
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	4.2 ± 0.7	2.9 ± 0.1	0.0015 ± 0.0004	0.36 ± 0.01	0.065 ± 0.002
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	4.0 ± 0.9	0.92 ± 0.01	0.0014 ± 0.0003	0.40 ± 0.01	0.035 ± 0.001
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	3.8 ± 0.8	4.7 ± 0.2	0.00077 ± 0.00010	0.38 ± 0.03	0.042 ± 0.004
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	4.0 ± 0.3	5.0 ± 0.1	— ± —	0.37 ± 0.02	0.052 ± 0.003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	3.7 ± 0.6	0.74 ± 0.02	< 0.0004 ± 0.0004	0.28 ± 0.01	0.016 ± 0.002
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	3.9 ± 0.5	0.77 ± 0.03	0.00068 ± 0.00025	0.28 ± 0.02	0.013 ± 0.003
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	5.1 ± 0.3	2.0 ± 0.1	0.0017 ± 0.0004	0.32 ± 0.01	0.016 ± 0.003
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	5.0 ± 0.1	1.8 ± 0.0	0.0019 ± 0.0007	0.34 ± 0.04	0.013 ± 0.002
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	5.1 ± 0.2	2.3 ± 0.1	0.0015 ± 0.0000	0.31 ± 0.03	0.013 ± 0.003
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	5.0 ± 0.2	2.3 ± 0.0	0.0013 ± 0.0003	0.30 ± 0.03	0.020 ± 0.001
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	4.7 ± 0.2	1.7 ± 0.1	0.00087 ± 0.00001	0.24 ± 0.04	0.0051 ± 0.0018
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	4.7 ± 0.1	1.7 ± 0.0	0.0012 ± 0.0001	0.17 ± 0.01	0.0041 ± 0.0013
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	5.2 ± 0.1	1.7 ± 0.0	0.0028 ± 0.0004	0.37 ± 0.03	0.010 ± 0.001
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	5.2 ± 0.0	1.8 ± 0.0	— ± —	0.36 ± 0.02	0.018 ± 0.002
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	4.8 ± 0.2	3.4 ± 0.0	0.0024 ± 0.0004	0.36 ± 0.00	0.016 ± 0.001
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	0.0027 ± 0.0003	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	0.0016 ± 0.0002	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	5.4 ± 0.3	3.6 ± 0.0	0.00069 ± 0.00008	0.41 ± 0.02	0.010 ± 0.004
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	5.8 ± 0.1	2.6 ± 0.0	0.00061 ± 0.00037	0.41 ± 0.03	0.0039 ± 0.0016
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	5.4 ± 0.3	4.4 ± 0.1	< 0.0004 ± 0.0001	0.40 ± 0.06	0.010 ± 0.001
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	5.9 ± 0.1	4.3 ± 0.0	0.00061 ± 0.00012	0.39 ± 0.07	0.012 ± 0.001
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	5.5 ± 0.0	2.4 ± 0.0	< 0.0004 ± 0.0001	0.32 ± 0.04	< 0.003 ± 0.000
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	4.7 ± 0.6	2.3 ± 0.0	< 0.0004 ± 0.0000	0.33 ± 0.02	0.0037 ± 0.0029
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	6.2 ± 0.1	6.7 ± 0.1	0.00061 ± 0.00014	0.47 ± 0.01	0.0093 ± 0.0018
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	6.3 ± 0.0	6.1 ± 0.1	0.00063 ± 0.00018	0.42 ± 0.02	0.011 ± 0.003
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	6.3 ± 0.1	7.1 ± 0.2	0.0012 ± 0.0001	0.44 ± 0.03	0.0091 ± 0.0064
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	6.4 ± 0.2	7.2 ± 0.1	0.00077 ± 0.00014	0.46 ± 0.04	0.011 ± 0.001
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	5.8 ± 0.1	5.1 ± 0.1	0.0010 ± 0.0002	0.30 ± 0.01	< 0.002 ± 0.001
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	5.8 ± 0.1	5.1 ± 0.2	0.00060 ± 0.00009	0.32 ± 0.02	< 0.002 ± 0.001
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	5.3 ± 0.9	2.3 ± 0.0	0.00078 ± 0.00033	0.51 ± 0.00	0.017 ± 0.002
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	6.3 ± 0.2	2.1 ± 0.1	0.0013 ± 0.0003	0.48 ± 0.02	0.012 ± 0.001
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	6.0 ± 0.9	2.7 ± 0.0	0.00092 ± 0.00015	0.48 ± 0.00	0.017 ± 0.002
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	4.7 ± 0.3	2.8 ± 0.1	0.0012 ± 0.0001	0.54 ± 0.00	0.018 ± 0.000
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	4.9 ± 0.7	1.8 ± 0.0	0.00073 ± 0.00041	0.30 ± 0.02	0.0038 ± 0.0017
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	4.8 ± 0.9	1.7 ± 0.0	0.00066 ± 0.00031	0.30 ± 0.00	< 0.003 ± 0.001
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	4.0 ± 0.5	0.29 ± 0.03	0.0020 ± 0.0001	0.37 ± 0.01	0.039 ± 0.002
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	3.9 ± 0.8	0.26 ± 0.02	0.0020 ± 0.0002	0.40 ± 0.04	0.039 ± 0.008

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	4.2 ± 0.7	3.2 ± 0.1	0.0017 ± 0.0003	0.39 ± 0.03	0.055 ± 0.000
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	4.2 ± 0.8	3.2 ± 0.1	0.0015 ± 0.0002	0.38 ± 0.00	0.055 ± 0.010
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	3.9 ± 0.8	0.22 ± 0.03	0.0011 ± 0.0002	0.42 ± 0.01	0.029 ± 0.004
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	4.2 ± 0.5	0.21 ± 0.01	0.0011 ± 0.0001	0.37 ± 0.02	0.025 ± 0.005
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	5.5 ± 0.0	1.6 ± 0.0	< 0.0004 ± 0.0001	0.37 ± 0.01	0.012 ± 0.002
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	5.6 ± 0.1	2.3 ± 0.0	0.00045 ± 0.00026	0.36 ± 0.01	0.021 ± 0.002
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	5.4 ± 0.1	2.5 ± 0.1	0.0013 ± 0.0004	0.37 ± 0.03	0.012 ± 0.001
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	5.5 ± 0.1	2.3 ± 0.1	0.00085 ± 0.00020	0.34 ± 0.02	0.013 ± 0.001
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	5.3 ± 0.1	0.62 ± 0.01	0.00066 ± 0.00013	0.26 ± 0.03	0.0020 ± 0.0015
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	5.3 ± 0.0	0.59 ± 0.01	0.00040 ± 0.00026	0.29 ± 0.05	0.0028 ± 0.0011
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	4.4 ± 0.0	0.77 ± 0.05	0.0014 ± 0.0002	0.41 ± 0.00	0.0074 ± 0.0019
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	4.6 ± 0.1	2.3 ± 0.1	0.0011 ± 0.0004	0.35 ± 0.00	0.022 ± 0.001
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	4.6 ± 0.1	1.6 ± 0.0	0.0021 ± 0.0003	0.36 ± 0.01	0.014 ± 0.001
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	4.5 ± 0.1	1.5 ± 0.0	— ± —	0.35 ± 0.01	0.016 ± 0.000
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	4.6 ± 0.2	0.43 ± 0.01	0.0011 ± 0.0004	0.32 ± 0.02	0.0079 ± 0.0011
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	4.6 ± 0.2	0.46 ± 0.01	0.00070 ± 0.00020	0.33 ± 0.01	0.0048 ± 0.0006
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	0.0011 ± 0.0001	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	6.5 ± 0.4	6.1 ± 0.1	0.00065 ± 0.00022	0.48 ± 0.05	0.025 ± 0.003
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	7.1 ± 0.1	2.8 ± 0.0	0.00064 ± 0.00033	0.47 ± 0.02	0.0070 ± 0.0011
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	6.8 ± 0.1	5.4 ± 0.0	0.0012 ± 0.0001	0.50 ± 0.01	0.010 ± 0.001
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	6.4 ± 0.0	5.3 ± 0.0	0.00065 ± 0.00011	0.46 ± 0.01	0.0098 ± 0.0022
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	6.0 ± 0.0	2.8 ± 0.0	0.00053 ± 0.00011	0.42 ± 0.07	< 0.003 ± 0.001
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	6.0 ± 0.1	2.9 ± 0.1	0.00051 ± 0.00014	0.39 ± 0.04	0.0087 ± 0.0001
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	0.00071 ± 0.00015	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	6.8 ± 0.1	9.2 ± 0.1	0.0012 ± 0.0005	0.53 ± 0.04	0.024 ± 0.006
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	7.0 ± 0.2	9.0 ± 0.1	0.0014 ± 0.0000	0.52 ± 0.03	0.025 ± 0.002
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	0.0012 ± 0.0001	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	4.6 ± 0.5	3.8 ± 0.1	0.0017 ± 0.0003	0.42 ± 0.01	0.026 ± 0.003
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	4.8 ± 0.1	3.2 ± 0.0	0.0015 ± 0.0005	0.40 ± 0.02	0.017 ± 0.001
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	4.8 ± 0.0	4.3 ± 0.0	0.0012 ± 0.0003	0.43 ± 0.07	0.024 ± 0.002
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	4.5 ± 0.5	4.2 ± 0.0	0.0016 ± 0.0001	0.38 ± 0.03	0.024 ± 0.003
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	4.6 ± 0.2	3.0 ± 0.1	0.00094 ± 0.00025	0.34 ± 0.02	0.0088 ± 0.0009
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	4.6 ± 0.1	3.0 ± 0.0	0.00088 ± 0.00042	0.37 ± 0.04	0.011 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	6.3 ± 0.1	0.68 ± 0.02	0.0013 ± 0.0002	0.50 ± 0.03	0.0077 ± 0.0001
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	6.3 ± 0.0	0.43 ± 0.00	0.00071 ± 0.00012	0.49 ± 0.02	0.0064 ± 0.0008
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	6.2 ± 0.1	1.8 ± 0.0	0.00055 ± 0.00014	0.47 ± 0.02	0.010 ± 0.002
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	6.3 ± 0.1	1.8 ± 0.0	0.00094 ± 0.00005	0.49 ± 0.03	0.011 ± 0.001
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	5.6 ± 0.1	0.28 ± 0.01	0.00095 ± 0.00012	0.28 ± 0.06	0.0035 ± 0.0002
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	5.6 ± 0.1	0.26 ± 0.01	0.00083 ± 0.00017	0.30 ± 0.05	0.0020 ± 0.0017
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	4.1 ± 0.0	0.63 ± 0.01	< 0.0004 ± 0.000	0.33 ± 0.00	0.013 ± 0.002
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	4.2 ± 0.0	0.44 ± 0.00	0.00060 ± 0.00000	0.34 ± 0.02	0.011 ± 0.002
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	4.2 ± 0.2	1.2 ± 0.0	0.0016 ± 0.0001	0.36 ± 0.00	0.011 ± 0.002
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	4.3 ± 0.1	0.91 ± 0.01	— ± —	0.33 ± 0.00	0.014 ± 0.001
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	3.9 ± 0.2	0.35 ± 0.01	0.00070 ± 0.00010	0.23 ± 0.01	0.0013 ± 0.0008
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	4.4 ± 0.1	0.35 ± 0.01	0.0010 ± 0.0002	0.38 ± 0.02	0.0038 ± 0.0002
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	0.00080 ± 0.00010	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	6.1 ± 0.2	1.1 ± 0.0	0.00052 ± 0.00007	0.48 ± 0.04	0.0042 ± 0.0008
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	6.4 ± 0.3	0.76 ± 0.04	< 0.0004 ± 0.0002	0.50 ± 0.04	0.0077 ± 0.0017
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	6.6 ± 0.0	1.8 ± 0.0	0.00049 ± 0.00001	0.50 ± 0.02	0.015 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	6.1 ± 0.0	1.8 ± 0.0	0.00063 ± 0.00009	0.52 ± 0.03	0.0086 ± 0.0003
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	5.3 ± 0.2	0.68 ± 0.03	< 0.0004 ± 0.0000	0.26 ± 0.04	< 0.002 ± 0.002
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	5.8 ± 0.0	0.64 ± 0.05	< 0.0004 ± 0.0001	0.30 ± 0.01	< 0.003 ± 0.002
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	5.5 ± 0.2	2.1 ± 0.0	< 0.0004 ± 0.0002	0.45 ± 0.00	0.0073 ± 0.0002
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	5.5 ± 0.1	1.9 ± 0.0	0.00071 ± 0.00021	0.44 ± 0.02	0.0075 ± 0.0011
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	5.5 ± 0.1	2.8 ± 0.0	0.00068 ± 0.00014	0.43 ± 0.00	0.0055 ± 0.0018
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	5.5 ± 0.1	2.8 ± 0.1	0.0015 ± 0.0001	0.42 ± 0.02	0.012 ± 0.002
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	4.7 ± 0.1	1.4 ± 0.0	0.00056 ± 0.00002	0.21 ± 0.02	< 0.002 ± 0.000
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	4.6 ± 0.2	1.3 ± 0.0	0.00083 ± 0.00024	0.25 ± 0.02	< 0.002 ± 0.000
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	3.3 ± 0.3	3.1 ± 0.0	0.0010 ± 0.0002	0.32 ± 0.01	0.025 ± 0.004
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	4.2 ± 0.9	2.7 ± 0.0	0.00084 ± 0.00030	0.37 ± 0.01	0.029 ± 0.004
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	4.2 ± 0.9	6.0 ± 0.1	0.0015 ± 0.0003	0.36 ± 0.02	0.036 ± 0.003
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	4.0 ± 0.7	6.0 ± 0.1	0.0011 ± 0.0002	0.35 ± 0.02	0.038 ± 0.004
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	3.8 ± 0.6	3.8 ± 0.1	0.00059 ± 0.00006	0.23 ± 0.03	0.015 ± 0.002
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	3.7 ± 0.7	3.8 ± 0.1	0.0011 ± 0.0002	0.26 ± 0.01	0.014 ± 0.007
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	1.5 ± 0.1	7.4 ± 0.2	0.0017 ± 0.0001	0.25 ± 0.02	0.10 ± 0.01
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	1.7 ± 0.3	7.5 ± 0.0	0.0020 ± 0.0005	0.24 ± 0.03	0.095 ± 0.011

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	1.7 ± 0.2	8.4 ± 0.2	0.0015 ± 0.0003	0.22 ± 0.02	0.12 ± 0.01
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	1.7 ± 0.1	8.7 ± 0.4	0.0017 ± 0.0001	0.25 ± 0.02	0.11 ± 0.00
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	1.4 ± 0.2	5.5 ± 0.2	0.00051 ± 0.00030	0.11 ± 0.01	0.026 ± 0.006
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	1.5 ± 0.2	5.2 ± 0.1	0.00087 ± 0.00031	0.13 ± 0.02	0.023 ± 0.003
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	5.1 ± 0.1	0.33 ± 0.01	0.00049 ± 0.00005	0.42 ± 0.04	0.0064 ± 0.0008
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	5.2 ± 0.0	0.33 ± 0.01	0.00066 ± 0.00009	0.42 ± 0.04	0.0078 ± 0.0016
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	5.1 ± 0.0	1.5 ± 0.0	0.00085 ± 0.00007	0.42 ± 0.04	0.0089 ± 0.0045
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	5.2 ± 0.1	1.5 ± 0.0	0.00059 ± 0.00017	0.39 ± 0.00	0.0094 ± 0.0015
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	4.4 ± 0.0	0.60 ± 0.01	0.0013 ± 0.0000	0.20 ± 0.04	< 0.002 ± 0.001
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	4.4 ± 0.0	0.59 ± 0.03	0.00069 ± 0.00027	0.20 ± 0.05	< 0.002 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	5.1 ± 0.1	0.74 ± 0.01	0.00068 ± 0.00013	0.46 ± 0.01	0.011 ± 0.003
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	5.1 ± 0.1	1.3 ± 0.1	0.00063 ± 0.00020	0.46 ± 0.01	0.014 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	5.1 ± 0.0	1.5 ± 0.0	0.00098 ± 0.00009	0.45 ± 0.01	0.010 ± 0.002
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	5.2 ± 0.0	1.5 ± 0.0	0.00060 ± 0.00005	0.48 ± 0.01	0.012 ± 0.004
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	4.5 ± 0.1	0.27 ± 0.01	0.00070 ± 0.00008	0.25 ± 0.03	< 0.003 ± 0.001
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	4.5 ± 0.1	0.27 ± 0.02	0.00054 ± 0.00023	0.25 ± 0.01	< 0.003 ± 0.001
Flat Cr.	12/11/96	0.40 µm Mem	1/2	1.5 ± 0.1	15 ± 1	0.0014 ± 0.0003	0.089 ± 0.016	0.089 ± 0.002
Flat Cr.	12/11/96	0.40 µm Mem	2/2	1.5 ± 0.1	15 ± 0	0.0010 ± 0.0003	0.094 ± 0.017	0.092 ± 0.001
Flat Cr.	12/11/96	0.45 µm Cap	1/2	1.6 ± 0.2	15 ± 0	0.0012 ± 0.0003	0.070 ± 0.004	0.066 ± 0.002
Flat Cr.	12/11/96	0.45 µm Cap	2/2	1.7 ± 0.1	15 ± 0	0.0015 ± 0.0003	0.072 ± 0.006	0.070 ± 0.001
Flat Cr.	12/11/96	10 kd Tan	1/2	1.4 ± 0.1	12 ± 0	0.0010 ± 0.0000	0.056 ± 0.015	0.031 ± 0.001
Flat Cr.	12/11/96	10 kd Tan	2/2	1.5 ± 0.1	13 ± 0	0.0011 ± 0.0003	0.070 ± 0.021	0.031 ± 0.001
Flat Cr.	05/29/97	0.40 µm Mem	1/2	6.8 ± 0.2	111 ± 2	0.00075 ± 0.00025	0.23 ± 0.02	0.043 ± 0.004
Flat Cr.	05/29/97	0.40 µm Mem	2/2	6.8 ± 0.0	112 ± 1	0.00089 ± 0.00033	0.24 ± 0.02	0.051 ± 0.003
Flat Cr.	05/29/97	0.45 µm Cap	1/2	6.8 ± 0.2	112 ± 2	0.00056 ± 0.00015	0.25 ± 0.02	0.034 ± 0.001
Flat Cr.	05/29/97	0.45 µm Cap	2/2	6.6 ± 0.2	110 ± 2	0.0010 ± 0.0003	0.24 ± 0.02	0.029 ± 0.003
Flat Cr.	05/29/97	10 kd Tan	1/2	6.0 ± 0.2	97 ± 2	0.0011 ± 0.0003	0.22 ± 0.03	0.0089 ± 0.0027
Flat Cr.	05/29/97	10 kd Tan	2/2	6.1 ± 0.3	101 ± 4	0.0010 ± 0.0003	0.24 ± 0.05	0.011 ± 0.001
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	3.8 ± 0.2	159 ± 2	0.0020 ± 0.0003	< 0.03 ± 0.02	4.7 ± 0.2
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	3.7 ± 0.6	154 ± 1	0.0022 ± 0.0003	< 0.03 ± 0.01	4.9 ± 0.0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	4.2 ± 0.2	158 ± 5	0.0022 ± 0.0003	< 0.03 ± 0.02	4.6 ± 0.0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	3.7 ± 0.6	156 ± 1	0.0016 ± 0.0002	< 0.03 ± 0.01	4.6 ± 0.0
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	3.8 ± 0.2	154 ± 7	0.0015 ± 0.0002	< 0.03 ± 0.01	4.7 ± 0.1

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	3.8 ± 0.2	153 ± 0	0.0014 ± 0.0004	< 0.03 ± 0.01	4.8 ± 0.3
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	16 ± 1	500 ± 24	0.0040 ± 0.0004	< 0.05 ± 0.03	7.8 ± 0.3
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	16 ± 1	512 ± 18	0.0036 ± 0.0002	< 0.05 ± 0.01	7.5 ± 0.0
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	15 ± 0	483 ± 28	0.0043 ± 0.0003	< 0.05 ± 0.00	7.5 ± 0.6
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	15 ± 0	493 ± 19	0.0048 ± 0.0003	< 0.05 ± 0.00	7.4 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	14 ± 1	492 ± 35	0.0019 ± 0.0001	< 0.05 ± 0.00	7.5 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	14 ± 0	484 ± 20	0.0018 ± 0.0004	< 0.05 ± 0.02	7.5 ± 0.2
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	3.6 ± 0.1	204 ± 0	0.0019 ± 0.0003	< 0.05 ± 0.01	3.6 ± 0.0
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	3.5 ± 0.1	207 ± 6	0.0012 ± 0.0002	< 0.03 ± 0.02	3.5 ± 0.2
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	3.5 ± 0.1	199 ± 0	0.0013 ± 0.0002	< 0.03 ± 0.03	3.7 ± 0.2
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	3.5 ± 0.0	212 ± 0	0.0012 ± 0.0001	< 0.03 ± 0.01	3.7 ± 0.2
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	3.4 ± 0.1	201 ± 1	0.0010 ± 0.0001	< 0.03 ± 0.01	3.4 ± 0.1
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	3.3 ± 0.1	193 ± 0	0.00081 ± 0.00029	< 0.03 ± 0.02	3.5 ± 0.0
Whiskeytown	12/11/96	0.40 µm Mem	1/2	5.3 ± 0.1	1.1 ± 0.0	0.00081 ± 0.00019	0.16 ± 0.03	0.015 ± 0.002
Whiskeytown	12/11/96	0.40 µm Mem	2/2	5.2 ± 0.1	1.2 ± 0.0	0.00044 ± 0.00009	0.17 ± 0.01	0.015 ± 0.002
Whiskeytown	12/11/96	0.45 µm Cap	1/2	5.1 ± 0.2	1.2 ± 0.0	0.00062 ± 0.00024	0.16 ± 0.01	0.011 ± 0.000
Whiskeytown	12/11/96	0.45 µm Cap	2/2	6.1 ± 0.0	1.2 ± 0.0	0.00081 ± 0.00012	0.13 ± 0.01	0.012 ± 0.004
Whiskeytown	12/11/96	10 kd Tan	1/2	5.2 ± 0.0	1.0 ± 0.0	0.00092 ± 0.00028	0.15 ± 0.02	0.0039 ± 0.0002
Whiskeytown	12/11/96	10 kd Tan	2/2	5.5 ± 0.4	1.0 ± 0.0	0.00091 ± 0.00020	0.11 ± 0.00	0.0049 ± 0.0026
Whiskeytown	05/29/97	0.40 µm Mem	1/2	5.8 ± 0.1	0.30 ± 0.01	0.0012 ± 0.0004	0.14 ± 0.02	0.0099 ± 0.0013
Whiskeytown	05/29/97	0.40 µm Mem	2/2	5.8 ± 0.2	0.79 ± 0.01	0.00066 ± 0.00018	0.13 ± 0.02	0.012 ± 0.003
Whiskeytown	05/29/97	0.45 µm Cap	1/2	5.7 ± 0.0	0.54 ± 0.02	0.0016 ± 0.0007	0.14 ± 0.01	0.010 ± 0.005
Whiskeytown	05/29/97	0.45 µm Cap	2/2	5.7 ± 0.0	0.62 ± 0.01	0.0011 ± 0.0003	0.13 ± 0.02	0.016 ± 0.006
Whiskeytown	05/29/97	10 kd Tan	1/2	5.2 ± 0.2	0.24 ± 0.01	0.00069 ± 0.00007	0.096 ± 0.011	0.0037 ± 0.0033
Whiskeytown	05/29/97	10 kd Tan	2/2	5.2 ± 0.1	0.24 ± 0.02	0.00060 ± 0.00018	0.089 ± 0.006	< 0.003 ± 0.003
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	— ± —	0.47 ± 0.00	0.00050 ± 0.00000	0.087 ± 0.006	0.012 ± 0.001
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	5.9 ± 0.1	0.55 ± 0.01	0.00040 ± 0.00000	0.11 ± 0.00	0.012 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	6.0 ± 0.0	0.67 ± 0.04	0.00050 ± 0.00010	0.12 ± 0.01	0.017 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	6.0 ± 0.0	0.75 ± 0.06	— ± —	0.11 ± 0.01	0.012 ± 0.000
Spring Cr. arm	07/12/96	10 kd Tan	1/3	5.8 ± 0.0	0.68 ± 0.07	0.0011 ± 0.0001	0.093 ± 0.012	0.0057 ± 0.0054
Spring Cr. arm	07/12/96	10 kd Tan	2/3	5.9 ± 0.0	0.47 ± 0.02	0.00050 ± 0.00020	0.068 ± 0.014	0.0048 ± 0.0007
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	0.0010 ± 0.0001	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	6.0 ± 0.0	1.5 ± 0.0	< 0.0004 ± 0.0001	0.12 ± 0.03	0.029 ± 0.000
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	6.1 ± 0.0	1.5 ± 0.0	0.00060 ± 0.00003	0.16 ± 0.03	0.024 ± 0.000

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Magnesium (mg/L) ICP–AES	Manganese (µg/L) ICP–MS	Mercury (µg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	6.5 ± 0.1	1.4 ± 0.0	0.0011 ± 0.0000	0.12 ± 0.01	0.017 ± 0.003
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	6.0 ± 0.1	1.4 ± 0.0	< 0.0004 ± 0.0002	0.12 ± 0.02	0.013 ± 0.001
Spring Cr. arm	09/18/96	10 kd Tan	1/2	5.7 ± 0.2	1.3 ± 0.0	0.00063 ± 0.00017	0.093 ± 0.012	0.0055 ± 0.0043
Spring Cr. arm	09/18/96	10 kd Tan	2/2	5.3 ± 0.0	1.3 ± 0.0	< 0.0004 ± 0.0001	0.082 ± 0.020	0.0048 ± 0.0015
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	6.1 ± 0.1	15 ± 0	< 0.0004 ± 0.0002	0.15 ± 0.01	0.083 ± 0.001
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	6.2 ± 0.1	14 ± 0	0.00051 ± 0.00004	0.14 ± 0.02	0.055 ± 0.007
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	6.2 ± 0.0	14 ± 0	0.00063 ± 0.00018	0.14 ± 0.01	0.073 ± 0.005
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	6.3 ± 0.0	14 ± 0	0.00047 ± 0.00007	0.13 ± 0.03	0.072 ± 0.004
Spring Cr. arm	11/20/96	10 kd Tan	1/2	5.2 ± 0.0	12 ± 0	0.0010 ± 0.0001	0.094 ± 0.046	0.0092 ± 0.0039
Spring Cr. arm	11/20/96	10 kd Tan	2/2	5.3 ± 0.1	12 ± 0	0.00056 ± 0.00011	0.090 ± 0.039	0.0076 ± 0.0002
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	5.6 ± 0.1	22 ± 1	0.00045 ± 0.00030	0.11 ± 0.00	0.10 ± 0.01
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	5.7 ± 0.1	21 ± 0	0.00057 ± 0.00004	0.14 ± 0.01	0.090 ± 0.000
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	5.7 ± 0.1	22 ± 0	0.00067 ± 0.00022	0.15 ± 0.01	0.17 ± 0.02
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	5.6 ± 0.1	22 ± 0	0.00087 ± 0.00025	0.16 ± 0.01	0.17 ± 0.00
Spring Cr. arm	12/11/96	10 kd Tan	1/2	4.7 ± 0.2	18 ± 0	0.00051 ± 0.00056	0.10 ± 0.01	0.026 ± 0.004
Spring Cr. arm	12/11/96	10 kd Tan	2/2	4.6 ± 0.1	18 ± 0	< 0.0004 ± 0.0000	0.083 ± 0.023	0.028 ± 0.004
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	5.8 ± 0.2	3.1 ± 0.1	0.0026 ± 0.0003	0.14 ± 0.02	0.023 ± 0.003
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	5.7 ± 0.1	3.0 ± 0.1	0.0023 ± 0.0003	0.14 ± 0.02	0.018 ± 0.000
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	5.6 ± 0.2	3.1 ± 0.1	0.0023 ± 0.0001	0.13 ± 0.02	0.026 ± 0.002
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	5.7 ± 0.2	3.1 ± 0.1	0.0022 ± 0.0002	0.15 ± 0.02	0.027 ± 0.002
Spring Cr. arm	05/28/97	10 kd Tan	1/2	4.9 ± 0.1	2.5 ± 0.1	0.0022 ± 0.0003	0.069 ± 0.006	0.0055 ± 0.0019
Spring Cr. arm	05/28/97	10 kd Tan	2/2	4.9 ± 0.1	2.5 ± 0.1	0.0025 ± 0.0002	0.080 ± 0.013	0.0043 ± 0.0011
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	28 ± 4	0.70 ± 0.02	0.00097 ± 0.00027	3.2 ± 0.0	0.018 ± 0.003
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	29 ± 0	0.60 ± 0.02	0.00066 ± 0.00008	3.3 ± 0.1	0.019 ± 0.002
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	30 ± 2	22 ± 0	0.0021 ± 0.0001	3.3 ± 0.1	0.020 ± 0.002
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	28 ± 3	22 ± 0	0.0022 ± 0.0002	3.4 ± 0.1	0.018 ± 0.003
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	23 ± 1	0.21 ± 0.00	0.00052 ± 0.00014	2.6 ± 0.1	0.012 ± 0.001
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	23 ± 4	0.20 ± 0.01	0.00097 ± 0.00005	2.6 ± 0.1	0.012 ± 0.002
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	4.1 ± 0.0	2.9 ± 0.1	0.0017 ± 0.0004	0.34 ± 0.00	0.041 ± 0.005
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	4.1 ± 0.0	1.8 ± 0.1	0.0014 ± 0.0000	0.35 ± 0.01	0.033 ± 0.001
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	4.1 ± 0.0	3.7 ± 0.1	0.0013 ± 0.0003	0.39 ± 0.03	0.071 ± 0.002
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	3.9 ± 0.1	3.6 ± 0.1	0.0013 ± 0.0002	0.37 ± 0.03	0.068 ± 0.000
Yolo Bypass	01/07/97	10 kd Tan	1/2	3.5 ± 0.0	1.8 ± 0.0	0.0013 ± 0.0003	0.26 ± 0.01	0.014 ± 0.004
Yolo Bypass	01/07/97	10 kd Tan	2/2	3.4 ± 0.1	1.6 ± 0.0	0.00090 ± 0.00018	0.21 ± 0.01	0.014 ± 0.003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	0.67 ± 0.07	1.1 ± 0.0	0.0050 ± 0.0001	< 0.0013 ± 0.0007	2.2 ± 0.0
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	0.74 ± 0.02	1.1 ± 0.0	0.0048 ± 0.0003	0.0013 ± 0.0000	2.1 ± 0.0
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	0.73 ± 0.05	1.1 ± 0.0	0.0052 ± 0.0000	0.00065 ± 0.00006	2.0 ± 0.0
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	0.77 ± 0.05	1.1 ± 0.0	0.0064 ± 0.0004	0.00057 ± 0.00008	2.0 ± 0.0
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	0.68 ± 0.09	1.0 ± 0.0	0.0022 ± 0.0006	0.00038 ± 0.00037	2.0 ± 0.0
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	0.60 ± 0.04	1.1 ± 0.0	0.0022 ± 0.0002	< 0.0013 ± 0.0003	1.8 ± 0.0
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	0.97 ± 0.06	0.96 ± 0.02	0.0070 ± 0.0002	< 0.0008 ± 0.0004	2.0 ± 0.0
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	1.1 ± 0.0	0.95 ± 0.01	0.0074 ± 0.0018	< 0.0008 ± 0.0005	1.9 ± 0.0
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	0.94 ± 0.07	0.94 ± 0.01	0.0040 ± 0.0003	< 0.0008 ± 0.0008	2.0 ± 0.1
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	1.0 ± 0.1	0.94 ± 0.01	0.0047 ± 0.0001	< 0.0010 ± 0.0002	2.0 ± 0.0
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	0.75 ± 0.08	0.85 ± 0.02	0.0024 ± 0.0000	0.0013 ± 0.0005	1.8 ± 0.0
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	0.81 ± 0.00	0.85 ± 0.01	0.0013 ± 0.0001	< 0.0008 ± 0.0001	1.7 ± 0.0
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	0.50 ± 0.04	1.3 ± 0.0	0.0020 ± 0.0003	< 0.0015 ± 0.0009	2.9 ± 0.0
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	0.49 ± 0.05	1.3 ± 0.0	0.0018 ± 0.0004	< 0.0015 ± 0.0005	3.0 ± 0.0
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.46 ± 0.07	1.3 ± 0.0	0.0013 ± 0.0002	< 0.0015 ± 0.0004	2.9 ± 0.0
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	0.35 ± 0.00	1.3 ± 0.0	0.0021 ± 0.0005	< 0.0015 ± 0.0002	3.0 ± 0.0
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	0.34 ± 0.03	1.2 ± 0.0	< 0.0005 ± 0.0006	< 0.0015 ± 0.0003	2.5 ± 0.0
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	0.31 ± 0.06	1.2 ± 0.0	< 0.0005 ± 0.0003	< 0.0015 ± 0.0007	2.6 ± 0.0
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	0.94 ± 0.06	1.5 ± 0.0	0.0029 ± 0.0005	< 0.0013 ± 0.0010	3.2 ± 0.0
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	0.88 ± 0.12	1.4 ± 0.1	0.0028 ± 0.0004	< 0.0013 ± 0.0001	3.2 ± 0.0
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	0.66 ± 0.04	1.4 ± 0.1	0.0034 ± 0.0002	< 0.0006 ± 0.0000	3.1 ± 0.0
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	0.56 ± 0.03	1.4 ± 0.0	0.0038 ± 0.0002	0.00076 ± 0.00054	3.1 ± 0.1
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	0.72 ± 0.03	1.3 ± 0.0	0.00070 ± 0.00028	0.0011 ± 0.0001	2.7 ± 0.0
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	0.70 ± 0.02	1.3 ± 0.0	0.00060 ± 0.00050	< 0.0013 ± 0.0005	2.9 ± 0.0
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	1.7 ± 0.1	1.2 ± 0.0	0.0059 ± 0.0002	< 0.0008 ± 0.0005	2.0 ± 0.0
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	1.4 ± 0.0	1.2 ± 0.0	0.0037 ± 0.0002	< 0.0008 ± 0.0000	1.9 ± 0.0
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	0.94 ± 0.08	1.1 ± 0.0	0.0044 ± 0.0009	< 0.0008 ± 0.0005	1.8 ± 0.1
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	0.90 ± 0.04	1.1 ± 0.1	0.0044 ± 0.0001	< 0.0008 ± 0.0004	1.9 ± 0.1
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	0.72 ± 0.09	0.99 ± 0.00	0.00059 ± 0.00046	< 0.0008 ± 0.0006	1.6 ± 0.0
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	0.72 ± 0.03	1.0 ± 0.0	0.0010 ± 0.0003	< 0.0008 ± 0.0006	1.6 ± 0.1
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	1.5 ± 0.0	0.91 ± 0.00	0.0041 ± 0.0002	< 0.0005 ± 0.0001	1.6 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	1.5 ± 0.0	0.91 ± 0.02	0.0040 ± 0.0002	< 0.0005 ± 0.0000	1.6 ± 0.0
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	1.6 ± 0.0	0.91 ± 0.00	0.0041 ± 0.0001	0.00067 ± 0.00022	1.6 ± 0.0
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	1.6 ± 0.0	0.90 ± 0.01	0.0051 ± 0.0000	< 0.0005 ± 0.0002	1.6 ± 0.0
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	1.4 ± 0.1	0.85 ± 0.01	0.0022 ± 0.0002	< 0.0005 ± 0.0001	1.5 ± 0.0
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	1.4 ± 0.0	0.88 ± 0.01	0.0022 ± 0.0000	< 0.0005 ± 0.0003	1.5 ± 0.0
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	1.4 ± 0.0	0.86 ± 0.00	0.0020 ± 0.0001	0.00062 ± 0.00021	1.5 ± 0.1
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	2.1 ± 0.1	0.68 ± 0.01	0.0052 ± 0.0005	< 0.0008 ± 0.0002	1.2 ± 0.0
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	2.0 ± 0.1	0.69 ± 0.01	0.0041 ± 0.0014	< 0.0010 ± 0.0003	1.3 ± 0.0
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	2.1 ± 0.0	0.68 ± 0.01	0.0036 ± 0.0010	< 0.0010 ± 0.0011	1.3 ± 0.0
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	2.0 ± 0.1	0.70 ± 0.01	0.0047 ± 0.0003	0.0011 ± 0.0004	1.3 ± 0.0
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	1.5 ± 0.1	0.61 ± 0.01	0.0010 ± 0.0006	< 0.0008 ± 0.0002	1.1 ± 0.0
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	1.5 ± 0.1	0.61 ± 0.01	0.0012 ± 0.0004	< 0.0008 ± 0.0009	1.1 ± 0.0
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	1.5 ± 0.0	0.62 ± 0.00	0.00057 ± 0.00051	< 0.0008 ± 0.0002	1.1 ± 0.0
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	0.71 ± 0.05	1.0 ± 0.0	0.0044 ± 0.0008	< 0.0015 ± 0.0003	2.3 ± 0.1
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	0.74 ± 0.01	1.1 ± 0.0	0.0051 ± 0.0003	< 0.0015 ± 0.0004	2.3 ± 0.1
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	0.90 ± 0.03	1.0 ± 0.0	0.0058 ± 0.0001	< 0.0015 ± 0.0005	2.2 ± 0.1
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	0.69 ± 0.01	1.1 ± 0.0	0.0046 ± 0.0005	< 0.0015 ± 0.0002	2.3 ± 0.1
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	0.51 ± 0.05	0.95 ± 0.02	0.00068 ± 0.00045	< 0.0015 ± 0.0004	2.0 ± 0.0
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	0.51 ± 0.05	0.94 ± 0.03	0.00064 ± 0.00050	< 0.0015 ± 0.0002	2.0 ± 0.0
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	0.63 ± 0.03	1.3 ± 0.0	0.0073 ± 0.0014	0.0014 ± 0.0004	2.7 ± 0.1
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	0.71 ± 0.06	1.3 ± 0.0	0.0053 ± 0.0001	< 0.0013 ± 0.0007	2.8 ± 0.1
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	0.71 ± 0.01	1.3 ± 0.1	0.0060 ± 0.0004	< 0.0006 ± 0.0003	2.6 ± 0.0
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	0.60 ± 0.10	1.3 ± 0.0	0.0061 ± 0.0004	< 0.0013 ± 0.0000	2.7 ± 0.0
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	0.35 ± 0.04	1.1 ± 0.0	0.00099 ± 0.00029	< 0.0013 ± 0.0008	2.4 ± 0.0
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	0.46 ± 0.01	1.1 ± 0.0	0.00064 ± 0.00050	< 0.0013 ± 0.0001	2.4 ± 0.0
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	0.64 ± 0.04	1.1 ± 0.0	0.0047 ± 0.0007	0.00071 ± 0.00059	2.2 ± 0.1
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	0.58 ± 0.03	1.1 ± 0.0	0.0055 ± 0.0011	< 0.0006 ± 0.0006	2.3 ± 0.1
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	0.77 ± 0.03	1.1 ± 0.0	0.0097 ± 0.0008	< 0.0006 ± 0.0004	2.2 ± 0.0
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	0.65 ± 0.06	1.1 ± 0.1	0.0095 ± 0.0005	< 0.0006 ± 0.0005	2.3 ± 0.0
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	0.54 ± 0.06	1.0 ± 0.0	0.0022 ± 0.0006	< 0.0006 ± 0.0002	2.0 ± 0.0
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	0.57 ± 0.09	1.1 ± 0.1	0.0021 ± 0.0001	< 0.0006 ± 0.0004	2.0 ± 0.0
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	0.62 ± 0.06	1.0 ± 0.0	0.0018 ± 0.0003	< 0.0005 ± 0.0003	2.0 ± 0.0
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	1.7 ± 0.1	0.92 ± 0.03	0.0033 ± 0.0003	< 0.0008 ± 0.0005	1.5 ± 0.0
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	2.0 ± 0.1	0.98 ± 0.04	0.0045 ± 0.0002	< 0.0008 ± 0.0002	1.5 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	1.6 ± 0.0	0.90 ± 0.03	0.0037 ± 0.0003	< 0.0008 ± 0.0003	1.5 ± 0.0
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	1.6 ± 0.0	0.92 ± 0.04	0.0049 ± 0.0003	< 0.0008 ± 0.0005	1.5 ± 0.0
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	1.3 ± 0.0	0.83 ± 0.04	0.0011 ± 0.0002	< 0.0008 ± 0.0003	1.3 ± 0.0
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	1.2 ± 0.0	0.87 ± 0.00	0.00093 ± 0.00009	< 0.0008 ± 0.0002	1.3 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	1.2 ± 0.0	0.94 ± 0.01	0.0028 ± 0.0004	< 0.0013 ± 0.0005	1.6 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	1.3 ± 0.0	0.95 ± 0.02	0.0024 ± 0.0004	0.0013 ± 0.0000	1.6 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	1.3 ± 0.0	0.96 ± 0.03	0.0034 ± 0.0001	< 0.0005 ± 0.0002	1.7 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	1.3 ± 0.0	0.95 ± 0.00	0.0031 ± 0.0001	0.00061 ± 0.00016	1.7 ± 0.0
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	2.7 ± 0.1	0.96 ± 0.00	0.00091 ± 0.00019	0.00072 ± 0.00012	1.8 ± 0.0
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	2.2 ± 0.0	0.92 ± 0.00	0.00074 ± 0.00012	< 0.0005 ± 0.0003	1.6 ± 0.00
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	1.6 ± 0.1	0.79 ± 0.02	0.0024 ± 0.0005	< 0.0010 ± 0.0002	1.6 ± 0.0
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	1.6 ± 0.0	0.83 ± 0.00	0.0019 ± 0.0002	< 0.0006 ± 0.0000	1.5 ± 0.0
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	1.8 ± 0.0	0.80 ± 0.01	0.0028 ± 0.0003	< 0.0008 ± 0.0006	1.5 ± 0.0
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	1.7 ± 0.1	0.80 ± 0.00	0.0024 ± 0.0002	< 0.0006 ± 0.0002	1.6 ± 0.0
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	0.97 ± 0.05	0.70 ± 0.01	0.00058 ± 0.00022	< 0.0008 ± 0.0003	1.3 ± 0.0
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	0.93 ± 0.05	0.72 ± 0.00	< 0.0004 ± 0.0001	< 0.0008 ± 0.0005	1.3 ± 0.0
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	1.0 ± 0.1	1.2 ± 0.0	0.0041 ± 0.0016	< 0.0015 ± 0.0003	2.2 ± 0.0
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	0.94 ± 0.11	1.2 ± 0.0	0.0040 ± 0.0005	< 0.0015 ± 0.0002	2.2 ± 0.0
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	1.0 ± 0.1	1.2 ± 0.0	0.0032 ± 0.0003	< 0.0015 ± 0.0000	2.1 ± 0.0
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	0.96 ± 0.09	1.2 ± 0.0	0.0033 ± 0.0004	< 0.0015 ± 0.0001	2.2 ± 0.0
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	0.50 ± 0.05	1.0 ± 0.0	0.00050 ± 0.00046	< 0.0015 ± 0.0001	2.0 ± 0.0
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	0.58 ± 0.12	1.0 ± 0.0	0.00047 ± 0.00048	0.0015 ± 0.0003	1.9 ± 0.0
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	0.86 ± 0.01	1.2 ± 0.1	0.0040 ± 0.0011	< 0.0013 ± 0.0010	2.1 ± 0.1
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	0.87 ± 0.07	1.2 ± 0.0	0.0038 ± 0.0009	0.0018 ± 0.0004	2.0 ± 0.0
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	0.88 ± 0.06	1.2 ± 0.0	0.0039 ± 0.0006	< 0.0013 ± 0.0007	2.0 ± 0.0
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	0.88 ± 0.05	1.1 ± 0.0	0.0038 ± 0.0007	< 0.0013 ± 0.0001	1.9 ± 0.0
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	0.43 ± 0.09	1.1 ± 0.0	0.00072 ± 0.00024	< 0.0013 ± 0.0003	1.9 ± 0.0
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	0.42 ± 0.04	1.1 ± 0.0	0.00085 ± 0.00021	< 0.0013 ± 0.0009	1.9 ± 0.0
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.91 ± 0.03	1.0 ± 0.0	0.012 ± 0.001	0.00067 ± 0.00065	1.1 ± 0.0
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.68 ± 0.03	1.0 ± 0.0	0.0056 ± 0.0013	0.00083 ± 0.00087	1.0 ± 0.0
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	0.65 ± 0.07	1.0 ± 0.0	0.0088 ± 0.0008	< 0.0006 ± 0.0003	1.1 ± 0.0
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.62 ± 0.07	1.0 ± 0.0	0.0082 ± 0.0008	0.00061 ± 0.00023	1.2 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	0.53 ± 0.04	0.91 ± 0.03	0.0023 ± 0.0005	0.00073 ± 0.00026	0.88 ± 0.01
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.50 ± 0.01	0.91 ± 0.05	0.0025 ± 0.0001	0.00065 ± 0.00076	0.91 ± 0.02
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	1.7 ± 0.1	0.98 ± 0.05	0.0033 ± 0.0003	< 0.0008 ± 0.0005	1.6 ± 0.0
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	1.6 ± 0.1	0.97 ± 0.02	0.0023 ± 0.0001	< 0.0008 ± 0.0002	1.6 ± 0.0
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	1.6 ± 0.0	0.96 ± 0.02	0.0034 ± 0.0003	< 0.0008 ± 0.0002	1.6 ± 0.0
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	1.5 ± 0.0	0.96 ± 0.02	0.0035 ± 0.0003	0.00092 ± 0.00063	1.5 ± 0.0
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	1.1 ± 0.0	0.87 ± 0.04	0.00071 ± 0.00020	< 0.0008 ± 0.0006	1.4 ± 0.0
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	1.2 ± 0.1	0.88 ± 0.04	0.00071 ± 0.00016	< 0.0008 ± 0.0005	1.4 ± 0.0
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	1.1 ± 0.0	1.0 ± 0.0	0.0025 ± 0.0001	0.00071 ± 0.00022	1.6 ± 0.0
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	1.0 ± 0.1	1.0 ± 0.0	0.0032 ± 0.0001	0.00071 ± 0.00032	1.6 ± 0.0
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	0.85 ± 0.01	1.0 ± 0.0	0.0027 ± 0.0002	< 0.0013 ± 0.0002	1.6 ± 0.0
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	1.5 ± 0.0	1.0 ± 0.0	0.0028 ± 0.0003	< 0.0008 ± 0.0004	1.6 ± 0.0
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	1.5 ± 0.1	1.0 ± 0.0	0.0013 ± 0.0005	< 0.0008 ± 0.0006	1.6 ± 0.0
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	1.4 ± 0.1	1.0 ± 0.0	0.0015 ± 0.0012	< 0.0008 ± 0.0005	1.6 ± 0.1
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	1.4 ± 0.0	1.0 ± 0.0	0.0020 ± 0.0000	0.00065 ± 0.00028	1.6 ± 0.0
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	1.0 ± 0.1	0.93 ± 0.01	< 0.0004 ± 0.0003	< 0.0008 ± 0.0004	1.4 ± 0.0
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	1.0 ± 0.1	0.92 ± 0.01	0.00053 ± 0.00030	< 0.0008 ± 0.0003	1.4 ± 0.0
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	0.88 ± 0.06	1.2 ± 0.0	0.0027 ± 0.0006	< 0.0015 ± 0.0002	2.0 ± 0.0
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	0.84 ± 0.04	1.3 ± 0.0	0.0022 ± 0.0006	< 0.0015 ± 0.0003	2.1 ± 0.0
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	0.78 ± 0.12	1.3 ± 0.0	0.0016 ± 0.0001	< 0.0015 ± 0.0002	2.1 ± 0.0
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	0.74 ± 0.04	1.3 ± 0.0	0.0021 ± 0.0002	< 0.0015 ± 0.0002	2.1 ± 0.1
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	0.56 ± 0.05	1.2 ± 0.0	< 0.0005 ± 0.0002	< 0.0015 ± 0.0002	1.9 ± 0.0
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	0.58 ± 0.07	1.2 ± 0.0	< 0.0005 ± 0.0002	< 0.0015 ± 0.0005	1.9 ± 0.0
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	1.2 ± 0.1	1.3 ± 0.0	0.0032 ± 0.0002	< 0.0013 ± 0.0007	1.3 ± 0.0
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	1.1 ± 0.0	1.3 ± 0.0	0.0029 ± 0.0004	0.0015 ± 0.0008	1.3 ± 0.0
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	1.4 ± 0.0	1.2 ± 0.0	0.0039 ± 0.0006	< 0.0006 ± 0.0004	1.2 ± 0.0
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	1.2 ± 0.0	1.3 ± 0.0	0.0035 ± 0.0006	< 0.0013 ± 0.0001	1.3 ± 0.0
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	0.81 ± 0.03	1.1 ± 0.0	0.00074 ± 0.00042	< 0.0006 ± 0.0002	1.1 ± 0.0
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	0.86 ± 0.03	1.2 ± 0.0	0.00058 ± 0.00028	< 0.0013 ± 0.0007	1.2 ± 0.0
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	2.1 ± 0.1	1.1 ± 0.1	0.0064 ± 0.0013	< 0.0006 ± 0.0004	0.58 ± 0.00
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	2.0 ± 0.0	1.1 ± 0.0	0.0063 ± 0.0008	0.00075 ± 0.00004	0.57 ± 0.01

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	1.6 ± 0.1	1.1 ± 0.0	0.010 ± 0.000	< 0.0006 ± 0.0006	0.59 ± 0.02
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	1.5 ± 0.0	1.1 ± 0.0	0.011 ± 0.001	< 0.0006 ± 0.0006	0.59 ± 0.01
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	1.9 ± 0.1	1.1 ± 0.0	0.0043 ± 0.0003	0.0010 ± 0.0001	0.54 ± 0.02
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	1.9 ± 0.1	1.0 ± 0.0	0.0040 ± 0.0006	0.00090 ± 0.00044	0.53 ± 0.01
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	1.1 ± 0.0	1.1 ± 0.0	0.0022 ± 0.0006	0.0010 ± 0.0002	1.5 ± 0.0
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	1.3 ± 0.1	1.1 ± 0.0	0.0042 ± 0.0002	0.0012 ± 0.0002	1.5 ± 0.0
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	0.88 ± 0.03	1.1 ± 0.0	0.0028 ± 0.0002	< 0.0008 ± 0.0003	1.5 ± 0.0
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	0.84 ± 0.06	1.1 ± 0.1	0.0022 ± 0.0003	< 0.0008 ± 0.0002	1.5 ± 0.0
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	0.73 ± 0.02	1.1 ± 0.0	0.00047 ± 0.00030	< 0.0008 ± 0.0004	1.4 ± 0.0
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	0.80 ± 0.05	1.0 ± 0.0	0.00044 ± 0.00036	< 0.0008 ± 0.0000	1.4 ± 0.0
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	0.47 ± 0.02	0.87 ± 0.01	0.0019 ± 0.0002	0.0019 ± 0.0009	1.1 ± 0.0
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	0.59 ± 0.04	0.90 ± 0.00	0.0042 ± 0.0001	< 0.0005 ± 0.0003	1.1 ± 0.0
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.50 ± 0.02	0.88 ± 0.01	0.0026 ± 0.0002	< 0.0005 ± 0.0002	1.1 ± 0.0
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.50 ± 0.03	0.89 ± 0.01	0.0028 ± 0.0000	< 0.0005 ± 0.0001	1.1 ± 0.0
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	0.63 ± 0.01	0.86 ± 0.00	0.0013 ± 0.0002	0.00066 ± 0.00026	1.1 ± 0.0
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	0.51 ± 0.05	0.87 ± 0.01	0.0012 ± 0.0002	< 0.0005 ± 0.0001	1.1 ± 0.0
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	0.81 ± 0.01	1.0 ± 0.0	0.0046 ± 0.0002	0.00096 ± 0.00015	1.1 ± 0.0
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	0.51 ± 0.00	1.0 ± 0.0	0.0011 ± 0.0002	0.00074 ± 0.00059	1.1 ± 0.0
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	0.62 ± 0.01	1.0 ± 0.0	0.0020 ± 0.0003	< 0.0006 ± 0.0001	1.1 ± 0.0
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	0.57 ± 0.11	1.0 ± 0.0	0.0020 ± 0.0003	0.00079 ± 0.00021	1.1 ± 0.0
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	0.28 ± 0.10	0.94 ± 0.02	0.00040 ± 0.00047	< 0.0008 ± 0.0009	1.0 ± 0.0
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	0.28 ± 0.07	0.95 ± 0.01	0.00054 ± 0.00048	0.00094 ± 0.00098	1.0 ± 0.0
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	0.76 ± 0.03	1.4 ± 0.0	0.0051 ± 0.0005	< 0.0015 ± 0.0003	1.3 ± 0.0
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	0.76 ± 0.05	1.4 ± 0.0	0.0041 ± 0.0006	< 0.0015 ± 0.0004	1.3 ± 0.0
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.86 ± 0.03	1.2 ± 0.1	0.0044 ± 0.0007	0.00080 ± 0.00010	1.0 ± 0.0
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.79 ± 0.06	1.2 ± 0.0	0.0041 ± 0.0014	< 0.0013 ± 0.0010	1.1 ± 0.0
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.79 ± 0.02	1.3 ± 0.0	0.0042 ± 0.0009	< 0.0013 ± 0.0007	1.1 ± 0.0
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.84 ± 0.02	1.2 ± 0.0	0.0047 ± 0.0008	< 0.0013 ± 0.0004	1.0 ± 0.0
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	0.60 ± 0.06	1.1 ± 0.0	0.0015 ± 0.0003	< 0.0013 ± 0.0003	0.95 ± 0.00
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	0.64 ± 0.07	1.1 ± 0.0	0.0013 ± 0.0001	< 0.0013 ± 0.0011	0.94 ± 0.00

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	0.67 ± 0.06	1.1 ± 0.0	0.0017 ± 0.0002	0.0011 ± 0.0010	1.2 ± 0.0
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	0.65 ± 0.02	1.0 ± 0.0	0.0011 ± 0.0001	< 0.0008 ± 0.0003	1.1 ± 0.0
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	0.61 ± 0.05	1.0 ± 0.0	0.0021 ± 0.0002	< 0.0008 ± 0.0001	1.1 ± 0.0
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	0.61 ± 0.02	1.0 ± 0.0	0.0021 ± 0.0003	< 0.0008 ± 0.0003	1.1 ± 0.0
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	0.40 ± 0.03	0.93 ± 0.01	0.00034 ± 0.00029	0.00087 ± 0.00048	0.97 ± 0.08
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	0.42 ± 0.03	0.94 ± 0.00	0.00056 ± 0.00037	< 0.0008 ± 0.0001	0.99 ± 0.04
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.41 ± 0.07	0.81 ± 0.02	0.0026 ± 0.0002	0.00077 ± 0.00016	0.99 ± 0.00
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	0.42 ± 0.07	0.84 ± 0.00	0.0022 ± 0.0002	0.00051 ± 0.00021	1.0 ± 0.0
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	0.43 ± 0.01	0.85 ± 0.01	0.0039 ± 0.0003	< 0.0013 ± 0.0018	1.1 ± 0.0
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.42 ± 0.05	0.86 ± 0.01	0.0032 ± 0.0002	< 0.0003 ± 0.0001	1.0 ± 0.0
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	0.61 ± 0.04	0.75 ± 0.01	0.00043 ± 0.00006	< 0.0005 ± 0.0003	0.91 ± 0.00
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	0.96 ± 0.00	0.91 ± 0.01	0.00082 ± 0.00007	0.00094 ± 0.00022	1.1 ± 0.0
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	0.50 ± 0.07	0.99 ± 0.02	0.0010 ± 0.0004	0.0012 ± 0.0004	1.1 ± 0.0
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	0.54 ± 0.10	0.98 ± 0.01	0.0010 ± 0.0004	< 0.0008 ± 0.0002	1.1 ± 0.0
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	0.62 ± 0.06	0.99 ± 0.00	0.0027 ± 0.0003	0.0015 ± 0.0002	1.1 ± 0.0
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	0.52 ± 0.06	0.98 ± 0.01	0.0021 ± 0.0003	< 0.0008 ± 0.0001	1.1 ± 0.0
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	0.25 ± 0.05	0.89 ± 0.01	< 0.0005 ± 0.0001	< 0.0006 ± 0.0000	0.94 ± 0.01
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	0.32 ± 0.06	0.90 ± 0.01	0.00050 ± 0.00027	0.0021 ± 0.0012	0.97 ± 0.03
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	0.63 ± 0.04	1.2 ± 0.0	0.0024 ± 0.0002	< 0.0015 ± 0.0003	1.2 ± 0.0
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	0.59 ± 0.02	1.2 ± 0.0	0.0015 ± 0.0004	< 0.0015 ± 0.0007	1.2 ± 0.0
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	0.62 ± 0.07	1.2 ± 0.0	0.0019 ± 0.0004	< 0.0015 ± 0.0005	1.2 ± 0.0
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	0.63 ± 0.04	1.2 ± 0.0	0.0013 ± 0.0004	< 0.0015 ± 0.0000	1.2 ± 0.0
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	0.33 ± 0.02	1.1 ± 0.0	< 0.0005 ± 0.0001	< 0.0015 ± 0.0002	1.1 ± 0.0
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	0.33 ± 0.05	1.1 ± 0.0	< 0.0005 ± 0.0001	< 0.0015 ± 0.0003	1.1 ± 0.0
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	0.78 ± 0.04	1.1 ± 0.0	0.0051 ± 0.0003	0.0013 ± 0.0008	0.96 ± 0.02
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.77 ± 0.08	1.2 ± 0.0	0.0056 ± 0.0002	< 0.0013 ± 0.0004	1.0 ± 0.0
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.86 ± 0.09	1.2 ± 0.0	0.0069 ± 0.0007	< 0.0013 ± 0.0001	0.97 ± 0.00
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.94 ± 0.08	1.2 ± 0.0	0.0070 ± 0.0004	< 0.0013 ± 0.0008	0.97 ± 0.05
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	0.69 ± 0.03	1.0 ± 0.0	0.0020 ± 0.0005	< 0.0013 ± 0.0001	0.86 ± 0.03
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.67 ± 0.04	1.1 ± 0.0	0.0026 ± 0.0008	< 0.0013 ± 0.0006	0.93 ± 0.01
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.68 ± 0.04	0.98 ± 0.02	0.022 ± 0.001	< 0.0006 ± 0.0002	1.2 ± 0.0
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.69 ± 0.02	0.98 ± 0.04	0.019 ± 0.002	< 0.0006 ± 0.0005	1.3 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	0.78 ± 0.07	1.0 ± 0.0	0.024 ± 0.001	< 0.0006 ± 0.0007	1.2 ± 0.0
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.66 ± 0.05	0.98 ± 0.03	0.025 ± 0.001	< 0.0006 ± 0.0004	1.2 ± 0.0
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	0.36 ± 0.02	0.85 ± 0.01	0.0040 ± 0.0008	< 0.0006 ± 0.0004	1.1 ± 0.0
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.36 ± 0.04	0.90 ± 0.03	0.0036 ± 0.0005	< 0.0006 ± 0.0004	1.1 ± 0.0
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	0.68 ± 0.05	0.99 ± 0.00	0.0015 ± 0.0003	0.00091 ± 0.00004	1.0 ± 0.0
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	0.68 ± 0.07	0.97 ± 0.03	0.0016 ± 0.0003	< 0.0008 ± 0.0004	1.1 ± 0.0
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	0.69 ± 0.01	0.97 ± 0.01	0.0021 ± 0.0003	< 0.0008 ± 0.0002	1.1 ± 0.0
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	0.70 ± 0.07	0.97 ± 0.00	0.0019 ± 0.0002	< 0.0008 ± 0.0005	1.0 ± 0.0
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	0.36 ± 0.02	0.83 ± 0.01	< 0.0003 ± 0.0000	< 0.0008 ± 0.0007	0.89 ± 0.05
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	0.37 ± 0.03	0.85 ± 0.02	0.00051 ± 0.00019	< 0.0008 ± 0.0001	0.92 ± 0.03
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	0.67 ± 0.01	0.96 ± 0.01	0.0018 ± 0.0003	0.0013 ± 0.0010	1.1 ± 0.0
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.73 ± 0.02	0.99 ± 0.01	0.0037 ± 0.0001	0.0015 ± 0.0003	1.1 ± 0.1
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	0.54 ± 0.03	0.97 ± 0.02	0.0026 ± 0.0011	0.0015 ± 0.0005	1.1 ± 0.0
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	0.53 ± 0.02	0.97 ± 0.01	0.0021 ± 0.0003	0.0015 ± 0.0009	1.1 ± 0.1
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	0.31 ± 0.04	0.87 ± 0.01	< 0.0003 ± 0.0003	0.0011 ± 0.0006	0.93 ± 0.01
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	0.33 ± 0.03	0.87 ± 0.00	< 0.0003 ± 0.0000	< 0.001 ± 0.001	0.95 ± 0.00
Flat Cr.	12/11/96	0.40 µm Mem	1/2	0.63 ± 0.00	0.19 ± 0.00	0.015 ± 0.002	0.00071 ± 0.00017	0.11 ± 0.00
Flat Cr.	12/11/96	0.40 µm Mem	2/2	0.75 ± 0.00	0.19 ± 0.01	0.014 ± 0.000	0.00078 ± 0.00012	0.10 ± 0.00
Flat Cr.	12/11/96	0.45 µm Cap	1/2	0.67 ± 0.02	0.19 ± 0.01	0.011 ± 0.001	< 0.0013 ± 0.0008	0.10 ± 0.01
Flat Cr.	12/11/96	0.45 µm Cap	2/2	0.78 ± 0.06	0.19 ± 0.00	0.011 ± 0.000	< 0.0006 ± 0.0002	0.096 ± 0.006
Flat Cr.	12/11/96	10 kd Tan	1/2	0.65 ± 0.03	0.25 ± 0.00	0.0054 ± 0.0006	0.0017 ± 0.0011	0.083 ± 0.002
Flat Cr.	12/11/96	10 kd Tan	2/2	0.74 ± 0.01	0.16 ± 0.00	0.0054 ± 0.0015	0.00092 ± 0.00031	0.075 ± 0.000
Flat Cr.	05/29/97	0.40 µm Mem	1/2	< 0.01 ± 0.02	0.33 ± 0.01	0.0071 ± 0.0004	0.0019 ± 0.0007	0.30 ± 0.01
Flat Cr.	05/29/97	0.40 µm Mem	2/2	0.084 ± 0.062	0.35 ± 0.00	0.0078 ± 0.0001	0.0023 ± 0.0005	0.30 ± 0.02
Flat Cr.	05/29/97	0.45 µm Cap	1/2	0.059 ± 0.087	0.34 ± 0.01	0.0047 ± 0.0002	0.0022 ± 0.0005	0.31 ± 0.02
Flat Cr.	05/29/97	0.45 µm Cap	2/2	0.078 ± 0.041	0.34 ± 0.00	0.0039 ± 0.0007	0.0019 ± 0.0010	0.30 ± 0.01
Flat Cr.	05/29/97	10 kd Tan	1/2	0.11 ± 0.02	0.32 ± 0.02	0.0011 ± 0.0002	0.0013 ± 0.0008	0.27 ± 0.01
Flat Cr.	05/29/97	10 kd Tan	2/2	0.13 ± 0.02	0.31 ± 0.00	0.0013 ± 0.0002	0.0014 ± 0.0004	0.28 ± 0.02
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	1.7 ± 0.0	0.39 ± 0.01	0.89 ± 0.01	0.0045 ± 0.0003	0.36 ± 0.00
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	1.9 ± 0.0	0.40 ± 0.01	0.91 ± 0.05	0.0033 ± 0.0006	0.36 ± 0.02
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	1.7 ± 0.0	0.40 ± 0.02	0.86 ± 0.00	< 0.0013 ± 0.0008	0.36 ± 0.01
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	1.7 ± 0.1	0.39 ± 0.01	0.85 ± 0.01	0.0019 ± 0.0002	0.35 ± 0.00
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	1.8 ± 0.0	0.38 ± 0.01	0.84 ± 0.02	0.0033 ± 0.0003	0.33 ± 0.00

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	1.6 ± 0.0	0.37 ± 0.00	0.89 ± 0.04	0.0026 ± 0.0005	0.33 ± 0.01
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	4.3 ± 0.1	2.6 ± 0.0	1.7 ± 0.1	0.016 ± 0.001	4.6 ± 0.0
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	4.7 ± 0.4	2.6 ± 0.0	1.7 ± 0.0	0.019 ± 0.001	4.7 ± 0.1
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	4.2 ± 0.2	2.5 ± 0.0	1.6 ± 0.0	0.0048 ± 0.0004	4.6 ± 0.2
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	4.2 ± 0.3	2.6 ± 0.1	1.6 ± 0.0	0.0074 ± 0.0003	4.7 ± 0.0
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	4.2 ± 0.7	2.5 ± 0.0	1.7 ± 0.0	0.017 ± 0.001	4.4 ± 0.1
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	4.2 ± 0.4	2.4 ± 0.0	1.7 ± 0.0	0.019 ± 0.001	4.4 ± 0.0
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	2.1 ± 0.0	0.52 ± 0.00	0.63 ± 0.00	0.0029 ± 0.0001	0.46 ± 0.00
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	2.0 ± 0.1	0.51 ± 0.01	0.62 ± 0.00	0.0024 ± 0.0007	0.46 ± 0.02
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	2.5 ± 0.1	0.51 ± 0.00	0.66 ± 0.00	< 0.0006 ± 0.0003	0.45 ± 0.00
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	2.0 ± 0.2	0.51 ± 0.02	0.64 ± 0.04	0.00066 ± 0.00048	0.47 ± 0.01
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	2.2 ± 0.1	0.48 ± 0.02	0.61 ± 0.02	0.0021 ± 0.0013	0.44 ± 0.01
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	1.9 ± 0.1	0.48 ± 0.01	0.58 ± 0.02	0.0014 ± 0.0006	0.43 ± 0.02
Whiskeytown	12/11/96	0.40 µm Mem	1/2	2.5 ± 0.1	0.39 ± 0.05	0.0022 ± 0.0002	< 0.0013 ± 0.0007	0.30 ± 0.01
Whiskeytown	12/11/96	0.40 µm Mem	2/2	2.6 ± 0.1	0.36 ± 0.00	0.0021 ± 0.0000	< 0.0006 ± 0.0001	0.28 ± 0.01
Whiskeytown	12/11/96	0.45 µm Cap	1/2	2.5 ± 0.1	0.35 ± 0.00	0.0021 ± 0.0004	0.00060 ± 0.00029	0.28 ± 0.01
Whiskeytown	12/11/96	0.45 µm Cap	2/2	2.4 ± 0.1	0.35 ± 0.00	0.0024 ± 0.0009	< 0.0013 ± 0.0002	0.30 ± 0.01
Whiskeytown	12/11/96	10 kd Tan	1/2	2.4 ± 0.0	0.32 ± 0.01	0.00071 ± 0.00022	< 0.0006 ± 0.0001	0.25 ± 0.00
Whiskeytown	12/11/96	10 kd Tan	2/2	2.3 ± 0.1	0.32 ± 0.00	0.00079 ± 0.00053	< 0.0013 ± 0.0003	0.26 ± 0.00
Whiskeytown	05/29/97	0.40 µm Mem	1/2	3.8 ± 0.0	0.35 ± 0.01	0.0024 ± 0.0006	< 0.001 ± 0.001	0.32 ± 0.02
Whiskeytown	05/29/97	0.40 µm Mem	2/2	4.6 ± 0.1	0.36 ± 0.01	0.0031 ± 0.0003	< 0.001 ± 0.001	0.31 ± 0.02
Whiskeytown	05/29/97	0.45 µm Cap	1/2	4.0 ± 0.1	0.35 ± 0.01	0.0026 ± 0.0005	< 0.001 ± 0.001	0.31 ± 0.02
Whiskeytown	05/29/97	0.45 µm Cap	2/2	4.0 ± 0.0	0.36 ± 0.02	0.0028 ± 0.0002	0.0011 ± 0.0010	0.30 ± 0.01
Whiskeytown	05/29/97	10 kd Tan	1/2	2.8 ± 0.1	0.32 ± 0.01	0.00051 ± 0.00027	< 0.001 ± 0.000	0.28 ± 0.01
Whiskeytown	05/29/97	10 kd Tan	2/2	2.7 ± 0.1	0.31 ± 0.00	0.00053 ± 0.00022	< 0.001 ± 0.001	0.28 ± 0.01
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	3.9 ± 0.0	0.31 ± 0.01	0.0022 ± 0.0003	< 0.0003 ± 0.0001	0.28 ± 0.01
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	3.8 ± 0.0	0.31 ± 0.00	0.0021 ± 0.0005	< 0.0005 ± 0.0005	0.29 ± 0.01
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	3.4 ± 0.1	0.31 ± 0.01	0.0020 ± 0.0002	< 0.0013 ± 0.0006	0.28 ± 0.01
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	4.0 ± 0.0	0.31 ± 0.00	0.0031 ± 0.0002	< 0.0013 ± 0.0004	0.30 ± 0.01
Spring Cr. arm	07/12/96	10 kd Tan	1/3	3.4 ± 0.3	0.29 ± 0.00	0.0010 ± 0.0005	< 0.0013 ± 0.0004	0.30 ± 0.01
Spring Cr. arm	07/12/96	10 kd Tan	2/3	3.4 ± 0.1	0.29 ± 0.00	0.00075 ± 0.00010	0.00043 ± 0.00019	0.27 ± 0.01
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	3.9 ± 0.1	0.31 ± 0.00	0.0036 ± 0.0005	< 0.0008 ± 0.0005	0.30 ± 0.00
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	4.1 ± 0.2	0.31 ± 0.00	0.0038 ± 0.0005	< 0.0008 ± 0.0004	0.30 ± 0.02

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Nickel (µg/L) ICP–MS	Potassium (µg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	3.9 ± 0.0	0.30 ± 0.00	0.0038 ± 0.0008	< 0.0008 ± 0.0004	0.29 ± 0.01
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	4.0 ± 0.2	0.30 ± 0.01	0.0036 ± 0.0002	< 0.0008 ± 0.0004	0.29 ± 0.01
Spring Cr. arm	09/18/96	10 kd Tan	1/2	3.2 ± 0.1	0.30 ± 0.03	0.0013 ± 0.0004	< 0.0008 ± 0.0007	0.27 ± 0.02
Spring Cr. arm	09/18/96	10 kd Tan	2/2	3.1 ± 0.1	0.27 ± 0.00	0.0014 ± 0.0002	< 0.0008 ± 0.0003	0.27 ± 0.01
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	2.8 ± 0.0	0.37 ± 0.01	0.013 ± 0.003	< 0.0015 ± 0.0002	0.34 ± 0.01
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	2.7 ± 0.0	0.36 ± 0.00	0.0094 ± 0.0002	< 0.0015 ± 0.0005	0.34 ± 0.01
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	3.0 ± 0.1	0.35 ± 0.00	0.013 ± 0.002	< 0.0015 ± 0.0002	0.32 ± 0.01
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	2.8 ± 0.1	0.39 ± 0.03	0.012 ± 0.002	< 0.0015 ± 0.0005	0.33 ± 0.02
Spring Cr. arm	11/20/96	10 kd Tan	1/2	2.2 ± 0.0	0.32 ± 0.00	0.0013 ± 0.0006	< 0.0015 ± 0.0003	0.28 ± 0.02
Spring Cr. arm	11/20/96	10 kd Tan	2/2	2.3 ± 0.1	0.31 ± 0.00	0.0018 ± 0.0005	< 0.0015 ± 0.0000	0.28 ± 0.02
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	3.0 ± 0.1	0.37 ± 0.02	0.018 ± 0.000	0.00091 ± 0.00001	0.29 ± 0.00
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	2.8 ± 0.1	0.35 ± 0.00	0.014 ± 0.000	0.00077 ± 0.00034	0.28 ± 0.01
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	2.3 ± 0.0	0.36 ± 0.01	0.033 ± 0.001	< 0.0013 ± 0.0002	0.30 ± 0.01
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	2.3 ± 0.0	0.36 ± 0.01	0.029 ± 0.001	< 0.0013 ± 0.0001	0.30 ± 0.00
Spring Cr. arm	12/11/96	10 kd Tan	1/2	2.1 ± 0.0	0.31 ± 0.01	0.0030 ± 0.0001	< 0.0013 ± 0.0008	0.26 ± 0.01
Spring Cr. arm	12/11/96	10 kd Tan	2/2	2.4 ± 0.0	0.31 ± 0.00	0.0038 ± 0.0006	0.00086 ± 0.00007	0.25 ± 0.01
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	4.2 ± 0.2	0.38 ± 0.02	0.0040 ± 0.0001	0.0010 ± 0.0006	0.34 ± 0.01
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	3.9 ± 0.1	0.37 ± 0.00	0.0036 ± 0.0003	0.0011 ± 0.0009	0.34 ± 0.01
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	5.1 ± 0.0	0.38 ± 0.01	0.0053 ± 0.0010	< 0.001 ± 0.001	0.33 ± 0.01
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	4.1 ± 0.0	0.37 ± 0.01	0.0054 ± 0.0004	< 0.001 ± 0.001	0.33 ± 0.01
Spring Cr. arm	05/28/97	10 kd Tan	1/2	2.8 ± 0.1	0.31 ± 0.01	0.00072 ± 0.00012	< 0.001 ± 0.001	0.28 ± 0.01
Spring Cr. arm	05/28/97	10 kd Tan	2/2	2.6 ± 0.0	0.32 ± 0.00	0.00056 ± 0.00016	< 0.001 ± 0.001	0.28 ± 0.00
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	2.0 ± 0.1	2.0 ± 0.0	0.0034 ± 0.0003	0.0038 ± 0.0011	0.54 ± 0.00
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	2.0 ± 0.0	nd ± nd	0.0036 ± 0.0002	0.0039 ± 0.0009	0.53 ± 0.01
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	2.0 ± 0.0	2.1 ± 0.1	0.0032 ± 0.0000	0.0039 ± 0.0011	0.51 ± 0.02
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	2.1 ± 0.1	2.2 ± 0.0	0.0032 ± 0.0003	0.0029 ± 0.0000	0.53 ± 0.03
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	1.1 ± 0.1	1.9 ± 0.1	0.0022 ± 0.0001	0.0031 ± 0.0009	0.48 ± 0.01
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	1.1 ± 0.1	2.0 ± 0.0	0.0021 ± 0.0001	0.0052 ± 0.0013	0.48 ± 0.01
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	1.3 ± 0.1	1.2 ± 0.1	0.0086 ± 0.0008	0.00062 ± 0.00031	0.62 ± 0.02
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	1.3 ± 0.1	1.2 ± 0.0	0.0057 ± 0.0007	< 0.0006 ± 0.0002	0.60 ± 0.03
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	1.3 ± 0.1	1.2 ± 0.0	0.011 ± 0.002	0.00060 ± 0.00081	0.56 ± 0.01
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	1.3 ± 0.1	1.1 ± 0.0	0.011 ± 0.002	< 0.0006 ± 0.0004	0.56 ± 0.02
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.86 ± 0.10	0.99 ± 0.03	0.0023 ± 0.0005	< 0.0006 ± 0.0003	0.49 ± 0.03
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.90 ± 0.06	0.99 ± 0.03	0.0024 ± 0.0008	0.00072 ± 0.00079	0.47 ± 0.01

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	0.0086 ± 0.0001	0.083 ± 0.010	22 ± 0	< 0.02 ± 0.01	5.7 ± 0.0
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	0.011 ± 0.001	0.094 ± 0.011	21 ± 0	0.034 ± 0.003	5.6 ± 0.1
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	0.0053 ± 0.0004	0.16 ± 0.05	21 ± 0	< 0.04 ± 0.00	5.6 ± 0.0
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	0.0085 ± 0.0007	0.085 ± 0.016	21 ± 0	< 0.01 ± 0.00	5.5 ± 0.0
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	0.0031 ± 0.0006	0.11 ± 0.03	21 ± 0	< 0.04 ± 0.01	5.4 ± 0.1
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	0.0040 ± 0.0011	< 0.07 ± 0.04	21 ± 0	< 0.02 ± 0.01	5.4 ± 0.0
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	0.0079 ± 0.0026	< 0.3 ± 0.05	21 ± 1	< 0.02 ± 0.01	5.7 ± 0.1
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	0.0090 ± 0.0034	< 0.3 ± 0.15	21 ± 1	< 0.02 ± 0.01	5.9 ± 0.2
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	0.0039 ± 0.0024	< 0.3 ± 0.05	22 ± 1	< 0.02 ± 0.02	6.0 ± 0.2
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	0.0087 ± 0.0021	< 0.13 ± 0.06	20 ± 1	< 0.03 ± 0.02	5.1 ± 0.3
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	< 0.006 ± 0.005	0.30 ± 0.25	21 ± 0	< 0.03 ± 0.03	5.1 ± 0.2
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.3 ± 0.05	21 ± 1	< 0.02 ± 0.01	5.3 ± 0.3
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.2 ± 0.12	24 ± 0	< 0.05 ± 0.01	7.5 ± 0.1
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	< 0.003 ± 0.000	< 0.2 ± 0.02	23 ± 0	< 0.05 ± 0.02	7.6 ± 0.5
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.0031 ± 0.0009	< 0.2 ± 0.11	23 ± 1	< 0.05 ± 0.01	7.0 ± 0.5
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	0.0047 ± 0.0025	< 0.2 ± 0.03	23 ± 0	< 0.05 ± 0.01	7.0 ± 0.2
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.2 ± 0.09	23 ± 0	< 0.05 ± 0.00	6.9 ± 0.2
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.2 ± 0.08	24 ± 0	< 0.05 ± 0.01	6.9 ± 0.3
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	0.0045 ± 0.0023	< 0.09 ± 0.06	25 ± 1	< 0.07 ± 0.04	8.3 ± 0.7
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	< 0.004 ± 0.004	< 0.09 ± 0.05	25 ± 2	< 0.07 ± 0.01	8.4 ± 1.2
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	0.0056 ± 0.0002	< 0.11 ± 0.08	24 ± 2	< 0.03 ± 0.00	8.5 ± 1.3
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	0.0045 ± 0.0009	< 0.11 ± 0.12	24 ± 0	< 0.03 ± 0.00	7.8 ± 0.0
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	0.0020 ± 0.0027	0.12 ± 0.08	24 ± 1	< 0.03 ± 0.02	7.1 ± 0.3
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	< 0.004 ± 0.002	< 0.09 ± 0.08	23 ± 0	< 0.07 ± 0.00	6.5 ± 0.0
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	0.0086 ± 0.0032	< 0.1 ± 0.02	21 ± 1	< 0.2 ± 0.17	5.7 ± 0.1
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	0.0059 ± 0.0013	< 0.1 ± 0.05	21 ± 1	< 0.2 ± 0.17	5.5 ± 0.2
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	0.0062 ± 0.0007	< 0.1 ± 0.13	20 ± 0	< 0.2 ± 0.17	5.1 ± 0.3
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	0.0067 ± 0.0009	< 0.1 ± 0.13	20 ± 1	< 0.2 ± 0.18	5.4 ± 0.3
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.1 ± 0.02	20 ± 0	< 0.2 ± 0.19	5.1 ± 0.3
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.1 ± 0.07	20 ± 1	< 0.2 ± 0.22	4.9 ± 0.3
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	0.0072 ± 0.0007	0.082 ± 0.014	19 ± 0	< 0.01 ± 0.00	4.6 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	0.0053 ± 0.0002	0.076 ± 0.013	19 ± 0	< 0.01 ± 0.00	4.7 ± 0.1
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	0.0057 ± 0.0008	0.10 ± 0.00	19 ± 0	< 0.01 ± 0.00	4.5 ± 0.1
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	0.010 ± 0.001	0.10 ± 0.00	19 ± 0	< 0.01 ± 0.01	4.6 ± 0.1
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	0.0047 ± 0.0019	0.093 ± 0.012	19 ± 0	< 0.01 ± 0.00	4.4 ± 0.0
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	0.0050 ± 0.0009	0.087 ± 0.020	18 ± 0	< 0.01 ± 0.01	4.4 ± 0.0
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	0.0046 ± 0.0005	0.076 ± 0.018	19 ± 0	< 0.01 ± 0.00	4.5 ± 0.1
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	0.0082 ± 0.0004	< 0.3 ± 0.05	16 ± 0	< 0.02 ± 0.01	3.5 ± 0.1
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	0.0090 ± 0.0030	< 0.13 ± 0.03	17 ± 0	< 0.03 ± 0.00	3.9 ± 0.1
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	0.0064 ± 0.0012	0.16 ± 0.09	17 ± 0	< 0.03 ± 0.00	4.0 ± 0.0
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	0.010 ± 0.002	< 0.13 ± 0.09	16 ± 0	< 0.03 ± 0.01	3.5 ± 0.1
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	< 0.003 ± 0.001	< 0.3 ± 0.05	18 ± 0	< 0.02 ± 0.01	3.9 ± 0.1
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	< 0.003 ± 0.000	< 0.3 ± 0.19	17 ± 0	< 0.02 ± 0.01	3.4 ± 0.0
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	< 0.003 ± 0.001	< 0.3 ± 0.15	17 ± 1	< 0.02 ± 0.01	3.5 ± 0.2
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	0.016 ± 0.004	< 0.2 ± 0.19	20 ± 0	< 0.05 ± 0.01	6.0 ± 0.4
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	0.015 ± 0.002	< 0.2 ± 0.19	20 ± 0	< 0.05 ± 0.03	5.8 ± 0.5
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	0.0099 ± 0.0018	< 0.2 ± 0.00	20 ± 1	< 0.05 ± 0.01	6.1 ± 0.6
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	0.013 ± 0.002	< 0.2 ± 0.15	19 ± 0	< 0.05 ± 0.03	5.8 ± 0.5
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	0.0030 ± 0.0017	< 0.2 ± 0.08	20 ± 0	0.074 ± 0.002	5.1 ± 0.3
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.2 ± 0.21	20 ± 1	< 0.05 ± 0.01	5.4 ± 0.4
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	0.015 ± 0.003	0.15 ± 0.04	23 ± 1	< 0.07 ± 0.01	7.3 ± 0.6
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	0.013 ± 0.004	< 0.09 ± 0.07	23 ± 0	< 0.07 ± 0.03	7.6 ± 0.3
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	0.011 ± 0.005	0.14 ± 0.08	23 ± 0	< 0.03 ± 0.00	7.1 ± 0.1
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	0.0091 ± 0.0016	0.12 ± 0.07	22 ± 1	< 0.07 ± 0.06	7.2 ± 0.7
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	< 0.004 ± 0.001	< 0.09 ± 0.04	22 ± 1	< 0.07 ± 0.02	6.2 ± 0.9
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	< 0.004 ± 0.002	0.10 ± 0.06	22 ± 1	< 0.07 ± 0.02	6.0 ± 0.6
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	0.011 ± 0.002	0.15 ± 0.06	21 ± 1	< 0.04 ± 0.04	6.1 ± 1.1
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	0.012 ± 0.004	0.17 ± 0.02	21 ± 1	< 0.04 ± 0.02	5.8 ± 1.4
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	0.018 ± 0.001	0.088 ± 0.062	22 ± 1	< 0.04 ± 0.01	5.0 ± 0.2
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	0.022 ± 0.001	0.084 ± 0.044	21 ± 0	< 0.04 ± 0.02	4.8 ± 0.0
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	0.0045 ± 0.0010	0.17 ± 0.02	21 ± 1	< 0.04 ± 0.01	5.8 ± 1.2
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	0.0049 ± 0.0015	0.16 ± 0.08	21 ± 1	< 0.04 ± 0.01	6.0 ± 1.0
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	0.0044 ± 0.0029	0.11 ± 0.12	21 ± 0	0.093 ± 0.043	6.2 ± 0.5
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.1 ± 0.20	19 ± 1	< 0.2 ± 0.07	4.4 ± 0.2
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	0.0063 ± 0.0002	< 0.1 ± 0.05	19 ± 1	< 0.2 ± 0.13	4.3 ± 0.1

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	0.0069 ± 0.0017	< 0.1 ± 0.11	18 ± 1	< 0.2 ± 0.16	4.5 ± 0.4
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	0.0061 ± 0.0013	< 0.1 ± 0.07	18 ± 0	< 0.2 ± 0.19	4.6 ± 0.3
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	< 0.003 ± 0.000	< 0.1 ± 0.11	18 ± 0	< 0.2 ± 0.37	4.2 ± 0.5
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.1 ± 0.11	19 ± 1	< 0.2 ± 0.12	4.4 ± 0.2
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	0.0079 ± 0.0014	< 0.07 ± 0.03	19 ± 0	< 0.02 ± 0.03	4.9 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	0.0049 ± 0.0015	0.12 ± 0.04	19 ± 0	< 0.04 ± 0.01	5.0 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	0.0058 ± 0.0012	0.096 ± 0.025	19 ± 0	< 0.01 ± 0.00	4.9 ± 0.0
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	< 0.0042 ± 0.0022	0.076 ± 0.027	19 ± 0	< 0.04 ± 0.00	4.8 ± 0.0
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	< 0.0017 ± 0.0001	0.12 ± 0.06	19 ± 0	< 0.04 ± 0.00	5.0 ± 0.0
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	0.0019 ± 0.0006	0.075 ± 0.044	19 ± 0	< 0.01 ± 0.01	5.0 ± 0.0
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	0.011 ± 0.001	0.13 ± 0.10	17 ± 0	< 0.03 ± 0.00	4.1 ± 0.1
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	0.0073 ± 0.0013	< 0.2 ± 0.06	18 ± 0	< 0.02 ± 0.00	4.6 ± 0.1
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	0.0042 ± 0.0013	< 0.3 ± 0.09	17 ± 0	< 0.02 ± 0.01	4.1 ± 0.0
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	0.0035 ± 0.0007	< 0.2 ± 0.11	18 ± 0	< 0.02 ± 0.00	4.8 ± 0.2
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.3 ± 0.08	18 ± 1	< 0.02 ± 0.02	4.3 ± 0.2
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.3 ± 0.12	18 ± 1	< 0.02 ± 0.01	4.5 ± 0.3
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	0.0097 ± 0.0016	< 0.2 ± 0.09	23 ± 1	< 0.05 ± 0.01	6.4 ± 0.4
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	0.0073 ± 0.0005	< 0.2 ± 0.12	22 ± 0	< 0.05 ± 0.01	6.2 ± 0.3
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	0.011 ± 0.002	< 0.2 ± 0.07	22 ± 0	< 0.05 ± 0.01	6.3 ± 0.3
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	0.0074 ± 0.0056	< 0.2 ± 0.17	22 ± 0	< 0.05 ± 0.01	6.4 ± 0.4
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.2 ± 0.15	22 ± 0	< 0.05 ± 0.00	5.8 ± 0.3
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	< 0.003 ± 0.000	< 0.2 ± 0.02	22 ± 0	< 0.05 ± 0.02	5.9 ± 0.3
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	0.010 ± 0.002	0.13 ± 0.11	22 ± 1	< 0.07 ± 0.00	7.3 ± 0.4
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	0.0072 ± 0.0054	0.17 ± 0.18	22 ± 1	< 0.07 ± 0.02	7.5 ± 0.8
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	0.0053 ± 0.0023	< 0.09 ± 0.09	22 ± 1	< 0.07 ± 0.01	7.1 ± 0.6
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	0.0070 ± 0.0028	0.11 ± 0.07	21 ± 1	< 0.07 ± 0.04	6.5 ± 0.1
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	< 0.004 ± 0.003	< 0.09 ± 0.12	22 ± 1	< 0.07 ± 0.03	6.3 ± 0.0
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	< 0.004 ± 0.001	< 0.09 ± 0.09	22 ± 2	< 0.07 ± 0.03	6.5 ± 1.3
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.019 ± 0.003	0.13 ± 0.04	19 ± 1	< 0.04 ± 0.03	5.1 ± 1.2
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.015 ± 0.002	0.097 ± 0.058	18 ± 0	< 0.04 ± 0.01	5.2 ± 1.5
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	0.014 ± 0.001	0.12 ± 0.05	20 ± 1	< 0.04 ± 0.03	4.8 ± 1.2
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.014 ± 0.002	0.11 ± 0.03	18 ± 0	< 0.04 ± 0.01	5.1 ± 0.3

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	0.0058 ± 0.0023	0.10 ± 0.06	18 ± 0	< 0.04 ± 0.01	4.8 ± 1.1
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.0055 ± 0.0021	< 0.07 ± 0.03	19 ± 1	< 0.04 ± 0.01	5.1 ± 0.7
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	0.0062 ± 0.0008	0.17 ± 0.02	19 ± 0	< 0.2 ± 0.13	4.8 ± 0.3
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	0.0039 ± 0.0015	< 0.1 ± 0.12	19 ± 0	< 0.2 ± 0.06	5.2 ± 0.4
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	0.0062 ± 0.0013	< 0.1 ± 0.08	19 ± 1	< 0.2 ± 0.11	5.1 ± 0.4
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	0.0051 ± 0.0019	< 0.1 ± 0.10	18 ± 1	< 0.2 ± 0.14	5.2 ± 0.3
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.1 ± 0.11	18 ± 1	< 0.2 ± 0.18	4.7 ± 0.4
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	< 0.003 ± 0.002	< 0.1 ± 0.17	19 ± 1	< 0.2 ± 0.09	4.8 ± 0.3
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	0.0045 ± 0.0000	0.15 ± 0.04	19 ± 0	< 0.04 ± 0.00	5.5 ± 0.0
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	0.0075 ± 0.0004	0.13 ± 0.02	19 ± 0	< 0.04 ± 0.01	5.6 ± 0.1
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	0.0044 ± 0.0013	0.13 ± 0.02	19 ± 0	< 0.02 ± 0.01	5.5 ± 0.2
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.3 ± 0.08	19 ± 1	< 0.02 ± 0.04	6.1 ± 0.4
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	0.0038 ± 0.0040	< 0.3 ± 0.03	20 ± 0	0.035 ± 0.003	6.4 ± 0.1
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	< 0.003 ± 0.002	< 0.3 ± 0.05	19 ± 0	< 0.02 ± 0.01	6.3 ± 0.5
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	0.0081 ± 0.0016	< 0.2 ± 0.11	20 ± 0	< 0.02 ± 0.00	6.6 ± 0.1
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.3 ± 0.11	20 ± 0	< 0.02 ± 0.01	6.1 ± 0.4
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.3 ± 0.11	18 ± 2	< 0.02 ± 0.00	5.3 ± 0.9
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.16 ± 0.12	22 ± 1	< 0.05 ± 0.02	7.6 ± 0.2
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	0.0062 ± 0.0029	< 0.16 ± 0.04	22 ± 0	< 0.05 ± 0.02	7.8 ± 0.1
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	0.0039 ± 0.0010	< 0.16 ± 0.10	23 ± 0	< 0.05 ± 0.02	7.7 ± 0.2
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	< 0.003 ± 0.001	< 0.16 ± 0.17	22 ± 1	< 0.05 ± 0.01	7.9 ± 0.4
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.16 ± 0.12	22 ± 0	< 0.05 ± 0.04	7.1 ± 0.3
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	< 0.003 ± 0.002	< 0.16 ± 0.09	22 ± 0	< 0.05 ± 0.01	7.2 ± 0.2
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	0.0050 ± 0.0029	< 0.09 ± 0.03	21 ± 3	< 0.07 ± 0.01	6.9 ± 1.5
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	0.0078 ± 0.0049	0.17 ± 0.09	23 ± 4	< 0.07 ± 0.03	7.5 ± 1.5
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	0.0062 ± 0.0018	< 0.11 ± 0.05	24 ± 3	< 0.03 ± 0.01	8.2 ± 1.4
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	0.0040 ± 0.0027	0.094 ± 0.061	22 ± 0	0.078 ± 0.103	5.7 ± 0.6
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	0.0024 ± 0.0017	< 0.11 ± 0.01	22 ± 3	< 0.03 ± 0.01	6.8 ± 1.3
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	< 0.004 ± 0.002	< 0.09 ± 0.03	21 ± 4	< 0.07 ± 0.01	5.5 ± 0.5
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	0.011 ± 0.003	0.13 ± 0.07	16 ± 1	< 0.03 ± 0.03	4.2 ± 0.7
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	0.017 ± 0.001	0.13 ± 0.05	15 ± 0	< 0.03 ± 0.01	4.1 ± 1.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	0.018 ± 0.004	0.17 ± 0.04	16 ± 1	< 0.03 ± 0.02	4.6 ± 1.0
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	0.017 ± 0.001	0.13 ± 0.08	16 ± 1	< 0.03 ± 0.01	4.5 ± 1.1
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	0.0067 ± 0.0018	< 0.07 ± 0.03	16 ± 1	< 0.04 ± 0.03	4.3 ± 1.2
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	0.0080 ± 0.0031	0.16 ± 0.06	16 ± 1	< 0.03 ± 0.01	4.8 ± 0.9
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.1 ± 0.12	19 ± 0	< 0.2 ± 0.04	6.8 ± 2.9
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	0.0054 ± 0.0026	< 0.1 ± 0.08	19 ± 0	< 0.2 ± 0.09	5.7 ± 0.3
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	0.0057 ± 0.0013	< 0.1 ± 0.12	19 ± 0	< 0.2 ± 0.10	6.5 ± 1.5
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	< 0.003 ± 0.000	< 0.1 ± 0.18	19 ± 0	< 0.2 ± 0.12	6.1 ± 0.7
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.1 ± 0.06	19 ± 0	< 0.2 ± 0.14	5.7 ± 0.7
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	0.0034 ± 0.0021	< 0.1 ± 0.15	19 ± 1	< 0.2 ± 0.05	5.5 ± 0.8
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	< 0.003 ± 0.001	< 0.07 ± 0.04	15 ± 0	< 0.02 ± 0.01	4.8 ± 0.0
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	0.0072 ± 0.0003	0.12 ± 0.01	16 ± 1	< 0.01 ± 0.00	5.0 ± 0.1
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.0045 ± 0.0011	0.12 ± 0.00	16 ± 0	< 0.01 ± 0.00	5.1 ± 0.2
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.0025 ± 0.0002	0.10 ± 0.03	16 ± 0	< 0.01 ± 0.01	5.0 ± 0.3
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	< 0.0017 ± 0.0006	< 0.06 ± 0.04	17 ± 1	< 0.04 ± 0.00	5.2 ± 0.3
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	< 0.0017 ± 0.0008	0.10 ± 0.02	17 ± 1	< 0.01 ± 0.01	5.4 ± 0.1
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	0.011 ± 0.000	< 0.2 ± 0.13	18 ± 1	< 0.02 ± 0.00	8.0 ± 0.6
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	< 0.003 ± 0.001	< 0.2 ± 0.05	19 ± 0	< 0.02 ± 0.00	9.2 ± 0.0
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	0.0052 ± 0.0032	< 0.2 ± 0.11	18 ± 1	< 0.02 ± 0.00	8.7 ± 0.4
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	< 0.003 ± 0.004	< 0.2 ± 0.13	17 ± 0	< 0.02 ± 0.00	7.8 ± 0.1
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	< 0.003 ± 0.003	< 0.3 ± 0.02	18 ± 0	< 0.02 ± 0.02	7.8 ± 0.3
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.3 ± 0.06	18 ± 0	< 0.02 ± 0.03	7.9 ± 0.0
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	0.0082 ± 0.0029	< 0.16 ± 0.07	20 ± 0	< 0.05 ± 0.03	11 ± 0
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	0.0088 ± 0.0002	< 0.16 ± 0.08	20 ± 1	< 0.05 ± 0.03	11 ± 1
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.0088 ± 0.0018	< 0.11 ± 0.04	17 ± 2	< 0.03 ± 0.00	5.5 ± 0.7
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.0069 ± 0.0015	0.15 ± 0.02	18 ± 0	< 0.07 ± 0.05	5.7 ± 0.3
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.0064 ± 0.0015	< 0.09 ± 0.11	18 ± 0	< 0.07 ± 0.01	5.7 ± 0.0
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.010 ± 0.004	< 0.09 ± 0.09	18 ± 0	< 0.07 ± 0.03	5.2 ± 0.8
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	< 0.004 ± 0.001	< 0.09 ± 0.12	18 ± 1	< 0.07 ± 0.04	5.3 ± 0.3
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	< 0.004 ± 0.002	0.093 ± 0.070	18 ± 0	< 0.07 ± 0.04	5.5 ± 0.2

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	< 0.003 ± 0.003	< 0.1 ± 0.13	18 ± 0	< 0.2 ± 0.09	7.8 ± 0.5
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	< 0.003 ± 0.001	< 0.1 ± 0.08	18 ± 1	< 0.2 ± 0.04	7.8 ± 0.4
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	< 0.003 ± 0.000	< 0.1 ± 0.09	18 ± 1	< 0.2 ± 0.08	7.8 ± 0.5
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	0.0039 ± 0.0021	< 0.1 ± 0.08	18 ± 1	< 0.2 ± 0.19	7.3 ± 0.4
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.1 ± 0.16	18 ± 1	< 0.2 ± 0.13	7.3 ± 1.4
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	< 0.003 ± 0.002	< 0.1 ± 0.07	18 ± 1	< 0.2 ± 0.05	7.6 ± 0.3
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.0020 ± 0.0004	< 0.06 ± 0.05	15 ± 0	< 0.04 ± 0.00	4.6 ± 0.1
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	0.0017 ± 0.0017	0.086 ± 0.038	15 ± 0	< 0.04 ± 0.00	4.7 ± 0.1
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	0.0081 ± 0.0001	< 0.07 ± 0.08	16 ± 0	< 0.02 ± 0.01	5.1 ± 0.1
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.0057 ± 0.0009	0.067 ± 0.070	16 ± 1	< 0.04 ± 0.00	4.9 ± 0.3
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	< 0.0017 ± 0.0004	0.090 ± 0.003	16 ± 1	< 0.01 ± 0.00	4.6 ± 0.3
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	< 0.0017 ± 0.0010	0.085 ± 0.014	16 ± 0	< 0.01 ± 0.00	4.9 ± 0.2
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	< 0.003 ± 0.002	< 0.3 ± 0.02	16 ± 0	< 0.02 ± 0.03	7.8 ± 0.2
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	< 0.003 ± 0.001	< 0.3 ± 0.04	17 ± 1	0.057 ± 0.095	8.6 ± 0.5
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	< 0.006 ± 0.002	< 0.13 ± 0.13	17 ± 0	0.029 ± 0.042	9.0 ± 0.4
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	< 0.003 ± 0.002	< 0.3 ± 0.14	17 ± 1	< 0.02 ± 0.00	8.1 ± 0.1
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.2 ± 0.16	15 ± 1	< 0.02 ± 0.01	7.4 ± 0.1
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	< 0.006 ± 0.001	< 0.13 ± 0.12	17 ± 0	< 0.03 ± 0.01	8.2 ± 0.1
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	< 0.003 ± 0.001	< 0.16 ± 0.12	18 ± 0	< 0.05 ± 0.05	7.0 ± 0.4
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	< 0.003 ± 0.003	< 0.16 ± 0.13	18 ± 0	< 0.05 ± 0.02	7.1 ± 0.2
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	0.0036 ± 0.0032	< 0.16 ± 0.07	18 ± 0	< 0.05 ± 0.01	7.0 ± 0.2
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	< 0.003 ± 0.002	< 0.16 ± 0.04	18 ± 0	< 0.05 ± 0.01	7.1 ± 0.2
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.16 ± 0.06	18 ± 0	< 0.05 ± 0.02	6.5 ± 0.2
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.16 ± 0.11	17 ± 1	< 0.05 ± 0.04	6.2 ± 0.4
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	0.0053 ± 0.0023	< 0.09 ± 0.12	15 ± 0	< 0.07 ± 0.02	3.5 ± 0.3
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.0066 ± 0.0007	< 0.09 ± 0.04	15 ± 0	< 0.07 ± 0.05	4.8 ± 1.5
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.0096 ± 0.0057	< 0.09 ± 0.03	15 ± 0	< 0.07 ± 0.05	4.7 ± 1.4
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.011 ± 0.003	< 0.09 ± 0.09	15 ± 0	< 0.07 ± 0.00	4.6 ± 1.5
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	< 0.004 ± 0.003	0.19 ± 0.05	15 ± 0	< 0.07 ± 0.01	4.5 ± 1.1
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.0060 ± 0.0039	< 0.09 ± 0.06	15 ± 0	< 0.07 ± 0.03	4.2 ± 1.1
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.033 ± 0.001	0.076 ± 0.065	8.9 ± 0.5	< 0.04 ± 0.02	1.6 ± 0.1
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.020 ± 0.005	< 0.07 ± 0.01	9.0 ± 0.2	< 0.04 ± 0.00	1.9 ± 0.4

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	0.027 ± 0.005	0.085 ± 0.069	8.9 ± 0.4	< 0.04 ± 0.00	1.9 ± 0.3
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.030 ± 0.006	< 0.07 ± 0.02	9.4 ± 0.4	< 0.04 ± 0.00	1.9 ± 0.2
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	0.0070 ± 0.0038	< 0.07 ± 0.02	9.4 ± 0.4	< 0.04 ± 0.01	1.7 ± 0.3
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.0036 ± 0.0009	< 0.07 ± 0.03	9.3 ± 0.3	< 0.04 ± 0.02	1.8 ± 0.3
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	0.0035 ± 0.0027	< 0.1 ± 0.11	16 ± 1	< 0.2 ± 0.09	6.6 ± 0.4
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	< 0.003 ± 0.001	< 0.1 ± 0.08	16 ± 0	< 0.2 ± 0.15	6.5 ± 0.8
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	0.0034 ± 0.0017	< 0.1 ± 0.08	16 ± 1	< 0.2 ± 0.06	6.4 ± 0.9
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	< 0.003 ± 0.002	< 0.1 ± 0.09	16 ± 0	< 0.2 ± 0.12	6.2 ± 0.3
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	< 0.003 ± 0.003	< 0.1 ± 0.05	16 ± 0	< 0.2 ± 0.17	5.2 ± 0.3
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	< 0.003 ± 0.002	< 0.1 ± 0.12	16 ± 1	< 0.2 ± 0.09	5.3 ± 0.3
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	0.0059 ± 0.0011	< 0.08 ± 0.03	16 ± 1	< 0.2 ± 0.13	6.6 ± 0.4
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.0039 ± 0.0010	< 0.08 ± 0.09	17 ± 1	< 0.2 ± 0.14	6.3 ± 0.1
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	0.0040 ± 0.0010	< 0.08 ± 0.04	17 ± 1	< 0.2 ± 0.15	5.2 ± 1.4
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	0.0036 ± 0.0005	0.096 ± 0.036	17 ± 1	< 0.2 ± 0.17	5.5 ± 0.6
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.08 ± 0.08	16 ± 1	< 0.2 ± 0.18	5.2 ± 1.4
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	< 0.003 ± 0.003	< 0.08 ± 0.08	16 ± 1	< 0.2 ± 0.25	5.4 ± 0.4
Flat Cr.	12/11/96	0.40 µm Mem	1/2	0.041 ± 0.001	0.27 ± 0.07	11 ± 0	< 0.03 ± 0.01	1.7 ± 0.1
Flat Cr.	12/11/96	0.40 µm Mem	2/2	0.037 ± 0.008	< 0.11 ± 0.11	11 ± 0	< 0.03 ± 0.02	1.8 ± 0.1
Flat Cr.	12/11/96	0.45 µm Cap	1/2	0.028 ± 0.000	0.098 ± 0.079	11 ± 0	< 0.07 ± 0.05	1.9 ± 0.3
Flat Cr.	12/11/96	0.45 µm Cap	2/2	0.033 ± 0.002	0.13 ± 0.10	11 ± 0	< 0.03 ± 0.00	2.0 ± 0.3
Flat Cr.	12/11/96	10 kd Tan	1/2	0.018 ± 0.001	< 0.09 ± 0.09	11 ± 0	< 0.07 ± 0.02	1.8 ± 0.2
Flat Cr.	12/11/96	10 kd Tan	2/2	0.016 ± 0.001	< 0.11 ± 0.06	11 ± 0	< 0.03 ± 0.01	1.8 ± 0.1
Flat Cr.	05/29/97	0.40 µm Mem	1/2	0.020 ± 0.001	0.16 ± 0.07	23 ± 1	< 0.2 ± 0.09	5.9 ± 0.2
Flat Cr.	05/29/97	0.40 µm Mem	2/2	0.018 ± 0.000	< 0.1 ± 0.02	23 ± 1	< 0.2 ± 0.05	5.5 ± 0.1
Flat Cr.	05/29/97	0.45 µm Cap	1/2	0.014 ± 0.004	0.17 ± 0.07	23 ± 1	< 0.2 ± 0.07	7.5 ± 1.2
Flat Cr.	05/29/97	0.45 µm Cap	2/2	0.011 ± 0.001	< 0.1 ± 0.09	23 ± 1	< 0.2 ± 0.10	6.9 ± 0.1
Flat Cr.	05/29/97	10 kd Tan	1/2	0.0045 ± 0.0034	< 0.1 ± 0.18	24 ± 1	< 0.2 ± 0.11	6.5 ± 0.7
Flat Cr.	05/29/97	10 kd Tan	2/2	< 0.003 ± 0.002	0.14 ± 0.06	22 ± 2	< 0.2 ± 0.12	8.8 ± 1.0
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	1.8 ± 0.0	0.56 ± 0.02	13 ± 0	< 0.07 ± 0.02	2.7 ± 0.2
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	1.9 ± 0.0	0.61 ± 0.04	13 ± 0	< 0.07 ± 0.02	2.5 ± 0.5
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	1.8 ± 0.0	0.68 ± 0.17	13 ± 0	< 0.07 ± 0.05	3.1 ± 0.1
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	1.8 ± 0.0	0.61 ± 0.17	13 ± 0	< 0.07 ± 0.04	2.5 ± 0.5
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	1.8 ± 0.1	0.88 ± 0.05	13 ± 0	< 0.03 ± 0.02	2.6 ± 0.3

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	1.9 ± 0.0	0.74 ± 0.00	13 ± 0	< 0.07 ± 0.00	2.7 ± 0.3
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	3.0 ± 0.1	1.6 ± 0.2	26 ± 1	< 0.2 ± 0.06	8.2 ± 0.6
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	2.9 ± 0.0	1.7 ± 0.0	26 ± 1	< 0.2 ± 0.07	8.7 ± 0.5
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	2.9 ± 0.2	1.6 ± 0.1	25 ± 0	< 0.2 ± 0.10	7.1 ± 0.4
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	2.8 ± 0.1	1.6 ± 0.1	25 ± 1	< 0.2 ± 0.11	7.7 ± 0.2
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	2.8 ± 0.0	1.6 ± 0.1	26 ± 0	< 0.2 ± 0.14	7.1 ± 0.5
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	2.9 ± 0.1	1.4 ± 0.0	26 ± 0	< 0.2 ± 0.27	6.8 ± 0.1
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	1.2 ± 0.0	0.84 ± 0.03	12 ± 0	0.048 ± 0.029	2.4 ± 0.2
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	1.2 ± 0.0	0.91 ± 0.06	11 ± 0	< 0.04 ± 0.02	2.2 ± 0.2
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	1.3 ± 0.1	0.83 ± 0.02	12 ± 0	< 0.04 ± 0.02	2.4 ± 0.3
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	1.3 ± 0.1	0.94 ± 0.09	11 ± 0	0.052 ± 0.029	2.3 ± 0.2
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	1.2 ± 0.1	0.69 ± 0.06	11 ± 0	< 0.04 ± 0.03	2.4 ± 0.3
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	1.2 ± 0.0	0.67 ± 0.01	11 ± 0	0.058 ± 0.006	2.1 ± 0.1
Whiskeytown	12/11/96	0.40 µm Mem	1/2	0.0043 ± 0.0013	< 0.09 ± 0.00	12 ± 0	< 0.07 ± 0.03	1.8 ± 0.1
Whiskeytown	12/11/96	0.40 µm Mem	2/2	0.0049 ± 0.0027	< 0.11 ± 0.04	12 ± 0	< 0.03 ± 0.04	1.8 ± 0.1
Whiskeytown	12/11/96	0.45 µm Cap	1/2	0.0061 ± 0.0020	< 0.11 ± 0.05	12 ± 0	< 0.03 ± 0.01	1.7 ± 0.1
Whiskeytown	12/11/96	0.45 µm Cap	2/2	0.0055 ± 0.0037	< 0.09 ± 0.01	12 ± 0	< 0.07 ± 0.01	2.2 ± 0.3
Whiskeytown	12/11/96	10 kd Tan	1/2	< 0.0016 ± 0.0016	< 0.11 ± 0.08	12 ± 0	< 0.03 ± 0.02	1.9 ± 0.2
Whiskeytown	12/11/96	10 kd Tan	2/2	< 0.004 ± 0.002	< 0.09 ± 0.05	13 ± 0	< 0.07 ± 0.01	1.9 ± 0.3
Whiskeytown	05/29/97	0.40 µm Mem	1/2	0.0032 ± 0.0032	< 0.1 ± 0.11	13 ± 1	< 0.2 ± 0.09	1.9 ± 0.1
Whiskeytown	05/29/97	0.40 µm Mem	2/2	0.0042 ± 0.0025	< 0.1 ± 0.14	13 ± 1	< 0.2 ± 0.11	1.8 ± 0.5
Whiskeytown	05/29/97	0.45 µm Cap	1/2	0.0046 ± 0.0040	< 0.1 ± 0.22	13 ± 1	< 0.2 ± 0.10	1.8 ± 0.4
Whiskeytown	05/29/97	0.45 µm Cap	2/2	0.0049 ± 0.0026	< 0.1 ± 0.25	12 ± 1	< 0.2 ± 0.12	1.8 ± 0.2
Whiskeytown	05/29/97	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.1 ± 0.17	12 ± 1	< 0.2 ± 0.12	1.8 ± 0.1
Whiskeytown	05/29/97	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.1 ± 0.21	12 ± 0	< 0.2 ± 0.12	1.8 ± 0.2
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	0.0047 ± 0.0005	< 0.06 ± 0.05	— ± —	< 0.04 ± 0.00	— ± —
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	0.0040 ± 0.0007	0.047 ± 0.010	12 ± 0	< 0.01 ± 0.01	1.7 ± 0.0
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	0.010 ± 0.000	< 0.07 ± 0.07	12 ± 0	< 0.02 ± 0.00	1.7 ± 0.0
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	0.0078 ± 0.0018	< 0.07 ± 0.04	12 ± 0	< 0.02 ± 0.01	1.7 ± 0.1
Spring Cr. arm	07/12/96	10 kd Tan	1/3	< 0.003 ± 0.001	< 0.07 ± 0.04	12 ± 0	< 0.02 ± 0.01	1.7 ± 0.0
Spring Cr. arm	07/12/96	10 kd Tan	2/3	< 0.0017 ± 0.0003	0.068 ± 0.050	12 ± 0	< 0.04 ± 0.02	1.7 ± 0.0
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	0.0091 ± 0.0048	< 0.3 ± 0.10	12 ± 0	< 0.02 ± 0.00	1.6 ± 0.0
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	0.010 ± 0.008	< 0.3 ± 0.08	12 ± 1	0.035 ± 0.002	1.8 ± 0.0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Samarium (µg/L) ICP–MS	Selenium (µg/L) ICP–MS	Silica (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (mg/L) ICP–AES
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	0.011 ± 0.002	< 0.3 ± 0.04	12 ± 1	< 0.02 ± 0.01	1.7 ± 0.1
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	0.0074 ± 0.0008	< 0.3 ± 0.01	12 ± 0	< 0.02 ± 0.00	1.7 ± 0.2
Spring Cr. arm	09/18/96	10 kd Tan	1/2	< 0.003 ± 0.001	< 0.3 ± 0.17	12 ± 1	< 0.02 ± 0.01	1.6 ± 0.1
Spring Cr. arm	09/18/96	10 kd Tan	2/2	< 0.003 ± 0.002	< 0.3 ± 0.04	11 ± 0	< 0.02 ± 0.00	1.5 ± 0.1
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	0.026 ± 0.003	< 0.2 ± 0.00	12 ± 0	< 0.05 ± 0.03	2.2 ± 0.2
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	0.020 ± 0.003	< 0.2 ± 0.06	12 ± 0	< 0.05 ± 0.01	2.2 ± 0.2
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	0.028 ± 0.001	< 0.2 ± 0.12	12 ± 1	< 0.05 ± 0.01	2.2 ± 0.2
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	0.026 ± 0.000	< 0.2 ± 0.03	13 ± 0	< 0.05 ± 0.02	2.4 ± 0.3
Spring Cr. arm	11/20/96	10 kd Tan	1/2	0.0049 ± 0.0014	< 0.2 ± 0.11	12 ± 0	< 0.05 ± 0.00	2.1 ± 0.2
Spring Cr. arm	11/20/96	10 kd Tan	2/2	0.0092 ± 0.0019	< 0.2 ± 0.21	12 ± 0	0.068 ± 0.103	2.0 ± 0.1
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	0.031 ± 0.004	< 0.11 ± 0.07	12 ± 0	< 0.03 ± 0.01	2.7 ± 0.4
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	0.030 ± 0.006	0.22 ± 0.12	12 ± 0	< 0.03 ± 0.01	2.5 ± 0.5
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	0.051 ± 0.006	0.10 ± 0.05	12 ± 0	< 0.07 ± 0.01	2.7 ± 0.6
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	0.054 ± 0.004	0.11 ± 0.05	12 ± 0	< 0.07 ± 0.04	2.5 ± 0.5
Spring Cr. arm	12/11/96	10 kd Tan	1/2	0.011 ± 0.001	< 0.09 ± 0.09	12 ± 0	< 0.07 ± 0.03	2.2 ± 0.4
Spring Cr. arm	12/11/96	10 kd Tan	2/2	0.0093 ± 0.0028	0.12 ± 0.04	12 ± 0	< 0.03 ± 0.01	2.0 ± 0.3
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	0.0066 ± 0.0032	< 0.1 ± 0.02	13 ± 1	< 0.2 ± 0.04	1.8 ± 0.3
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	0.0064 ± 0.0029	< 0.1 ± 0.13	13 ± 1	< 0.2 ± 0.05	2.1 ± 0.5
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	0.0090 ± 0.0009	< 0.1 ± 0.13	13 ± 1	< 0.2 ± 0.22	1.9 ± 0.5
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	0.0082 ± 0.0027	< 0.1 ± 0.07	13 ± 0	< 0.2 ± 0.06	2.2 ± 0.9
Spring Cr. arm	05/28/97	10 kd Tan	1/2	< 0.003 ± 0.002	< 0.1 ± 0.13	13 ± 0	< 0.2 ± 0.05	1.6 ± 0.5
Spring Cr. arm	05/28/97	10 kd Tan	2/2	< 0.003 ± 0.001	< 0.1 ± 0.05	13 ± 0	< 0.2 ± 0.07	1.8 ± 0.5
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	0.0038 ± 0.0030	0.40 ± 0.18	20 ± 1	< 0.2 ± 0.07	93 ± 1
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	0.010 ± 0.004	0.35 ± 0.04	20 ± 1	< 0.2 ± 0.15	86 ± 5
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	0.0074 ± 0.0026	0.40 ± 0.07	20 ± 1	< 0.2 ± 0.04	91 ± 3
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	0.0054 ± 0.0035	0.39 ± 0.03	21 ± 1	< 0.2 ± 0.16	87 ± 3
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	< 0.003 ± 0.001	0.35 ± 0.04	20 ± 1	< 0.2 ± 0.17	68 ± 1
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	0.0036 ± 0.0015	0.30 ± 0.07	20 ± 1	< 0.2 ± 0.07	64 ± 16
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	0.013 ± 0.003	0.11 ± 0.01	15 ± 0	< 0.04 ± 0.01	4.7 ± 0.5
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	0.0084 ± 0.0040	0.17 ± 0.00	15 ± 0	< 0.03 ± 0.01	4.5 ± 0.1
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	0.017 ± 0.001	0.12 ± 0.03	16 ± 0	< 0.03 ± 0.01	4.8 ± 0.7
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	0.015 ± 0.002	< 0.07 ± 0.03	14 ± 0	< 0.03 ± 0.01	4.4 ± 0.2
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.0065 ± 0.0021	0.13 ± 0.04	14 ± 0	< 0.03 ± 0.02	3.8 ± 0.0
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.0040 ± 0.0020	0.13 ± 0.05	14 ± 0	< 0.03 ± 0.01	4.0 ± 0.2

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	52 ± 0	0.0014 ± 0.0002	0.0021 ± 0.0007	— ± —	0.00076 ± 0.00028
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	53 ± 0	0.00097 ± 0.00010	0.0023 ± 0.0006	— ± —	0.00061 ± 0.00003
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	52 ± 1	0.0011 ± 0.0000	0.0018 ± 0.0003	— ± —	0.00051 ± 0.00007
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	51 ± 0	0.0014 ± 0.0001	0.0024 ± 0.0003	— ± —	0.00091 ± 0.00007
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	51 ± 0	0.00072 ± 0.00001	0.0027 ± 0.0003	— ± —	0.00029 ± 0.00006
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	49 ± 0	0.00052 ± 0.00023	< 0.0014 ± 0.0003	— ± —	0.00089 ± 0.00012
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	52 ± 0	0.0023 ± 0.0004	< 0.005 ± 0.001	< 0.003 ± 0.000	0.00097 ± 0.00031
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	51 ± 1	0.0028 ± 0.0003	< 0.005 ± 0.002	< 0.003 ± 0.001	0.00083 ± 0.00023
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	50 ± 0	0.0014 ± 0.0004	< 0.005 ± 0.000	< 0.003 ± 0.000	0.00081 ± 0.00029
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	51 ± 1	0.00085 ± 0.00007	0.0023 ± 0.0010	< 0.003 ± 0.000	0.00066 ± 0.00084
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	48 ± 1	0.00069 ± 0.00003	< 0.002 ± 0.002	< 0.003 ± 0.001	< 0.0005 ± 0.0008
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	46 ± 0	0.00088 ± 0.00026	< 0.005 ± 0.000	< 0.003 ± 0.001	< 0.0005 ± 0.0002
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	55 ± 0	0.00086 ± 0.00015	< 0.005 ± 0.000	— ± —	0.00053 ± 0.00016
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	55 ± 1	< 0.0005 ± 0.0004	< 0.005 ± 0.003	— ± —	0.00053 ± 0.00026
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	55 ± 0	0.00083 ± 0.00053	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0003
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	56 ± 1	< 0.0005 ± 0.0004	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0000
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	49 ± 2	< 0.0005 ± 0.0003	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0002
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	49 ± 1	< 0.0005 ± 0.0003	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0000
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	55 ± 1	0.00072 ± 0.00023	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0001
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	56 ± 0	0.00068 ± 0.00011	< 0.004 ± 0.000	— ± —	< 0.0006 ± 0.0005
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	56 ± 0	0.00059 ± 0.00010	< 0.004 ± 0.000	— ± —	0.00057 ± 0.00010
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	56 ± 1	0.0013 ± 0.0006	< 0.004 ± 0.001	— ± —	0.00046 ± 0.00019
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	49 ± 0	< 0.0003 ± 0.0002	< 0.004 ± 0.001	— ± —	< 0.0002 ± 0.0000
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	49 ± 0	< 0.0005 ± 0.0002	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0002
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	53 ± 0	0.0016 ± 0.0003	< 0.008 ± 0.000	— ± —	0.00097 ± 0.00022
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	52 ± 1	0.0013 ± 0.0001	< 0.008 ± 0.002	— ± —	0.00047 ± 0.00010
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	50 ± 2	0.0013 ± 0.0005	< 0.008 ± 0.001	— ± —	0.00049 ± 0.00018
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	51 ± 2	0.00085 ± 0.00012	< 0.008 ± 0.001	— ± —	0.00087 ± 0.00030
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	43 ± 2	< 0.0007 ± 0.0003	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0002
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	42 ± 1	< 0.0007 ± 0.0002	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0001
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	43 ± 0	0.00084 ± 0.00014	0.0015 ± 0.0004	— ± —	0.00059 ± 0.00021

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	44 ± 0	0.0012 ± 0.0001	0.0019 ± 0.0003	— ± —	0.00067 ± 0.00007
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	44 ± 1	0.0012 ± 0.0001	0.0018 ± 0.0001	— ± —	0.00033 ± 0.00006
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	44 ± 0	0.0014 ± 0.0001	0.0012 ± 0.0002	— ± —	0.00067 ± 0.00003
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	43 ± 2	0.00060 ± 0.00013	0.0016 ± 0.0005	— ± —	0.00025 ± 0.00010
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	44 ± 1	0.00072 ± 0.00019	0.0018 ± 0.0005	— ± —	0.00040 ± 0.00013
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	42 ± 1	0.00068 ± 0.00017	0.0024 ± 0.0001	— ± —	0.00033 ± 0.00000
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	38 ± 0	0.0020 ± 0.0005	< 0.005 ± 0.001	< 0.003 ± 0.001	0.00056 ± 0.00025
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	39 ± 1	0.00072 ± 0.00026	< 0.002 ± 0.000	< 0.003 ± 0.001	0.00070 ± 0.00017
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	39 ± 1	0.0018 ± 0.0009	< 0.002 ± 0.002	< 0.003 ± 0.000	0.00056 ± 0.00028
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	38 ± 1	0.0015 ± 0.0004	0.0026 ± 0.0026	< 0.003 ± 0.001	< 0.0005 ± 0.0003
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	32 ± 0	< 0.0008 ± 0.0004	< 0.005 ± 0.002	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	33 ± 0	0.00084 ± 0.00032	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	33 ± 0	< 0.0008 ± 0.0004	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	47 ± 1	0.0022 ± 0.0006	< 0.005 ± 0.002	— ± —	0.0013 ± 0.0004
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	47 ± 2	0.0027 ± 0.0000	< 0.005 ± 0.001	— ± —	0.0015 ± 0.0001
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	45 ± 2	0.0025 ± 0.0005	< 0.005 ± 0.002	— ± —	0.00091 ± 0.00007
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	46 ± 2	0.0024 ± 0.0004	< 0.005 ± 0.001	— ± —	0.0014 ± 0.0006
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	39 ± 1	< 0.0005 ± 0.0005	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0001
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	39 ± 1	0.00059 ± 0.00016	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0002
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	52 ± 0	0.0026 ± 0.0006	< 0.004 ± 0.001	— ± —	0.00077 ± 0.00047
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	52 ± 2	0.0021 ± 0.0011	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0002
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	51 ± 0	0.0027 ± 0.0002	< 0.004 ± 0.002	— ± —	0.00049 ± 0.00022
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	51 ± 2	0.0029 ± 0.0010	< 0.004 ± 0.002	— ± —	0.0010 ± 0.0002
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	42 ± 1	< 0.0005 ± 0.0006	< 0.004 ± 0.003	— ± —	< 0.0006 ± 0.0002
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	42 ± 0	< 0.0005 ± 0.0003	< 0.004 ± 0.003	— ± —	< 0.0006 ± 0.0001
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	49 ± 1	0.0018 ± 0.0008	< 0.004 ± 0.002	— ± —	0.00067 ± 0.00033
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	51 ± 3	0.0020 ± 0.0005	< 0.004 ± 0.000	— ± —	0.00063 ± 0.00072
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	48 ± 2	0.0041 ± 0.0010	< 0.004 ± 0.002	— ± —	0.0012 ± 0.0004
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	50 ± 2	0.0033 ± 0.0006	< 0.004 ± 0.002	— ± —	0.00083 ± 0.00051
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	47 ± 2	0.00064 ± 0.00061	< 0.004 ± 0.002	— ± —	0.00042 ± 0.00010
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	46 ± 2	0.0011 ± 0.0002	< 0.004 ± 0.002	— ± —	0.00047 ± 0.00039
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	46 ± 0	0.0010 ± 0.0003	< 0.007 ± 0.001	— ± —	0.00077 ± 0.00006
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	43 ± 1	0.00097 ± 0.00034	< 0.008 ± 0.000	— ± —	0.00044 ± 0.00026
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	43 ± 0	0.0014 ± 0.0002	< 0.008 ± 0.001	— ± —	0.00065 ± 0.00002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	42 ± 1	0.0011 ± 0.0002	< 0.008 ± 0.001	— ± —	0.00035 ± 0.00016
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	43 ± 1	0.0012 ± 0.0002	< 0.008 ± 0.000	— ± —	0.00067 ± 0.00041
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	37 ± 0	< 0.0007 ± 0.0003	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0000
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	38 ± 1	< 0.0007 ± 0.0002	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0001
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	49 ± 0	0.00068 ± 0.00023	0.0018 ± 0.0007	— ± —	< 0.0003 ± 0.0003
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	48 ± 0	0.0011 ± 0.0001	0.0020 ± 0.0010	— ± —	0.00053 ± 0.00012
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	49 ± 0	0.00060 ± 0.00005	0.0012 ± 0.0000	— ± —	0.00043 ± 0.00010
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	49 ± 0	0.00082 ± 0.00000	0.0026 ± 0.0003	— ± —	0.00038 ± 0.00008
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	51 ± 0	0.00018 ± 0.00010	0.0017 ± 0.0001	— ± —	< 0.00054 ± 0.00010
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	46 ± 0	0.00039 ± 0.00016	0.0023 ± 0.0003	— ± —	< 0.0002 ± 0.0001
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	45 ± 1	0.0010 ± 0.0008	< 0.002 ± 0.000	< 0.003 ± 0.000	< 0.0005 ± 0.0003
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	44 ± 0	0.00073 ± 0.00019	0.0022 ± 0.0012	< 0.0015 ± 0.0004	< 0.0006 ± 0.0003
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	44 ± 0	0.0012 ± 0.0012	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0004
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	44 ± 0	0.0012 ± 0.0005	< 0.0013 ± 0.0012	< 0.0015 ± 0.0004	< 0.0006 ± 0.0002
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	37 ± 0	< 0.0008 ± 0.0001	< 0.005 ± 0.002	< 0.003 ± 0.001	< 0.0005 ± 0.0000
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	38 ± 0	< 0.0008 ± 0.0003	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	67 ± 2	0.0022 ± 0.0002	< 0.005 ± 0.000	— ± —	0.00047 ± 0.00003
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	64 ± 0	0.0012 ± 0.0000	< 0.005 ± 0.001	— ± —	0.00077 ± 0.00005
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	64 ± 1	0.0026 ± 0.0005	< 0.005 ± 0.001	— ± —	0.00067 ± 0.00024
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	66 ± 1	0.0018 ± 0.0003	< 0.005 ± 0.002	— ± —	0.0011 ± 0.0001
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	53 ± 1	< 0.0005 ± 0.0004	< 0.005 ± 0.002	— ± —	< 0.0003 ± 0.0002
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	54 ± 2	< 0.0005 ± 0.0003	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0001
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	59 ± 1	0.0013 ± 0.0004	< 0.004 ± 0.002	— ± —	0.00075 ± 0.00031
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	61 ± 0	0.0019 ± 0.0004	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0005
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	59 ± 1	0.0020 ± 0.0004	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0001
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	57 ± 1	0.0013 ± 0.0006	< 0.004 ± 0.000	— ± —	0.00061 ± 0.00008
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	50 ± 1	< 0.0005 ± 0.0001	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0003
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	49 ± 0	0.00053 ± 0.00055	< 0.004 ± 0.004	— ± —	< 0.0006 ± 0.0001
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	63 ± 2	0.0031 ± 0.0005	< 0.004 ± 0.002	— ± —	0.0012 ± 0.0001
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	62 ± 3	0.0024 ± 0.0008	< 0.004 ± 0.004	— ± —	0.00068 ± 0.00008
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	60 ± 3	0.0030 ± 0.0000	< 0.004 ± 0.004	— ± —	0.0010 ± 0.0003
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	62 ± 2	0.0021 ± 0.0002	< 0.004 ± 0.002	— ± —	0.00087 ± 0.00044

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	55 ± 2	0.00064 ± 0.00027	< 0.004 ± 0.003	— ± —	0.00026 ± 0.00008
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	55 ± 2	0.00049 ± 0.00018	< 0.004 ± 0.002	— ± —	0.00031 ± 0.00005
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	51 ± 0	0.00083 ± 0.00010	< 0.008 ± 0.001	— ± —	0.00052 ± 0.00020
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	51 ± 1	0.00092 ± 0.00019	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0003
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	50 ± 0	0.0013 ± 0.0005	< 0.008 ± 0.001	— ± —	0.00069 ± 0.00027
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	49 ± 1	0.00095 ± 0.00018	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0001
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	44 ± 1	< 0.0007 ± 0.0002	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0003
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	44 ± 1	< 0.0007 ± 0.0003	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0003
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	59 ± 1	0.00071 ± 0.00007	0.0015 ± 0.0001	— ± —	< 0.0003 ± 0.0000
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	60 ± 0	0.00052 ± 0.00008	0.0024 ± 0.0001	— ± —	0.00033 ± 0.00012
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	55 ± 1	0.00070 ± 0.00023	0.0016 ± 0.0014	— ± —	0.00068 ± 0.00003
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	60 ± 1	< 0.0008 ± 0.0004	< 0.005 ± 0.001	< 0.003 ± 0.000	< 0.0005 ± 0.0003
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	59 ± 1	< 0.0008 ± 0.0006	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0002
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	59 ± 1	< 0.0008 ± 0.0002	< 0.005 ± 0.000	< 0.003 ± 0.001	< 0.0005 ± 0.0002
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	61 ± 0	0.00050 ± 0.00012	0.0025 ± 0.0003	< 0.0015 ± 0.0018	< 0.0006 ± 0.0003
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	55 ± 1	< 0.0008 ± 0.0003	< 0.005 ± 0.001	< 0.003 ± 0.002	< 0.0005 ± 0.0003
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	55 ± 0	< 0.0008 ± 0.0002	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0003
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	76 ± 0	0.00060 ± 0.00050	< 0.005 ± 0.002	— ± —	< 0.0003 ± 0.0001
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	75 ± 0	0.00075 ± 0.00027	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0002
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	75 ± 1	0.00057 ± 0.00035	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0000
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	74 ± 1	< 0.0005 ± 0.0001	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0001
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	68 ± 1	< 0.0005 ± 0.0002	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0002
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	70 ± 1	< 0.0005 ± 0.0001	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0002
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	86 ± 1	0.0013 ± 0.0002	< 0.004 ± 0.006	— ± —	0.00078 ± 0.00023
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	88 ± 0	0.0011 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0003
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	84 ± 1	0.0013 ± 0.0001	< 0.004 ± 0.001	— ± —	0.00047 ± 0.00012
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	87 ± 3	< 0.0005 ± 0.0000	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0002
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	73 ± 0	< 0.0003 ± 0.0002	< 0.004 ± 0.000	— ± —	< 0.0002 ± 0.0000
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	73 ± 0	< 0.0005 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0003
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	83 ± 1	0.0019 ± 0.0008	< 0.004 ± 0.002	— ± —	0.00044 ± 0.00034
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	83 ± 2	0.0020 ± 0.0005	< 0.004 ± 0.003	— ± —	0.00067 ± 0.00010

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	86 ± 4	0.0027 ± 0.0007	< 0.004 ± 0.001	— ± —	0.0012 ± 0.0004
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	88 ± 4	0.0027 ± 0.0002	< 0.004 ± 0.001	— ± —	0.0010 ± 0.0004
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	80 ± 3	0.00058 ± 0.00012	< 0.004 ± 0.002	— ± —	0.00035 ± 0.00015
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	81 ± 0	0.0011 ± 0.0002	< 0.004 ± 0.001	— ± —	0.00053 ± 0.00014
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	64 ± 1	0.00079 ± 0.00020	< 0.008 ± 0.000	— ± —	0.00040 ± 0.00023
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	64 ± 1	0.0010 ± 0.0004	< 0.008 ± 0.000	— ± —	0.00044 ± 0.00003
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	64 ± 1	0.00079 ± 0.00019	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0000
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	64 ± 2	< 0.0007 ± 0.0002	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0002
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	60 ± 0	< 0.0007 ± 0.0001	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0003
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	60 ± 2	< 0.0007 ± 0.0005	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0002
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	61 ± 0	0.00033 ± 0.00008	0.0035 ± 0.0016	— ± —	0.00031 ± 0.00021
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	63 ± 2	0.00097 ± 0.00004	0.0018 ± 0.0004	— ± —	0.00057 ± 0.00007
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	64 ± 0	0.00069 ± 0.00005	0.0012 ± 0.0003	— ± —	< 0.0002 ± 0.0001
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	61 ± 0	0.00073 ± 0.00014	0.0021 ± 0.0006	— ± —	0.00039 ± 0.00011
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	59 ± 0	0.00026 ± 0.00006	0.0014 ± 0.0008	— ± —	< 0.0003 ± 0.0001
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	60 ± 0	< 0.0002 ± 0.0001	0.0014 ± 0.0003	— ± —	< 0.0002 ± 0.0001
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	82 ± 0	0.00039 ± 0.00038	0.0023 ± 0.0014	< 0.0015 ± 0.0006	0.00063 ± 0.00008
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	81 ± 0	0.00059 ± 0.00044	< 0.0013 ± 0.0009	< 0.0015 ± 0.0006	< 0.0006 ± 0.0003
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	82 ± 0	0.00081 ± 0.00039	0.0017 ± 0.0017	0.0016 ± 0.0004	< 0.0006 ± 0.0005
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	82 ± 0	0.00054 ± 0.00036	< 0.0013 ± 0.0012	< 0.0015 ± 0.0011	< 0.0006 ± 0.0002
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	75 ± 1	< 0.0008 ± 0.0004	< 0.005 ± 0.000	< 0.003 ± 0.001	< 0.0005 ± 0.0002
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	75 ± 1	< 0.0008 ± 0.0005	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	86 ± 2	0.0014 ± 0.0003	< 0.005 ± 0.000	— ± —	0.00053 ± 0.00003
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	87 ± 2	0.0015 ± 0.0007	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0001
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	72 ± 0	0.0014 ± 0.0003	< 0.004 ± 0.001	— ± —	0.00036 ± 0.00012
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	73 ± 2	0.00093 ± 0.00040	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0004
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	71 ± 1	0.0018 ± 0.0004	< 0.004 ± 0.004	— ± —	< 0.0006 ± 0.0003
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	71 ± 1	0.0013 ± 0.0001	< 0.004 ± 0.000	— ± —	0.00058 ± 0.00026
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	67 ± 2	< 0.0005 ± 0.0002	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0001
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	68 ± 1	< 0.0005 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	84 ± 1	0.0010 ± 0.0005	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0000
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	83 ± 2	< 0.0007 ± 0.0002	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0001
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	81 ± 2	0.00075 ± 0.00025	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0002
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	83 ± 2	< 0.0007 ± 0.0004	< 0.008 ± 0.000	— ± —	0.00055 ± 0.00019
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	70 ± 5	< 0.0007 ± 0.0003	< 0.008 ± 0.001	— ± —	0.00067 ± 0.00007
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	72 ± 3	< 0.0007 ± 0.0004	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0002
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	57 ± 0	0.00032 ± 0.00002	0.00097 ± 0.00073	— ± —	< 0.0003 ± 0.0000
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	57 ± 0	0.00048 ± 0.00017	< 0.0009 ± 0.0001	— ± —	< 0.0003 ± 0.0001
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	62 ± 0	0.00095 ± 0.00015	0.0028 ± 0.0000	— ± —	0.0011 ± 0.0002
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	59 ± 0	0.00068 ± 0.00003	0.0020 ± 0.0003	— ± —	0.00041 ± 0.00003
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	51 ± 0	0.00025 ± 0.00016	0.0015 ± 0.0001	— ± —	< 0.0002 ± 0.0001
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	63 ± 2	0.00026 ± 0.00004	0.0016 ± 0.0004	— ± —	0.00023 ± 0.00016
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	83 ± 1	< 0.0008 ± 0.0004	< 0.005 ± 0.001	< 0.003 ± 0.000	< 0.0005 ± 0.0001
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	83 ± 3	< 0.0008 ± 0.0003	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	86 ± 2	0.00071 ± 0.00050	< 0.002 ± 0.000	< 0.003 ± 0.002	< 0.0005 ± 0.0003
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	83 ± 0	0.0012 ± 0.0006	< 0.005 ± 0.002	< 0.003 ± 0.000	< 0.0005 ± 0.0001
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	72 ± 0	< 0.0004 ± 0.0001	< 0.0013 ± 0.0010	< 0.0015 ± 0.0006	< 0.0006 ± 0.0001
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	73 ± 4	< 0.0005 ± 0.0001	< 0.002 ± 0.001	< 0.003 ± 0.000	< 0.0005 ± 0.0002
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	73 ± 1	0.00060 ± 0.00059	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0002
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	74 ± 1	0.00062 ± 0.00045	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0003
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	73 ± 2	0.00054 ± 0.00045	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0001
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	73 ± 1	< 0.0005 ± 0.0003	< 0.005 ± 0.001	— ± —	0.00066 ± 0.00014
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	62 ± 1	< 0.0005 ± 0.0002	< 0.005 ± 0.000	— ± —	< 0.0003 ± 0.0002
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	62 ± 1	< 0.0005 ± 0.0001	< 0.005 ± 0.003	— ± —	< 0.0003 ± 0.0001
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	61 ± 1	0.0014 ± 0.0005	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0004
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	63 ± 1	0.0015 ± 0.0009	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0004
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	62 ± 2	0.0021 ± 0.0007	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0006
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	62 ± 1	0.0021 ± 0.0004	< 0.004 ± 0.003	— ± —	0.00090 ± 0.00035
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	57 ± 2	0.00086 ± 0.00042	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0002
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	58 ± 2	< 0.0005 ± 0.0003	< 0.004 ± 0.003	— ± —	< 0.0006 ± 0.0005
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	32 ± 1	0.0031 ± 0.0002	< 0.004 ± 0.002	— ± —	0.0015 ± 0.0001
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	33 ± 0	0.0031 ± 0.0007	< 0.004 ± 0.003	— ± —	0.0014 ± 0.0003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	32 ± 1	0.0036 ± 0.0018	< 0.004 ± 0.002	— ± —	0.0016 ± 0.0001
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	34 ± 2	0.0031 ± 0.0002	< 0.004 ± 0.003	— ± —	0.0018 ± 0.0002
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	27 ± 2	0.00094 ± 0.00017	< 0.004 ± 0.002	— ± —	0.00038 ± 0.00024
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	26 ± 1	0.00073 ± 0.00011	< 0.004 ± 0.003	— ± —	0.00054 ± 0.00027
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	70 ± 2	< 0.0007 ± 0.0003	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0000
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	72 ± 0	< 0.0007 ± 0.0004	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0001
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	72 ± 2	< 0.0007 ± 0.0001	< 0.008 ± 0.001	— ± —	0.00042 ± 0.00018
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	71 ± 0	0.00080 ± 0.00034	< 0.008 ± 0.001	— ± —	< 0.0004 ± 0.0002
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	58 ± 3	< 0.0007 ± 0.0001	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0001
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	59 ± 2	< 0.0007 ± 0.0005	< 0.008 ± 0.000	— ± —	< 0.0004 ± 0.0002
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	78 ± 0	0.00064 ± 0.00034	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0003
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	76 ± 3	0.00085 ± 0.00043	< 0.004 ± 0.001	— ± —	0.00040 ± 0.00030
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	78 ± 1	0.00062 ± 0.00042	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	78 ± 4	< 0.0004 ± 0.0005	< 0.004 ± 0.002	— ± —	0.00049 ± 0.00013
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	63 ± 2	< 0.0004 ± 0.0002	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0004
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	62 ± 2	< 0.0004 ± 0.0004	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0001
Flat Cr.	12/11/96	0.40 µm Mem	1/2	7.9 ± 0.0	0.0076 ± 0.0011	< 0.004 ± 0.001	— ± —	0.0036 ± 0.0004
Flat Cr.	12/11/96	0.40 µm Mem	2/2	8.0 ± 0.0	0.0077 ± 0.0008	< 0.004 ± 0.001	— ± —	0.0031 ± 0.0002
Flat Cr.	12/11/96	0.45 µm Cap	1/2	7.9 ± 0.1	0.0055 ± 0.0003	< 0.004 ± 0.001	— ± —	0.0027 ± 0.0013
Flat Cr.	12/11/96	0.45 µm Cap	2/2	7.8 ± 0.1	0.0052 ± 0.0009	< 0.004 ± 0.001	— ± —	0.0027 ± 0.0001
Flat Cr.	12/11/96	10 kd Tan	1/2	6.4 ± 0.1	0.0033 ± 0.0006	< 0.004 ± 0.002	— ± —	0.0019 ± 0.0004
Flat Cr.	12/11/96	10 kd Tan	2/2	6.7 ± 0.0	0.0031 ± 0.0003	< 0.004 ± 0.001	— ± —	0.0020 ± 0.0001
Flat Cr.	05/29/97	0.40 µm Mem	1/2	31 ± 0	0.0045 ± 0.0003	0.0051 ± 0.0006	— ± —	0.0028 ± 0.0001
Flat Cr.	05/29/97	0.40 µm Mem	2/2	31 ± 1	0.0045 ± 0.0007	0.0052 ± 0.0012	— ± —	0.0031 ± 0.0002
Flat Cr.	05/29/97	0.45 µm Cap	1/2	32 ± 2	0.0039 ± 0.0004	0.0045 ± 0.0016	— ± —	0.0021 ± 0.0001
Flat Cr.	05/29/97	0.45 µm Cap	2/2	30 ± 1	0.0031 ± 0.0001	0.0072 ± 0.0010	— ± —	0.0024 ± 0.0001
Flat Cr.	05/29/97	10 kd Tan	1/2	26 ± 1	0.00083 ± 0.00012	< 0.004 ± 0.000	— ± —	0.00089 ± 0.00018
Flat Cr.	05/29/97	10 kd Tan	2/2	27 ± 1	0.0013 ± 0.0005	0.0045 ± 0.0007	— ± —	0.00070 ± 0.00010
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	13 ± 0	0.36 ± 0.00	0.039 ± 0.000	— ± —	0.12 ± 0.01
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	13 ± 0	0.38 ± 0.00	0.042 ± 0.000	— ± —	0.13 ± 0.01
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	14 ± 0	0.36 ± 0.01	0.040 ± 0.005	— ± —	0.12 ± 0.01
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	13 ± 0	0.37 ± 0.00	0.038 ± 0.001	— ± —	0.11 ± 0.00
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	13 ± 0	0.38 ± 0.00	0.034 ± 0.001	— ± —	0.12 ± 0.01

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	13 ± 0	0.37 ± 0.02	0.033 ± 0.005	— ± —	0.12 ± 0.01
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	53 ± 2	0.63 ± 0.03	0.47 ± 0.00	— ± —	0.20 ± 0.00
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	53 ± 2	0.62 ± 0.00	0.47 ± 0.00	— ± —	0.20 ± 0.00
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	51 ± 3	0.62 ± 0.05	0.46 ± 0.01	— ± —	0.20 ± 0.00
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	53 ± 0	0.60 ± 0.00	0.48 ± 0.01	— ± —	0.20 ± 0.00
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	50 ± 2	0.60 ± 0.00	0.45 ± 0.00	— ± —	0.20 ± 0.00
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	49 ± 3	0.59 ± 0.00	0.45 ± 0.02	— ± —	0.20 ± 0.01
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	15 ± 1	0.27 ± 0.00	0.15 ± 0.00	— ± —	0.086 ± 0.06
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	15 ± 0	0.25 ± 0.00	0.15 ± 0.00	— ± —	0.087 ± 0.000
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	15 ± 1	0.27 ± 0.00	0.15 ± 0.01	— ± —	0.084 ± 0.008
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	15 ± 1	0.28 ± 0.00	0.14 ± 0.00	— ± —	0.084 ± 0.010
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	15 ± 1	0.24 ± 0.00	0.13 ± 0.01	— ± —	0.079 ± 0.004
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	14 ± 1	0.23 ± 0.00	0.13 ± 0.00	— ± —	0.082 ± 0.004
Whiskeytown	12/11/96	0.40 µm Mem	1/2	23 ± 0	0.00089 ± 0.00012	< 0.004 ± 0.001	— ± —	0.00059 ± 0.00019
Whiskeytown	12/11/96	0.40 µm Mem	2/2	22 ± 0	0.00085 ± 0.00022	< 0.004 ± 0.001	— ± —	0.00050 ± 0.00013
Whiskeytown	12/11/96	0.45 µm Cap	1/2	23 ± 0	0.00085 ± 0.00031	< 0.004 ± 0.001	— ± —	0.00057 ± 0.00017
Whiskeytown	12/11/96	0.45 µm Cap	2/2	23 ± 0	0.0016 ± 0.0006	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0001
Whiskeytown	12/11/96	10 kd Tan	1/2	21 ± 0	0.00067 ± 0.00025	< 0.004 ± 0.001	— ± —	< 0.0002 ± 0.0001
Whiskeytown	12/11/96	10 kd Tan	2/2	21 ± 1	< 0.0005 ± 0.0006	< 0.004 ± 0.002	— ± —	< 0.0006 ± 0.0001
Whiskeytown	05/29/97	0.40 µm Mem	1/2	22 ± 1	0.00074 ± 0.00034	< 0.004 ± 0.001	— ± —	0.00054 ± 0.00027
Whiskeytown	05/29/97	0.40 µm Mem	2/2	22 ± 2	0.0011 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0002
Whiskeytown	05/29/97	0.45 µm Cap	1/2	22 ± 1	0.00093 ± 0.00049	< 0.004 ± 0.002	— ± —	0.00071 ± 0.00044
Whiskeytown	05/29/97	0.45 µm Cap	2/2	22 ± 1	0.0012 ± 0.0002	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0001
Whiskeytown	05/29/97	10 kd Tan	1/2	19 ± 1	< 0.0004 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0003
Whiskeytown	05/29/97	10 kd Tan	2/2	19 ± 0	< 0.0004 ± 0.0004	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0002
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	20 ± 0	0.00084 ± 0.00005	< 0.0009 ± 0.0003	— ± —	0.00040 ± 0.00008
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	20 ± 0	0.00075 ± 0.00012	< 0.0009 ± 0.0000	— ± —	0.00054 ± 0.00010
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	20 ± 0	0.00065 ± 0.00018	< 0.0014 ± 0.0024	— ± —	< 0.0003 ± 0.0002
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	21 ± 1	0.0012 ± 0.0001	< 0.0014 ± 0.0000	— ± —	0.00072 ± 0.00023
Spring Cr. arm	07/12/96	10 kd Tan	1/3	19 ± 0	0.00072 ± 0.00014	< 0.0014 ± 0.0007	— ± —	< 0.0003 ± 0.0001
Spring Cr. arm	07/12/96	10 kd Tan	2/3	20 ± 0	0.00042 ± 0.00006	< 0.0009 ± 0.0004	— ± —	< 0.0003 ± 0.0000
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	19 ± 0	0.0016 ± 0.0001	< 0.005 ± 0.001	< 0.003 ± 0.002	< 0.0005 ± 0.0000
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	19 ± 0	0.0017 ± 0.0005	< 0.005 ± 0.001	< 0.003 ± 0.001	0.0011 ± 0.0002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	19 ± 0	0.0014 ± 0.0002	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0001
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	19 ± 0	0.0021 ± 0.0003	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0003
Spring Cr. arm	09/18/96	10 kd Tan	1/2	17 ± 0	< 0.0008 ± 0.0002	< 0.005 ± 0.000	< 0.003 ± 0.001	< 0.0005 ± 0.0002
Spring Cr. arm	09/18/96	10 kd Tan	2/2	17 ± 0	< 0.0008 ± 0.0003	< 0.005 ± 0.001	< 0.003 ± 0.001	< 0.0005 ± 0.0003
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	22 ± 1	0.0059 ± 0.0002	< 0.005 ± 0.002	— ± —	0.0018 ± 0.0001
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	22 ± 0	0.0044 ± 0.0005	< 0.005 ± 0.001	— ± —	0.0015 ± 0.0000
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	21 ± 1	0.0054 ± 0.0006	< 0.005 ± 0.000	— ± —	0.0019 ± 0.0000
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	21 ± 1	0.0054 ± 0.0002	< 0.005 ± 0.000	— ± —	0.0016 ± 0.0006
Spring Cr. arm	11/20/96	10 kd Tan	1/2	18 ± 1	0.0011 ± 0.0005	< 0.005 ± 0.002	— ± —	< 0.0003 ± 0.0002
Spring Cr. arm	11/20/96	10 kd Tan	2/2	18 ± 1	< 0.0005 ± 0.0005	< 0.005 ± 0.001	— ± —	< 0.0003 ± 0.0000
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	22 ± 0	0.0054 ± 0.0004	0.0051 ± 0.0002	— ± —	0.0025 ± 0.0000
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	22 ± 0	0.0037 ± 0.0000	< 0.004 ± 0.001	— ± —	0.0015 ± 0.0002
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	22 ± 0	0.0094 ± 0.0009	< 0.004 ± 0.001	— ± —	0.0027 ± 0.0006
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	22 ± 1	0.0089 ± 0.0006	0.0053 ± 0.0017	— ± —	0.0035 ± 0.0002
Spring Cr. arm	12/11/96	10 kd Tan	1/2	17 ± 0	0.00085 ± 0.00071	< 0.004 ± 0.001	— ± —	< 0.0006 ± 0.0003
Spring Cr. arm	12/11/96	10 kd Tan	2/2	18 ± 0	0.0011 ± 0.0001	< 0.004 ± 0.001	— ± —	0.00036 ± 0.00010
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	23 ± 1	0.0023 ± 0.0001	< 0.004 ± 0.001	— ± —	0.00085 ± 0.00017
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	23 ± 1	0.0016 ± 0.0007	< 0.004 ± 0.001	— ± —	0.00073 ± 0.00024
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	22 ± 1	0.0020 ± 0.0003	< 0.004 ± 0.000	— ± —	0.00061 ± 0.00008
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	23 ± 1	0.0016 ± 0.0003	< 0.004 ± 0.002	— ± —	0.00077 ± 0.00019
Spring Cr. arm	05/28/97	10 kd Tan	1/2	18 ± 1	0.00046 ± 0.00007	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0001
Spring Cr. arm	05/28/97	10 kd Tan	2/2	18 ± 0	< 0.0004 ± 0.0003	< 0.004 ± 0.001	— ± —	< 0.0004 ± 0.0001
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	486 ± 10	0.0012 ± 0.0001	< 0.004 ± 0.001	— ± —	0.0017 ± 0.0004
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	479 ± 4	0.0019 ± 0.0004	< 0.004 ± 0.000	— ± —	0.0016 ± 0.0003
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	474 ± 4	0.0015 ± 0.0004	< 0.004 ± 0.001	— ± —	0.0019 ± 0.0003
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	485 ± 2	0.0016 ± 0.0001	< 0.004 ± 0.001	— ± —	0.0019 ± 0.0003
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	437 ± 16	0.0011 ± 0.0000	< 0.004 ± 0.000	— ± —	0.0015 ± 0.0002
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	445 ± 0	0.0013 ± 0.0003	< 0.004 ± 0.001	— ± —	0.0017 ± 0.0003
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	64 ± 3	0.0031 ± 0.0002	< 0.004 ± 0.000	— ± —	0.0012 ± 0.0002
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	65 ± 3	0.0015 ± 0.0004	< 0.004 ± 0.002	— ± —	0.0010 ± 0.0002
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	67 ± 2	0.0028 ± 0.0007	< 0.004 ± 0.003	— ± —	0.0012 ± 0.0003
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	65 ± 3	0.0024 ± 0.0005	< 0.004 ± 0.002	— ± —	0.0013 ± 0.0003
Yolo Bypass	01/07/97	10 kd Tan	1/2	55 ± 3	0.00077 ± 0.00070	< 0.004 ± 0.003	— ± —	0.00057 ± 0.00022
Yolo Bypass	01/07/97	10 kd Tan	2/2	52 ± 2	0.0010 ± 0.0004	< 0.004 ± 0.001	— ± —	0.00030 ± 0.00029

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	0.12 ± 0.00	3.6 ± 0.0	0.0052 ± 0.0017	0.052 ± 0.000
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	0.11 ± 0.00	3.7 ± 0.1	0.0036 ± 0.0002	0.047 ± 0.001
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	0.10 ± 0.00	3.5 ± 0.0	0.0055 ± 0.0006	0.055 ± 0.003
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	0.11 ± 0.00	3.5 ± 0.0	0.0032 ± 0.0004	0.054 ± 0.000
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	0.11 ± 0.00	3.4 ± 0.0	0.0011 ± 0.0001	0.031 ± 0.002
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	0.11 ± 0.00	3.2 ± 0.1	0.0048 ± 0.0006	0.030 ± 0.001
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	0.092 ± 0.015	3.2 ± 0.1	0.0041 ± 0.0001	0.060 ± 0.002
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	0.088 ± 0.017	3.2 ± 0.1	0.0031 ± 0.0005	0.061 ± 0.008
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	0.10 ± 0.01	3.2 ± 0.1	0.0047 ± 0.0005	0.051 ± 0.001
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	0.099 ± 0.015	3.0 ± 0.0	< 0.002 ± 0.000	0.050 ± 0.001
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	0.097 ± 0.021	2.9 ± 0.1	0.0029 ± 0.0024	0.024 ± 0.002
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	0.072 ± 0.013	2.7 ± 0.0	0.0022 ± 0.0009	0.022 ± 0.002
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	0.12 ± 0.00	4.1 ± 0.1	0.0030 ± 0.0022	0.025 ± 0.002
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	0.13 ± 0.00	4.1 ± 0.1	0.0030 ± 0.0013	0.027 ± 0.003
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.11 ± 0.00	4.1 ± 0.1	0.0034 ± 0.0028	0.027 ± 0.002
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	0.12 ± 0.00	4.1 ± 0.0	0.0021 ± 0.0007	0.027 ± 0.003
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	0.090 ± 0.002	3.6 ± 0.0	< 0.0014 ± 0.0002	0.011 ± 0.001
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	0.10 ± 0.01	3.6 ± 0.1	< 0.0014 ± 0.0011	0.012 ± 0.001
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	0.14 ± 0.00	4.5 ± 0.0	0.0024 ± 0.0019	0.033 ± 0.003
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	0.14 ± 0.00	4.6 ± 0.1	0.0027 ± 0.0016	0.035 ± 0.003
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	0.13 ± 0.00	4.6 ± 0.0	0.0030 ± 0.0011	0.041 ± 0.003
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	0.13 ± 0.00	4.7 ± 0.4	0.0047 ± 0.0003	0.041 ± 0.001
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	0.099 ± 0.000	3.8 ± 0.1	0.0018 ± 0.0002	0.014 ± 0.001
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	0.10 ± 0.01	3.8 ± 0.0	< 0.002 ± 0.001	0.012 ± 0.001
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	0.091 ± 0.001	3.6 ± 0.1	0.0045 ± 0.0010	0.051 ± 0.003
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	0.098 ± 0.005	3.5 ± 0.1	0.0038 ± 0.0007	0.039 ± 0.000
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	0.089 ± 0.001	3.2 ± 0.0	0.0036 ± 0.0007	0.041 ± 0.001
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	0.091 ± 0.006	3.3 ± 0.0	0.0041 ± 0.0006	0.042 ± 0.000
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	0.064 ± 0.003	2.6 ± 0.0	< 0.0008 ± 0.0011	0.010 ± 0.001
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	0.062 ± 0.002	2.6 ± 0.1	0.00086 ± 0.00086	0.0091 ± 0.0003
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	0.088 ± 0.002	2.7 ± 0.0	0.0035 ± 0.0001	0.038 ± 0.000

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	0.081 ± 0.003	2.7 ± 0.0	0.0043 ± 0.0002	0.041 ± 0.000
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	0.088 ± 0.002	2.7 ± 0.0	0.0064 ± 0.0006	0.047 ± 0.000
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	0.092 ± 0.004	2.8 ± 0.0	0.0047 ± 0.0006	0.048 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	0.081 ± 0.005	2.7 ± 0.1	0.0021 ± 0.0004	0.028 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	0.087 ± 0.010	2.7 ± 0.0	0.0029 ± 0.0002	0.028 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	0.084 ± 0.000	2.6 ± 0.0	0.0023 ± 0.0002	0.027 ± 0.001
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	0.078 ± 0.024	2.0 ± 0.0	0.0063 ± 0.0028	0.059 ± 0.000
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	0.066 ± 0.007	2.1 ± 0.1	0.0061 ± 0.0013	0.049 ± 0.001
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	0.059 ± 0.002	2.1 ± 0.0	0.0056 ± 0.0019	0.057 ± 0.000
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	0.062 ± 0.004	2.0 ± 0.0	0.0034 ± 0.0003	0.053 ± 0.001
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	0.051 ± 0.013	1.7 ± 0.0	< 0.0008 ± 0.0003	0.015 ± 0.003
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	0.049 ± 0.010	1.7 ± 0.0	0.0016 ± 0.0020	0.016 ± 0.001
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	0.044 ± 0.007	1.8 ± 0.0	0.0015 ± 0.0012	0.015 ± 0.001
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	0.091 ± 0.003	3.2 ± 0.1	0.013 ± 0.001	0.091 ± 0.008
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	0.089 ± 0.001	3.1 ± 0.1	0.0097 ± 0.0009	0.089 ± 0.000
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	0.087 ± 0.001	3.1 ± 0.1	0.0071 ± 0.0020	0.086 ± 0.002
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	0.090 ± 0.000	3.0 ± 0.1	0.0087 ± 0.0032	0.076 ± 0.000
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	0.057 ± 0.001	2.5 ± 0.0	< 0.0014 ± 0.0004	0.018 ± 0.002
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	0.059 ± 0.000	2.5 ± 0.1	0.0015 ± 0.0019	0.015 ± 0.001
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	0.12 ± 0.02	4.0 ± 0.0	0.0065 ± 0.0013	0.080 ± 0.001
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	0.12 ± 0.01	4.1 ± 0.1	0.0067 ± 0.0014	0.075 ± 0.002
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	0.11 ± 0.00	4.0 ± 0.1	0.0049 ± 0.0009	0.075 ± 0.002
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	0.12 ± 0.01	3.9 ± 0.1	0.0052 ± 0.0026	0.079 ± 0.002
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	0.085 ± 0.004	3.1 ± 0.0	< 0.002 ± 0.002	0.017 ± 0.001
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	0.075 ± 0.002	3.1 ± 0.0	< 0.002 ± 0.001	0.018 ± 0.002
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	0.094 ± 0.005	2.5 ± 0.0	0.0044 ± 0.0004	0.065 ± 0.002
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	0.094 ± 0.005	2.5 ± 0.0	0.0045 ± 0.0021	0.068 ± 0.004
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	0.088 ± 0.006	2.7 ± 0.1	0.011 ± 0.000	0.10 ± 0.00
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	0.093 ± 0.002	2.8 ± 0.0	0.0075 ± 0.0013	0.10 ± 0.00
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	0.081 ± 0.001	2.3 ± 0.1	0.0021 ± 0.0008	0.036 ± 0.003
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	0.087 ± 0.009	2.2 ± 0.0	0.0016 ± 0.0005	0.037 ± 0.001
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	0.088 ± 0.003	2.3 ± 0.0	0.0032 ± 0.0009	0.035 ± 0.002
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	0.071 ± 0.003	2.6 ± 0.2	0.0028 ± 0.0012	0.034 ± 0.000
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	0.076 ± 0.005	2.7 ± 0.1	0.0031 ± 0.0011	0.041 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	0.073 ± 0.004	2.6 ± 0.1	0.0045 ± 0.0010	0.040 ± 0.003
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	0.075 ± 0.003	2.5 ± 0.0	0.0031 ± 0.0007	0.042 ± 0.001
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	0.053 ± 0.007	2.2 ± 0.1	< 0.0008 ± 0.0002	0.015 ± 0.000
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	0.056 ± 0.001	2.2 ± 0.1	0.0010 ± 0.0003	0.014 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	0.087 ± 0.002	2.9 ± 0.0	0.0037 ± 0.0001	0.028 ± 0.001
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	0.074 ± 0.005	2.8 ± 0.0	0.0035 ± 0.0003	0.031 ± 0.003
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	0.083 ± 0.001	2.9 ± 0.0	0.0033 ± 0.0001	0.033 ± 0.002
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	0.091 ± 0.009	2.9 ± 0.0	0.0031 ± 0.0003	0.035 ± 0.000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	0.086 ± 0.001	2.9 ± 0.0	0.00080 ± 0.00011	0.030 ± 0.001
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	0.077 ± 0.002	2.7 ± 0.0	0.0016 ± 0.0003	0.014 ± 0.000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	0.058 ± 0.005	2.3 ± 0.1	< 0.002 ± 0.001	0.029 ± 0.003
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	0.065 ± 0.001	2.4 ± 0.0	0.0035 ± 0.0007	0.028 ± 0.001
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	0.063 ± 0.009	2.2 ± 0.1	0.0036 ± 0.0018	0.037 ± 0.004
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	0.057 ± 0.006	2.5 ± 0.0	0.0017 ± 0.0006	0.037 ± 0.001
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	0.040 ± 0.012	1.8 ± 0.0	0.0013 ± 0.0011	0.0084 ± 0.0009
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	0.047 ± 0.012	1.8 ± 0.0	< 0.0008 ± 0.0003	0.0063 ± 0.0008
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	0.085 ± 0.003	3.1 ± 0.1	0.0070 ± 0.0006	0.071 ± 0.001
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	0.083 ± 0.006	3.0 ± 0.1	0.0060 ± 0.0021	0.068 ± 0.003
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	0.082 ± 0.004	3.0 ± 0.0	0.0054 ± 0.0011	0.068 ± 0.005
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	0.080 ± 0.002	3.0 ± 0.1	0.0066 ± 0.0021	0.068 ± 0.002
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	0.049 ± 0.002	2.4 ± 0.1	< 0.0014 ± 0.0003	0.0080 ± 0.0005
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	0.054 ± 0.003	2.4 ± 0.1	< 0.0014 ± 0.0008	0.010 ± 0.000
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	0.10 ± 0.00	3.5 ± 0.0	0.0046 ± 0.0019	0.047 ± 0.002
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	0.11 ± 0.00	3.4 ± 0.0	0.0042 ± 0.0009	0.055 ± 0.004
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	0.099 ± 0.011	3.4 ± 0.1	0.0034 ± 0.0015	0.052 ± 0.003
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	0.093 ± 0.004	3.2 ± 0.1	0.0061 ± 0.0017	0.054 ± 0.001
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	0.066 ± 0.002	2.8 ± 0.0	< 0.002 ± 0.000	0.010 ± 0.000
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	0.065 ± 0.007	2.8 ± 0.1	< 0.002 ± 0.001	0.0089 ± 0.0005
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.087 ± 0.009	2.3 ± 0.0	0.0098 ± 0.0001	0.084 ± 0.005
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.080 ± 0.003	2.2 ± 0.0	0.0067 ± 0.0007	0.056 ± 0.002
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	0.080 ± 0.002	2.1 ± 0.1	0.0076 ± 0.0011	0.065 ± 0.002
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.077 ± 0.001	2.2 ± 0.0	0.0071 ± 0.0013	0.070 ± 0.005

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	0.072 ± 0.006	1.8 ± 0.0	0.0035 ± 0.0008	0.027 ± 0.003
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.071 ± 0.008	1.8 ± 0.0	0.0031 ± 0.0016	0.030 ± 0.001
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	0.063 ± 0.002	2.6 ± 0.1	0.0031 ± 0.0003	0.035 ± 0.000
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	0.059 ± 0.004	2.6 ± 0.1	0.0025 ± 0.0011	0.031 ± 0.000
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	0.066 ± 0.006	2.6 ± 0.1	0.0027 ± 0.0009	0.036 ± 0.000
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	0.066 ± 0.002	2.5 ± 0.1	0.0032 ± 0.0005	0.036 ± 0.000
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	0.053 ± 0.004	2.2 ± 0.1	< 0.0008 ± 0.0006	0.013 ± 0.000
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	0.053 ± 0.007	2.2 ± 0.1	0.0015 ± 0.0003	0.012 ± 0.000
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	0.096 ± 0.001	3.2 ± 0.0	0.0021 ± 0.0009	0.022 ± 0.000
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	0.091 ± 0.010	3.2 ± 0.0	0.0023 ± 0.0004	0.030 ± 0.001
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	0.087 ± 0.006	3.0 ± 0.3	0.0038 ± 0.0006	0.025 ± 0.001
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	0.10 ± 0.01	3.0 ± 0.0	0.0011 ± 0.0013	0.019 ± 0.002
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	0.17 ± 0.01	3.1 ± 0.0	0.0016 ± 0.0006	0.017 ± 0.002
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	0.13 ± 0.04	3.2 ± 0.0	0.0018 ± 0.0000	0.021 ± 0.001
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	0.11 ± 0.00	3.2 ± 0.0	0.0026 ± 0.0008	0.023 ± 0.000
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	0.098 ± 0.007	2.7 ± 0.0	0.0014 ± 0.0013	0.0079 ± 0.0012
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	0.093 ± 0.003	2.8 ± 0.0	0.0020 ± 0.0003	0.0055 ± 0.0002
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	0.13 ± 0.00	3.6 ± 0.0	0.0020 ± 0.0012	0.024 ± 0.001
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	0.13 ± 0.00	3.6 ± 0.1	< 0.0014 ± 0.0013	0.023 ± 0.003
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	0.12 ± 0.00	3.6 ± 0.0	0.0018 ± 0.0015	0.023 ± 0.001
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	0.13 ± 0.01	3.7 ± 0.1	0.0022 ± 0.0013	0.022 ± 0.001
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	0.11 ± 0.00	3.2 ± 0.0	< 0.0014 ± 0.0006	0.0063 ± 0.0008
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	0.11 ± 0.00	3.3 ± 0.1	< 0.0014 ± 0.0005	0.0066 ± 0.0000
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	0.11 ± 0.00	3.5 ± 0.0	0.0035 ± 0.0021	0.039 ± 0.002
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	0.11 ± 0.00	3.5 ± 0.0	0.0029 ± 0.0018	0.039 ± 0.001
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	0.11 ± 0.00	3.4 ± 0.1	0.0042 ± 0.0009	0.039 ± 0.002
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	0.11 ± 0.01	3.6 ± 0.0	0.0040 ± 0.0009	0.042 ± 0.002
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	0.081 ± 0.006	2.9 ± 0.0	0.0012 ± 0.0011	0.010 ± 0.001
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	0.085 ± 0.002	3.0 ± 0.0	0.0021 ± 0.0016	0.012 ± 0.002
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	0.057 ± 0.002	1.7 ± 0.0	0.0071 ± 0.0017	0.063 ± 0.004
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	0.061 ± 0.003	1.7 ± 0.0	0.0076 ± 0.0007	0.065 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	0.052 ± 0.004	1.7 ± 0.0	0.0091 ± 0.0014	0.075 ± 0.005
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	0.054 ± 0.002	1.8 ± 0.0	0.0067 ± 0.0012	0.079 ± 0.003
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	0.062 ± 0.006	1.6 ± 0.0	0.0050 ± 0.0007	0.052 ± 0.000
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	0.060 ± 0.001	1.6 ± 0.1	0.0039 ± 0.0013	0.046 ± 0.003
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	0.094 ± 0.008	2.9 ± 0.0	0.0020 ± 0.0004	0.022 ± 0.002
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	0.094 ± 0.002	3.0 ± 0.0	0.0040 ± 0.0000	0.031 ± 0.001
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	0.089 ± 0.001	2.9 ± 0.0	0.0015 ± 0.0003	0.021 ± 0.001
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	0.091 ± 0.005	2.9 ± 0.0	0.0020 ± 0.0011	0.021 ± 0.001
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	0.083 ± 0.004	2.7 ± 0.0	0.00097 ± 0.00078	0.0093 ± 0.0009
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	0.084 ± 0.006	2.7 ± 0.0	< 0.0008 ± 0.0008	0.0094 ± 0.0007
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	0.13 ± 0.00	2.8 ± 0.0	0.0032 ± 0.0003	0.018 ± 0.001
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	0.12 ± 0.00	2.8 ± 0.1	0.0035 ± 0.0003	0.026 ± 0.002
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.12 ± 0.00	2.8 ± 0.0	0.0016 ± 0.0006	0.022 ± 0.000
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.13 ± 0.00	2.6 ± 0.0	0.0028 ± 0.0001	0.022 ± 0.001
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	0.11 ± 0.01	2.5 ± 0.0	0.00077 ± 0.00042	0.014 ± 0.000
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	0.13 ± 0.00	2.6 ± 0.0	0.00097 ± 0.00041	0.012 ± 0.001
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	0.19 ± 0.00	3.6 ± 0.0	0.0033 ± 0.0009	0.033 ± 0.001
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	0.19 ± 0.00	3.5 ± 0.0	0.0018 ± 0.0006	0.016 ± 0.001
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	0.19 ± 0.00	3.5 ± 0.1	< 0.0006 ± 0.0013	0.017 ± 0.004
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	0.18 ± 0.02	3.5 ± 0.1	0.0023 ± 0.0010	0.021 ± 0.003
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	0.16 ± 0.02	3.0 ± 0.1	0.00084 ± 0.00055	0.0091 ± 0.0043
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	0.17 ± 0.01	3.1 ± 0.0	< 0.0008 ± 0.0002	0.010 ± 0.001
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	0.22 ± 0.00	3.2 ± 0.1	0.0025 ± 0.0004	0.035 ± 0.002
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	0.21 ± 0.00	3.3 ± 0.0	0.0027 ± 0.0010	0.036 ± 0.001
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.11 ± 0.00	2.5 ± 0.0	0.0045 ± 0.0008	0.045 ± 0.000
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.11 ± 0.00	2.5 ± 0.0	0.0036 ± 0.0008	0.039 ± 0.003
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.099 ± 0.001	2.4 ± 0.0	0.0053 ± 0.0020	0.044 ± 0.002
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.11 ± 0.01	2.4 ± 0.0	0.0043 ± 0.0025	0.043 ± 0.001
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	0.093 ± 0.004	2.3 ± 0.1	0.0031 ± 0.0017	0.018 ± 0.001
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	0.088 ± 0.004	2.3 ± 0.0	0.0025 ± 0.0011	0.023 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	0.16 ± 0.00	3.5 ± 0.1	0.0020 ± 0.0013	0.018 ± 0.002
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	0.17 ± 0.01	3.5 ± 0.1	0.0014 ± 0.0006	0.014 ± 0.001
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	0.16 ± 0.01	3.4 ± 0.0	0.0022 ± 0.0008	0.020 ± 0.000
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	0.16 ± 0.01	3.5 ± 0.0	0.0024 ± 0.0009	0.018 ± 0.001
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	0.14 ± 0.00	2.9 ± 0.1	< 0.0008 ± 0.0002	0.0067 ± 0.0005
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	0.13 ± 0.00	3.0 ± 0.0	0.00077 ± 0.00049	0.0071 ± 0.0008
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.12 ± 0.01	2.5 ± 0.0	0.0014 ± 0.0003	0.017 ± 0.000
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	0.11 ± 0.00	2.5 ± 0.0	0.0021 ± 0.0002	0.020 ± 0.000
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	0.13 ± 0.00	2.6 ± 0.0	0.0037 ± 0.0000	0.025 ± 0.000
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.11 ± 0.00	2.5 ± 0.0	0.0012 ± 0.0004	0.024 ± 0.001
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	0.087 ± 0.001	2.2 ± 0.0	0.00094 ± 0.00063	0.0052 ± 0.0004
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	0.14 ± 0.00	2.7 ± 0.0	0.0011 ± 0.0005	0.0090 ± 0.0004
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	0.21 ± 0.00	3.2 ± 0.0	0.0026 ± 0.0027	0.016 ± 0.001
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	0.26 ± 0.03	3.1 ± 0.0	0.0016 ± 0.0008	0.014 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	0.20 ± 0.00	3.2 ± 0.1	< 0.002 ± 0.001	0.021 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	0.20 ± 0.02	3.2 ± 0.0	< 0.0008 ± 0.0004	0.023 ± 0.002
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	0.14 ± 0.00	2.6 ± 0.0	< 0.0006 ± 0.0002	0.0054 ± 0.0005
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	0.15 ± 0.00	2.7 ± 0.0	0.0022 ± 0.0003	0.0065 ± 0.0017
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	0.16 ± 0.00	2.4 ± 0.0	0.0019 ± 0.0014	0.015 ± 0.000
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	0.16 ± 0.01	2.4 ± 0.1	0.0026 ± 0.0021	0.017 ± 0.001
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	0.15 ± 0.01	2.4 ± 0.0	0.0016 ± 0.0008	0.021 ± 0.002
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	0.14 ± 0.00	2.4 ± 0.0	0.0017 ± 0.0004	0.017 ± 0.000
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	0.095 ± 0.005	1.9 ± 0.1	< 0.0014 ± 0.0006	0.0041 ± 0.0012
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	0.093 ± 0.002	1.9 ± 0.0	< 0.0014 ± 0.0002	0.0033 ± 0.0006
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	0.089 ± 0.006	2.1 ± 0.0	0.0045 ± 0.0011	0.044 ± 0.004
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.091 ± 0.008	2.1 ± 0.0	0.0032 ± 0.0000	0.043 ± 0.003
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.082 ± 0.004	2.1 ± 0.1	0.0054 ± 0.0017	0.057 ± 0.003
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.084 ± 0.006	2.0 ± 0.0	0.0074 ± 0.0012	0.052 ± 0.002
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	0.082 ± 0.006	1.8 ± 0.0	0.0021 ± 0.0015	0.022 ± 0.002
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.077 ± 0.009	1.9 ± 0.0	0.0037 ± 0.0006	0.025 ± 0.001
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.052 ± 0.004	0.95 ± 0.02	0.011 ± 0.002	0.095 ± 0.002
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.051 ± 0.003	0.99 ± 0.02	0.0087 ± 0.0002	0.090 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	0.047 ± 0.002	0.96 ± 0.01	0.011 ± 0.001	0.10 ± 0.01
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.053 ± 0.006	1.0 ± 0.0	0.011 ± 0.001	0.11 ± 0.00
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	0.024 ± 0.002	0.80 ± 0.04	0.0022 ± 0.0001	0.026 ± 0.003
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.026 ± 0.001	0.82 ± 0.04	0.0027 ± 0.0008	0.025 ± 0.001
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	0.14 ± 0.01	2.9 ± 0.0	0.0013 ± 0.0008	0.014 ± 0.001
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	0.15 ± 0.00	2.9 ± 0.1	0.00080 ± 0.00085	0.014 ± 0.001
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	0.13 ± 0.00	2.9 ± 0.0	0.0019 ± 0.0010	0.017 ± 0.001
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	0.13 ± 0.01	2.9 ± 0.0	0.0019 ± 0.0005	0.019 ± 0.001
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	0.095 ± 0.001	2.2 ± 0.0	< 0.0008 ± 0.0009	0.0050 ± 0.0013
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	0.092 ± 0.005	2.2 ± 0.0	< 0.0008 ± 0.0008	0.0053 ± 0.0003
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	0.15 ± 0.01	3.3 ± 0.0	0.0021 ± 0.0008	0.018 ± 0.002
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.15 ± 0.00	3.2 ± 0.0	0.0042 ± 0.0012	0.025 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	0.15 ± 0.01	3.3 ± 0.0	0.0035 ± 0.0016	0.018 ± 0.001
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	0.14 ± 0.01	3.5 ± 0.1	0.0019 ± 0.0005	0.019 ± 0.002
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	0.11 ± 0.00	2.5 ± 0.1	0.0011 ± 0.0005	0.0062 ± 0.0009
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	0.10 ± 0.01	2.6 ± 0.0	< 0.001 ± 0.001	0.0057 ± 0.0004
Flat Cr.	12/11/96	0.40 µm Mem	1/2	0.0040 ± 0.0016	0.27 ± 0.02	0.026 ± 0.000	0.24 ± 0.01
Flat Cr.	12/11/96	0.40 µm Mem	2/2	0.0043 ± 0.0010	0.27 ± 0.02	0.026 ± 0.001	0.23 ± 0.00
Flat Cr.	12/11/96	0.45 µm Cap	1/2	0.0035 ± 0.0012	0.24 ± 0.02	0.021 ± 0.008	0.17 ± 0.00
Flat Cr.	12/11/96	0.45 µm Cap	2/2	0.0030 ± 0.0005	0.24 ± 0.02	0.019 ± 0.003	0.18 ± 0.00
Flat Cr.	12/11/96	10 kd Tan	1/2	< 0.0019 ± 0.0004	0.21 ± 0.01	0.013 ± 0.001	0.10 ± 0.00
Flat Cr.	12/11/96	10 kd Tan	2/2	0.0029 ± 0.0004	0.21 ± 0.02	0.013 ± 0.000	0.10 ± 0.00
Flat Cr.	05/29/97	0.40 µm Mem	1/2	< 0.002 ± 0.000	0.35 ± 0.00	0.021 ± 0.003	0.19 ± 0.00
Flat Cr.	05/29/97	0.40 µm Mem	2/2	0.0026 ± 0.0015	0.38 ± 0.03	0.020 ± 0.003	0.18 ± 0.00
Flat Cr.	05/29/97	0.45 µm Cap	1/2	< 0.002 ± 0.001	0.37 ± 0.04	0.018 ± 0.001	0.17 ± 0.00
Flat Cr.	05/29/97	0.45 µm Cap	2/2	< 0.002 ± 0.002	0.37 ± 0.07	0.022 ± 0.001	0.17 ± 0.00
Flat Cr.	05/29/97	10 kd Tan	1/2	< 0.002 ± 0.001	0.22 ± 0.06	0.0071 ± 0.0017	0.061 ± 0.001
Flat Cr.	05/29/97	10 kd Tan	2/2	< 0.002 ± 0.001	0.22 ± 0.03	0.0067 ± 0.0008	0.066 ± 0.001
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	0.092 ± 0.003	0.027 ± 0.015	0.78 ± 0.05	10 ± 0
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	0.083 ± 0.001	< 0.02 ± 0.01	0.76 ± 0.00	10 ± 0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	0.097 ± 0.013	< 0.02 ± 0.00	0.79 ± 0.07	10 ± 0
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	0.093 ± 0.004	< 0.02 ± 0.00	0.79 ± 0.10	9.8 ± 0.0
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	0.098 ± 0.002	0.012 ± 0.005	0.78 ± 0.02	10 ± 0

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	0.094 ± 0.007	< 0.02 ± 0.01	0.78 ± 0.06	9.8 ± 0.1
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	0.13 ± 0.01	< 0.05 ± 0.02	1.3 ± 0.0	16 ± 0.0
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	0.13 ± 0.01	< 0.05 ± 0.03	1.3 ± 0.0	17 ± 0
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	0.12 ± 0.01	< 0.05 ± 0.03	1.2 ± 0.0	16 ± 0
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	0.13 ± 0.01	< 0.05 ± 0.03	1.3 ± 0.1	17 ± 0
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	0.13 ± 0.01	< 0.05 ± 0.03	1.2 ± 0.0	16 ± 0
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	0.13 ± 0.01	< 0.05 ± 0.03	1.2 ± 0.0	16 ± 1
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	0.21 ± 0.00	0.027 ± 0.04	0.57 ± 0.03	6.9 ± 0.2
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	0.22 ± 0.02	0.028 ± 0.005	0.60 ± 0.01	6.7 ± 0.0
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	0.21 ± 0.00	0.11 ± 0.01	0.56 ± 0.04	6.6 ± 0.2
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	0.23 ± 0.00	0.12 ± 0.00	0.59 ± 0.05	7.1 ± 0.1
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	0.22 ± 0.00	0.037 ± 0.002	0.54 ± 0.00	6.8 ± 0.0
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	0.21 ± 0.00	0.038 ± 0.002	0.55 ± 0.02	6.5 ± 0.2
Whiskeytown	12/11/96	0.40 µm Mem	1/2	0.038 ± 0.003	0.46 ± 0.02	0.0041 ± 0.0005	0.042 ± 0.001
Whiskeytown	12/11/96	0.40 µm Mem	2/2	0.040 ± 0.002	0.50 ± 0.01	0.0041 ± 0.0004	0.045 ± 0.000
Whiskeytown	12/11/96	0.45 µm Cap	1/2	0.035 ± 0.001	0.46 ± 0.00	0.0033 ± 0.0007	0.042 ± 0.001
Whiskeytown	12/11/96	0.45 µm Cap	2/2	0.037 ± 0.005	0.47 ± 0.01	0.0038 ± 0.0007	0.040 ± 0.002
Whiskeytown	12/11/96	10 kd Tan	1/2	0.032 ± 0.001	0.43 ± 0.02	0.0024 ± 0.0006	0.023 ± 0.002
Whiskeytown	12/11/96	10 kd Tan	2/2	0.033 ± 0.003	0.42 ± 0.04	0.0022 ± 0.0003	0.019 ± 0.003
Whiskeytown	05/29/97	0.40 µm Mem	1/2	0.032 ± 0.002	0.48 ± 0.06	0.0032 ± 0.0009	0.027 ± 0.003
Whiskeytown	05/29/97	0.40 µm Mem	2/2	0.032 ± 0.005	0.52 ± 0.05	0.0033 ± 0.0011	0.032 ± 0.003
Whiskeytown	05/29/97	0.45 µm Cap	1/2	0.029 ± 0.004	0.47 ± 0.04	0.0031 ± 0.0004	0.033 ± 0.001
Whiskeytown	05/29/97	0.45 µm Cap	2/2	0.028 ± 0.001	0.48 ± 0.08	0.0042 ± 0.0013	0.033 ± 0.002
Whiskeytown	05/29/97	10 kd Tan	1/2	0.018 ± 0.001	0.43 ± 0.07	< 0.001 ± 0.001	0.011 ± 0.001
Whiskeytown	05/29/97	10 kd Tan	2/2	0.019 ± 0.001	0.41 ± 0.04	< 0.001 ± 0.000	0.011 ± 0.001
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	0.028 ± 0.004	0.45 ± 0.01	0.0026 ± 0.0002	0.036 ± 0.000
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	0.029 ± 0.003	0.45 ± 0.00	0.0026 ± 0.0005	0.036 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	0.026 ± 0.005	0.49 ± 0.06	0.0028 ± 0.0008	0.037 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	0.029 ± 0.005	0.54 ± 0.24	0.0029 ± 0.0005	0.038 ± 0.001
Spring Cr. arm	07/12/96	10 kd Tan	1/3	0.027 ± 0.005	0.47 ± 0.06	0.0046 ± 0.0005	0.019 ± 0.001
Spring Cr. arm	07/12/96	10 kd Tan	2/3	0.023 ± 0.003	0.43 ± 0.00	0.0013 ± 0.0003	0.021 ± 0.000
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	0.032 ± 0.009	0.45 ± 0.02	0.0060 ± 0.0012	0.058 ± 0.002
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	0.11 ± 0.01	0.44 ± 0.02	0.0039 ± 0.0019	0.055 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (µg/L) ICP–MS	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	0.017 ± 0.005	0.41 ± 0.03	0.0041 ± 0.0009	0.058 ± 0.001
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	0.019 ± 0.006	0.42 ± 0.01	0.0072 ± 0.0002	0.053 ± 0.004
Spring Cr. arm	09/18/96	10 kd Tan	1/2	0.017 ± 0.006	0.38 ± 0.01	< 0.0008 ± 0.0004	0.019 ± 0.001
Spring Cr. arm	09/18/96	10 kd Tan	2/2	< 0.013 ± 0.000	0.37 ± 0.01	0.0016 ± 0.0003	0.017 ± 0.001
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	0.030 ± 0.002	0.44 ± 0.03	0.014 ± 0.001	0.18 ± 0.00
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	0.029 ± 0.001	0.38 ± 0.01	0.012 ± 0.000	0.13 ± 0.00
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	0.025 ± 0.002	0.38 ± 0.03	0.012 ± 0.002	0.17 ± 0.00
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	0.022 ± 0.005	0.38 ± 0.04	0.015 ± 0.001	0.17 ± 0.00
Spring Cr. arm	11/20/96	10 kd Tan	1/2	0.018 ± 0.001	0.33 ± 0.07	0.0033 ± 0.0026	0.033 ± 0.003
Spring Cr. arm	11/20/96	10 kd Tan	2/2	0.022 ± 0.003	0.30 ± 0.00	0.0033 ± 0.0008	0.033 ± 0.003
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	0.032 ± 0.002	0.31 ± 0.01	0.011 ± 0.002	0.21 ± 0.00
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	0.032 ± 0.001	0.30 ± 0.01	0.0091 ± 0.0001	0.16 ± 0.00
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	0.027 ± 0.004	0.31 ± 0.01	0.025 ± 0.003	0.35 ± 0.00
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	0.024 ± 0.001	0.32 ± 0.02	0.026 ± 0.001	0.34 ± 0.02
Spring Cr. arm	12/11/96	10 kd Tan	1/2	0.022 ± 0.003	0.26 ± 0.01	0.0022 ± 0.0008	0.053 ± 0.002
Spring Cr. arm	12/11/96	10 kd Tan	2/2	0.024 ± 0.001	0.26 ± 0.01	0.0030 ± 0.0010	0.051 ± 0.003
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	0.034 ± 0.005	0.52 ± 0.02	0.0056 ± 0.0016	0.051 ± 0.002
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	0.030 ± 0.002	0.49 ± 0.02	0.0049 ± 0.0017	0.050 ± 0.003
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	0.029 ± 0.006	0.49 ± 0.04	0.0050 ± 0.0005	0.059 ± 0.001
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	0.027 ± 0.005	0.51 ± 0.04	0.0050 ± 0.0015	0.059 ± 0.001
Spring Cr. arm	05/28/97	10 kd Tan	1/2	0.017 ± 0.001	0.38 ± 0.01	< 0.001 ± 0.001	0.011 ± 0.001
Spring Cr. arm	05/28/97	10 kd Tan	2/2	0.017 ± 0.001	0.38 ± 0.03	0.0011 ± 0.0011	0.010 ± 0.002
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	1.5 ± 0.1	10 ± 0	0.012 ± 0.001	0.082 ± 0.001
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	1.6 ± 0.0	10 ± 0	0.015 ± 0.001	0.087 ± 0.003
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	1.6 ± 0.0	9.8 ± 0.2	0.013 ± 0.000	0.079 ± 0.000
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	1.6 ± 0.0	10 ± 1	0.017 ± 0.000	0.077 ± 0.003
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	1.3 ± 0.1	9.0 ± 0.4	0.0099 ± 0.0013	0.066 ± 0.004
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	1.3 ± 0.1	9.3 ± 0.0	0.010 ± 0.001	0.066 ± 0.000
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	0.081 ± 0.006	2.1 ± 0.0	0.0065 ± 0.0013	0.068 ± 0.003
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	0.082 ± 0.001	2.1 ± 0.0	0.0048 ± 0.0015	0.053 ± 0.002
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	0.075 ± 0.002	2.1 ± 0.1	0.0078 ± 0.0030	0.079 ± 0.001
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	0.081 ± 0.000	2.1 ± 0.0	0.0065 ± 0.0024	0.075 ± 0.001
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.061 ± 0.003	1.7 ± 0.1	0.0031 ± 0.0018	0.029 ± 0.005
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.059 ± 0.001	1.6 ± 0.0	0.0038 ± 0.0004	0.024 ± 0.001

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	0.40 µm Mem	1/1	2.3 ± 0.1	0.054 ± 0.003
Sac. R.–Shasta	07/12/96	0.40 µm Mem	2/2	2.2 ± 0.1	0.045 ± 0.000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	1/1	3.1 ± 0.0	< 0.017 ± 0.000
Sac. R.–Shasta	07/12/96	0.45 µm Cap	2/2	2.3 ± 0.1	0.023 ± 0.007
Sac. R.–Shasta	07/12/96	10 kd Tan	1/3	2.2 ± 0.0	< 0.017 ± 0.003
Sac. R.–Shasta	07/12/96	10 kd Tan	2/3	2.4 ± 0.1	0.019 ± 0.007
Sac. R.–Shasta	07/12/96	10 kd Tan	3/3	— ± —	— ± —
Sac. R.–Shasta	09/19/96	0.40 µm Mem	1/2	4.5 ± 0.2	0.043 ± 0.000
Sac. R.–Shasta	09/19/96	0.40 µm Mem	2/2	4.3 ± 0.1	0.029 ± 0.010
Sac. R.–Shasta	09/19/96	0.45 µm Cap	1/2	4.9 ± 0.4	0.015 ± 0.010
Sac. R.–Shasta	09/19/96	0.45 µm Cap	2/2	4.3 ± 0.1	0.0094 ± 0.0000
Sac. R.–Shasta	09/19/96	10 kd Tan	1/2	3.6 ± 0.1	< 0.003 ± 0.001
Sac. R.–Shasta	09/19/96	10 kd Tan	2/2	3.5 ± 0.1	< 0.008 ± 0.005
Sac. R.–Shasta	11/19/96	0.40 µm Mem	1/2	1.0 ± 0.2	0.016 ± 0.003
Sac. R.–Shasta	11/19/96	0.40 µm Mem	2/2	0.86 ± 0.06	0.015 ± 0.007
Sac. R.–Shasta	11/19/96	0.45 µm Cap	1/2	0.77 ± 0.09	0.011 ± 0.004
Sac. R.–Shasta	11/19/96	0.45 µm Cap	2/2	0.94 ± 0.09	0.0078 ± 0.0046
Sac. R.–Shasta	11/19/96	10 kd Tan	1/2	1.3 ± 0.2	< 0.005 ± 0.000
Sac. R.–Shasta	11/19/96	10 kd Tan	2/2	1.1 ± 0.0	0.0070 ± 0.0011
Sac. R.–Shasta	12/12/96	0.40 µm Mem	1/2	3.7 ± 0.1	0.014 ± 0.005
Sac. R.–Shasta	12/12/96	0.40 µm Mem	2/2	4.0 ± 0.1	0.022 ± 0.007
Sac. R.–Shasta	12/12/96	0.45 µm Cap	1/2	4.9 ± 0.2	0.028 ± 0.003
Sac. R.–Shasta	12/12/96	0.45 µm Cap	2/2	5.0 ± 0.2	0.015 ± 0.005
Sac. R.–Shasta	12/12/96	10 kd Tan	1/2	3.3 ± 0.0	0.013 ± 0.007
Sac. R.–Shasta	12/12/96	10 kd Tan	2/2	3.5 ± 0.1	< 0.006 ± 0.001
Sac. R.–Shasta	05/29/97	0.40 µm Mem	1/2	1.1 ± 0.0	0.069 ± 0.009
Sac. R.–Shasta	05/29/97	0.40 µm Mem	2/2	0.99 ± 0.12	0.038 ± 0.005
Sac. R.–Shasta	05/29/97	0.45 µm Cap	1/2	1.1 ± 0.1	0.027 ± 0.000
Sac. R.–Shasta	05/29/97	0.45 µm Cap	2/2	1.0 ± 0.1	0.017 ± 0.002
Sac. R.–Shasta	05/29/97	10 kd Tan	1/2	0.79 ± 0.07	< 0.005 ± 0.005
Sac. R.–Shasta	05/29/97	10 kd Tan	2/2	0.63 ± 0.07	< 0.005 ± 0.005
Sac. R.–Keswick	07/11/96	0.40 µm Mem	1/2	3.1 ± 0.4	0.028 ± 0.005

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Keswick	07/11/96	0.40 µm Mem	2/2	1.7 ± 0.1	0.030 ± 0.005
Sac. R.–Keswick	07/11/96	0.45 µm Cap	1/2	1.8 ± 0.1	0.031 ± 0.007
Sac. R.–Keswick	07/11/96	0.45 µm Cap	2/2	1.8 ± 0.1	0.029 ± 0.003
Sac. R.–Keswick	07/11/96	10 kd Tan	1/3	1.8 ± 0.0	0.019 ± 0.004
Sac. R.–Keswick	07/11/96	10 kd Tan	2/3	2.2 ± 0.5	0.016 ± 0.004
Sac. R.–Keswick	07/11/96	10 kd Tan	3/3	2.1 ± 0.6	0.012 ± 0.006
Sac. R.–Keswick	09/19/96	0.40 µm Mem	1/2	2.9 ± 0.0	0.016 ± 0.005
Sac. R.–Keswick	09/19/96	0.40 µm Mem	2/2	3.4 ± 0.0	0.013 ± 0.004
Sac. R.–Keswick	09/19/96	0.45 µm Cap	1/2	3.5 ± 0.1	0.0092 ± 0.0030
Sac. R.–Keswick	09/19/96	0.45 µm Cap	2/2	3.0 ± 0.1	0.0077 ± 0.0019
Sac. R.–Keswick	09/19/96	10 kd Tan	1/3	2.6 ± 0.1	< 0.008 ± 0.001
Sac. R.–Keswick	09/19/96	10 kd Tan	2/3	2.3 ± 0.1	< 0.008 ± 0.005
Sac. R.–Keswick	09/19/96	10 kd Tan	3/3	2.4 ± 0.1	< 0.008 ± 0.003
Sac. R.–Keswick	11/21/96	0.40 µm Mem	1/2	3.9 ± 0.1	0.0084 ± 0.0026
Sac. R.–Keswick	11/21/96	0.40 µm Mem	2/2	4.0 ± 0.2	0.014 ± 0.008
Sac. R.–Keswick	11/21/96	0.45 µm Cap	1/2	4.5 ± 0.3	0.0096 ± 0.0056
Sac. R.–Keswick	11/21/96	0.45 µm Cap	2/2	4.5 ± 0.1	0.0086 ± 0.0042
Sac. R.–Keswick	11/21/96	10 kd Tan	1/2	2.9 ± 0.1	0.0055 ± 0.0004
Sac. R.–Keswick	11/21/96	10 kd Tan	2/2	2.9 ± 0.1	< 0.005 ± 0.005
Sac. R.–Keswick	12/11/96	0.40 µm Mem	1/2	7.0 ± 0.1	0.015 ± 0.008
Sac. R.–Keswick	12/11/96	0.40 µm Mem	2/2	6.5 ± 0.2	0.012 ± 0.001
Sac. R.–Keswick	12/11/96	0.45 µm Cap	1/2	8.4 ± 0.2	0.014 ± 0.005
Sac. R.–Keswick	12/11/96	0.45 µm Cap	2/2	8.8 ± 0.4	0.026 ± 0.006
Sac. R.–Keswick	12/11/96	10 kd Tan	1/2	4.9 ± 0.2	< 0.006 ± 0.003
Sac. R.–Keswick	12/11/96	10 kd Tan	2/2	4.9 ± 0.1	0.0081 ± 0.0031
Sac. R.–Keswick	01/02/97	0.40 µm Mem	1/2	8.9 ± 0.2	0.011 ± 0.005
Sac. R.–Keswick	01/02/97	0.40 µm Mem	2/2	9.2 ± 0.2	0.014 ± 0.004
Sac. R.–Keswick	01/02/97	0.45 µm Cap	1/2	16 ± 1	0.010 ± 0.004
Sac. R.–Keswick	01/02/97	0.45 µm Cap	2/2	16 ± 0	0.017 ± 0.006
Sac. R.–Keswick	01/02/97	10 kd Tan	1/3	8.1 ± 0.2	< 0.006 ± 0.000
Sac. R.–Keswick	01/02/97	10 kd Tan	2/3	8.1 ± 0.2	0.0084 ± 0.0039
Sac. R.–Keswick	01/02/97	10 kd Tan	3/3	7.9 ± 0.3	< 0.007 ± 0.001
Sac. R.–Keswick	05/28/97	0.40 µm Mem	1/2	1.5 ± 0.1	0.019 ± 0.004
Sac. R.–Keswick	05/28/97	0.40 µm Mem	2/2	1.5 ± 0.0	0.038 ± 0.003

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Keswick	05/28/97	0.45 µm Cap	1/2	2.6 ± 0.1	0.017 ± 0.002
Sac. R.–Keswick	05/28/97	0.45 µm Cap	2/2	2.2 ± 0.2	0.013 ± 0.003
Sac. R.–Keswick	05/28/97	10 kd Tan	1/2	1.6 ± 0.1	< 0.005 ± 0.002
Sac. R.–Keswick	05/28/97	10 kd Tan	2/2	1.7 ± 0.1	0.0063 ± 0.0046
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	1/2	1.7 ± 0.0	0.051 ± 0.003
Sac. R.–Bend Br.	07/11/96	0.40 µm Mem	2/2	1.5 ± 0.0	0.029 ± 0.000
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	1/2	1.6 ± 0.0	0.031 ± 0.003
Sac. R.–Bend Br.	07/11/96	0.45 µm Cap	2/2	1.3 ± 0.1	0.022 ± 0.000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/3	1.3 ± 0.1	< 0.017 ± 0.002
Sac. R.–Bend Br.	07/11/96	10 kd Tan	2/3	1.2 ± 0.1	0.020 ± 0.007
Sac. R.–Bend Br.	07/11/96	10 kd Tan	3/3	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	1/2	2.8 ± 0.7	0.016 ± 0.002
Sac. R.–Bend Br.	09/20/96	0.40 µm Mem	2/2	2.6 ± 0.6	0.022 ± 0.005
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	1/2	2.9 ± 0.1	0.023 ± 0.004
Sac. R.–Bend Br.	09/20/96	0.45 µm Cap	2/2	2.7 ± 0.1	0.017 ± 0.003
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/2	1.9 ± 0.1	< 0.008 ± 0.003
Sac. R.–Bend Br.	09/20/96	10 kd Tan	2/2	2.3 ± 0.2	< 0.008 ± 0.005
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	1/2	2.0 ± 0.1	0.058 ± 0.011
Sac. R.–Bend Br.	11/22/96	0.40 µm Mem	2/2	2.0 ± 0.1	0.054 ± 0.005
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	1/2	2.7 ± 0.1	0.044 ± 0.007
Sac. R.–Bend Br.	11/22/96	0.45 µm Cap	2/2	2.7 ± 0.0	0.041 ± 0.005
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/2	1.9 ± 0.3	< 0.005 ± 0.001
Sac. R.–Bend Br.	11/22/96	10 kd Tan	2/2	1.9 ± 0.4	< 0.005 ± 0.007
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	1/2	1.1 ± 0.1	0.031 ± 0.005
Sac. R.–Bend Br.	12/12/96	0.40 µm Mem	2/2	1.2 ± 0.0	0.032 ± 0.006
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	1/2	1.4 ± 0.0	0.026 ± 0.004
Sac. R.–Bend Br.	12/12/96	0.45 µm Cap	2/2	1.9 ± 0.1	0.020 ± 0.008
Sac. R.–Bend Br.	12/12/96	10 kd Tan	1/2	0.80 ± 0.06	< 0.006 ± 0.002
Sac. R.–Bend Br.	12/12/96	10 kd Tan	2/2	0.76 ± 0.02	0.0075 ± 0.0046
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	1/2	0.79 ± 0.05	0.078 ± 0.015
Sac. R.–Bend Br.	01/03/97	0.40 µm Mem	2/2	0.32 ± 0.04	0.037 ± 0.009
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	1/2	2.0 ± 0.0	0.033 ± 0.005
Sac. R.–Bend Br.	01/03/97	0.45 µm Cap	2/2	0.84 ± 0.02	0.028 ± 0.002

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Bend Br.	01/03/97	10 kd Tan	1/2	0.43 ± 0.07	0.0093 ± 0.0028
Sac. R.–Bend Br.	01/03/97	10 kd Tan	2/2	0.36 ± 0.03	0.017 ± 0.004
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	1/2	1.1 ± 0.2	0.046 ± 0.004
Sac. R.–Bend Br.	05/30/97	0.40 µm Mem	2/2	0.94 ± 0.07	0.038 ± 0.000
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	1/2	2.3 ± 0.3	0.028 ± 0.004
Sac. R.–Bend Br.	05/30/97	0.45 µm Cap	2/2	3.2 ± 0.1	0.027 ± 0.003
Sac. R.–Bend Br.	05/30/97	10 kd Tan	1/2	1.1 ± 0.1	0.0067 ± 0.0023
Sac. R.–Bend Br.	05/30/97	10 kd Tan	2/2	1.0 ± 0.1	< 0.005 ± 0.003
Sac. R.–Colusa	07/16/96	0.40 µm Mem	1/2	0.62 ± 0.21	0.035 ± 0.006
Sac. R.–Colusa	07/16/96	0.40 µm Mem	2/2	0.67 ± 0.07	0.035 ± 0.001
Sac. R.–Colusa	07/16/96	0.45 µm Cap	1/1	1.4 ± 0.0	0.034 ± 0.004
Sac. R.–Colusa	07/16/96	10 kd Tan	1/2	— ± —	— ± —
Sac. R.–Colusa	07/16/96	10 kd Tan	2/2	— ± —	— ± —
Sac. R.–Colusa	09/25/96	0.40 µm Mem	1/2	0.49 ± 0.03	0.021 ± 0.006
Sac. R.–Colusa	09/25/96	0.40 µm Mem	2/2	1.3 ± 0.1	0.034 ± 0.008
Sac. R.–Colusa	09/25/96	0.45 µm Cap	1/2	0.94 ± 0.10	0.018 ± 0.000
Sac. R.–Colusa	09/25/96	0.45 µm Cap	2/2	1.2 ± 0.4	0.019 ± 0.001
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	0.33 ± 0.04	0.013 ± 0.004
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	0.39 ± 0.04	0.014 ± 0.003
Sac. R.–Colusa	11/13/96	0.40 µm Mem	1/2	0.55 ± 0.03	0.035 ± 0.008
Sac. R.–Colusa	11/13/96	0.40 µm Mem	2/2	0.50 ± 0.02	0.039 ± 0.000
Sac. R.–Colusa	11/13/96	0.45 µm Cap	1/2	0.51 ± 0.03	0.022 ± 0.003
Sac. R.–Colusa	11/13/96	0.45 µm Cap	2/2	0.48 ± 0.04	0.023 ± 0.009
Sac. R.–Colusa	11/13/96	10 kd Tan	1/2	0.34 ± 0.01	0.0070 ± 0.0051
Sac. R.–Colusa	11/13/96	10 kd Tan	2/2	0.50 ± 0.12	0.010 ± 0.009
Sac. R.–Colusa	12/16/96	0.40 µm Mem	1/2	0.61 ± 0.05	0.039 ± 0.009
Sac. R.–Colusa	12/16/96	0.40 µm Mem	2/2	0.71 ± 0.21	0.023 ± 0.006
Sac. R.–Colusa	12/16/96	0.45 µm Cap	1/2	1.8 ± 0.2	0.032 ± 0.008
Sac. R.–Colusa	12/16/96	0.45 µm Cap	2/2	0.87 ± 0.01	0.020 ± 0.003
Sac. R.–Colusa	12/16/96	10 kd Tan	1/2	0.55 ± 0.07	0.015 ± 0.001
Sac. R.–Colusa	12/16/96	10 kd Tan	2/2	0.61 ± 0.06	0.0074 ± 0.0022
Sac. R.–Colusa	01/04/97	0.40 µm Mem	1/2	0.16 ± 0.02	0.074 ± 0.012
Sac. R.–Colusa	01/04/97	0.40 µm Mem	2/2	0.21 ± 0.08	0.049 ± 0.015

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Colusa	01/04/97	0.45 µm Cap	1/2	1.1 ± 0.0	0.067 ± 0.012
Sac. R.–Colusa	01/04/97	0.45 µm Cap	2/2	0.40 ± 0.06	0.081 ± 0.006
Sac. R.–Colusa	01/04/97	10 kd Tan	1/2	0.17 ± 0.03	0.043 ± 0.008
Sac. R.–Colusa	01/04/97	10 kd Tan	2/2	0.20 ± 0.04	0.041 ± 0.019
Sac. R.–Colusa	06/03/97	0.40 µm Mem	1/2	1.0 ± 0.3	0.029 ± 0.000
Sac. R.–Colusa	06/03/97	0.40 µm Mem	2/2	0.46 ± 0.06	0.067 ± 0.005
Sac. R.–Colusa	06/03/97	0.45 µm Cap	1/2	1.2 ± 0.0	0.017 ± 0.001
Sac. R.–Colusa	06/03/97	0.45 µm Cap	2/2	0.99 ± 0.13	0.016 ± 0.002
Sac. R.–Colusa	06/03/97	10 kd Tan	1/2	0.60 ± 0.28	< 0.005 ± 0.002
Sac. R.–Colusa	06/03/97	10 kd Tan	2/2	0.88 ± 0.33	0.0055 ± 0.0042
Sac. R.–Verona	07/18/96	0.40 µm Mem	1/2	1.3 ± 0.1	0.039 ± 0.005
Sac. R.–Verona	07/18/96	0.40 µm Mem	2/2	1.9 ± 0.7	0.032 ± 0.006
Sac. R.–Verona	07/18/96	0.45 µm Cap	1/2	0.37 ± 0.04	0.033 ± 0.009
Sac. R.–Verona	07/18/96	0.45 µm Cap	2/2	0.62 ± 0.17	0.027 ± 0.008
Sac. R.–Verona	07/18/96	10 kd Tan	1/3	0.24 ± 0.03	< 0.017 ± 0.000
Sac. R.–Verona	07/18/96	10 kd Tan	2/3	0.17 ± 0.08	0.017 ± 0.004
Sac. R.–Verona	07/18/96	10 kd Tan	3/3	— ± —	— ± —
Sac. R.–Verona	09/26/96	0.40 µm Mem	1/2	0.63 ± 0.06	0.025 ± 0.000
Sac. R.–Verona	09/26/96	0.40 µm Mem	2/2	0.71 ± 0.19	0.013 ± 0.003
Sac. R.–Verona	09/26/96	0.45 µm Cap	1/2	0.58 ± 0.07	0.019 ± 0.004
Sac. R.–Verona	09/26/96	0.45 µm Cap	2/2	0.64 ± 0.09	0.017 ± 0.002
Sac. R.–Verona	09/26/96	10 kd Tan	1/2	0.33 ± 0.13	< 0.008 ± 0.003
Sac. R.–Verona	09/26/96	10 kd Tan	2/2	0.35 ± 0.07	< 0.008 ± 0.003
Sac. R.–Verona	11/14/96	0.40 µm Mem	1/1	— ± —	— ± —
Sac. R.–Verona	11/14/96	0.45 µm Cap	1/2	0.63 ± 0.07	0.047 ± 0.015
Sac. R.–Verona	11/14/96	0.45 µm Cap	2/2	0.55 ± 0.06	0.073 ± 0.036
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	— ± —	— ± —
Sac. R.–Verona	12/18/96	0.40 µm Mem	1/2	0.62 ± 0.10	0.035 ± 0.005
Sac. R.–Verona	12/18/96	0.40 µm Mem	2/2	0.58 ± 0.03	0.038 ± 0.013
Sac. R.–Verona	12/18/96	0.45 µm Cap	1/2	0.59 ± 0.03	0.033 ± 0.003
Sac. R.–Verona	12/18/96	0.45 µm Cap	2/2	0.70 ± 0.06	0.032 ± 0.005
Sac. R.–Verona	12/18/96	10 kd Tan	1/2	0.62 ± 0.07	0.016 ± 0.006
Sac. R.–Verona	12/18/96	10 kd Tan	2/2	0.30 ± 0.08	0.013 ± 0.005

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	0.40 µm Mem	1/2	0.49 ± 0.08	0.025 ± 0.012
Sac. R.–Verona	06/04/97	0.40 µm Mem	2/2	0.32 ± 0.21	0.024 ± 0.009
Sac. R.–Verona	06/04/97	0.45 µm Cap	1/2	1.2 ± 0.0	0.013 ± 0.003
Sac. R.–Verona	06/04/97	0.45 µm Cap	2/2	1.1 ± 0.5	0.013 ± 0.004
Sac. R.–Verona	06/04/97	10 kd Tan	1/2	0.27 ± 0.08	0.0057 ± 0.0074
Sac. R.–Verona	06/04/97	10 kd Tan	2/2	0.57 ± 0.17	< 0.005 ± 0.003
Sac. R.–Freeport	07/17/96	0.40 µm Mem	1/2	0.59 ± 0.05	< 0.017 ± 0.001
Sac. R.–Freeport	07/17/96	0.40 µm Mem	2/2	1.1 ± 0.1	0.019 ± 0.008
Sac. R.–Freeport	07/17/96	0.45 µm Cap	1/2	0.81 ± 0.04	0.067 ± 0.000
Sac. R.–Freeport	07/17/96	0.45 µm Cap	2/2	0.55 ± 0.04	0.036 ± 0.002
Sac. R.–Freeport	07/17/96	10 kd Tan	1/3	0.34 ± 0.08	0.014 ± 0.006
Sac. R.–Freeport	07/17/96	10 kd Tan	2/3	0.37 ± 0.12	0.018 ± 0.004
Sac. R.–Freeport	07/17/96	10 kd Tan	3/3	— ± —	— ± —
Sac. R.–Freeport	09/24/96	0.40 µm Mem	1/2	0.96 ± 0.06	0.015 ± 0.004
Sac. R.–Freeport	09/24/96	0.40 µm Mem	2/2	0.64 ± 0.08	0.013 ± 0.003
Sac. R.–Freeport	09/24/96	0.45 µm Cap	1/2	0.67 ± 0.04	0.012 ± 0.001
Sac. R.–Freeport	09/24/96	0.45 µm Cap	2/2	0.69 ± 0.03	0.025 ± 0.014
Sac. R.–Freeport	09/24/96	10 kd Tan	1/2	2.2 ± 0.1	< 0.009 ± 0.003
Sac. R.–Freeport	09/24/96	10 kd Tan	2/2	0.58 ± 0.01	< 0.003 ± 0.001
Sac. R.–Freeport	11/12/96	0.40 µm Mem	1/2	0.75 ± 0.07	0.027 ± 0.003
Sac. R.–Freeport	11/12/96	0.40 µm Mem	2/2	0.61 ± 0.05	0.017 ± 0.006
Sac. R.–Freeport	11/12/96	0.45 µm Cap	1/2	1.0 ± 0.0	0.014 ± 0.004
Sac. R.–Freeport	11/12/96	0.45 µm Cap	2/2	1.0 ± 0.1	0.015 ± 0.000
Sac. R.–Freeport	11/12/96	10 kd Tan	1/2	0.54 ± 0.03	< 0.005 ± 0.005
Sac. R.–Freeport	11/12/96	10 kd Tan	2/2	0.70 ± 0.06	< 0.005 ± 0.001
Sac. R.–Freeport	12/17/96	0.40 µm Mem	1/2	0.63 ± 0.13	0.047 ± 0.006
Sac. R.–Freeport	12/17/96	0.40 µm Mem	2/2	0.47 ± 0.28	0.10 ± 0.01
Sac. R.–Freeport	12/17/96	0.45 µm Cap	1/2	0.51 ± 0.06	0.062 ± 0.019
Sac. R.–Freeport	12/17/96	0.45 µm Cap	2/2	0.65 ± 0.09	0.053 ± 0.014
Sac. R.–Freeport	12/17/96	10 kd Tan	1/2	0.42 ± 0.06	0.023 ± 0.003
Sac. R.–Freeport	12/17/96	10 kd Tan	2/2	0.34 ± 0.11	0.019 ± 0.003
Sac. R.–Freeport	01/06/97	0.40 µm Mem	1/2	0.11 ± 0.02	0.10 ± 0.00
Sac. R.–Freeport	01/06/97	0.40 µm Mem	2/2	0.31 ± 0.07	0.10 ± 0.01

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Sac. R.–Freeport	01/06/97	0.45 µm Cap	1/2	1.1 ± 0.2	0.091 ± 0.018
Sac. R.–Freeport	01/06/97	0.45 µm Cap	2/2	0.20 ± 0.02	0.090 ± 0.014
Sac. R.–Freeport	01/06/97	10 kd Tan	1/2	1.2 ± 0.1	0.017 ± 0.003
Sac. R.–Freeport	01/06/97	10 kd Tan	2/2	0.085 ± 0.014	0.022 ± 0.002
Sac. R.–Freeport	06/05/97	0.40 µm Mem	1/2	1.1 ± 0.1	0.015 ± 0.003
Sac. R.–Freeport	06/05/97	0.40 µm Mem	2/2	0.23 ± 0.04	0.013 ± 0.005
Sac. R.–Freeport	06/05/97	0.45 µm Cap	1/2	0.22 ± 0.02	0.013 ± 0.002
Sac. R.–Freeport	06/05/97	0.45 µm Cap	2/2	0.28 ± 0.04	0.016 ± 0.002
Sac. R.–Freeport	06/05/97	10 kd Tan	1/2	0.35 ± 0.05	< 0.005 ± 0.002
Sac. R.–Freeport	06/05/97	10 kd Tan	2/2	0.32 ± 0.03	< 0.005 ± 0.003
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	1/2	0.39 ± 0.10	0.024 ± 0.004
Sac. R.–Freeport, dup	06/05/97	0.40 µm Mem	2/2	0.35 ± 0.15	0.027 ± 0.003
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	1/2	0.25 ± 0.14	0.018 ± 0.003
Sac. R.–Freeport, dup	06/05/97	0.45 µm Cap	2/2	0.25 ± 0.09	0.021 ± 0.001
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	1/2	0.093 ± 0.056	< 0.004 ± 0.002
Sac. R.–Freeport, dup	06/05/97	10 kd Tan	2/2	0.13 ± 0.08	< 0.004 ± 0.000
Flat Cr.	12/11/96	0.40 µm Mem	1/2	23 ± 1	0.026 ± 0.004
Flat Cr.	12/11/96	0.40 µm Mem	2/2	23 ± 1	0.020 ± 0.004
Flat Cr.	12/11/96	0.45 µm Cap	1/2	18 ± 0	0.020 ± 0.001
Flat Cr.	12/11/96	0.45 µm Cap	2/2	18 ± 1	0.023 ± 0.006
Flat Cr.	12/11/96	10 kd Tan	1/2	13 ± 0	0.0084 ± 0.0021
Flat Cr.	12/11/96	10 kd Tan	2/2	12 ± 0	0.011 ± 0.004
Flat Cr.	05/29/97	0.40 µm Mem	1/2	5.5 ± 0.1	0.0066 ± 0.0060
Flat Cr.	05/29/97	0.40 µm Mem	2/2	5.9 ± 0.2	0.0068 ± 0.0009
Flat Cr.	05/29/97	0.45 µm Cap	1/2	6.8 ± 0.3	0.0070 ± 0.0015
Flat Cr.	05/29/97	0.45 µm Cap	2/2	7.8 ± 0.1	0.0053 ± 0.0028
Flat Cr.	05/29/97	10 kd Tan	1/2	5.3 ± 0.3	< 0.004 ± 0.002
Flat Cr.	05/29/97	10 kd Tan	2/2	5.0 ± 0.1	< 0.004 ± 0.000
Spring Cr.–Weir	12/11/96	0.40 µm Mem	1/2	529 ± 9	0.039 ± 0.006
Spring Cr.–Weir	12/11/96	0.40 µm Mem	2/2	565 ± 27	0.040 ± 0.005
Spring Cr.–Weir	12/11/96	0.45 µm Cap	1/2	568 ± 7	0.044 ± 0.002
Spring Cr.–Weir	12/11/96	0.45 µm Cap	2/2	567 ± 18	0.036 ± 0.009
Spring Cr.–Weir	12/11/96	10 kd Tan	1/2	560 ± 4	0.041 ± 0.000

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Spring Cr.–Weir	12/11/96	10 kd Tan	2/2	544 ± 7	0.043 ± 0.006
Spring Cr.–Weir	05/28/97	0.40 µm Mem	1/2	992 ± 40	0.010 ± 0.001
Spring Cr.–Weir	05/28/97	0.40 µm Mem	2/2	1,020 ± 50	0.0088 ± 0.0022
Spring Cr.–Weir	05/28/97	0.45 µm Cap	1/2	916 ± 15	0.011 ± 0.001
Spring Cr.–Weir	05/28/97	0.45 µm Cap	2/2	968 ± 4	0.0079 ± 0.0013
Spring Cr.–Weir	05/28/97	10 kd Tan	1/2	853 ± 2	0.0076 ± 0.0037
Spring Cr.–Weir	05/28/97	10 kd Tan	2/2	884 ± 4	0.0076 ± 0.0020
Spring Cr.–Road	01/02/97	0.40 µm Mem	1/2	1,360 ± 30	0.051 ± 0.004
Spring Cr.–Road	01/02/97	0.40 µm Mem	2/2	1,350 ± 40	0.066 ± 0.020
Spring Cr.–Road	01/02/97	0.45 µm Cap	1/2	1,320 ± 0	0.063 ± 0.007
Spring Cr.–Road	01/02/97	0.45 µm Cap	2/2	1,340 ± 20	0.064 ± 0.002
Spring Cr.–Road	01/02/97	10 kd Tan	1/2	1,280 ± 20	0.057 ± 0.007
Spring Cr.–Road	01/02/97	10 kd Tan	2/2	1,250 ± 30	0.053 ± 0.004
Whiskeytown	12/11/96	0.40 µm Mem	1/2	0.55 ± 0.04	0.036 ± 0.024
Whiskeytown	12/11/96	0.40 µm Mem	2/2	0.66 ± 0.04	0.020 ± 0.005
Whiskeytown	12/11/96	0.45 µm Cap	1/2	1.1 ± 0.0	0.011 ± 0.003
Whiskeytown	12/11/96	0.45 µm Cap	2/2	1.3 ± 0.1	0.012 ± 0.003
Whiskeytown	12/11/96	10 kd Tan	1/2	0.92 ± 0.11	0.016 ± 0.009
Whiskeytown	12/11/96	10 kd Tan	2/2	0.94 ± 0.08	< 0.006 ± 0.002
Whiskeytown	05/29/97	0.40 µm Mem	1/2	0.18 ± 0.05	0.011 ± 0.003
Whiskeytown	05/29/97	0.40 µm Mem	2/2	0.18 ± 0.06	0.014 ± 0.002
Whiskeytown	05/29/97	0.45 µm Cap	1/2	0.67 ± 0.04	0.010 ± 0.003
Whiskeytown	05/29/97	0.45 µm Cap	2/2	3.8 ± 0.4	0.0091 ± 0.0023
Whiskeytown	05/29/97	10 kd Tan	1/2	0.17 ± 0.03	< 0.004 ± 0.001
Whiskeytown	05/29/97	10 kd Tan	2/2	0.34 ± 0.15	< 0.004 ± 0.002
Spring Cr. arm	07/12/96	0.40 µm Mem	1/2	1.6 ± 0.1	< 0.017 ± 0.005
Spring Cr. arm	07/12/96	0.40 µm Mem	2/2	1.6 ± 0.2	0.016 ± 0.001
Spring Cr. arm	07/12/96	0.45 µm Cap	1/2	1.3 ± 0.0	0.024 ± 0.008
Spring Cr. arm	07/12/96	0.45 µm Cap	2/2	1.2 ± 0.2	0.029 ± 0.012
Spring Cr. arm	07/12/96	10 kd Tan	1/3	0.84 ± 0.05	0.019 ± 0.005
Spring Cr. arm	07/12/96	10 kd Tan	2/3	0.68 ± 0.05	< 0.017 ± 0.001
Spring Cr. arm	07/12/96	10 kd Tan	3/3	— ± —	— ± —
Spring Cr. arm	09/18/96	0.40 µm Mem	1/2	2.5 ± 0.0	0.0092 ± 0.0074
Spring Cr. arm	09/18/96	0.40 µm Mem	2/2	2.5 ± 0.0	< 0.008 ± 0.004

Table A4-1. Concentrations of major cations and trace elements in filtered water samples—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Zinc (µg/L) ICP–MS	Zirconium (µg/L) ICP–MS
Spring Cr. arm	09/18/96	0.45 µm Cap	1/2	2.8 ± 0.0	< 0.008 ± 0.004
Spring Cr. arm	09/18/96	0.45 µm Cap	2/2	2.9 ± 0.2	< 0.008 ± 0.001
Spring Cr. arm	09/18/96	10 kd Tan	1/2	2.2 ± 0.0	< 0.008 ± 0.001
Spring Cr. arm	09/18/96	10 kd Tan	2/2	2.5 ± 0.5	< 0.008 ± 0.004
Spring Cr. arm	11/20/96	0.40 µm Mem	1/2	14 ± 0	0.014 ± 0.008
Spring Cr. arm	11/20/96	0.40 µm Mem	2/2	12 ± 0	0.0088 ± 0.0087
Spring Cr. arm	11/20/96	0.45 µm Cap	1/2	15 ± 1	0.0054 ± 0.0037
Spring Cr. arm	11/20/96	0.45 µm Cap	2/2	16 ± 0	0.0078 ± 0.0062
Spring Cr. arm	11/20/96	10 kd Tan	1/2	11 ± 0	< 0.005 ± 0.005
Spring Cr. arm	11/20/96	10 kd Tan	2/2	11 ± 0	< 0.005 ± 0.002
Spring Cr. arm	12/11/96	0.40 µm Mem	1/2	47 ± 1	0.0053 ± 0.0042
Spring Cr. arm	12/11/96	0.40 µm Mem	2/2	47 ± 1	0.0050 ± 0.0017
Spring Cr. arm	12/11/96	0.45 µm Cap	1/2	56 ± 1	0.0059 ± 0.0022
Spring Cr. arm	12/11/96	0.45 µm Cap	2/2	55 ± 1	< 0.006 ± 0.002
Spring Cr. arm	12/11/96	10 kd Tan	1/2	36 ± 0	< 0.006 ± 0.002
Spring Cr. arm	12/11/96	10 kd Tan	2/2	35 ± 0	0.0037 ± 0.0026
Spring Cr. arm	05/28/97	0.40 µm Mem	1/2	2.3 ± 0.3	0.0091 ± 0.0011
Spring Cr. arm	05/28/97	0.40 µm Mem	2/2	2.0 ± 0.1	0.0097 ± 0.0027
Spring Cr. arm	05/28/97	0.45 µm Cap	1/2	3.1 ± 0.2	< 0.004 ± 0.000
Spring Cr. arm	05/28/97	0.45 µm Cap	2/2	2.8 ± 0.1	0.0074 ± 0.0015
Spring Cr. arm	05/28/97	10 kd Tan	1/2	2.3 ± 0.2	< 0.004 ± 0.000
Spring Cr. arm	05/28/97	10 kd Tan	2/2	1.8 ± 0.2	< 0.004 ± 0.001
Colusa Basin Drain	06/06/97	0.40 µm Mem	1/2	0.43 ± 0.07	0.040 ± 0.010
Colusa Basin Drain	06/06/97	0.40 µm Mem	2/2	0.53 ± 0.26	0.041 ± 0.003
Colusa Basin Drain	06/06/97	0.45 µm Cap	1/2	0.40 ± 0.09	0.033 ± 0.008
Colusa Basin Drain	06/06/97	0.45 µm Cap	2/2	0.50 ± 0.10	0.036 ± 0.004
Colusa Basin Drain	06/06/97	10 kd Tan	1/2	0.26 ± 0.09	0.0094 ± 0.0034
Colusa Basin Drain	06/06/97	10 kd Tan	2/2	0.35 ± 0.08	0.016 ± 0.007
Yolo Bypass	01/07/97	0.40 µm Mem	1/2	0.56 ± 0.14	0.080 ± 0.004
Yolo Bypass	01/07/97	0.40 µm Mem	2/2	0.35 ± 0.01	0.052 ± 0.009
Yolo Bypass	01/07/97	0.45 µm Cap	1/2	0.88 ± 0.10	0.088 ± 0.006
Yolo Bypass	01/07/97	0.45 µm Cap	2/2	0.49 ± 0.01	0.095 ± 0.004
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.18 ± 0.04	0.019 ± 0.004
Yolo Bypass	01/07/97	10 kd Tan	2/2	0.23 ± 0.08	0.015 ± 0.005

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples

[Ax, axial; Br., bridge; Cr., creek; CV–AFS, cold–vapor/atomic fluorescence spectrometry; dup, duplicate; ICP–AES, inductively coupled plasma–atomic emission spectrometry; ICP–MS, inductively coupled plasma–mass spectrometry; R., river; Sac.,Sacramento; Split replicate (1/2), first number identifies which replicate was analyzed, second number represents number of replicate samples; UV–VIS, ultraviolet–visible spectroscopy; mm/dd/yy, month/day/year; µg/L, microgram per liter; mg/L, milligram per liter. <, less than the indicated detection limit; —, no data available]

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Aluminum (µg/L) ICP–MS/ICP–AES	Antimony (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS	Bismuth (µg/L) ICP–AES
Sac. R.–Shasta	07/12/96	1/2	209 ± 1	0.041 ± 0.004	15 ± 1	<0.03 ± 0.04	<0.003 ± 0.004
Sac. R.–Shasta	07/12/96	2/2	187 ± 5	0.033 ± 0.005	15 ± 0	<0.03 ± 0.00	<0.003 ± 0.003
Sac. R.–Shasta	09/19/96	1/2	73 ± 3	0.044 ± 0.015	15 ± 0	<0.03 ± 0.02	<0.003 ± 0.001
Sac. R.–Shasta	09/19/96	2/2	98 ± 14	0.046 ± 0.006	15 ± 1	<0.1 ± 0.1	<0.004 ± 0.000
Sac. R.–Shasta	11/19/96	1/2	53 ± 4	0.043 ± 0.013	14 ± 0	<0.1 ± 0.1	<0.004 ± 0.001
Sac. R.–Shasta	11/19/96	2/2	52 ± 4	0.051 ± 0.007	14 ± 1	<0.1 ± 0.0	<0.004 ± 0.001
Sac. R.–Shasta	12/12/96	1/2	97 ± 3	0.047 ± 0.010	14 ± 0	<0.03 ± 0.00	<0.004 ± 0.001
Sac. R.–Shasta	12/12/96	2/2	95 ± 4	0.053 ± 0.008	14 ± 0	<0.03 ± 0.01	0.0065 ± 0.0007
Sac. R.–Shasta	05/29/97	1/2	397 ± 23	0.040 ± 0.005	16 ± 0	<0.03 ± 0.04	<0.004 ± 0.001
Sac. R.–Shasta	05/29/97	2/2	414 ± 7	0.052 ± 0.015	15 ± 1	<0.03 ± 0.02	<0.004 ± 0.001
Sac. R.–Keswick	07/11/96	1/2	175 ± 14	0.038 ± 0.005	13 ± 0	<0.03 ± 0.02	<0.003 ± 0.002
Sac. R.–Keswick	07/11/96	2/2	169 ± 2	0.040 ± 0.006	13 ± 0	<0.03 ± 0.02	<0.003 ± 0.001
Sac. R.–Keswick	09/19/96	1/2	85 ± 15	0.041 ± 0.000	11 ± 1	0.12 ± 0.10	0.0052 ± 0.0028
Sac. R.–Keswick	09/19/96	2/2	57 ± 3	0.035 ± 0.010	11 ± 0	<0.03 ± 0.01	<0.003 ± 0.001
Sac. R.–Keswick	11/21/96	1/2	243 ± 31	0.078 ± 0.008	12 ± 1	0.12 ± 0.09	0.012 ± 0.001
Sac. R.–Keswick	11/21/96	2/2	222 ± 5	0.087 ± 0.009	12 ± 0	<0.1 ± 0.1	0.015 ± 0.001
Sac. R.–Keswick	12/11/96	1/2	157 ± 2	0.060 ± 0.007	13 ± 0	<0.03 ± 0.00	0.0087 ± 0.0032
Sac. R.–Keswick	12/11/96	2/2	165 ± 3	0.053 ± 0.003	13 ± 0	<0.03 ± 0.02	0.0066 ± 0.0024
Sac. R.–Keswick	01/02/97	1/2	609 ± 5	0.072 ± 0.004	18 ± 1	<0.03 ± 0.02	0.013 ± 0.005
Sac. R.–Keswick	01/02/97	2/2	594 ± 13	0.062 ± 0.009	17 ± 0	<0.03 ± 0.02	0.0090 ± 0.0001
Sac. R.–Keswick	05/28/97	1/2	390 ± 17	0.040 ± 0.005	14 ± 1	<0.03 ± 0.02	<0.004 ± 0.001
Sac. R.–Keswick	05/28/97	2/2	386 ± 21	0.041 ± 0.005	14 ± 1	<0.03 ± 0.04	<0.004 ± 0.001
Sac. R.–Bend Br.	07/11/96	1/2	223 ± 5	0.042 ± 0.006	15 ± 1	<0.03 ± 0.02	<0.003 ± 0.001
Sac. R.–Bend Br.	07/11/96	2/2	230 ± 5	0.053 ± 0.016	16 ± 0	<0.03 ± 0.02	<0.003 ± 0.000
Sac. R.–Bend Br.	09/20/96	1/2	131 ± 5	0.042 ± 0.004	14 ± 0	<0.03 ± 0.02	<0.003 ± 0.001
Sac. R.–Bend Br.	09/20/96	2/2	154 ± 20	0.047 ± 0.010	14 ± 1	0.12 ± 0.08	<0.004 ± 0.001
Sac. R.–Bend Br.	11/22/96	1/2	558 ± 55	0.094 ± 0.004	20 ± 0	<0.1 ± 0.1	0.012 ± 0.000
Sac. R.–Bend Br.	11/22/96	2/2	520 ± 11	0.086 ± 0.002	20 ± 0	<0.1 ± 0.0	0.013 ± 0.001
Sac. R.–Bend Br.	12/12/96	1/2	1,730 ± 36	0.093 ± 0.007	28 ± 2	0.035 ± 0.011	0.011 ± 0.000
Sac. R.–Bend Br.	12/12/96	2/2	1,730 ± 120	0.10 ± 0.01	25 ± 0	0.032 ± 0.018	0.017 ± 0.001
Sac. R.–Bend Br.	01/03/97	1/2	6,030 ± 1,012	0.14 ± 0.01	58 ± 5	0.12 ± 0.03	0.031 ± 0.001
Sac. R.–Bend Br.	01/03/97	2/2	6,010 ± 780	0.13 ± 0.01	58 ± 0	0.11 ± 0.01	0.031 ± 0.003

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Aluminum (µg/L) ICP–MS/ICP–AES	Antimony (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS	Bismuth (µg/L) ICP–AES
Sac. R.–Bend Br.	05/30/97	1/2	396 ± 16	0.047 ± 0.006	15 ± 0	<0.03 ± 0.02	<0.004 ± 0.001
Sac. R.–Bend Br.	05/30/97	2/2	405 ± 24	0.050 ± 0.007	16 ± 0	<0.03 ± 0.05	<0.004 ± 0.001
Sac. R.–Colusa	07/16/96	1/1	2,787 ± 278	0.066 ± 0.004	35 ± 2	0.028 ± 0.013	0.0066 ± 0.0007
Sac. R.–Colusa	09/25/96	1/2	559 ± 25	0.074 ± 0.013	21 ± 1	<0.1 ± 0.1	0.0073 ± 0.0012
Sac. R.–Colusa	09/25/96	2/2	608 ± 66	0.071 ± 0.020	21 ± 0	0.12 ± 0.04	<0.004 ± 0.001
Sac. R.–Colusa	11/13/96	1/2	1,062 ± 53	0.077 ± 0.012	25 ± 1	<0.03 ± 0.01	<0.005 ± 0.000
Sac. R.–Colusa	11/13/96	2/2	1,108 ± 67	0.067 ± 0.005	25 ± 1	<0.03 ± 0.01	<0.005 ± 0.003
Sac. R.–Colusa	12/16/96	1/2	3,381 ± 142	0.12 ± 0.00	48 ± 1	0.057 ± 0.006	0.016 ± 0.001
Sac. R.–Colusa	12/16/96	2/2	3,450 ± 50	0.13 ± 0.00	47 ± 1	0.059 ± 0.002	0.028 ± 0.003
Sac. R.–Colusa	01/04/97	1/2	21,567 ± 276	0.33 ± 0.01	133 ± 8	0.34 ± 0.03	0.091 ± 0.002
Sac. R.–Colusa	01/04/97	2/2	21,312 ± 307	0.33 ± 0.01	143 ± 0	0.30 ± 0.02	0.087 ± 0.001
Sac. R.–Colusa	06/03/97	1/2	1,012 ± 23	0.081 ± 0.003	21 ± 3	<0.03 ± 0.01	0.0075 ± 0.0022
Sac. R.–Colusa	06/03/97	2/2	1,082 ± 74	0.088 ± 0.002	19 ± 4	<0.03 ± 0.01	<0.005 ± 0.001
Sac. R.–Verona	07/18/96	1/2	1,203 ± 129	0.056 ± 0.006	24 ± 1	<0.03 ± 0.01	<0.005 ± 0.001
Sac. R.–Verona	07/18/96	2/2	1,183 ± 51	0.058 ± 0.015	20 ± 5	<0.03 ± 0.01	<0.005 ± 0.002
Sac. R.–Verona	09/26/96	1/2	1,602 ± 37	0.074 ± 0.002	31 ± 1	0.026 ± 0.009	0.0060 ± 0.0019
Sac. R.–Verona	09/26/96	2/2	1,604 ± 64	0.077 ± 0.005	30 ± 1	0.029 ± 0.004	0.0070 ± 0.0018
Sac. R.–Verona	11/14/96	1/2	1,127 ± 58	0.084 ± 0.011	30 ± 2	<0.03 ± 0.02	<0.005 ± 0.000
Sac. R.–Verona	11/14/96	2/2	1,162 ± 85	0.073 ± 0.002	30 ± 1	0.027 ± 0.018	<0.005 ± 0.001
Sac. R.–Verona	12/18/96	1/2	1,770 ± 31	0.088 ± 0.008	30 ± 2	0.034 ± 0.010	0.018 ± 0.001
Sac. R.–Verona	12/18/96	2/2	1,773 ± 35	0.076 ± 0.002	29 ± 2	0.029 ± 0.001	0.0078 ± 0.0004
Sac. R.–Verona	06/04/97	1/2	1,181 ± 137	0.089 ± 0.006	29 ± 2	<0.03 ± 0.01	0.0060 ± 0.0009
Sac. R.–Verona	06/04/97	2/2	1,199 ± 119	0.091 ± 0.009	21 ± 1	<0.03 ± 0.01	<0.005 ± 0.001
Sac. R.–Freeport	07/17/96	1/2	965 ± 12	0.060 ± 0.005	22 ± 1	<0.03 ± 0.00	0.0068 ± 0.0021
Sac. R.–Freeport	07/17/96	2/2	902 ± 13	0.062 ± 0.017	22 ± 0	<0.03 ± 0.04	0.0063 ± 0.0014
Sac. R.–Freeport	09/24/96	1/2	737 ± 70	0.074 ± 0.001	27 ± 1	<0.1 ± 0.1	0.0078 ± 0.0001
Sac. R.–Freeport	09/24/96	2/2	765 ± 13	0.070 ± 0.000	27 ± 0	<0.03 ± 0.02	<0.003 ± 0.001
Sac. R.–Freeport	11/12/96	1/2	323 ± 29	0.061 ± 0.008	23 ± 1	<0.1 ± 0.1	0.0038 ± 0.0019
Sac. R.–Freeport	11/12/96	2/2	317 ± 22	0.062 ± 0.012	22 ± 0	<0.1 ± 0.0	0.0047 ± 0.0025
Sac. R.–Freeport	12/17/96	1/2	2,016 ± 109	0.075 ± 0.006	30 ± 0	0.026 ± 0.008	0.013 ± 0.001
Sac. R.–Freeport	12/17/96	2/2	1,948 ± 192	0.076 ± 0.001	32 ± 1	0.033 ± 0.010	0.0084 ± 0.0004
Sac. R.–Freeport	01/06/97	1/2	9,786 ± 1,627	0.10 ± 0.00	86 ± 3	0.19 ± 0.00	0.050 ± 0.000
Sac. R.–Freeport	01/06/97	1/2	9,886 ± 1,164	0.092 ± 0.008	87 ± 4	0.19 ± 0.00	0.051 ± 0.003
Sac. R.–Freeport	06/05/97	1/2	802 ± 36	0.089 ± 0.006	23 ± 0	<0.03 ± 0.01	<0.004 ± 0.001
Sac. R.–Freeport	06/05/97	2/2	809 ± 39	0.10 ± 0.00	23 ± 1	<0.03 ± 0.02	0.0048 ± 0.0002
Sac. R.–Freeport, dup	06/05/97	1/2	456 ± 26	0.089 ± 0.006	21 ± 1	<0.03 ± 0.03	<0.004 ± 0.002

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Aluminum (µg/L) ICP–MS/ICP–AES	Antimony (µg/L) ICP–MS	Barium (µg/L) ICP–MS	Beryllium (µg/L) ICP–MS	Bismuth (µg/L) ICP–AES
Sac. R.–Freeport, dup	06/05/97	2/2	456 ± 25	0.089 ± 0.006	21 ± 1	<0.03 ± 0.04	<0.004 ± 0.001
Flat Cr.	12/11/96	1/2	321 ± 7	0.044 ± 0.006	5.4 ± 0.3	<0.03 ± 0.03	<0.004 ± 0.001
Flat Cr.	12/11/96	2/2	323 ± 13	0.038 ± 0.002	5.3 ± 0.2	<0.03 ± 0.04	<0.004 ± 0.002
Flat Cr.	05/29/97	1/2	5 ± 0	0.071 ± 0.005	7.6 ± 0.5	<0.03 ± 0.03	0.0039 ± 0.0037
Flat Cr.	05/29/97	2/2	5 ± 0	0.061 ± 0.005	7.5 ± 0.4	<0.03 ± 0.02	<0.004 ± 0.001
Spring Cr.–Weir	12/11/96	1/2	2,900 ± 129	0.032 ± 0.006	8.6 ± 0.2	0.061 ± 0.008	0.0079 ± 0.0015
Spring Cr.–Weir	12/11/96	2/2	2,960 ± 31	0.034 ± 0.007	8.7 ± 0.2	0.054 ± 0.003	0.0084 ± 0.0005
Spring Cr.–Weir	05/28/97	1/2	5,450 ± 328	<0.02 ± 0.00	25 ± 4	0.12 ± 0.02	<0.005 ± 0.000
Spring Cr.–Weir	05/28/97	2/2	5,390 ± 124	<0.02 ± 0.00	22 ± 2	0.14 ± 0.02	<0.005 ± 0.000
Spring Cr.–Road	01/02/97	1/2	2,590 ± 167	0.16 ± 0.01	19 ± 1	0.039 ± 0.009	0.015 ± 0.001
Spring Cr.–Road	01/02/97	2/2	2,650 ± 187	0.17 ± 0.01	18 ± 0	0.049 ± 0.015	0.018 ± 0.001
Whiskeytown	12/11/96	1/2	33 ± 1	0.030 ± 0.005	6.9 ± 0.2	<0.03 ± 0.01	<0.004 ± 0.001
Whiskeytown	12/11/96	2/2	32 ± 1	0.029 ± 0.005	7.4 ± 0.2	<0.03 ± 0.00	<0.003 ± 0.001
Whiskeytown	05/29/97	1/2	419 ± 18	0.052 ± 0.004	8.4 ± 0.1	<0.03 ± 0.02	<0.004 ± 0.000
Whiskeytown	05/29/97	2/2	411 ± 14	0.062 ± 0.007	8.0 ± 0.3	<0.03 ± 0.02	<0.004 ± 0.001
Spring Cr. arm	07/12/96	1/2	20 ± 3	0.025 ± 0.003	7.2 ± 0.4	<0.03 ± 0.04	<0.003 ± 0.001
Spring Cr. arm	07/12/96	2/2	20 ± 3	0.024 ± 0.004	7.1 ± 0.5	<0.03 ± 0.01	<0.003 ± 0.001
Spring Cr. arm	09/18/96	1/2	26 ± 1	0.026 ± 0.008	6.6 ± 0.3	<0.03 ± 0.01	<0.003 ± 0.001
Spring Cr. arm	09/18/96	2/2	36 ± 3	0.054 ± 0.033	6.6 ± 0.6	0.14 ± 0.10	<0.004 ± 0.001
Spring Cr. arm	11/20/96	1/2	205 ± 23	0.029 ± 0.004	7.2 ± 0.3	<0.1 ± 0.1	<0.004 ± 0.002
Spring Cr. arm	11/20/96	2/2	203 ± 18	0.037 ± 0.013	7.1 ± 0.3	<0.1 ± 0.1	<0.004 ± 0.001
Spring Cr. arm	12/11/96	1/2	359 ± 17	0.035 ± 0.010	7.2 ± 0.2	<0.03 ± 0.03	<0.004 ± 0.000
Spring Cr. arm	12/11/96	2/2	364 ± 24	0.035 ± 0.005	7.5 ± 0.1	<0.03 ± 0.01	<0.004 ± 0.002
Spring Cr. arm	05/28/97	1/2	436 ± 29	0.070 ± 0.006	8.1 ± 0.5	<0.03 ± 0.02	0.0050 ± 0.0003
Spring Cr. arm	05/28/97	2/2	427 ± 25	0.044 ± 0.008	8.5 ± 0.3	<0.03 ± 0.03	<0.004 ± 0.002
Colusa Basin Drain	06/06/97	1/2	5,220 ± 174	0.30 ± 0.03	139 ± 22	0.11 ± 0.01	0.030 ± 0.002
Colusa Basin Drain	06/06/97	2/2	5,420 ± 229	0.29 ± 0.01	153 ± 3	0.14 ± 0.01	0.025 ± 0.002
Yolo Bypass	01/07/97	1/2	8,890 ± 559	0.20 ± 0.01	76 ± 1	0.15 ± 0.01	0.048 ± 0.000
Yolo Bypass	01/07/97	2/2	9,510 ± 147	0.20 ± 0.01	75 ± 2	0.16 ± 0.01	0.040 ± 0.002

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Boron (µg/L) ICP–AES	Cadmium (µg/L) ICP–MS	Calcium (µg/L) ICP–AES	Cerium (µg/L) ICP–MS	Chromium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	0.032 ± 0.004	0.033 ± 0.007	11 ± 1	0.11 ± 0.00	19 ± 1
Sac. R.–Shasta	07/12/96	2/2	0.029 ± 0.002	0.032 ± 0.005	10 ± 0	0.11 ± 0.00	20 ± 2
Sac. R.–Shasta	09/19/96	1/2	0.030 ± 0.002	0.033 ± 0.002	11 ± 0	0.060 ± 0.001	21 ± 2
Sac. R.–Shasta	09/19/96	2/2	0.030 ± 0.002	0.043 ± 0.001	11 ± 0	0.066 ± 0.005	16 ± 3
Sac. R.–Shasta	11/19/96	1/2	0.040 ± 0.001	0.012 ± 0.006	12 ± 1	0.037 ± 0.003	17 ± 1
Sac. R.–Shasta	11/19/96	2/2	0.039 ± 0.001	0.018 ± 0.003	12 ± 0	0.036 ± 0.005	16 ± 1
Sac. R.–Shasta	12/12/96	1/2	0.047 ± 0.002	0.050 ± 0.004	11 ± 0	0.083 ± 0.002	13 ± 0
Sac. R.–Shasta	12/12/96	2/2	0.049 ± 0.001	0.088 ± 0.003	10 ± 0	0.098 ± 0.006	14 ± 1
Sac. R.–Shasta	05/29/97	1/2	0.032 ± 0.002	0.023 ± 0.002	11 ± 0	0.27 ± 0.01	13 ± 1
Sac. R.–Shasta	05/29/97	2/2	0.032 ± 0.001	0.026 ± 0.004	11 ± 0	0.26 ± 0.00	13 ± 1
Sac. R.–Keswick	07/11/96	1/2	0.025 ± 0.001	0.032 ± 0.008	8.6 ± 0.3	0.096 ± 0.004	20 ± 2
Sac. R.–Keswick	07/11/96	2/2	0.030 ± 0.005	0.024 ± 0.004	9.1 ± 0.2	0.099 ± 0.003	20 ± 3
Sac. R.–Keswick	09/19/96	1/2	0.020 ± 0.002	0.040 ± 0.012	8.5 ± 0.5	0.059 ± 0.007	17 ± 2
Sac. R.–Keswick	09/19/96	2/2	0.024 ± 0.002	0.022 ± 0.002	8.7 ± 0.1	0.053 ± 0.002	22 ± 2
Sac. R.–Keswick	11/21/96	1/2	0.033 ± 0.001	0.093 ± 0.003	9.8 ± 0.8	0.11 ± 0.00	18 ± 3
Sac. R.–Keswick	11/21/96	2/2	0.032 ± 0.001	0.086 ± 0.006	10 ± 0	0.11 ± 0.00	16 ± 3
Sac. R.–Keswick	12/11/96	1/2	0.044 ± 0.000	0.094 ± 0.003	10 ± 1	0.16 ± 0.01	15 ± 1
Sac. R.–Keswick	12/11/96	2/2	0.044 ± 0.002	0.099 ± 0.004	9.8 ± 0.2	0.15 ± 0.01	13 ± 1
Sac. R.–Keswick	01/02/97	1/2	0.038 ± 0.004	0.21 ± 0.00	10 ± 1	0.53 ± 0.03	21 ± 1
Sac. R.–Keswick	01/02/97	2/2	0.036 ± 0.004	0.20 ± 0.01	10 ± 0	0.52 ± 0.01	20 ± 1
Sac. R.–Keswick	05/28/97	1/2	0.026 ± 0.003	0.020 ± 0.006	9.0 ± 0.4	0.23 ± 0.01	14 ± 1
Sac. R.–Keswick	05/28/97	2/2	0.028 ± 0.003	0.024 ± 0.006	9.3 ± 0.3	0.23 ± 0.01	13 ± 1
Sac. R.–Bend Br.	07/11/96	1/2	0.028 ± 0.004	0.030 ± 0.005	9.4 ± 0.9	0.12 ± 0.00	19 ± 3
Sac. R.–Bend Br.	07/11/96	2/2	0.027 ± 0.001	0.033 ± 0.001	9.1 ± 0.3	0.14 ± 0.00	20 ± 4
Sac. R.–Bend Br.	09/20/96	1/2	0.027 ± 0.001	0.026 ± 0.004	9.4 ± 0.1	0.10 ± 0.00	21 ± 2
Sac. R.–Bend Br.	09/20/96	2/2	0.025 ± 0.001	0.033 ± 0.013	8.8 ± 0.4	0.099 ± 0.006	16 ± 3
Sac. R.–Bend Br.	11/22/96	1/2	0.039 ± 0.000	0.064 ± 0.005	12 ± 0	0.28 ± 0.00	19 ± 2
Sac. R.–Bend Br.	11/22/96	2/2	0.037 ± 0.003	0.062 ± 0.004	11 ± 1	0.28 ± 0.00	19 ± 3
Sac. R.–Bend Br.	12/12/96	1/2	0.044 ± 0.006	0.082 ± 0.006	10 ± 0	1.1 ± 0.1	24 ± 0
Sac. R.–Bend Br.	12/12/96	2/2	0.040 ± 0.002	0.089 ± 0.003	10 ± 1	1.1 ± 0.1	16 ± 0
Sac. R.–Bend Br.	01/03/97	1/2	0.038 ± 0.009	0.11 ± 0.00	11 ± 0	4.2 ± 0.4	26 ± 0
Sac. R.–Bend Br.	01/03/97	2/2	0.036 ± 0.006	0.11 ± 0.00	9.9 ± 1.0	4.2 ± 0.0	23 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Boron (µg/L) ICP–AES	Cadmium (µg/L) ICP–MS	Calcium (µg/L) ICP–AES	Cerium (µg/L) ICP–MS	Chromium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.027 ± 0.001	0.034 ± 0.006	9.5 ± 0.2	0.24 ± 0.00	14 ± 2
Sac. R.–Bend Br.	05/30/97	2/2	0.028 ± 0.002	0.035 ± 0.003	9.5 ± 0.2	0.25 ± 0.02	13 ± 2
Sac. R.–Colusa	07/16/96	1/1	0.036 ± 0.001	0.074 ± 0.008	11 ± 1	1.1 ± 0.3	14 ± 0
Sac. R.–Colusa	09/25/96	1/2	0.035 ± 0.001	0.028 ± 0.001	12 ± 0	0.27 ± 0.02	18 ± 4
Sac. R.–Colusa	09/25/96	2/2	0.040 ± 0.000	0.040 ± 0.009	11 ± 1	0.30 ± 0.02	18 ± 2
Sac. R.–Colusa	11/13/96	1/2	0.054 ± 0.002	0.033 ± 0.004	13 ± 0	0.42 ± 0.03	11 ± 1
Sac. R.–Colusa	11/13/96	2/2	0.052 ± 0.000	0.030 ± 0.001	13 ± 1	0.41 ± 0.03	11 ± 0
Sac. R.–Colusa	12/16/96	1/2	0.056 ± 0.003	0.086 ± 0.001	13 ± 0	1.8 ± 0.0	18 ± 1
Sac. R.–Colusa	12/16/96	2/2	0.054 ± 0.001	0.10 ± 0.00	13 ± 0	2.1 ± 0.0	18 ± 2
Sac. R.–Colusa	01/04/97	1/2	0.073 ± 0.005	0.20 ± 0.00	14 ± 1	11 ± 1	52 ± 1
Sac. R.–Colusa	01/04/97	2/2	0.074 ± 0.005	0.22 ± 0.01	14 ± 1	12 ± 0	53 ± 2
Sac. R.–Colusa	06/03/97	1/2	0.037 ± 0.001	0.042 ± 0.001	11 ± 0	0.58 ± 0.10	12 ± 0
Sac. R.–Colusa	06/03/97	2/2	0.037 ± 0.001	0.029 ± 0.003	11 ± 0	0.57 ± 0.15	12 ± 0
Sac. R.–Verona	07/18/96	1/2	0.030 ± 0.005	0.038 ± 0.003	9.7 ± 1.1	0.67 ± 0.05	12 ± 0
Sac. R.–Verona	07/18/96	2/2	0.032 ± 0.001	0.071 ± 0.000	9.7 ± 0.3	0.58 ± 0.15	12 ± 0
Sac. R.–Verona	09/26/96	1/2	0.047 ± 0.002	0.042 ± 0.000	13 ± 0	0.76 ± 0.03	16 ± 1
Sac. R.–Verona	09/26/96	2/2	0.042 ± 0.002	0.038 ± 0.001	13 ± 0	0.76 ± 0.01	15 ± 2
Sac. R.–Verona	11/14/96	1/2	0.046 ± 0.001	0.037 ± 0.004	14 ± 0	0.63 ± 0.07	13 ± 1
Sac. R.–Verona	11/14/96	2/2	0.044 ± 0.006	0.034 ± 0.003	14 ± 1	0.60 ± 0.13	11 ± 0
Sac. R.–Verona	12/18/96	1/2	0.038 ± 0.001	0.049 ± 0.002	11 ± 0	1.1 ± 0.1	15 ± 2
Sac. R.–Verona	12/18/96	2/2	0.037 ± 0.003	0.036 ± 0.004	11 ± 0	0.98 ± 0.06	15 ± 2
Sac. R.–Verona	06/04/97	1/2	0.040 ± 0.004	0.040 ± 0.003	12 ± 1	0.86 ± 0.08	12 ± 0
Sac. R.–Verona	06/04/97	2/2	0.043 ± 0.003	0.038 ± 0.004	12 ± 1	0.63 ± 0.01	12 ± 0
Sac. R.–Freeport	07/17/96	1/2	0.025 ± 0.005	0.037 ± 0.002	9.3 ± 0.3	0.63 ± 0.01	22 ± 4
Sac. R.–Freeport	07/17/96	2/2	0.025 ± 0.002	0.045 ± 0.005	8.8 ± 0.1	0.57 ± 0.03	23 ± 4
Sac. R.–Freeport	09/24/96	1/2	0.036 ± 0.003	0.041 ± 0.007	12 ± 1	0.47 ± 0.01	18 ± 3
Sac. R.–Freeport	09/24/96	2/2	0.040 ± 0.002	0.021 ± 0.004	12 ± 0	0.50 ± 0.00	21 ± 3
Sac. R.–Freeport	11/12/96	1/2	0.032 ± 0.003	0.017 ± 0.008	11 ± 0	0.21 ± 0.00	16 ± 2
Sac. R.–Freeport	11/12/96	2/2	0.032 ± 0.001	0.020 ± 0.010	11 ± 0	0.21 ± 0.01	16 ± 2
Sac. R.–Freeport	12/17/96	1/2	0.028 ± 0.001	0.060 ± 0.003	9.3 ± 0.5	1.3 ± 0.0	16 ± 0
Sac. R.–Freeport	12/17/96	2/2	0.028 ± 0.003	0.049 ± 0.007	9.0 ± 0.9	1.4 ± 0.1	15 ± 0
Sac. R.–Freeport	01/06/97	1/2	0.018 ± 0.006	0.079 ± 0.000	6.2 ± 1.0	12 ± 1	21 ± 2
Sac. R.–Freeport	01/06/97	1/2	0.020 ± 0.004	0.071 ± 0.005	6.2 ± 0.7	13 ± 0	21 ± 1
Sac. R.–Freeport	06/05/97	1/2	0.033 ± 0.002	0.026 ± 0.002	11 ± 0	0.58 ± 0.00	14 ± 1
Sac. R.–Freeport	06/05/97	2/2	0.033 ± 0.004	0.026 ± 0.004	11 ± 0	0.58 ± 0.04	14 ± 1
Sac. R.–Freeport, dup	06/05/97	1/2	0.027 ± 0.002	0.020 ± 0.007	10 ± 0	0.39 ± 0.001	14 ± 1

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Boron (µg/L) ICP–AES	Cadmium (µg/L) ICP–MS	Calcium (µg/L) ICP–AES	Cerium (µg/L) ICP–MS	Chromium (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.031 ± 0.001	0.022 ± 0.001	10 ± 0	0.41 ± 0.01	13 ± 1
Flat Cr.	12/11/96	1/2	<0.005 ± 0.002	0.17 ± 0.01	2.9 ± 0.1	0.23 ± 0.00	13 ± 1
Flat Cr.	12/11/96	2/2	<0.005 ± 0.003	0.19 ± 0.01	2.9 ± 0.2	0.21 ± 0.01	12 ± 1
Flat Cr.	05/29/97	1/2	0.0076 ± 0.0014	0.092 ± 0.005	13 ± 1	0.040 ± 0.001	11 ± 1
Flat Cr.	05/29/97	2/2	0.0068 ± 0.0018	0.086 ± 0.005	14 ± 0	0.039 ± 0.004	12 ± 1
Spring Cr.–Weir	12/11/96	1/2	0.0066 ± 0.0017	3.7 ± 0.0	8.1 ± 0.4	4.6 ± 0.0	11 ± 1
Spring Cr.–Weir	12/11/96	2/2	0.0083 ± 0.0011	3.7 ± 0.0	8.3 ± 0.3	4.8 ± 0.1	13 ± 1
Spring Cr.–Weir	05/28/97	1/2	0.0092 ± 0.0014	6.6 ± 0.0	45 ± 3	9.8 ± 0.0	7.7 ± 1.3
Spring Cr.–Weir	05/28/97	2/2	0.0089 ± 0.0015	6.5 ± 0.0	45 ± 1	9.9 ± 0.4	7.3 ± 0.9
Spring Cr.–Road	01/02/97	1/2	0.024 ± 0.001	8.2 ± 0.0	5.7 ± 0.4	3.0 ± 0.1	7.3 ± 1.9
Spring Cr.–Road	01/02/97	2/2	0.025 ± 0.003	8.2 ± 0.2	5.8 ± 0.6	3.0 ± 0.0	7.2 ± 2.9
Whiskeytown	12/11/96	1/2	0.011 ± 0.001	0.014 ± 0.002	4.8 ± 0.4	0.033 ± 0.001	13 ± 1
Whiskeytown	12/11/96	2/2	0.012 ± 0.001	<0.006 ± 0.000	4.7 ± 0.1	0.034 ± 0.003	20 ± 3
Whiskeytown	05/29/97	1/2	0.0076 ± 0.0008	0.010 ± 0.001	4.8 ± 0.1	0.18 ± 0.01	14 ± 1
Whiskeytown	05/29/97	2/2	0.012 ± 0.001	0.016 ± 0.004	4.8 ± 0.1	0.17 ± 0.01	17 ± 1
Spring Cr. arm	07/12/96	1/2	0.011 ± 0.004	<0.006 ± 0.001	4.5 ± 0.1	0.019 ± 0.001	19 ± 3
Spring Cr. arm	07/12/96	2/2	0.0091 ± 0.0009	0.012 ± 0.004	4.4 ± 0.2	0.021 ± 0.001	20 ± 3
Spring Cr. arm	09/18/96	1/2	0.0081 ± 0.0004	0.015 ± 0.002	4.5 ± 0.2	0.038 ± 0.003	21 ± 1
Spring Cr. arm	09/18/96	2/2	0.0072 ± 0.0016	0.028 ± 0.008	4.4 ± 0.1	0.043 ± 0.001	17 ± 2
Spring Cr. arm	11/20/96	1/2	0.0050 ± 0.0020	0.13 ± 0.01	5.3 ± 0.3	0.23 ± 0.01	16 ± 2
Spring Cr. arm	11/20/96	2/2	0.011 ± 0.002	0.16 ± 0.00	5.3 ± 0.3	0.24 ± 0.02	15 ± 2
Spring Cr. arm	12/11/96	1/2	0.0089 ± 0.0010	0.49 ± 0.00	5.4 ± 0.2	0.60 ± 0.01	13 ± 1
Spring Cr. arm	12/11/96	2/2	0.0083 ± 0.0012	0.47 ± 0.02	5.3 ± 0.2	0.64 ± 0.01	13 ± 1
Spring Cr. arm	05/28/97	1/2	0.011 ± 0.003	0.042 ± 0.011	5.0 ± 0.1	0.20 ± 0.01	18 ± 2
Spring Cr. arm	05/28/97	2/2	0.0097 ± 0.0026	0.040 ± 0.004	5.0 ± 0.2	0.21 ± 0.00	17 ± 2
Colusa Basin Drain	06/06/97	1/2	0.33 ± 0.00	0.044 ± 0.003	38 ± 1	3.9 ± 0.6	24 ± 1
Colusa Basin Drain	06/06/97	2/2	0.34 ± 0.01	0.046 ± 0.001	39 ± 2	4.2 ± 0.2	24 ± 1
Yolo Bypass	01/07/97	1/2	0.039 ± 0.004	0.099 ± 0.006	9.0 ± 0.8	5.7 ± 0.1	28 ± 1
Yolo Bypass	01/07/97	2/2	0.040 ± 0.003	0.10 ± 0.00	9.9 ± 0.5	5.6 ± 0.1	27 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS	Europium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	0.042 ± 0.010	1.8 ± 0.1	0.016 ± 0.001	0.013 ± 0.000	0.0057 ± 0.0016
Sac. R.–Shasta	07/12/96	2/2	0.036 ± 0.009	1.9 ± 0.2	0.020 ± 0.005	0.013 ± 0.006	0.0048 ± 0.0009
Sac. R.–Shasta	09/19/96	1/2	0.014 ± 0.007	1.4 ± 0.1	0.013 ± 0.001	0.012 ± 0.003	0.0033 ± 0.0006
Sac. R.–Shasta	09/19/96	2/2	0.015 ± 0.012	1.7 ± 0.1	0.015 ± 0.004	0.0087 ± 0.0056	0.0062 ± 0.0009
Sac. R.–Shasta	11/19/96	1/2	0.025 ± 0.007	1.4 ± 0.1	0.013 ± 0.005	0.0097 ± 0.0041	0.0056 ± 0.0012
Sac. R.–Shasta	11/19/96	2/2	0.022 ± 0.004	1.3 ± 0.1	0.014 ± 0.004	0.0086 ± 0.0021	0.0047 ± 0.0016
Sac. R.–Shasta	12/12/96	1/2	0.060 ± 0.008	4.1 ± 0.2	0.023 ± 0.002	0.0087 ± 0.0011	0.0048 ± 0.0010
Sac. R.–Shasta	12/12/96	2/2	0.061 ± 0.005	4.3 ± 0.2	0.021 ± 0.000	0.011 ± 0.000	0.0069 ± 0.0015
Sac. R.–Shasta	05/29/97	1/2	0.13 ± 0.00	1.7 ± 0.1	0.041 ± 0.006	0.020 ± 0.002	0.014 ± 0.002
Sac. R.–Shasta	05/29/97	2/2	0.13 ± 0.01	1.7 ± 0.0	0.034 ± 0.004	0.022 ± 0.002	0.011 ± 0.002
Sac. R.–Keswick	07/11/96	1/2	0.038 ± 0.003	1.6 ± 0.2	0.019 ± 0.003	0.010 ± 0.002	0.0048 ± 0.0010
Sac. R.–Keswick	07/11/96	2/2	0.040 ± 0.002	1.5 ± 0.1	0.012 ± 0.000	0.011 ± 0.001	0.0062 ± 0.0002
Sac. R.–Keswick	09/19/96	1/2	0.041 ± 0.006	1.9 ± 0.1	0.023 ± 0.002	0.012 ± 0.005	0.0060 ± 0.0016
Sac. R.–Keswick	09/19/96	2/2	0.027 ± 0.005	1.6 ± 0.1	0.015 ± 0.002	0.0093 ± 0.0009	0.0036 ± 0.0012
Sac. R.–Keswick	11/21/96	1/2	0.17 ± 0.02	4.4 ± 0.4	0.044 ± 0.003	0.024 ± 0.005	0.0070 ± 0.0012
Sac. R.–Keswick	11/21/96	2/2	0.17 ± 0.02	4.3 ± 0.4	0.044 ± 0.003	0.027 ± 0.004	0.0084 ± 0.0027
Sac. R.–Keswick	12/11/96	1/2	0.12 ± 0.01	7.7 ± 0.2	0.059 ± 0.002	0.030 ± 0.003	0.011 ± 0.002
Sac. R.–Keswick	12/11/96	2/2	0.13 ± 0.01	7.8 ± 0.1	0.048 ± 0.006	0.025 ± 0.002	0.013 ± 0.003
Sac. R.–Keswick	01/02/97	1/2	0.48 ± 0.01	14 ± 0	0.10 ± 0.01	0.067 ± 0.002	0.019 ± 0.000
Sac. R.–Keswick	01/02/97	2/2	0.46 ± 0.01	14 ± 2	0.11 ± 0.00	0.069 ± 0.008	0.023 ± 0.003
Sac. R.–Keswick	05/28/97	1/2	0.24 ± 0.02	2.0 ± 0.2	0.038 ± 0.001	0.020 ± 0.002	0.011 ± 0.002
Sac. R.–Keswick	05/28/97	2/2	0.24 ± 0.02	1.9 ± 0.1	0.034 ± 0.001	0.019 ± 0.001	0.0089 ± 0.0004
Sac. R.–Bend Br.	07/11/96	1/2	0.13 ± 0.00	1.7 ± 0.1	0.022 ± 0.001	0.015 ± 0.001	0.0056 ± 0.0002
Sac. R.–Bend Br.	07/11/96	2/2	0.12 ± 0.01	1.7 ± 0.0	0.019 ± 0.005	0.013 ± 0.002	0.0049 ± 0.0013
Sac. R.–Bend Br.	09/20/96	1/2	0.074 ± 0.010	1.6 ± 0.0	0.021 ± 0.001	0.010 ± 0.002	0.0039 ± 0.0011
Sac. R.–Bend Br.	09/20/96	2/2	0.082 ± 0.013	2.0 ± 0.1	0.021 ± 0.005	0.015 ± 0.005	0.0056 ± 0.0007
Sac. R.–Bend Br.	11/22/96	1/2	0.39 ± 0.04	4.3 ± 0.3	0.056 ± 0.006	0.039 ± 0.001	0.013 ± 0.001
Sac. R.–Bend Br.	11/22/96	2/2	0.38 ± 0.04	4.3 ± 0.0	0.061 ± 0.008	0.033 ± 0.007	0.014 ± 0.002
Sac. R.–Bend Br.	12/12/96	1/2	1.1 ± 0.0	7.9 ± 0.0	0.15 ± 0.00	0.078 ± 0.007	0.038 ± 0.001
Sac. R.–Bend Br.	12/12/96	2/2	1.1 ± 0.0	8.3 ± 0.1	0.16 ± 0.01	0.079 ± 0.004	0.034 ± 0.001
Sac. R.–Bend Br.	01/03/97	1/2	3.3 ± 0.1	14 ± 0	0.52 ± 0.01	0.25 ± 0.01	0.12 ± 0.00
Sac. R.–Bend Br.	01/03/97	2/2	3.3 ± 0.0	14 ± 0	0.49 ± 0.02	0.24 ± 0.00	0.13 ± 0.00

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS	Europium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.26 ± 0.03	2.2 ± 0.1	0.038 ± 0.004	0.018 ± 0.001	0.011 ± 0.002
Sac. R.–Bend Br.	05/30/97	2/2	0.27 ± 0.02	2.2 ± 0.2	0.035 ± 0.002	0.020 ± 0.004	0.012 ± 0.001
Sac. R.–Colusa	07/16/96	1/1	1.2 ± 0.1	5.4 ± 0.4	0.16 ± 0.02	0.082 ± 0.002	0.042 ± 0.002
Sac. R.–Colusa	09/25/96	1/2	0.30 ± 0.04	2.7 ± 0.2	0.039 ± 0.002	0.020 ± 0.004	0.011 ± 0.002
Sac. R.–Colusa	09/25/96	2/2	0.30 ± 0.04	3.0 ± 0.2	0.038 ± 0.006	0.023 ± 0.002	0.015 ± 0.001
Sac. R.–Colusa	11/13/96	1/2	0.45 ± 0.02	2.7 ± 0.2	0.064 ± 0.005	0.036 ± 0.004	0.017 ± 0.001
Sac. R.–Colusa	11/13/96	2/2	0.43 ± 0.02	2.7 ± 0.1	0.057 ± 0.001	0.027 ± 0.002	0.015 ± 0.001
Sac. R.–Colusa	12/16/96	1/2	1.8 ± 0.0	8.5 ± 0.1	0.26 ± 0.01	0.13 ± 0.01	0.066 ± 0.005
Sac. R.–Colusa	12/16/96	2/2	1.9 ± 0.1	12 ± 0	0.29 ± 0.01	0.14 ± 0.00	0.075 ± 0.003
Sac. R.–Colusa	01/04/97	1/2	12 ± 0	35 ± 0	1.6 ± 0.1	0.84 ± 0.02	0.40 ± 0.00
Sac. R.–Colusa	01/04/97	2/2	11 ± 0	35 ± 0	1.6 ± 0.0	0.83 ± 0.01	0.41 ± 0.00
Sac. R.–Colusa	06/03/97	1/2	0.64 ± 0.03	3.6 ± 0.2	0.087 ± 0.004	0.045 ± 0.003	0.019 ± 0.002
Sac. R.–Colusa	06/03/97	2/2	0.70 ± 0.08	3.9 ± 0.5	0.093 ± 0.005	0.048 ± 0.002	0.020 ± 0.000
Sac. R.–Verona	07/18/96	1/2	0.56 ± 0.02	3.1 ± 0.1	0.081 ± 0.006	0.040 ± 0.006	0.019 ± 0.000
Sac. R.–Verona	07/18/96	2/2	0.61 ± 0.03	3.2 ± 0.3	0.078 ± 0.010	0.039 ± 0.006	0.019 ± 0.005
Sac. R.–Verona	09/26/96	1/2	0.70 ± 0.01	3.8 ± 0.1	0.10 ± 0.00	0.056 ± 0.001	0.027 ± 0.002
Sac. R.–Verona	09/26/96	2/2	0.70 ± 0.01	3.7 ± 0.1	0.10 ± 0.00	0.058 ± 0.001	0.028 ± 0.001
Sac. R.–Verona	11/14/96	1/2	0.55 ± 0.02	3.4 ± 0.3	0.079 ± 0.004	0.043 ± 0.002	0.019 ± 0.003
Sac. R.–Verona	11/14/96	2/2	0.53 ± 0.02	3.7 ± 0.5	0.083 ± 0.006	0.044 ± 0.005	0.020 ± 0.001
Sac. R.–Verona	12/18/96	1/2	0.98 ± 0.05	5.6 ± 0.2	0.15 ± 0.01	0.075 ± 0.006	0.037 ± 0.001
Sac. R.–Verona	12/18/96	2/2	0.89 ± 0.02	4.4 ± 0.1	0.13 ± 0.00	0.067 ± 0.002	0.034 ± 0.003
Sac. R.–Verona	06/04/97	1/2	0.72 ± 0.02	4.0 ± 0.1	0.11 ± 0.00	0.057 ± 0.003	0.025 ± 0.002
Sac. R.–Verona	06/04/97	2/2	0.77 ± 0.05	4.3 ± 0.4	0.11 ± 0.01	0.052 ± 0.004	0.023 ± 0.001
Sac. R.–Freeport	07/17/96	1/2	0.38 ± 0.01	2.5 ± 0.0	0.069 ± 0.005	0.036 ± 0.002	0.020 ± 0.001
Sac. R.–Freeport	07/17/96	2/2	0.43 ± 0.06	2.6 ± 0.1	0.065 ± 0.013	0.037 ± 0.003	0.017 ± 0.002
Sac. R.–Freeport	09/24/96	1/2	0.42 ± 0.04	3.1 ± 0.3	0.055 ± 0.005	0.027 ± 0.004	0.019 ± 0.003
Sac. R.–Freeport	09/24/96	2/2	0.31 ± 0.00	2.4 ± 0.1	0.052 ± 0.007	0.028 ± 0.003	0.015 ± 0.001
Sac. R.–Freeport	11/12/96	1/2	0.20 ± 0.02	2.1 ± 0.1	0.029 ± 0.001	0.014 ± 0.006	0.0098 ± 0.0016
Sac. R.–Freeport	11/12/96	2/2	0.19 ± 0.03	2.2 ± 0.1	0.026 ± 0.002	0.016 ± 0.004	0.0077 ± 0.0008
Sac. R.–Freeport	12/17/96	1/2	1.1 ± 0.0	5.2 ± 0.1	0.16 ± 0.01	0.082 ± 0.007	0.039 ± 0.002
Sac. R.–Freeport	12/17/96	2/2	1.1 ± 0.0	4.8 ± 0.1	0.17 ± 0.01	0.084 ± 0.006	0.041 ± 0.001
Sac. R.–Freeport	01/06/97	1/2	4.6 ± 0.1	14 ± 0	0.69 ± 0.01	0.35 ± 0.00	0.19 ± 0.01
Sac. R.–Freeport	01/06/97	1/2	4.4 ± 0.1	14 ± 0	0.68 ± 0.01	0.35 ± 0.00	0.20 ± 0.00
Sac. R.–Freeport	06/05/97	1/2	0.43 ± 0.03	2.8 ± 0.1	0.068 ± 0.001	0.032 ± 0.007	0.021 ± 0.000
Sac. R.–Freeport	06/05/97	2/2	0.45 ± 0.02	2.9 ± 0.1	0.066 ± 0.001	0.031 ± 0.000	0.022 ± 0.003
Sac. R.–Freeport, dup	06/05/97	1/2	0.28 ± 0.002	2.3 ± 0.1	0.043 ± 0.002	0.017 ± 0.002	0.017 ± 0.001

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Cobalt (µg/L) ICP–MS	Copper (µg/L) ICP–MS	Dysprosium (µg/L) ICP–MS	Erbium (µg/L) ICP–MS	Europium (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.29 ± 0.03	2.3 ± 0.1	0.049 ± 0.002	0.025 ± 0.004	0.014 ± 0.000
Flat Cr.	12/11/96	1/2	0.30 ± 0.01	11 ± 0	0.11 ± 0.00	0.064 ± 0.005	0.023 ± 0.000
Flat Cr.	12/11/96	2/2	0.30 ± 0.02	11 ± 0	0.11 ± 0.01	0.066 ± 0.004	0.023 ± 0.004
Flat Cr.	05/29/97	1/2	0.35 ± 0.02	1.8 ± 0.1	0.041 ± 0.002	0.031 ± 0.004	0.0061 ± 0.0020
Flat Cr.	05/29/97	2/2	0.35 ± 0.02	1.8 ± 0.1	0.040 ± 0.007	0.032 ± 0.006	0.0056 ± 0.0017
Spring Cr.–Weir	12/11/96	1/2	4.4 ± 0.0	402 ± 17	2.2 ± 0.0	1.1 ± 0.0	0.33 ± 0.01
Spring Cr.–Weir	12/11/96	2/2	4.4 ± 0.1	410 ± 15	2.2 ± 0.0	1.1 ± 0.0	0.33 ± 0.01
Spring Cr.–Weir	05/28/97	1/2	12 ± 0	500 ± 31	3.8 ± 0.2	1.9 ± 0.1	0.51 ± 0.00
Spring Cr.–Weir	05/28/97	2/2	12 ± 0	496 ± 13	3.7 ± 0.0	1.8 ± 0.1	0.52 ± 0.01
Spring Cr.–Road	01/02/97	1/2	6.3 ± 0.1	547 ± 2	1.4 ± 0.0	0.73 ± 0.01	0.22 ± 0.00
Spring Cr.–Road	01/02/97	2/2	6.3 ± 0.3	539 ± 43	1.4 ± 0.0	0.69 ± 0.01	0.22 ± 0.00
Whiskeytown	12/11/96	1/2	0.025 ± 0.003	1.2 ± 0.0	0.012 ± 0.001	0.0061 ± 0.0032	<0.001 ± 0.002
Whiskeytown	12/11/96	2/2	0.018 ± 0.007	1.1 ± 0.1	0.010 ± 0.002	0.0075 ± 0.0012	0.0016 ± 0.0009
Whiskeytown	05/29/97	1/2	0.61 ± 0.04	1.7 ± 0.1	0.029 ± 0.004	0.016 ± 0.002	0.0083 ± 0.0006
Whiskeytown	05/29/97	2/2	0.58 ± 0.01	1.7 ± 0.1	0.026 ± 0.002	0.013 ± 0.004	0.0090 ± 0.0005
Spring Cr. arm	07/12/96	1/2	0.029 ± 0.014	0.80 ± 0.07	0.0086 ± 0.0021	0.0034 ± 0.0009	0.0018 ± 0.0012
Spring Cr. arm	07/12/96	2/2	0.027 ± 0.011	0.89 ± 0.03	0.0088 ± 0.0027	0.0079 ± 0.0016	0.0023 ± 0.0012
Spring Cr. arm	09/18/96	1/2	0.047 ± 0.006	1.2 ± 0.0	0.016 ± 0.002	0.0087 ± 0.0033	0.0021 ± 0.0003
Spring Cr. arm	09/18/96	2/2	0.053 ± 0.013	1.7 ± 0.0	0.019 ± 0.004	0.011 ± 0.002	0.0035 ± 0.0013
Spring Cr. arm	11/20/96	1/2	0.35 ± 0.03	11 ± 0	0.10 ± 0.01	0.066 ± 0.004	0.018 ± 0.003
Spring Cr. arm	11/20/96	2/2	0.36 ± 0.03	12 ± 0	0.089 ± 0.003	0.052 ± 0.003	0.016 ± 0.002
Spring Cr. arm	12/11/96	1/2	0.60 ± 0.02	46 ± 2	0.27 ± 0.00	0.14 ± 0.00	0.052 ± 0.001
Spring Cr. arm	12/11/96	2/2	0.59 ± 0.04	49 ± 1	0.30 ± 0.00	0.14 ± 0.00	0.060 ± 0.002
Spring Cr. arm	05/28/97	1/2	0.67 ± 0.02	3.4 ± 0.3	0.034 ± 0.001	0.022 ± 0.002	0.0087 ± 0.0004
Spring Cr. arm	05/28/97	2/2	0.63 ± 0.04	3.1 ± 0.0	0.034 ± 0.003	0.022 ± 0.006	0.011 ± 0.002
Colusa Basin Drain	06/06/97	1/2	3.7 ± 0.1	13 ± 0	0.47 ± 0.03	0.21 ± 0.01	0.11 ± 0.00
Colusa Basin Drain	06/06/97	2/2	3.5 ± 0.1	12 ± 0	0.49 ± 0.01	0.22 ± 0.00	0.11 ± 0.00
Yolo Bypass	01/07/97	1/2	4.9 ± 0.0	17 ± 0	0.72 ± 0.01	0.36 ± 0.00	0.18 ± 0.00
Yolo Bypass	01/07/97	2/2	4.9 ± 0.0	17 ± 0	0.70 ± 0.01	0.36 ± 0.01	0.17 ± 0.00

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES	Iron (µg/L) UV–vis	Iron (II) (µg/L) UV–vis
Sac. R.–Shasta	07/12/96	1/2	0.023 ± 0.000	0.0040 ± 0.0005	147 ± 15	105 ± 2	54 ± 13
Sac. R.–Shasta	07/12/96	2/2	0.031 ± 0.000	0.0036 ± 0.0007	130 ± 28	— ± —	— ± —
Sac. R.–Shasta	09/19/96	1/2	0.021 ± 0.002	0.0032 ± 0.0002	39 ± 6	41 ± —	29 ± —
Sac. R.–Shasta	09/19/96	2/2	0.023 ± 0.005	0.0028 ± 0.0001	71 ± 21	— ± —	— ± —
Sac. R.–Shasta	11/19/96	1/2	0.016 ± 0.004	0.0019 ± 0.0003	49 ± 12	30 ± 0	22 ± 0
Sac. R.–Shasta	11/19/96	2/2	0.017 ± 0.002	0.0017 ± 0.0006	45 ± 13	— ± —	— ± —
Sac. R.–Shasta	12/12/96	1/2	0.027 ± 0.002	0.0037 ± 0.0004	83 ± 9	51 ± —	27 ± —
Sac. R.–Shasta	12/12/96	2/2	0.029 ± 0.004	0.0043 ± 0.0009	83 ± 10	— ± —	— ± —
Sac. R.–Shasta	05/29/97	1/2	0.056 ± 0.007	0.0067 ± 0.0005	338 ± 34	152 ± 3	46 ± 1
Sac. R.–Shasta	05/29/97	2/2	0.057 ± 0.006	0.0069 ± 0.0003	349 ± 18	— ± —	— ± —
Sac. R.–Keswick	07/11/96	1/2	0.028 ± 0.003	0.0041 ± 0.0002	114 ± 15	40 ± 0	16 ± 9
Sac. R.–Keswick	07/11/96	2/2	0.024 ± 0.001	0.0031 ± 0.0009	118 ± 6	— ± —	— ± —
Sac. R.–Keswick	09/19/96	1/2	0.028 ± 0.005	0.0044 ± 0.0002	70 ± 13	40 ± 4	31 ± 2
Sac. R.–Keswick	09/19/96	2/2	0.024 ± 0.004	0.0025 ± 0.0008	33 ± 12	— ± —	— ± —
Sac. R.–Keswick	11/21/96	1/2	0.060 ± 0.006	0.0088 ± 0.0012	248 ± 32	132 ± —	73 ± —
Sac. R.–Keswick	11/21/96	2/2	0.056 ± 0.008	0.0086 ± 0.0004	250 ± 41	— ± —	— ± —
Sac. R.–Keswick	12/11/96	1/2	0.072 ± 0.004	0.0095 ± 0.0007	153 ± 6	101 ± —	37 ± —
Sac. R.–Keswick	12/11/96	2/2	0.074 ± 0.010	0.0097 ± 0.0012	163 ± 11	— ± —	— ± —
Sac. R.–Keswick	01/02/97	1/2	0.16 ± 0.03	0.020 ± 0.001	812 ± 15	436 ± —	145 ± —
Sac. R.–Keswick	01/02/97	2/2	0.16 ± 0.00	0.016 ± 0.000	809 ± 119	— ± —	— ± —
Sac. R.–Keswick	05/28/97	1/2	0.051 ± 0.005	0.0068 ± 0.0010	392 ± 37	167 ± 6	49 ± 2
Sac. R.–Keswick	05/28/97	2/2	0.052 ± 0.006	0.0071 ± 0.0010	380 ± 39	— ± —	— ± —
Sac. R.–Bend Br.	07/11/96	1/2	0.023 ± 0.003	0.0034 ± 0.0009	175 ± 9	181 ± 4	70 ± 0
Sac. R.–Bend Br.	07/11/96	2/2	0.032 ± 0.004	0.0039 ± 0.0004	182 ± 12	— ± —	— ± —
Sac. R.–Bend Br.	09/20/96	1/2	0.028 ± 0.003	0.0035 ± 0.0005	113 ± 7	122 ± —	67 ± —
Sac. R.–Bend Br.	09/20/96	2/2	0.032 ± 0.003	0.0030 ± 0.0000	150 ± 30	— ± —	— ± —
Sac. R.–Bend Br.	11/22/96	1/2	0.077 ± 0.009	0.011 ± 0.000	645 ± 53	385 ± —	248 ± —
Sac. R.–Bend Br.	11/22/96	2/2	0.079 ± 0.003	0.012 ± 0.001	602 ± 20	— ± —	— ± —
Sac. R.–Bend Br.	12/12/96	1/2	0.21 ± 0.01	0.024 ± 0.001	2,080 ± 48	1,060 ± —	397 ± —
Sac. R.–Bend Br.	12/12/96	2/2	0.21 ± 0.01	0.027 ± 0.001	2,070 ± 110	— ± —	— ± —
Sac. R.–Bend Br.	01/03/97	1/2	0.70 ± 0.04	0.086 ± 0.001	7,210 ± 590	2,320 ± —	657 ± —
Sac. R.–Bend Br.	01/03/97	2/2	0.66 ± 0.01	0.083 ± 0.004	7,150 ± 450	— ± —	— ± —

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES	Iron (µg/L) UV–vis	Iron (II) (µg/L) UV–vis
Sac. R.–Bend Br.	05/30/97	1/2	0.052 ± 0.007	0.0066 ± 0.0007	408 ± 34	214 ± 5	79 ± 3
Sac. R.–Bend Br.	05/30/97	2/2	0.054 ± 0.012	0.0071 ± 0.0006	386 ± 3	— ± —	— ± —
Sac. R.–Colusa	07/16/96	1/1	0.23 ± 0.02	0.028 ± 0.000	2,330 ± 120	1,610 ± 11	647 ± 14
Sac. R.–Colusa	09/25/96	1/2	0.057 ± 0.008	0.0084 ± 0.0011	593 ± 72	406 ± —	201 ± —
Sac. R.–Colusa	09/25/96	2/2	0.060 ± 0.004	0.0068 ± 0.0011	596 ± 49	— ± —	— ± —
Sac. R.–Colusa	11/13/96	1/2	0.099 ± 0.006	0.010 ± 0.001	847 ± 11	771 ± —	334 ± —
Sac. R.–Colusa	11/13/96	2/2	0.087 ± 0.004	0.0098 ± 0.0011	826 ± 8	— ± —	— ± —
Sac. R.–Colusa	12/16/96	1/2	0.37 ± 0.00	0.044 ± 0.001	3,830 ± 66	1,860 ± —	478 ± —
Sac. R.–Colusa	12/16/96	2/2	0.41 ± 0.02	0.049 ± 0.001	4,050 ± 130	— ± —	— ± —
Sac. R.–Colusa	01/04/97	1/2	2.1 ± 0.0	0.27 ± 0.00	23,700 ± 5	6,670 ± —	1,640 ± —
Sac. R.–Colusa	01/04/97	2/2	2.1 ± 0.0	0.27 ± 0.00	23,200 ± 21	— ± —	— ± —
Sac. R.–Colusa	06/03/97	1/2	0.13 ± 0.02	0.015 ± 0.001	1,120 ± 61	471 ± 17	148 ± 46
Sac. R.–Colusa	06/03/97	2/2	0.14 ± 0.02	0.015 ± 0.001	1,250 ± 120	— ± —	— ± —
Sac. R.–Verona	07/18/96	1/2	0.12 ± 0.01	0.012 ± 0.000	1,010 ± 29	1,060 ± —	384 ± —
Sac. R.–Verona	07/18/96	2/2	0.12 ± 0.01	0.012 ± 0.001	1,090 ± 64	— ± —	— ± —
Sac. R.–Verona	09/26/96	1/2	0.15 ± 0.02	0.017 ± 0.000	1,590 ± 36	1,370 ± —	544 ± —
Sac. R.–Verona	09/26/96	2/2	0.16 ± 0.01	0.018 ± 0.001	1,590 ± 36	— ± —	— ± —
Sac. R.–Verona	11/14/96	1/2	0.13 ± 0.01	0.013 ± 0.001	1,090 ± 41	850 ± —	331 ± —
Sac. R.–Verona	11/14/96	2/2	0.12 ± 0.01	0.014 ± 0.001	1,090 ± 30	— ± —	— ± —
Sac. R.–Verona	12/18/96	1/2	0.20 ± 0.02	0.025 ± 0.001	1,980 ± 75	986 ± —	294 ± —
Sac. R.–Verona	12/18/96	2/2	0.19 ± 0.01	0.021 ± 0.000	1,870 ± 49	— ± —	— ± —
Sac. R.–Verona	06/04/97	1/2	0.16 ± 0.01	0.019 ± 0.001	1,330 ± 68	532 ± 15	146 ± 33
Sac. R.–Verona	06/04/97	2/2	0.15 ± 0.01	0.018 ± 0.002	1,490 ± 79	— ± —	— ± —
Sac. R.–Freeport	07/17/96	1/2	0.10 ± 0.02	0.011 ± 0.001	861 ± 69	745 ± —	271 ± —
Sac. R.–Freeport	07/17/96	2/2	0.098 ± 0.002	0.0097 ± 0.0014	845 ± 17	— ± —	— ± —
Sac. R.–Freeport	09/24/96	1/2	0.092 ± 0.008	0.0092 ± 0.0005	691 ± 31	540 ± —	237 ± —
Sac. R.–Freeport	09/24/96	2/2	0.079 ± 0.001	0.0087 ± 0.0001	700 ± 19	— ± —	— ± —
Sac. R.–Freeport	11/12/96	1/2	0.044 ± 0.006	0.0066 ± 0.0010	413 ± 41	261 ± 7	127 ± 1
Sac. R.–Freeport	11/12/96	2/2	0.046 ± 0.000	0.0049 ± 0.0005	414 ± 26	— ± —	— ± —
Sac. R.–Freeport	12/17/96	1/2	0.21 ± 0.01	0.026 ± 0.001	2,220 ± 73	983 ± —	305 ± —
Sac. R.–Freeport	12/17/96	2/2	0.22 ± 0.02	0.027 ± 0.002	2,240 ± 84	— ± —	— ± —
Sac. R.–Freeport	01/06/97	1/2	0.98 ± 0.03	0.11 ± 0.00	8,470 ± 94	3,400 ± —	841 ± —
Sac. R.–Freeport	01/06/97	1/2	0.97 ± 0.03	0.11 ± 0.00	8,300 ± 38	— ± —	— ± —
Sac. R.–Freeport	06/05/97	1/2	0.097 ± 0.002	0.012 ± 0.001	852 ± 11	303 ± 26	76 ± 14
Sac. R.–Freeport	06/05/97	2/2	0.11 ± 0.01	0.013 ± 0.001	870 ± 0	— ± —	— ± —
Sac. R.–Freeport, dup	06/05/97	1/2	0.068 ± 0.009	0.0086 ± 0.0011	583 ± 54	204 ± 7	54 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Gadolinium (µg/L) ICP–MS	Holmium (µg/L) ICP–MS	Iron (µg/L) ICP–AES	Iron (µg/L) UV–vis	Iron (II) (µg/L) UV–vis
Sac. R.–Freeport, dup	06/05/97	2/2	0.065 ± 0.002	0.0083 ± 0.0009	580 ± 48	— ± —	— ± —
Flat Cr.	12/11/96	1/2	0.16 ± 0.00	0.023 ± 0.001	227 ± 15	100 ± —	49 ± —
Flat Cr.	12/11/96	2/2	0.15 ± 0.01	0.021 ± 0.001	225 ± 18	— ± —	— ± —
Flat Cr.	05/29/97	1/2	0.057 ± 0.008	0.0083 ± 0.0001	354 ± 34	351 ± 6	153 ± 17
Flat Cr.	05/29/97	2/2	0.055 ± 0.003	0.0087 ± 0.0002	355 ± 39	— ± —	— ± —
Spring Cr.–Weir	12/11/96	1/2	2.8 ± 0.1	0.37 ± 0.00	1,420 ± 50	1,180 ± 4	880 ± 9
Spring Cr.–Weir	12/11/96	2/2	2.8 ± 0.0	0.37 ± 0.00	1,400 ± 33	— ± —	— ± —
Spring Cr.–Weir	05/28/97	1/2	5.0 ± 0.1	0.64 ± 0.00	1,860 ± 92	1,930 ± 150	848 ± 110
Spring Cr.–Weir	05/28/97	2/2	5.1 ± 0.1	0.61 ± 0.00	1,800 ± 12	— ± —	— ± —
Spring Cr.–Road	01/02/97	1/2	1.8 ± 0.0	0.24 ± 0.00	12,800 ± 640	13,300 ± 800	11,800 ± 710
Spring Cr.–Road	01/02/97	2/2	1.8 ± 0.0	0.24 ± 0.00	13,000 ± 920	— ± —	— ± —
Whiskeytown	12/11/96	1/2	0.016 ± 0.002	0.0020 ± 0.0002	45 ± 5	30 ± —	22 ± —
Whiskeytown	12/11/96	2/2	0.014 ± 0.001	0.0024 ± 0.0005	35 ± 9	— ± —	— ± —
Whiskeytown	05/29/97	1/2	0.037 ± 0.003	0.0047 ± 0.0010	563 ± 34	245 ± 1	55 ± 4
Whiskeytown	05/29/97	2/2	0.037 ± 0.005	0.0042 ± 0.0004	560 ± 28	— ± —	— ± —
Spring Cr. arm	07/12/96	1/2	0.014 ± 0.002	0.0020 ± 0.0007	<30 ± 30	40 ± —	27 ± —
Spring Cr. arm	07/12/96	2/2	0.012 ± 0.004	0.0022 ± 0.0013	<30 ± 28	— ± —	— ± —
Spring Cr. arm	09/18/96	1/2	0.024 ± 0.002	0.0024 ± 0.0005	<30 ± 4	35 ± 2	25 ± 1
Spring Cr. arm	09/18/96	2/2	0.028 ± 0.004	0.0031 ± 0.0003	63 ± 20	— ± —	— ± —
Spring Cr. arm	11/20/96	1/2	0.13 ± 0.02	0.018 ± 0.001	213 ± 33	165 ± 5	44 ± 1
Spring Cr. arm	11/20/96	2/2	0.14 ± 0.00	0.018 ± 0.001	218 ± 24	— ± —	— ± —
Spring Cr. arm	12/11/96	1/2	0.38 ± 0.00	0.046 ± 0.000	198 ± 13	162 ± —	42 ± —
Spring Cr. arm	12/11/96	2/2	0.40 ± 0.00	0.048 ± 0.001	201 ± 29	— ± —	— ± —
Spring Cr. arm	05/28/97	1/2	0.054 ± 0.003	0.0085 ± 0.0001	577 ± 62	264 ± 3	64 ± 1
Spring Cr. arm	05/28/97	2/2	0.054 ± 0.005	0.0068 ± 0.0003	529 ± 18	— ± —	— ± —
Colusa Basin Drain	06/06/97	1/2	0.73 ± 0.05	0.073 ± 0.001	6,840 ± 95	1,980 ± 210	202 ± 60
Colusa Basin Drain	06/06/97	2/2	0.72 ± 0.02	0.075 ± 0.001	6,660 ± 32	— ± —	— ± —
Yolo Bypass	01/07/97	1/2	0.93 ± 0.01	0.12 ± 0.00	10,800 ± 510	3,870 ± —	700 ± —
Yolo Bypass	01/07/97	2/2	0.93 ± 0.02	0.12 ± 0.00	10,700 ± 320	— ± —	— ± —

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Lanthanum (μg/L) ICP–MS	Lead (μg/L) ICP–MS	Lithium (μg/L) I0CP–MS	Lutetium (μg/L) ICP–MS	Magnesium (mg/L) ICP–AES
Sac. R.–Shasta	07/12/96	1/2	0.061 ± 0.001	0.056 ± 0.004	1.9 ± 0.5	0.0023 ± 0.0005	4.4 ± 0.3
Sac. R.–Shasta	07/12/96	2/2	0.062 ± 0.005	0.060 ± 0.014	1.4 ± 0.2	0.0022 ± 0.0002	4.1 ± 0.1
Sac. R.–Shasta	09/19/96	1/2	0.043 ± 0.002	0.023 ± 0.005	1.7 ± 0.2	0.0011 ± 0.0007	4.3 ± 0.0
Sac. R.–Shasta	09/19/96	2/2	0.042 ± 0.005	0.043 ± 0.007	2.0 ± 0.0	0.0021 ± 0.0006	4.2 ± 0.1
Sac. R.–Shasta	11/19/96	1/2	0.025 ± 0.000	0.029 ± 0.006	3.2 ± 0.4	0.0014 ± 0.0005	4.7 ± 0.2
Sac. R.–Shasta	11/19/96	2/2	0.023 ± 0.003	0.022 ± 0.001	3.1 ± 0.4	0.0017 ± 0.0008	4.8 ± 0.1
Sac. R.–Shasta	12/12/96	1/2	0.038 ± 0.001	0.076 ± 0.005	2.9 ± 0.1	0.0013 ± 0.0004	5.0 ± 0.1
Sac. R.–Shasta	12/12/96	2/2	0.041 ± 0.000	0.16 ± 0.01	2.8 ± 0.1	0.0020 ± 0.0002	4.8 ± 0.1
Sac. R.–Shasta	05/29/97	1/2	0.12 ± 0.00	0.12 ± 0.00	1.7 ± 0.1	0.0029 ± 0.0005	4.3 ± 0.1
Sac. R.–Shasta	05/29/97	2/2	0.11 ± 0.00	0.11 ± 0.00	1.8 ± 0.2	0.0028 ± 0.0001	4.2 ± 0.1
Sac. R.–Keswick	07/11/96	1/2	0.056 ± 0.003	0.078 ± 0.010	1.4 ± 0.3	0.0018 ± 0.0004	4.5 ± 0.1
Sac. R.–Keswick	07/11/96	2/2	0.052 ± 0.000	0.076 ± 0.003	1.4 ± 0.2	0.0016 ± 0.0005	4.8 ± 0.1
Sac. R.–Keswick	09/19/96	1/2	0.038 ± 0.003	0.051 ± 0.007	1.8 ± 0.3	0.0022 ± 0.0005	5.0 ± 0.2
Sac. R.–Keswick	09/19/96	2/2	0.035 ± 0.002	0.038 ± 0.003	1.3 ± 0.2	0.0009 ± 0.0003	5.2 ± 0.1
Sac. R.–Keswick	11/21/96	1/2	0.046 ± 0.002	0.29 ± 0.00	2.7 ± 0.6	0.0034 ± 0.0015	4.8 ± 0.3
Sac. R.–Keswick	11/21/96	2/2	0.051 ± 0.001	0.30 ± 0.00	2.2 ± 0.1	0.0033 ± 0.0006	4.9 ± 0.2
Sac. R.–Keswick	12/11/96	1/2	0.068 ± 0.003	0.36 ± 0.01	2.5 ± 0.1	0.0034 ± 0.0003	5.3 ± 0.1
Sac. R.–Keswick	12/11/96	2/2	0.065 ± 0.002	0.21 ± 0.00	2.6 ± 0.2	0.0030 ± 0.0004	5.0 ± 0.1
Sac. R.–Keswick	01/02/97	1/2	0.20 ± 0.00	0.55 ± 0.02	2.2 ± 0.2	0.0078 ± 0.0001	4.5 ± 0.2
Sac. R.–Keswick	01/02/97	2/2	0.19 ± 0.00	0.52 ± 0.04	2.0 ± 0.4	0.0068 ± 0.0006	4.4 ± 0.1
Sac. R.–Keswick	05/28/97	1/2	0.097 ± 0.001	0.11 ± 0.00	1.5 ± 0.1	0.0026 ± 0.0005	4.7 ± 0.1
Sac. R.–Keswick	05/28/97	2/2	0.10 ± 0.00	0.097 ± 0.003	1.5 ± 0.2	0.0024 ± 0.0001	4.9 ± 0.0
Sac. R.–Bend Br.	07/11/96	1/2	0.062 ± 0.001	0.091 ± 0.024	1.5 ± 0.3	0.0014 ± 0.0004	4.9 ± 0.4
Sac. R.–Bend Br.	07/11/96	2/2	0.072 ± 0.001	0.10 ± 0.01	1.6 ± 0.5	0.0025 ± 0.0002	4.8 ± 0.1
Sac. R.–Bend Br.	09/20/96	1/2	0.049 ± 0.001	0.065 ± 0.001	1.3 ± 0.2	0.0017 ± 0.0006	5.3 ± 0.1
Sac. R.–Bend Br.	09/20/96	2/2	0.050 ± 0.005	0.078 ± 0.002	2.0 ± 0.5	0.0024 ± 0.0011	5.1 ± 0.2
Sac. R.–Bend Br.	11/22/96	1/2	0.12 ± 0.01	0.41 ± 0.00	3.0 ± 0.5	0.0048 ± 0.0012	5.7 ± 0.1
Sac. R.–Bend Br.	11/22/96	2/2	0.12 ± 0.00	0.43 ± 0.02	3.0 ± 0.7	0.0051 ± 0.0007	5.5 ± 0.3
Sac. R.–Bend Br.	12/12/96	1/2	0.45 ± 0.03	0.69 ± 0.02	3.6 ± 0.0	0.0081 ± 0.0008	6.0 ± 0.1
Sac. R.–Bend Br.	12/12/96	2/2	0.47 ± 0.04	1.1 ± 0.0	3.7 ± 0.1	0.0096 ± 0.0005	5.9 ± 0.3
Sac. R.–Bend Br.	01/03/97	1/2	1.7 ± 0.1	2.3 ± 0.1	6.0 ± 0.1	0.030 ± 0.002	6.6 ± 0.0
Sac. R.–Bend Br.	01/03/97	2/2	1.7 ± 0.0	2.2 ± 0.0	6.6 ± 0.3	0.030 ± 0.001	6.1 ± 0.5

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Lanthanum (µg/L) ICP–MS	Lead (µg/L) ICP–MS	Lithium (µg/L) IOCP–MS	Lutetium (µg/L) ICP–MS	Magnesium (mg/L) ICP–AES
Sac. R.–Bend Br.	05/30/97	1/2	0.097 ± 0.002	0.16 ± 0.00	1.6 ± 0.1	0.0033 ± 0.0003	5.2 ± 0.2
Sac. R.–Bend Br.	05/30/97	2/2	0.10 ± 0.00	0.16 ± 0.01	1.6 ± 0.2	0.0027 ± 0.0003	5.1 ± 0.1
Sac. R.–Colusa	07/16/96	1/1	0.44 ± 0.11	0.73 ± 0.02	3.5 ± 0.0	0.0083 ± 0.0004	6.1 ± 0.5
Sac. R.–Colusa	09/25/96	1/2	0.12 ± 0.00	0.16 ± 0.00	2.6 ± 0.3	0.0040 ± 0.0006	5.7 ± 0.3
Sac. R.–Colusa	09/25/96	2/2	0.14 ± 0.00	0.19 ± 0.02	3.0 ± 0.5	0.0025 ± 0.0011	5.7 ± 0.2
Sac. R.–Colusa	11/13/96	1/2	0.18 ± 0.01	0.25 ± 0.01	3.3 ± 0.1	0.0036 ± 0.0004	6.6 ± 0.2
Sac. R.–Colusa	11/13/96	2/2	0.18 ± 0.01	0.24 ± 0.00	3.4 ± 0.0	0.0035 ± 0.0006	6.6 ± 0.4
Sac. R.–Colusa	12/16/96	1/2	0.75 ± 0.02	1.1 ± 0.0	5.3 ± 0.1	0.016 ± 0.000	6.9 ± 0.2
Sac. R.–Colusa	12/16/96	2/2	0.87 ± 0.03	5.2 ± 0.0	5.6 ± 0.0	0.016 ± 0.001	6.9 ± 0.0
Sac. R.–Colusa	01/04/97	1/2	4.2 ± 0.3	7.8 ± 0.0	24 ± 0	0.098 ± 0.000	12 ± 1
Sac. R.–Colusa	01/04/97	2/2	4.4 ± 0.1	7.6 ± 0.0	23 ± 1	0.098 ± 0.001	13 ± 0
Sac. R.–Colusa	06/03/97	1/2	0.23 ± 0.04	0.37 ± 0.02	2.6 ± 0.1	0.0054 ± 0.0011	5.9 ± 0.1
Sac. R.–Colusa	06/03/97	2/2	0.22 ± 0.06	0.40 ± 0.04	2.6 ± 0.1	0.0059 ± 0.0003	6.2 ± 0.7
Sac. R.–Verona	07/18/96	1/2	0.28 ± 0.02	0.41 ± 0.01	1.9 ± 0.0	0.0043 ± 0.0006	4.9 ± 0.5
Sac. R.–Verona	07/18/96	2/2	0.24 ± 0.06	0.41 ± 0.03	1.9 ± 0.0	0.0049 ± 0.0005	4.9 ± 0.2
Sac. R.–Verona	09/26/96	1/2	0.32 ± 0.02	0.42 ± 0.02	2.9 ± 0.1	0.0060 ± 0.0008	7.3 ± 0.0
Sac. R.–Verona	09/26/96	2/2	0.32 ± 0.01	0.43 ± 0.02	2.9 ± 0.1	0.0063 ± 0.0005	7.4 ± 0.1
Sac. R.–Verona	11/14/96	1/2	0.26 ± 0.03	0.37 ± 0.02	2.6 ± 0.1	0.0045 ± 0.0005	7.7 ± 0.2
Sac. R.–Verona	11/14/96	2/2	0.24 ± 0.06	0.39 ± 0.02	2.7 ± 0.1	0.0051 ± 0.0009	7.7 ± 0.3
Sac. R.–Verona	12/18/96	1/2	0.47 ± 0.03	2.2 ± 0.0	2.8 ± 0.0	0.0092 ± 0.0010	5.6 ± 0.1
Sac. R.–Verona	12/18/96	2/2	0.41 ± 0.03	0.60 ± 0.01	2.8 ± 0.1	0.0086 ± 0.0004	5.6 ± 0.1
Sac. R.–Verona	06/04/97	1/2	0.33 ± 0.03	0.50 ± 0.01	2.4 ± 0.2	0.0063 ± 0.0003	6.5 ± 0.6
Sac. R.–Verona	06/04/97	2/2	0.28 ± 0.07	0.52 ± 0.02	2.5 ± 0.0	0.0066 ± 0.0005	6.6 ± 0.5
Sac. R.–Freeport	07/17/96	1/2	0.29 ± 0.02	0.36 ± 0.00	1.3 ± 0.1	0.0057 ± 0.0002	4.6 ± 0.1
Sac. R.–Freeport	07/17/96	2/2	0.24 ± 0.00	0.38 ± 0.01	1.4 ± 0.0	0.0039 ± 0.0002	4.4 ± 0.0
Sac. R.–Freeport	09/24/96	1/2	0.20 ± 0.00	0.29 ± 0.00	2.4 ± 0.0	0.0045 ± 0.0008	6.4 ± 0.1
Sac. R.–Freeport	09/24/96	2/2	0.20 ± 0.00	0.27 ± 0.01	1.8 ± 0.2	0.0039 ± 0.0006	6.7 ± 0.0
Sac. R.–Freeport	11/12/96	1/2	0.092 ± 0.003	0.14 ± 0.01	2.2 ± 0.3	0.0022 ± 0.0014	5.7 ± 0.1
Sac. R.–Freeport	11/12/96	2/2	0.094 ± 0.003	0.14 ± 0.01	2.2 ± 0.5	0.0023 ± 0.0011	5.6 ± 0.1
Sac. R.–Freeport	12/17/96	1/2	0.55 ± 0.01	1.4 ± 0.0	2.5 ± 0.1	0.010 ± 0.000	4.9 ± 0.2
Sac. R.–Freeport	12/17/96	2/2	0.58 ± 0.02	0.81 ± 0.02	2.5 ± 0.0	0.011 ± 0.001	4.7 ± 0.4
Sac. R.–Freeport	01/06/97	1/2	4.6 ± 0.2	4.4 ± 0.1	4.9 ± 0.1	0.046 ± 0.002	3.9 ± 0.5
Sac. R.–Freeport	01/06/97	1/2	4.7 ± 0.2	4.5 ± 0.0	4.8 ± 0.0	0.046 ± 0.000	3.9 ± 0.4
Sac. R.–Freeport	06/05/97	1/2	0.23 ± 0.00	0.39 ± 0.01	1.8 ± 0.1	0.0043 ± 0.0005	5.4 ± 0.1
Sac. R.–Freeport	06/05/97	2/2	0.23 ± 0.01	0.38 ± 0.01	1.8 ± 0.2	0.0046 ± 0.0003	5.4 ± 0.2
Sac. R.–Freeport, dup	06/05/97	1/2	0.16 ± 0.01	0.26 ± 0.01	1.6 ± 0.2	0.0032 ± 0.0001	5.3 ± 0.1

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Lanthanum (µg/L) ICP–MS	Lead (µg/L) ICP–MS	Lithium (µg/L) I0CP–MS	Lutetium (µg/L) ICP–MS	Magnesium (mg/L) ICP–AES
Sac. R.–Freeport, dup	06/05/97	2/2	0.16 ± 0.00	0.29 ± 0.01	1.7 ± 0.3	0.0039 ± 0.0002	5.3 ± 0.1
Flat Cr.	12/11/96	1/2	0.073 ± 0.000	0.15 ± 0.00	0.43 ± 0.06	0.0099 ± 0.0008	1.7 ± 0.0
Flat Cr.	12/11/96	2/2	0.065 ± 0.002	0.23 ± 0.01	0.44 ± 0.13	0.0094 ± 0.0004	1.7 ± 0.1
Flat Cr.	05/29/97	1/2	0.019 ± 0.002	0.034 ± 0.008	0.17 ± 0.06	0.0048 ± 0.0002	6.8 ± 0.5
Flat Cr.	05/29/97	2/2	0.020 ± 0.003	0.020 ± 0.004	<0.1 ± 0.1	0.0043 ± 0.0002	7.1 ± 0.2
Spring Cr.–Weir	12/11/96	1/2	2.0 ± 0.0	1.4 ± 0.1	3.2 ± 0.0	0.12 ± 0.00	3.7 ± 0.2
Spring Cr.–Weir	12/11/96	2/2	2.1 ± 0.0	1.4 ± 0.0	3.3 ± 0.1	0.11 ± 0.00	3.7 ± 0.1
Spring Cr.–Weir	05/28/97	1/2	3.8 ± 0.0	3.8 ± 0.0	8.9 ± 0.4	0.17 ± 0.01	15 ± 1
Spring Cr.–Weir	05/28/97	2/2	3.9 ± 0.2	3.7 ± 0.1	9.1 ± 0.1	0.16 ± 0.00	15 ± 0
Spring Cr.–Road	01/02/97	1/2	1.5 ± 0.0	4.0 ± 0.0	1.7 ± 0.0	0.076 ± 0.001	3.2 ± 0.2
Spring Cr.–Road	01/02/97	2/2	1.4 ± 0.0	4.0 ± 0.1	1.8 ± 0.1	0.072 ± 0.000	3.3 ± 0.3
Whiskeytown	12/11/96	1/2	0.015 ± 0.001	0.069 ± 0.002	0.87 ± 0.09	<0.0008 ± 0.0001	5.7 ± 0.4
Whiskeytown	12/11/96	2/2	0.018 ± 0.001	0.052 ± 0.009	0.68 ± 0.19	0.0013 ± 0.0003	5.5 ± 0.2
Whiskeytown	05/29/97	1/2	0.067 ± 0.001	0.12 ± 0.01	0.90 ± 0.16	0.0020 ± 0.0004	6.5 ± 0.2
Whiskeytown	05/29/97	2/2	0.065 ± 0.003	0.12 ± 0.00	0.89 ± 0.15	0.0017 ± 0.0003	6.4 ± 0.2
Spring Cr. arm	07/12/96	1/2	0.013 ± 0.001	0.030 ± 0.008	0.40 ± 0.08	0.0010 ± 0.00092	6.1 ± 0.1
Spring Cr. arm	07/12/96	2/2	0.015 ± 0.001	0.031 ± 0.004	0.45 ± 0.03	0.0011 ± 0.0005	6.1 ± 0.0
Spring Cr. arm	09/18/96	1/2	0.019 ± 0.001	0.026 ± 0.016	0.72 ± 0.12	0.0015 ± 0.0004	6.3 ± 0.2
Spring Cr. arm	09/18/96	2/2	0.023 ± 0.001	0.047 ± 0.007	1.1 ± 0.1	0.0016 ± 0.0006	6.2 ± 0.1
Spring Cr. arm	11/20/96	1/2	0.085 ± 0.002	0.11 ± 0.01	1.1 ± 0.3	0.0079 ± 0.0010	6.2 ± 0.3
Spring Cr. arm	11/20/96	2/2	0.085 ± 0.001	0.10 ± 0.01	1.1 ± 0.3	0.0059 ± 0.0009	6.1 ± 0.4
Spring Cr. arm	12/11/96	1/2	0.25 ± 0.00	0.26 ± 0.00	1.2 ± 0.2	0.015 ± 0.000	5.5 ± 0.2
Spring Cr. arm	12/11/96	2/2	0.28 ± 0.00	0.26 ± 0.01	1.2 ± 0.2	0.014 ± 0.001	5.5 ± 0.1
Spring Cr. arm	05/28/97	1/2	0.078 ± 0.005	0.080 ± 0.001	1.1 ± 0.1	0.0028 ± 0.0009	6.4 ± 0.0
Spring Cr. arm	05/28/97	2/2	0.079 ± 0.001	0.086 ± 0.005	0.96 ± 0.13	0.0029 ± 0.0008	6.4 ± 0.1
Colusa Basin Drain	06/06/97	1/2	1.4 ± 0.2	2.2 ± 0.0	15 ± 1	0.024 ± 0.000	29 ± 1
Colusa Basin Drain	06/06/97	2/2	1.5 ± 0.1	2.1 ± 0.0	15 ± 0	0.024 ± 0.001	30 ± 1
Yolo Bypass	01/07/97	1/2	2.2 ± 0.0	3.5 ± 0.0	8.5 ± 0.3	0.046 ± 0.001	6.8 ± 0.5
Yolo Bypass	01/07/97	2/2	2.1 ± 0.0	3.5 ± 0.1	8.4 ± 0.1	0.043 ± 0.000	7.4 ± 0.3

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Manganese (µg/L) ICP–MS	Mercury (mg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS	Nickel (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	3.8 ± 0.2	0.0007 ± 0.0003	0.38 ± 0.02	0.091 ± 0.003	1.0 ± 0.1
Sac. R.–Shasta	07/12/96	2/2	3.3 ± 0.3	0.0009 ± 0.0002	0.34 ± 0.01	0.087 ± 0.007	0.87 ± 0.05
Sac. R.–Shasta	09/19/96	1/2	4.5 ± 0.1	<0.0004 ± 0.0002	0.32 ± 0.02	0.060 ± 0.006	1.0 ± 0.0
Sac. R.–Shasta	09/19/96	2/2	5.3 ± 0.4	<0.0004 ± 0.0002	0.40 ± 0.02	0.060 ± 0.007	1.4 ± 0.1
Sac. R.–Shasta	11/19/96	1/2	21 ± 1	0.0010 ± 0.0001	0.56 ± 0.03	0.030 ± 0.005	0.70 ± 0.07
Sac. R.–Shasta	11/19/96	2/2	21 ± 1	0.0008 ± 0.0001	0.56 ± 0.01	0.033 ± 0.007	0.89 ± 0.27
Sac. R.–Shasta	12/12/96	1/2	7.9 ± 0.4	0.0007 ± 0.0001	0.49 ± 0.01	0.064 ± 0.011	0.85 ± 0.03
Sac. R.–Shasta	12/12/96	2/2	7.8 ± 0.4	0.0011 ± 0.0002	0.52 ± 0.01	0.076 ± 0.005	0.87 ± 0.03
Sac. R.–Shasta	05/29/97	1/2	5.1 ± 0.4	0.0024 ± 0.0002	0.32 ± 0.01	0.17 ± 0.01	2.4 ± 0.2
Sac. R.–Shasta	05/29/97	2/2	5.0 ± 0.2	0.0024 ± 0.0004	0.33 ± 0.04	0.16 ± 0.00	2.5 ± 0.0
Sac. R.–Keswick	07/11/96	1/2	4.2 ± 0.3	0.0010 ± 0.0002	0.29 ± 0.03	0.078 ± 0.003	1.6 ± 0.1
Sac. R.–Keswick	07/11/96	2/2	4.2 ± 0.2	0.0012 ± 0.0000	0.27 ± 0.03	0.077 ± 0.006	1.5 ± 0.0
Sac. R.–Keswick	09/19/96	1/2	6.3 ± 0.3	0.0006 ± 0.0002	0.29 ± 0.03	0.052 ± 0.005	2.7 ± 0.2
Sac. R.–Keswick	09/19/96	2/2	5.3 ± 0.3	0.0010 ± 0.0002	0.24 ± 0.02	0.055 ± 0.006	2.0 ± 0.1
Sac. R.–Keswick	11/21/96	1/2	22 ± 2	0.0026 ± 0.0003	0.44 ± 0.04	0.099 ± 0.010	1.2 ± 0.1
Sac. R.–Keswick	11/21/96	2/2	21 ± 1	0.0021 ± 0.0001	0.40 ± 0.01	0.10 ± 0.00	1.3 ± 0.2
Sac. R.–Keswick	12/11/96	1/2	12 ± 0	0.0017 ± 0.0003	0.43 ± 0.00	0.14 ± 0.01	1.1 ± 0.0
Sac. R.–Keswick	12/11/96	2/2	12 ± 0	0.0016 ± 0.0001	0.43 ± 0.02	0.14 ± 0.01	1.0 ± 0.1
Sac. R.–Keswick	01/02/97	1/2	25 ± 0	0.0075 ± 0.0003	0.35 ± 0.03	0.37 ± 0.03	1.6 ± 0.0
Sac. R.–Keswick	01/02/97	2/2	25 ± 3	0.0082 ± 0.0004	0.33 ± 0.04	0.39 ± 0.01	1.6 ± 0.0
Sac. R.–Keswick	05/28/97	1/2	7.2 ± 0.5	0.0023 ± 0.0004	0.24 ± 0.01	0.15 ± 0.01	6.8 ± 0.2
Sac. R.–Keswick	05/28/97	2/2	7.1 ± 0.6	0.0050 ± 0.0002	0.23 ± 0.02	0.15 ± 0.01	7.0 ± 0.4
Sac. R.–Bend Br.	07/11/96	1/2	6.5 ± 0.2	0.0015 ± 0.0002	0.30 ± 0.01	0.090 ± 0.009	1.7 ± 0.0
Sac. R.–Bend Br.	07/11/96	2/2	7.1 ± 0.4	0.0017 ± 0.0002	0.39 ± 0.01	0.091 ± 0.011	1.7 ± 0.1
Sac. R.–Bend Br.	09/20/96	1/2	7.4 ± 0.3	0.0019 ± 0.0001	0.25 ± 0.00	0.071 ± 0.007	1.9 ± 0.0
Sac. R.–Bend Br.	09/20/96	2/2	8.5 ± 0.7	0.0006 ± 0.0001	0.31 ± 0.01	0.064 ± 0.004	2.6 ± 0.1
Sac. R.–Bend Br.	11/22/96	1/2	28 ± 2	0.0033 ± 0.0004	0.46 ± 0.03	0.18 ± 0.00	3.5 ± 0.3
Sac. R.–Bend Br.	11/22/96	2/2	29 ± 1	0.0034 ± 0.0001	0.44 ± 0.03	0.18 ± 0.01	3.3 ± 0.1
Sac. R.–Bend Br.	12/12/96	1/2	51 ± 1	0.0072 ± 0.0001	0.31 ± 0.02	0.62 ± 0.04	9.1 ± 0.2
Sac. R.–Bend Br.	12/12/96	2/2	52 ± 1	0.0064 ± 0.0006	0.31 ± 0.03	0.65 ± 0.05	10 ± 0
Sac. R.–Bend Br.	01/03/97	1/2	148 ± 2	0.019 ± 0.000	0.21 ± 0.01	2.3 ± 0.2	16 ± 1
Sac. R.–Bend Br.	01/03/97	2/2	149 ± 0	— ± —	0.22 ± 0.01	2.2 ± 0.0	16 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Manganese (µg/L) ICP–MS	Mercury (mg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS	Nickel (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	9.6 ± 0.6	0.0032 ± 0.0004	0.30 ± 0.01	0.15 ± 0.00	6.5 ± 0.1
Sac. R.–Bend Br.	05/30/97	2/2	9.8 ± 0.7	0.0025 ± 0.0004	0.27 ± 0.03	0.15 ± 0.00	6.7 ± 0.3
Sac. R.–Colusa	07/16/96	1/1	50 ± 3	0.0065 ± 0.0001	0.22 ± 0.01	0.59 ± 0.10	7.9 ± 0.5
Sac. R.–Colusa	09/25/96	1/2	20 ± 2	0.0017 ± 0.0003	0.53 ± 0.18	0.14 ± 0.00	3.3 ± 0.3
Sac. R.–Colusa	09/25/96	2/2	20 ± 1	0.0017 ± 0.0003	0.43 ± 0.02	0.16 ± 0.01	3.3 ± 0.3
Sac. R.–Colusa	11/13/96	1/2	25 ± 0	0.0022 ± 0.0001	0.34 ± 0.00	0.25 ± 0.01	3.1 ± 0.2
Sac. R.–Colusa	11/13/96	2/2	25 ± 0	0.0025 ± 0.0001	0.37 ± 0.02	0.24 ± 0.00	3.1 ± 0.1
Sac. R.–Colusa	12/16/96	1/2	82 ± 1	0.010 ± 0.000	0.27 ± 0.03	1.1 ± 0.0	11 ± 0
Sac. R.–Colusa	12/16/96	2/2	94 ± 1	0.010 ± 0.001	0.32 ± 0.02	1.2 ± 0.0	11 ± 0
Sac. R.–Colusa	01/04/97	1/2	467 ± 2	0.081 ± 0.000	0.23 ± 0.01	6.3 ± 0.1	52 ± 1
Sac. R.–Colusa	01/04/97	2/2	458 ± 1	0.081 ± 0.000	0.28 ± 0.09	6.2 ± 0.0	51 ± 0
Sac. R.–Colusa	06/03/97	1/2	30 ± 2	0.0047 ± 0.0001	0.28 ± 0.02	0.33 ± 0.06	7.1 ± 0.4
Sac. R.–Colusa	06/03/97	2/2	34 ± 3	0.0044 ± 0.0001	0.29 ± 0.05	0.32 ± 0.06	7.5 ± 0.9
Sac. R.–Verona	07/18/96	1/2	33 ± 1	0.0043 ± 0.0001	0.29 ± 0.03	0.34 ± 0.02	3.8 ± 0.1
Sac. R.–Verona	07/18/96	2/2	36 ± 2	0.0048 ± 0.0001	0.30 ± 0.04	0.30 ± 0.06	4.2 ± 0.4
Sac. R.–Verona	09/26/96	1/2	44 ± 0	0.0047 ± 0.0000	0.39 ± 0.03	0.44 ± 0.01	4.2 ± 0.1
Sac. R.–Verona	09/26/96	2/2	44 ± 0	0.0052 ± 0.0001	0.37 ± 0.00	0.44 ± 0.02	4.1 ± 0.1
Sac. R.–Verona	11/14/96	1/2	55 ± 2	0.0036 ± 0.0004	0.48 ± 0.00	0.33 ± 0.03	3.4 ± 0.4
Sac. R.–Verona	11/14/96	2/2	55 ± 1	— ± —	0.44 ± 0.01	0.32 ± 0.05	3.4 ± 0.1
Sac. R.–Verona	12/18/96	1/2	49 ± 1	0.0072 ± 0.0005	0.26 ± 0.02	0.64 ± 0.04	5.9 ± 0.1
Sac. R.–Verona	12/18/96	2/2	46 ± 0	0.0073 ± 0.0001	0.25 ± 0.00	0.56 ± 0.03	5.4 ± 0.2
Sac. R.–Verona	06/04/97	1/2	48 ± 2	0.0055 ± 0.0003	0.35 ± 0.03	0.45 ± 0.02	5.5 ± 0.1
Sac. R.–Verona	06/04/97	2/2	54 ± 4	0.0047 ± 0.0000	0.35 ± 0.01	0.40 ± 0.09	6.3 ± 0.5
Sac. R.–Freeport	07/17/96	1/2	30 ± 1	0.0042 ± 0.0004	0.31 ± 0.05	0.33 ± 0.00	2.4 ± 0.0
Sac. R.–Freeport	07/17/96	2/2	29 ± 1	0.0041 ± 0.0003	0.28 ± 0.03	0.32 ± 0.00	2.5 ± 0.0
Sac. R.–Freeport	09/24/96	1/2	34 ± 3	0.0025 ± 0.0003	0.52 ± 0.02	0.24 ± 0.00	3.0 ± 0.3
Sac. R.–Freeport	09/24/96	2/2	27 ± 1	0.0022 ± 0.0004	0.41 ± 0.04	0.27 ± 0.01	2.1 ± 0.1
Sac. R.–Freeport	11/12/96	1/2	21 ± 1	0.0013 ± 0.0003	0.49 ± 0.02	0.13 ± 0.01	1.7 ± 0.2
Sac. R.–Freeport	11/12/96	2/2	21 ± 1	0.0018 ± 0.0006	0.48 ± 0.03	0.11 ± 0.00	1.6 ± 0.1
Sac. R.–Freeport	12/17/96	1/2	55 ± 0	0.0097 ± 0.0001	0.18 ± 0.01	0.71 ± 0.01	6.6 ± 0.1
Sac. R.–Freeport	12/17/96	2/2	57 ± 1	0.0094 ± 0.0001	0.19 ± 0.01	0.74 ± 0.03	6.5 ± 0.1
Sac. R.–Freeport	01/06/97	1/2	201 ± 1	0.028 ± 0.000	0.14 ± 0.01	4.8 ± 0.0	17 ± 0
Sac. R.–Freeport	01/06/97	1/2	194 ± 6	0.030 ± 0.000	0.15 ± 0.01	4.7 ± 0.2	16 ± 0
Sac. R.–Freeport	06/05/97	1/2	31 ± 1	0.0051 ± 0.0003	0.35 ± 0.01	0.30 ± 0.00	3.7 ± 0.2
Sac. R.–Freeport	06/05/97	2/2	32 ± 0	0.0046 ± 0.0002	0.35 ± 0.01	0.29 ± 0.01	3.8 ± 0.3
Sac. R.–Freeport, dup	06/05/97	1/2	23 ± 2	0.0031 ± 0.0001	0.37 ± 0.01	0.21 ± 0.01	2.7 ± 0.2

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Manganese (µg/L) ICP–MS	Mercury (mg/L) CV–AFS	Molybdenum (µg/L) ICP–MS	Neodymium (µg/L) ICP–MS	Nickel (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	23 ± 1	0.0033 ± 0.0003	0.37 ± 0.04	0.22 ± 0.01	2.7 ± 0.2
Flat Cr.	12/11/96	1/2	19 ± 1	0.0031 ± 0.0004	<0.08 ± 0.01	0.23 ± 0.01	0.94 ± 0.00
Flat Cr.	12/11/96	2/2	19 ± 1	0.0035 ± 0.0000	<0.08 ± 0.01	0.21 ± 0.01	1.3 ± 0.2
Flat Cr.	05/29/97	1/2	119 ± 7	0.0019 ± 0.0000	0.24 ± 0.02	0.069 ± 0.007	0.13 ± 0.02
Flat Cr.	05/29/97	2/2	114 ± 3	0.0021 ± 0.0002	0.22 ± 0.03	0.073 ± 0.002	0.12 ± 0.03
Spring Cr.–Weir	12/11/96	1/2	160 ± 1	0.012 ± 0.000	<0.1 ± 0.0	4.8 ± 0.0	1.6 ± 0.0
Spring Cr.–Weir	12/11/96	2/2	161 ± 2	0.014 ± 0.000	<0.1 ± 0.0	5.0 ± 0.1	1.6 ± 0.1
Spring Cr.–Weir	05/28/97	1/2	536 ± 4	0.0092 ± 0.0004	<0.09 ± 0.00	8.7 ± 0.1	4.4 ± 0.1
Spring Cr.–Weir	05/28/97	2/2	531 ± 8	0.0088 ± 0.0002	<0.09 ± 0.03	8.8 ± 0.3	4.2 ± 0.2
Spring Cr.–Road	01/02/97	1/2	197 ± 3	0.038 ± 0.000	<0.1 ± 0.0	3.3 ± 0.0	1.8 ± 0.0
Spring Cr.–Road	01/02/97	2/2	200 ± 7	0.042 ± 0.000	<0.1 ± 0.0	3.3 ± 0.0	1.8 ± 0.1
Whiskeytown	12/11/96	1/2	5.8 ± 0.1	0.0009 ± 0.00035	0.15 ± 0.01	0.022 ± 0.001	2.6 ± 0.1
Whiskeytown	12/11/96	2/2	5.8 ± 0.2	0.0010 ± 0.0003	0.15 ± 0.04	0.026 ± 0.002	2.3 ± 0.1
Whiskeytown	05/29/97	1/2	12 ± 1	0.0028 ± 0.0002	<0.08 ± 0.02	0.095 ± 0.007	21 ± 1
Whiskeytown	05/29/97	2/2	12 ± 1	0.0028 ± 0.0003	0.11 ± 0.04	0.088 ± 0.007	20 ± 0
Spring Cr. arm	07/12/96	1/2	4.4 ± 0.5	0.0012 ± 0.0001	0.086 ± 0.009	0.026 ± 0.006	3.5 ± 0.4
Spring Cr. arm	07/12/96	2/2	4.6 ± 0.4	0.0011 ± 0.0002	0.090 ± 0.020	0.024 ± 0.006	3.4 ± 0.0
Spring Cr. arm	09/18/96	1/2	6.1 ± 0.1	0.0010 ± 0.00018	0.090 ± 0.017	0.037 ± 0.003	3.6 ± 0.1
Spring Cr. arm	09/18/96	2/2	7.3 ± 0.4	0.0009 ± 0.00025	0.11 ± 0.00	0.044 ± 0.007	4.9 ± 0.3
Spring Cr. arm	11/20/96	1/2	24 ± 2	0.0010 ± 0.0002	0.13 ± 0.00	0.21 ± 0.01	3.6 ± 0.3
Spring Cr. arm	11/20/96	2/2	24 ± 2	0.0013 ± 0.0002	0.15 ± 0.01	0.20 ± 0.02	3.7 ± 0.2
Spring Cr. arm	12/11/96	1/2	26 ± 1	0.0035 ± 0.0003	0.098 ± 0.008	0.60 ± 0.02	2.5 ± 0.1
Spring Cr. arm	12/11/96	2/2	26 ± 2	0.0031 ± 0.0002	0.11 ± 0.02	0.65 ± 0.01	2.5 ± 0.2
Spring Cr. arm	05/28/97	1/2	14 ± 1	0.0040 ± 0.0002	0.086 ± 0.009	0.11 ± 0.00	20 ± 1
Spring Cr. arm	05/28/97	2/2	14 ± 1	0.0040 ± 0.0000	<0.08 ± 0.01	0.12 ± 0.01	20 ± 1
Colusa Basin Drain	06/06/97	1/2	284 ± 3	0.0083 ± 0.0001	2.1 ± 0.1	2.0 ± 0.3	24 ± 1
Colusa Basin Drain	06/06/97	2/2	278 ± 2	0.0098 ± 0.0002	2.0 ± 0.0	2.1 ± 0.1	23 ± 1
Yolo Bypass	01/07/97	1/2	206 ± 3	0.046 ± 0.000	0.20 ± 0.01	3.0 ± 0.0	25 ± 0
Yolo Bypass	01/07/97	2/2	204 ± 1	0.046 ± 0.001	0.20 ± 0.01	3.0 ± 0.0	25 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Potassium (mg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS	Samarium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	1.1 ± 0.0	0.018 ± 0.002	<0.001 ± 0.001	2.1 ± 0.0	0.022 ± 0.002
Sac. R.–Shasta	07/12/96	2/2	1.1 ± 0.0	0.019 ± 0.000	<0.001 ± 0.000	2.1 ± 0.2	0.023 ± 0.002
Sac. R.–Shasta	09/19/96	1/2	0.97 ± 0.00	0.011 ± 0.001	<0.001 ± 0.001	2.0 ± 0.1	0.017 ± 0.004
Sac. R.–Shasta	09/19/96	2/2	0.96 ± 0.01	0.011 ± 0.000	0.0017 ± 0.0007	2.2 ± 0.0	0.025 ± 0.012
Sac. R.–Shasta	11/19/96	1/2	1.2 ± 0.0	0.0067 ± 0.0009	0.0025 ± 0.0017	3.2 ± 0.1	0.015 ± 0.006
Sac. R.–Shasta	11/19/96	2/2	1.2 ± 0.0	0.0067 ± 0.0006	0.0032 ± 0.0009	3.2 ± 0.1	0.0099 ± 0.0135
Sac. R.–Shasta	12/12/96	1/2	1.4 ± 0.0	0.012 ± 0.000	<0.002 ± 0.001	3.2 ± 0.0	0.020 ± 0.001
Sac. R.–Shasta	12/12/96	2/2	1.3 ± 0.0	0.013 ± 0.001	<0.002 ± 0.001	3.1 ± 0.1	0.024 ± 0.004
Sac. R.–Shasta	05/29/97	1/2	1.1 ± 0.0	0.035 ± 0.002	<0.002 ± 0.001	2.1 ± 0.1	0.047 ± 0.000
Sac. R.–Shasta	05/29/97	2/2	1.1 ± 0.0	0.033 ± 0.001	<0.002 ± 0.000	2.0 ± 0.0	0.044 ± 0.004
Sac. R.–Keswick	07/11/96	1/2	0.90 ± 0.02	0.016 ± 0.001	<0.001 ± 0.000	1.7 ± 0.1	0.015 ± 0.004
Sac. R.–Keswick	07/11/96	2/2	0.91 ± 0.02	0.015 ± 0.001	<0.001 ± 0.001	1.7 ± 0.1	0.022 ± 0.006
Sac. R.–Keswick	09/19/96	1/2	0.69 ± 0.00	0.010 ± 0.002	<0.001 ± 0.001	1.4 ± 0.1	0.019 ± 0.003
Sac. R.–Keswick	09/19/96	2/2	0.69 ± 0.00	0.011 ± 0.001	<0.001 ± 0.001	1.3 ± 0.0	0.014 ± 0.002
Sac. R.–Keswick	11/21/96	1/2	1.0 ± 0.0	0.018 ± 0.000	0.0035 ± 0.0007	2.5 ± 0.0	0.036 ± 0.008
Sac. R.–Keswick	11/21/96	2/2	1.0 ± 0.0	0.020 ± 0.000	0.0021 ± 0.0009	2.4 ± 0.0	0.047 ± 0.006
Sac. R.–Keswick	12/11/96	1/2	1.2 ± 0.0	0.025 ± 0.002	<0.002 ± 0.001	2.7 ± 0.0	0.043 ± 0.004
Sac. R.–Keswick	12/11/96	2/2	1.2 ± 0.0	0.022 ± 0.001	<0.002 ± 0.000	2.7 ± 0.0	0.046 ± 0.002
Sac. R.–Keswick	01/02/97	1/2	1.1 ± 0.0	0.071 ± 0.004	<0.001 ± 0.000	2.5 ± 0.1	0.095 ± 0.002
Sac. R.–Keswick	01/02/97	2/2	1.1 ± 0.0	0.065 ± 0.001	<0.001 ± 0.001	2.5 ± 0.0	0.12 ± 0.01
Sac. R.–Keswick	05/28/97	1/2	0.90 ± 0.01	0.030 ± 0.003	<0.002 ± 0.001	1.6 ± 0.1	0.037 ± 0.003
Sac. R.–Keswick	05/28/97	2/2	0.89 ± 0.01	0.028 ± 0.002	<0.002 ± 0.000	1.6 ± 0.1	0.042 ± 0.002
Sac. R.–Bend Br.	07/11/96	1/2	0.94 ± 0.00	0.018 ± 0.001	0.0012 ± 0.0013	1.7 ± 0.1	0.023 ± 0.004
Sac. R.–Bend Br.	07/11/96	2/2	0.94 ± 0.02	0.019 ± 0.001	<0.001 ± 0.000	1.7 ± 0.0	0.026 ± 0.007
Sac. R.–Bend Br.	09/20/96	1/2	0.83 ± 0.01	0.015 ± 0.001	<0.001 ± 0.001	1.6 ± 0.0	0.022 ± 0.006
Sac. R.–Bend Br.	09/20/96	2/2	0.82 ± 0.00	0.012 ± 0.000	0.0017 ± 0.0010	1.8 ± 0.1	0.024 ± 0.007
Sac. R.–Bend Br.	11/22/96	1/2	1.1 ± 0.0	0.036 ± 0.001	0.0019 ± 0.0015	2.6 ± 0.0	0.054 ± 0.011
Sac. R.–Bend Br.	11/22/96	2/2	1.1 ± 0.0	0.036 ± 0.001	0.0026 ± 0.0012	2.5 ± 0.0	0.056 ± 0.013
Sac. R.–Bend Br.	12/12/96	1/2	1.3 ± 0.0	0.13 ± 0.01	0.0012 ± 0.0003	2.9 ± 0.0	0.16 ± 0.01
Sac. R.–Bend Br.	12/12/96	2/2	1.3 ± 0.0	0.13 ± 0.01	0.0012 ± 0.0003	2.9 ± 0.1	0.17 ± 0.01
Sac. R.–Bend Br.	01/03/97	1/2	1.6 ± 0.1	0.47 ± 0.04	0.0008 ± 0.0003	4.1 ± 0.1	0.63 ± 0.01
Sac. R.–Bend Br.	01/03/97	2/2	1.5 ± 0.0	0.47 ± 0.01	<0.0006 ± 0.0005	4.1 ± 0.0	0.56 ± 0.01

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Potassium (mg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS	Samarium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.96 ± 0.02	0.027 ± 0.000	<0.002 ± 0.000	1.7 ± 0.0	0.037 ± 0.006
Sac. R.–Bend Br.	05/30/97	2/2	0.95 ± 0.01	0.032 ± 0.000	<0.002 ± 0.000	1.7 ± 0.0	0.043 ± 0.006
Sac. R.–Colusa	07/16/96	1/1	1.2 ± 0.0	0.12 ± 0.03	<0.0008 ± 0.0003	2.8 ± 0.1	0.18 ± 0.03
Sac. R.–Colusa	09/25/96	1/2	1.1 ± 0.0	0.031 ± 0.001	0.0022 ± 0.0010	2.1 ± 0.1	0.052 ± 0.014
Sac. R.–Colusa	09/25/96	2/2	1.1 ± 0.0	0.035 ± 0.000	0.0031 ± 0.0007	2.1 ± 0.1	0.060 ± 0.005
Sac. R.–Colusa	11/13/96	1/2	1.3 ± 0.0	0.049 ± 0.004	0.0010 ± 0.0004	2.5 ± 0.0	0.073 ± 0.009
Sac. R.–Colusa	11/13/96	2/2	1.3 ± 0.0	0.047 ± 0.004	<0.0008 ± 0.0005	2.4 ± 0.0	0.068 ± 0.008
Sac. R.–Colusa	12/16/96	1/2	1.5 ± 0.0	0.22 ± 0.01	0.0007 ± 0.0001	2.9 ± 0.0	0.30 ± 0.00
Sac. R.–Colusa	12/16/96	2/2	1.5 ± 0.0	0.26 ± 0.01	0.0011 ± 0.0005	3.0 ± 0.0	0.34 ± 0.01
Sac. R.–Colusa	01/04/97	1/2	2.3 ± 0.0	1.3 ± 0.0	0.0011 ± 0.0003	7.4 ± 0.0	1.7 ± 0.1
Sac. R.–Colusa	01/04/97	2/2	2.3 ± 0.0	1.3 ± 0.0	0.0011 ± 0.0005	7.5 ± 0.0	1.7 ± 0.0
Sac. R.–Colusa	06/03/97	1/2	1.1 ± 0.0	0.064 ± 0.010	<0.0008 ± 0.0001	2.0 ± 0.1	0.096 ± 0.012
Sac. R.–Colusa	06/03/97	2/2	1.1 ± 0.0	0.067 ± 0.016	<0.0008 ± 0.0004	2.0 ± 0.1	0.095 ± 0.018
Sac. R.–Verona	07/18/96	1/2	0.97 ± 0.00	0.074 ± 0.006	<0.0008 ± 0.0001	1.7 ± 0.0	0.097 ± 0.014
Sac. R.–Verona	07/18/96	2/2	0.98 ± 0.02	0.063 ± 0.016	<0.0008 ± 0.0002	1.7 ± 0.0	0.088 ± 0.019
Sac. R.–Verona	09/26/96	1/2	1.2 ± 0.0	0.090 ± 0.005	<0.0006 ± 0.0004	2.0 ± 0.0	0.12 ± 0.00
Sac. R.–Verona	09/26/96	2/2	1.2 ± 0.0	0.092 ± 0.005	0.0007 ± 0.00034	2.0 ± 0.0	0.12 ± 0.01
Sac. R.–Verona	11/14/96	1/2	1.4 ± 0.0	0.071 ± 0.007	<0.0008 ± 0.0004	1.9 ± 0.0	0.10 ± 0.01
Sac. R.–Verona	11/14/96	2/2	1.4 ± 0.0	0.068 ± 0.016	<0.0008 ± 0.0003	1.9 ± 0.0	0.093 ± 0.022
Sac. R.–Verona	12/18/96	1/2	1.3 ± 0.0	0.13 ± 0.01	<0.0006 ± 0.0002	2.0 ± 0.1	0.16 ± 0.01
Sac. R.–Verona	12/18/96	2/2	1.3 ± 0.0	0.12 ± 0.01	<0.0006 ± 0.0001	1.8 ± 0.0	0.15 ± 0.01
Sac. R.–Verona	06/04/97	1/2	1.1 ± 0.0	0.093 ± 0.008	<0.0008 ± 0.0002	1.8 ± 0.1	0.12 ± 0.01
Sac. R.–Verona	06/04/97	2/2	1.1 ± 0.0	0.069 ± 0.000	<0.0008 ± 0.0004	1.8 ± 0.0	0.12 ± 0.03
Sac. R.–Freeport	07/17/96	1/2	0.90 ± 0.01	0.071 ± 0.001	<0.001 ± 0.000	1.5 ± 0.0	0.091 ± 0.007
Sac. R.–Freeport	07/17/96	2/2	0.92 ± 0.01	0.068 ± 0.001	<0.001 ± 0.001	1.5 ± 0.0	0.084 ± 0.006
Sac. R.–Freeport	09/24/96	1/2	1.1 ± 0.0	0.054 ± 0.001	0.0035 ± 0.0006	1.7 ± 0.1	0.066 ± 0.011
Sac. R.–Freeport	09/24/96	2/2	1.1 ± 0.0	0.056 ± 0.001	<0.001 ± 0.001	1.5 ± 0.0	0.069 ± 0.010
Sac. R.–Freeport	11/12/96	1/2	1.2 ± 0.0	0.025 ± 0.001	0.0027 ± 0.0013	1.5 ± 0.1	0.035 ± 0.005
Sac. R.–Freeport	11/12/96	2/2	1.2 ± 0.0	0.024 ± 0.000	0.0017 ± 0.0014	1.6 ± 0.0	0.031 ± 0.007
Sac. R.–Freeport	12/17/96	1/2	1.2 ± 0.0	0.15 ± 0.00	0.0008 ± 0.00014	2.0 ± 0.0	0.17 ± 0.01
Sac. R.–Freeport	12/17/96	2/2	1.3 ± 0.0	0.16 ± 0.00	0.0008 ± 0.00054	2.1 ± 0.0	0.18 ± 0.00
Sac. R.–Freeport	01/06/97	1/2	1.8 ± 0.0	1.1 ± 0.0	<0.0006 ± 0.0004	7.9 ± 0.1	1.0 ± 0.0
Sac. R.–Freeport	01/06/97	1/2	1.9 ± 0.0	1.1 ± 0.0	<0.0006 ± 0.0003	7.9 ± 0.2	1.0 ± 0.0
Sac. R.–Freeport	06/05/97	1/2	1.0 ± 0.0	0.064 ± 0.001	<0.002 ± 0.001	1.6 ± 0.0	0.076 ± 0.000
Sac. R.–Freeport	06/05/97	2/2	1.0 ± 0.0	0.065 ± 0.003	<0.002 ± 0.000	1.6 ± 0.1	0.087 ± 0.005
Sac. R.–Freeport, dup	06/05/97	1/2	1.0 ± 0.0	0.046 ± 0.003	<0.002 ± 0.000	1.4 ± 0.0	0.058 ± 0.001

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Potassium (mg/L) ICP–AES-Ax	Praseodymium (µg/L) ICP–MS	Rhenium (µg/L) ICP–MS	Rubidium (µg/L) ICP–MS	Samarium (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.99 ± 0.00	0.044 ± 0.000	<0.002 ± 0.000	1.4 ± 0.1	0.055 ± 0.010
Flat Cr.	12/11/96	1/2	0.19 ± 0.01	0.038 ± 0.000	<0.002 ± 0.000	0.14 ± 0.01	0.10 ± 0.00
Flat Cr.	12/11/96	2/2	0.18 ± 0.00	0.036 ± 0.001	<0.002 ± 0.000	0.15 ± 0.01	0.092 ± 0.005
Flat Cr.	05/29/97	1/2	0.33 ± 0.01	0.010 ± 0.001	<0.002 ± 0.000	0.29 ± 0.01	0.028 ± 0.004
Flat Cr.	05/29/97	2/2	0.33 ± 0.00	0.0095 ± 0.0005	<0.002 ± 0.001	0.29 ± 0.02	0.030 ± 0.004
Spring Cr.–Weir	12/11/96	1/2	0.37 ± 0.00	0.84 ± 0.00	0.0031 ± 0.0001	0.36 ± 0.01	1.7 ± 0.0
Spring Cr.–Weir	12/11/96	2/2	0.38 ± 0.00	0.90 ± 0.01	0.0029 ± 0.0003	0.37 ± 0.02	1.8 ± 0.1
Spring Cr.–Weir	05/28/97	1/2	2.5 ± 0.0	1.5 ± 0.0	0.020 ± 0.000	4.5 ± 0.0	3.2 ± 0.1
Spring Cr.–Weir	05/28/97	2/2	2.5 ± 0.0	1.5 ± 0.0	0.019 ± 0.000	4.5 ± 0.0	3.2 ± 0.1
Spring Cr.–Road	01/02/97	1/2	0.50 ± 0.01	0.59 ± 0.01	0.0022 ± 0.0004	0.46 ± 0.00	1.2 ± 0.0
Spring Cr.–Road	01/02/97	2/2	0.50 ± 0.01	0.58 ± 0.01	0.0020 ± 0.0001	0.45 ± 0.00	1.1 ± 0.0
Whiskeytown	12/11/96	1/2	0.34 ± 0.01	0.0045 ± 0.0005	<0.002 ± 0.000	0.31 ± 0.01	0.0076 ± 0.0032
Whiskeytown	12/11/96	2/2	0.35 ± 0.01	0.0044 ± 0.0002	<0.001 ± 0.000	0.30 ± 0.02	0.0084 ± 0.0046
Whiskeytown	05/29/97	1/2	0.36 ± 0.01	0.019 ± 0.000	<0.002 ± 0.001	0.40 ± 0.01	0.028 ± 0.004
Whiskeytown	05/29/97	2/2	0.36 ± 0.01	0.018 ± 0.001	<0.002 ± 0.000	0.39 ± 0.03	0.024 ± 0.005
Spring Cr. arm	07/12/96	1/2	0.31 ± 0.00	0.0044 ± 0.0009	<0.001 ± 0.000	0.30 ± 0.03	0.0062 ± 0.0051
Spring Cr. arm	07/12/96	2/2	0.31 ± 0.01	0.0047 ± 0.0006	0.0020 ± 0.0025	0.29 ± 0.01	0.013 ± 0.004
Spring Cr. arm	09/18/96	1/2	0.31 ± 0.00	0.0066 ± 0.0004	<0.001 ± 0.001	0.31 ± 0.01	0.014 ± 0.004
Spring Cr. arm	09/18/96	2/2	0.31 ± 0.01	0.0076 ± 0.0002	<0.001 ± 0.000	0.36 ± 0.01	0.014 ± 0.012
Spring Cr. arm	11/20/96	1/2	0.34 ± 0.01	0.035 ± 0.001	0.0017 ± 0.0012	0.37 ± 0.02	0.079 ± 0.014
Spring Cr. arm	11/20/96	2/2	0.35 ± 0.00	0.037 ± 0.000	0.0022 ± 0.0019	0.38 ± 0.00	0.064 ± 0.001
Spring Cr. arm	12/11/96	1/2	0.35 ± 0.01	0.10 ± 0.00	<0.002 ± 0.000	0.31 ± 0.02	0.21 ± 0.02
Spring Cr. arm	12/11/96	2/2	0.35 ± 0.01	0.11 ± 0.00	0.0016 ± 0.0004	0.32 ± 0.02	0.22 ± 0.01
Spring Cr. arm	05/28/97	1/2	0.37 ± 0.01	0.023 ± 0.002	<0.002 ± 0.000	0.40 ± 0.03	0.032 ± 0.001
Spring Cr. arm	05/28/97	2/2	0.36 ± 0.00	0.024 ± 0.001	<0.002 ± 0.000	0.42 ± 0.02	0.036 ± 0.004
Colusa Basin Drain	06/06/97	1/2	2.5 ± 0.0	0.41 ± 0.06	0.0043 ± 0.0001	4.3 ± 0.1	0.55 ± 0.06
Colusa Basin Drain	06/06/97	2/2	2.5 ± 0.1	0.43 ± 0.01	0.0036 ± 0.0004	4.2 ± 0.1	0.59 ± 0.03
Yolo Bypass	01/07/97	1/2	1.7 ± 0.0	0.62 ± 0.01	<0.0006 ± 0.0003	4.5 ± 0.0	0.79 ± 0.02
Yolo Bypass	01/07/97	2/2	1.8 ± 0.1	0.61 ± 0.00	<0.0006 ± 0.0003	4.4 ± 0.0	0.78 ± 0.01

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Silica (as SiO_2) (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (µg/L) ICP–AES	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	24 ± 2	<0.2 ± 0.0	6.7 ± 0.2	52 ± 0	0.0036 ± 0.0002
Sac. R.–Shasta	07/12/96	2/2	21 ± 0	<0.2 ± 0.0	5.6 ± 0.2	51 ± 1	0.0038 ± 0.0008
Sac. R.–Shasta	09/19/96	1/2	21 ± 0	<0.2 ± 0.0	5.5 ± 0.0	52 ± 2	0.0031 ± 0.0006
Sac. R.–Shasta	09/19/96	2/2	21 ± 1	<0.09 ± 0.04	5.1 ± 0.3	76 ± 0	0.0030 ± 0.0011
Sac. R.–Shasta	11/19/96	1/2	24 ± 1	<0.09 ± 0.00	6.5 ± 0.3	64 ± 2	0.0027 ± 0.0009
Sac. R.–Shasta	11/19/96	2/2	25 ± 0	<0.09 ± 0.01	6.7 ± 0.3	64 ± 1	0.0020 ± 0.0011
Sac. R.–Shasta	12/12/96	1/2	25 ± 0	<0.2 ± 0.3	7.3 ± 0.1	56 ± 2	0.0039 ± 0.0009
Sac. R.–Shasta	12/12/96	2/2	24 ± 0	<0.2 ± 0.0	6.9 ± 0.0	55 ± 3	0.0038 ± 0.0011
Sac. R.–Shasta	05/29/97	1/2	24 ± 1	<0.2 ± 0.0	6.0 ± 0.2	52 ± 3	0.0078 ± 0.0006
Sac. R.–Shasta	05/29/97	2/2	23 ± 1	<0.2 ± 0.1	5.7 ± 0.3	50 ± 1	0.0069 ± 0.0010
Sac. R.–Keswick	07/11/96	1/2	19 ± 1	<0.2 ± 0.0	4.6 ± 0.2	45 ± 2	0.0039 ± 0.0009
Sac. R.–Keswick	07/11/96	2/2	20 ± 1	<0.2 ± 0.0	4.9 ± 0.1	45 ± 2	0.0033 ± 0.0006
Sac. R.–Keswick	09/19/96	1/2	18 ± 1	<0.09 ± 0.02	3.8 ± 0.3	43 ± 1	0.0030 ± 0.0006
Sac. R.–Keswick	09/19/96	2/2	18 ± 0	<0.2 ± 0.0	3.8 ± 0.0	40 ± 1	0.0028 ± 0.0006
Sac. R.–Keswick	11/21/96	1/2	21 ± 1	<0.09 ± 0.07	5.4 ± 0.5	53 ± 2	0.0080 ± 0.0006
Sac. R.–Keswick	11/21/96	2/2	22 ± 1	<0.09 ± 0.04	5.5 ± 0.2	54 ± 3	0.0087 ± 0.0016
Sac. R.–Keswick	12/11/96	1/2	24 ± 0	<0.2 ± 0.0	6.6 ± 0.4	51 ± 1	0.0091 ± 0.0014
Sac. R.–Keswick	12/11/96	2/2	23 ± 0	<0.2 ± 0.0	6.5 ± 0.0	52 ± 1	0.0096 ± 0.0007
Sac. R.–Keswick	01/02/97	1/2	24 ± 2	<0.2 ± 0.2	5.9 ± 0.5	51 ± 0	0.020 ± 0.001
Sac. R.–Keswick	01/02/97	2/2	24 ± 1	<0.2 ± 0.1	5.8 ± 0.2	52 ± 1	0.021 ± 0.001
Sac. R.–Keswick	05/28/97	1/2	21 ± 1	<0.2 ± 0.0	4.7 ± 0.3	44 ± 2	0.0078 ± 0.0014
Sac. R.–Keswick	05/28/97	2/2	21 ± 0	<0.2 ± 0.0	4.9 ± 0.1	43 ± 1	0.0069 ± 0.0011
Sac. R.–Bend Br.	07/11/96	1/2	21 ± 2	<0.2 ± 0.0	5.3 ± 0.7	49 ± 1	0.0042 ± 0.0007
Sac. R.–Bend Br.	07/11/96	2/2	20 ± 0	<0.2 ± 0.2	5.0 ± 0.2	50 ± 2	0.0040 ± 0.0003
Sac. R.–Bend Br.	09/20/96	1/2	19 ± 0	<0.2 ± 0.0	4.6 ± 0.0	46 ± 1	0.0027 ± 0.0008
Sac. R.–Bend Br.	09/20/96	2/2	18 ± 1	<0.09 ± 0.06	4.3 ± 0.3	50 ± 2	0.0041 ± 0.0009
Sac. R.–Bend Br.	11/22/96	1/2	24 ± 0	<0.09 ± 0.04	7.0 ± 0.0	75 ± 2	0.011 ± 0.001
Sac. R.–Bend Br.	11/22/96	2/2	23 ± 1	<0.09 ± 0.05	6.6 ± 0.3	73 ± 1	0.012 ± 0.002
Sac. R.–Bend Br.	12/12/96	1/2	29 ± 0	<0.2 ± 0.0	6.4 ± 0.2	61 ± 1	0.028 ± 0.002
Sac. R.–Bend Br.	12/12/96	2/2	28 ± 2	<0.2 ± 0.0	6.2 ± 0.5	59 ± 0	0.030 ± 0.001
Sac. R.–Bend Br.	01/03/97	1/2	41 ± 6	<0.2 ± 0.0	5.7 ± 0.2	73 ± 0	0.098 ± 0.005
Sac. R.–Bend Br.	01/03/97	2/2	41 ± 5	<0.2 ± 0.0	5.1 ± 0.7	71 ± 1	0.089 ± 0.000

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Silica (as SiO_2) (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (µg/L) ICP–AES	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	21 ± 0	<0.2 ± 0.0	5.1 ± 0.2	51 ± 2	0.0069 ± 0.0009
Sac. R.–Bend Br.	05/30/97	2/2	21 ± 0	<0.2 ± 0.0	5.1 ± 0.2	50 ± 0	0.0063 ± 0.0015
Sac. R.–Colusa	07/16/96	1/1	32 ± 3	<0.2 ± 0.0	6.3 ± 0.8	66 ± 2	0.033 ± 0.000
Sac. R.–Colusa	09/25/96	1/2	22 ± 1	0.26 ± 0.03	6.3 ± 0.4	70 ± 3	0.0069 ± 0.0006
Sac. R.–Colusa	09/25/96	2/2	22 ± 1	<0.09 ± 0.00	6.2 ± 0.4	70 ± 2	0.0084 ± 0.0005
Sac. R.–Colusa	11/13/96	1/2	25 ± 1	<0.2 ± 0.0	7.8 ± 0.8	77 ± 1	0.012 ± 0.001
Sac. R.–Colusa	11/13/96	2/2	25 ± 1	<0.2 ± 0.0	7.3 ± 0.7	79 ± 1	0.012 ± 0.001
Sac. R.–Colusa	12/16/96	1/2	36 ± 1	<0.2 ± 0.0	7.9 ± 0.1	93 ± 1	0.050 ± 0.001
Sac. R.–Colusa	12/16/96	2/2	36 ± 0	<0.2 ± 0.0	7.5 ± 0.1	94 ± 0	0.058 ± 0.002
Sac. R.–Colusa	01/04/97	1/2	88 ± 4	<0.2 ± 0.0	5.6 ± 0.3	121 ± 1	0.31 ± 0.00
Sac. R.–Colusa	01/04/97	2/2	90 ± 1	0.21 ± 0.15	5.7 ± 0.1	124 ± 3	0.31 ± 0.01
Sac. R.–Colusa	06/03/97	1/2	23 ± 1	<0.2 ± 0.0	6.0 ± 0.2	64 ± 2	0.017 ± 0.003
Sac. R.–Colusa	06/03/97	2/2	23 ± 0	<0.2 ± 0.0	6.0 ± 0.2	65 ± 2	0.017 ± 0.003
Sac. R.–Verona	07/18/96	1/2	22 ± 1	<0.2 ± 0.0	5.5 ± 0.7	63 ± 1	0.016 ± 0.001
Sac. R.–Verona	07/18/96	2/2	21 ± 1	<0.2 ± 0.0	5.4 ± 0.2	63 ± 2	0.014 ± 0.002
Sac. R.–Verona	09/26/96	1/2	26 ± 1	<0.2 ± 0.0	8.9 ± 0.4	86 ± 1	0.021 ± 0.001
Sac. R.–Verona	09/26/96	2/2	26 ± 0	<0.2 ± 0.0	8.7 ± 0.4	85 ± 2	0.021 ± 0.002
Sac. R.–Verona	11/14/96	1/2	24 ± 1	<0.2 ± 0.1	9.3 ± 1.3	91 ± 3	0.015 ± 0.002
Sac. R.–Verona	11/14/96	2/2	25 ± 2	<0.2 ± 0.0	9.3 ± 1.8	91 ± 2	0.015 ± 0.002
Sac. R.–Verona	12/18/96	1/2	25 ± 0	<0.2 ± 0.0	6.1 ± 0.1	74 ± 0	0.028 ± 0.001
Sac. R.–Verona	12/18/96	2/2	25 ± 0	<0.2 ± 0.0	6.2 ± 0.3	72 ± 0	0.025 ± 0.002
Sac. R.–Verona	06/04/97	1/2	22 ± 2	<0.2 ± 0.0	7.8 ± 0.7	82 ± 3	0.021 ± 0.000
Sac. R.–Verona	06/04/97	2/2	23 ± 1	<0.2 ± 0.0	7.8 ± 0.8	83 ± 3	0.021 ± 0.003
Sac. R.–Freeport	07/17/96	1/2	20 ± 1	<0.2 ± 0.0	5.3 ± 0.2	61 ± 0	0.014 ± 0.000
Sac. R.–Freeport	07/17/96	2/2	19 ± 0	<0.2 ± 0.0	5.0 ± 0.1	61 ± 0	0.012 ± 0.000
Sac. R.–Freeport	09/24/96	1/2	20 ± 1	<0.09 ± 0.09	8.0 ± 0.2	100 ± 3	0.011 ± 0.000
Sac. R.–Freeport	09/24/96	2/2	21 ± 0	<0.2 ± 0.0	8.7 ± 0.1	86 ± 3	0.010 ± 0.001
Sac. R.–Freeport	11/12/96	1/2	18 ± 1	<0.09 ± 0.06	7.4 ± 0.2	85 ± 3	0.0059 ± 0.0004
Sac. R.–Freeport	11/12/96	2/2	18 ± 0	<0.09 ± 0.02	7.1 ± 0.3	85 ± 1	0.0050 ± 0.0016
Sac. R.–Freeport	12/17/96	1/2	24 ± 1	<0.2 ± 0.0	5.0 ± 0.3	65 ± 1	0.031 ± 0.001
Sac. R.–Freeport	12/17/96	2/2	24 ± 2	<0.2 ± 0.0	4.8 ± 0.6	66 ± 0	0.031 ± 0.003
Sac. R.–Freeport	01/06/97	1/2	41 ± 6	<0.2 ± 0.0	2.6 ± 0.5	58 ± 0	0.13 ± 0.00
Sac. R.–Freeport	01/06/97	1/2	42 ± 4	<0.2 ± 0.0	2.6 ± 0.3	59 ± 0	0.14 ± 0.00
Sac. R.–Freeport	06/05/97	1/2	20 ± 0	<0.2 ± 0.0	6.4 ± 0.3	71 ± 0	0.011 ± 0.001
Sac. R.–Freeport	06/05/97	2/2	20 ± 1	<0.2 ± 0.0	6.8 ± 0.1	71 ± 0	0.013 ± 0.001
Sac. R.–Freeport, dup	06/05/97	1/2	19 ± 1	<0.2 ± 0.0	6.5 ± 0.2	72 ± 4	0.0095 ± 0.0007

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Silica (as SiO_2) (mg/L) ICP–AES	Silver (µg/L) ICP–MS	Sodium (µg/L) ICP–AES	Strontium (µg/L) ICP–MS	Terbium (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	19 ± 0	<0.2 ± 0.0	6.1 ± 0.8	72 ± 3	0.0074 ± 0.0017
Flat Cr.	12/11/96	1/2	12 ± 0	<0.2 ± 0.0	2.0 ± 0.1	8.0 ± 0.2	0.020 ± 0.001
Flat Cr.	12/11/96	2/2	12 ± 0	<0.2 ± 0.0	2.0 ± 0.1	8.0 ± 0.4	0.020 ± 0.001
Flat Cr.	05/29/97	1/2	23 ± 1	<0.2 ± 0.0	8.2 ± 0.8	30 ± 1	0.0067 ± 0.0011
Flat Cr.	05/29/97	2/2	25 ± 1	<0.2 ± 0.0	8.3 ± 1.1	30 ± 1	0.0064 ± 0.0006
Spring Cr.–Weir	12/11/96	1/2	14 ± 0	<0.2 ± 0.0	2.6 ± 0.2	13 ± 0	0.40 ± 0.00
Spring Cr.–Weir	12/11/96	2/2	14 ± 0	<0.2 ± 0.0	2.6 ± 0.2	13 ± 0	0.42 ± 0.00
Spring Cr.–Weir	05/28/97	1/2	26 ± 1	<0.2 ± 0.0	7.2 ± 0.4	49 ± 0	0.70 ± 0.04
Spring Cr.–Weir	05/28/97	2/2	27 ± 2	<0.2 ± 0.0	7.6 ± 0.7	50 ± 1	0.69 ± 0.02
Spring Cr.–Road	01/02/97	1/2	12 ± 1	<0.2 ± 0.0	1.9 ± 0.1	13 ± 0	0.26 ± 0.00
Spring Cr.–Road	01/02/97	2/2	12 ± 1	<0.2 ± 0.0	2.0 ± 0.2	13 ± 0	0.26 ± 0.01
Whiskeytown	12/11/96	1/2	12 ± 1	<0.2 ± 0.0	2.0 ± 0.2	23 ± 0	0.0015 ± 0.0004
Whiskeytown	12/11/96	2/2	12 ± 0	<0.2 ± 0.0	2.0 ± 0.0	23 ± 1	0.0019 ± 0.0008
Whiskeytown	05/29/97	1/2	15 ± 0	<0.2 ± 0.0	2.0 ± 0.1	22 ± 1	0.0049 ± 0.0004
Whiskeytown	05/29/97	2/2	15 ± 0	<0.2 ± 0.0	1.9 ± 0.1	21 ± 1	0.0042 ± 0.0005
Spring Cr. arm	07/12/96	1/2	13 ± 1	<0.2 ± 0.0	1.8 ± 0.0	23 ± 2	0.0016 ± 0.0007
Spring Cr. arm	07/12/96	2/2	12 ± 0	<0.2 ± 0.0	1.7 ± 0.1	21 ± 1	0.0015 ± 0.0004
Spring Cr. arm	09/18/96	1/2	12 ± 0	<0.2 ± 0.0	1.7 ± 0.1	20 ± 0	0.0026 ± 0.0007
Spring Cr. arm	09/18/96	2/2	12 ± 0	<0.09 ± 0.00	1.6 ± 0.0	22 ± 0	0.0031 ± 0.0006
Spring Cr. arm	11/20/96	1/2	13 ± 1	<0.09 ± 0.03	1.9 ± 0.1	24 ± 1	0.017 ± 0.003
Spring Cr. arm	11/20/96	2/2	12 ± 1	<0.09 ± 0.13	1.9 ± 0.1	24 ± 1	0.017 ± 0.002
Spring Cr. arm	12/11/96	1/2	12 ± 0	<0.2 ± 0.0	2.2 ± 0.1	24 ± 1	0.048 ± 0.001
Spring Cr. arm	12/11/96	2/2	12 ± 0	<0.2 ± 0.0	2.1 ± 0.1	22 ± 1	0.052 ± 0.001
Spring Cr. arm	05/28/97	1/2	15 ± 0	<0.2 ± 0.0	2.0 ± 0.0	22 ± 2	0.0082 ± 0.0006
Spring Cr. arm	05/28/97	2/2	15 ± 0	<0.2 ± 0.0	2.0 ± 0.1	22 ± 1	0.0067 ± 0.0008
Colusa Basin Drain	06/06/97	1/2	42 ± 1	<0.2 ± 0.0	76 ± 1	479 ± 9	0.090 ± 0.006
Colusa Basin Drain	06/06/97	2/2	44 ± 2	<0.2 ± 0.0	82 ± 2	479 ± 1	0.094 ± 0.003
Yolo Bypass	01/07/97	1/2	47 ± 2	<0.2 ± 0.0	4.4 ± 0.4	78 ± 1	0.14 ± 0.00
Yolo Bypass	01/07/97	2/2	50 ± 1	<0.2 ± 0.0	4.8 ± 0.2	78 ± 1	0.14 ± 0.00

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS	Tin (µg/L) ICP–MS	Titanium (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	<0.003 ± 0.001	0.0051 ± 0.0013	0.0017 ± 0.0003	0.75 ± 0.03	7.2 ± 0.8
Sac. R.–Shasta	07/12/96	2/2	<0.003 ± 0.000	0.0047 ± 0.0010	0.0007 ± 0.0002	0.17 ± 0.05	5.2 ± 0.6
Sac. R.–Shasta	09/19/96	1/2	<0.003 ± 0.000	<0.003 ± 0.001	0.0011 ± 0.0006	1.1 ± 0.1	1.8 ± 0.3
Sac. R.–Shasta	09/19/96	2/2	0.0047 ± 0.0046	<0.003 ± 0.003	0.0009 ± 0.0004	1.6 ± 0.0	2.3 ± 0.3
Sac. R.–Shasta	11/19/96	1/2	0.0047 ± 0.0008	<0.003 ± 0.001	0.0013 ± 0.0006	0.33 ± 0.12	2.0 ± 0.1
Sac. R.–Shasta	11/19/96	2/2	<0.003 ± 0.001	<0.003 ± 0.002	0.0008 ± 0.0011	0.19 ± 0.07	2.0 ± 0.2
Sac. R.–Shasta	12/12/96	1/2	0.0046 ± 0.0027	<0.003 ± 0.000	0.0013 ± 0.0002	0.81 ± 0.00	1.6 ± 0.2
Sac. R.–Shasta	12/12/96	2/2	<0.002 ± 0.001	0.0027 ± 0.0003	0.0013 ± 0.0001	0.13 ± 0.01	1.8 ± 0.2
Sac. R.–Shasta	05/29/97	1/2	0.0025 ± 0.0018	0.0083 ± 0.0002	0.0023 ± 0.0005	0.12 ± 0.03	11 ± 0
Sac. R.–Shasta	05/29/97	2/2	0.0038 ± 0.0031	0.014 ± 0.000	0.0027 ± 0.0010	0.39 ± 0.20	12 ± 0
Sac. R.–Keswick	07/11/96	1/2	<0.003 ± 0.001	0.0039 ± 0.0013	0.0015 ± 0.0002	<0.1 ± 0.0	4.4 ± 0.5
Sac. R.–Keswick	07/11/96	2/2	<0.003 ± 0.001	0.0044 ± 0.0005	0.0014 ± 0.0001	0.77 ± 0.01	4.4 ± 0.3
Sac. R.–Keswick	09/19/96	1/2	<0.003 ± 0.002	0.0045 ± 0.0018	0.0008 ± 0.0005	1.2 ± 0.0	1.9 ± 0.4
Sac. R.–Keswick	09/19/96	2/2	<0.003 ± 0.002	<0.003 ± 0.003	0.0011 ± 0.0004	1.1 ± 0.1	1.1 ± 0.1
Sac. R.–Keswick	11/21/96	1/2	0.0040 ± 0.0023	0.0032 ± 0.0014	0.0034 ± 0.0002	0.55 ± 0.04	3.8 ± 0.2
Sac. R.–Keswick	11/21/96	2/2	0.0053 ± 0.0030	<0.003 ± 0.000	0.0036 ± 0.0003	0.58 ± 0.06	3.5 ± 0.5
Sac. R.–Keswick	12/11/96	1/2	0.0019 ± 0.0007	0.0042 ± 0.0013	0.0026 ± 0.0006	0.39 ± 0.04	2.1 ± 0.2
Sac. R.–Keswick	12/11/96	2/2	0.0019 ± 0.0023	0.0032 ± 0.0017	0.0028 ± 0.0003	0.20 ± 0.05	2.1 ± 0.1
Sac. R.–Keswick	01/02/97	1/2	0.0095 ± 0.0006	0.013 ± 0.003	0.0054 ± 0.0002	0.18 ± 0.16	11 ± 0
Sac. R.–Keswick	01/02/97	2/2	0.011 ± 0.000	0.012 ± 0.003	0.0068 ± 0.0007	<0.1 ± 0.1	9.9 ± 0.6
Sac. R.–Keswick	05/28/97	1/2	0.0018 ± 0.0024	0.0097 ± 0.0016	0.0026 ± 0.0005	1.0 ± 0.0	10 ± 1
Sac. R.–Keswick	05/28/97	2/2	0.0024 ± 0.0002	0.0086 ± 0.0012	0.0024 ± 0.0005	1.0 ± 0.1	9.8 ± 1.2
Sac. R.–Bend Br.	07/11/96	1/2	<0.003 ± 0.001	0.0057 ± 0.0004	0.0016 ± 0.0004	0.75 ± 0.04	6.1 ± 0.3
Sac. R.–Bend Br.	07/11/96	2/2	<0.003 ± 0.001	0.0064 ± 0.0014	0.0018 ± 0.0011	0.33 ± 0.34	5.9 ± 0.0
Sac. R.–Bend Br.	09/20/96	1/2	<0.003 ± 0.000	0.0032 ± 0.0022	0.0011 ± 0.0001	0.52 ± 0.01	3.3 ± 0.4
Sac. R.–Bend Br.	09/20/96	2/2	<0.003 ± 0.004	0.0059 ± 0.0031	0.0019 ± 0.0001	0.32 ± 0.00	3.3 ± 0.3
Sac. R.–Bend Br.	11/22/96	1/2	0.0042 ± 0.0017	0.011 ± 0.002	0.0038 ± 0.0002	0.24 ± 0.08	11 ± 1
Sac. R.–Bend Br.	11/22/96	2/2	0.0038 ± 0.0008	0.0087 ± 0.0054	0.0038 ± 0.0007	0.19 ± 0.03	10 ± 0
Sac. R.–Bend Br.	12/12/96	1/2	0.0090 ± 0.0010	0.068 ± 0.001	0.0078 ± 0.0005	0.39 ± 0.06	50 ± 0
Sac. R.–Bend Br.	12/12/96	2/2	0.0091 ± 0.0024	0.068 ± 0.006	0.0083 ± 0.0004	0.32 ± 0.16	50 ± 1
Sac. R.–Bend Br.	01/03/97	1/2	0.026 ± 0.000	0.25 ± 0.02	0.025 ± 0.001	0.70 ± 0.16	135 ± 1
Sac. R.–Bend Br.	01/03/97	2/2	0.023 ± 0.001	0.25 ± 0.02	0.025 ± 0.002	0.18 ± 0.05	135 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS	Tin (µg/L) ICP–MS	Titanium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.0035 ± 0.0025	0.0070 ± 0.0004	0.0029 ± 0.0006	0.26 ± 0.02	10 ± 1
Sac. R.–Bend Br.	05/30/97	2/2	0.0018 ± 0.0007	0.0078 ± 0.0030	0.0029 ± 0.0005	0.28 ± 0.08	9.6 ± 0.3
Sac. R.–Colusa	07/16/96	1/1	0.010 ± 0.002	0.052 ± 0.001	0.0097 ± 0.0009	<0.2 ± 0.0	59 ± 0
Sac. R.–Colusa	09/25/96	1/2	<0.003 ± 0.001	0.0064 ± 0.0010	0.0032 ± 0.0001	0.37 ± 0.03	11 ± 1
Sac. R.–Colusa	09/25/96	2/2	<0.003 ± 0.000	0.0074 ± 0.0002	0.0026 ± 0.0002	0.47 ± 0.02	11 ± 0
Sac. R.–Colusa	11/13/96	1/2	<0.003 ± 0.000	0.019 ± 0.002	0.0044 ± 0.0002	0.18 ± 0.16	29 ± 1
Sac. R.–Colusa	11/13/96	2/2	0.0047 ± 0.0021	0.018 ± 0.000	0.0039 ± 0.0005	0.21 ± 0.10	18 ± 0
Sac. R.–Colusa	12/16/96	1/2	0.014 ± 0.001	0.087 ± 0.000	0.013 ± 0.001	1.0 ± 0.0	80 ± 0
Sac. R.–Colusa	12/16/96	2/2	0.012 ± 0.002	0.081 ± 0.004	0.015 ± 0.001	1.6 ± 0.0	83 ± 2
Sac. R.–Colusa	01/04/97	1/2	0.069 ± 0.002	0.70 ± 0.00	0.085 ± 0.003	0.27 ± 0.04	329 ± 1
Sac. R.–Colusa	01/04/97	2/2	0.064 ± 0.001	0.70 ± 0.01	0.084 ± 0.003	0.67 ± 0.44	314 ± 6
Sac. R.–Colusa	06/03/97	1/2	0.0051 ± 0.0012	0.018 ± 0.000	0.0066 ± 0.0007	0.35 ± 0.18	22 ± 0
Sac. R.–Colusa	06/03/97	2/2	0.0062 ± 0.0018	0.020 ± 0.002	0.0059 ± 0.0009	0.94 ± 0.15	25 ± 3
Sac. R.–Verona	07/18/96	1/2	<0.003 ± 0.001	0.029 ± 0.002	0.0060 ± 0.0010	0.94 ± 0.05	27 ± 1
Sac. R.–Verona	07/18/96	2/2	0.0039 ± 0.0011	0.033 ± 0.002	0.0043 ± 0.0003	0.51 ± 0.51	31 ± 1
Sac. R.–Verona	09/26/96	1/2	0.0052 ± 0.0006	0.038 ± 0.005	0.0057 ± 0.0003	0.41 ± 0.02	36 ± 1
Sac. R.–Verona	09/26/96	2/2	0.0069 ± 0.0015	0.036 ± 0.003	0.0055 ± 0.0003	<0.1 ± 0.0	34 ± 1
Sac. R.–Verona	11/14/96	1/2	<0.003 ± 0.002	0.027 ± 0.002	0.0057 ± 0.0003	0.68 ± 0.24	23 ± 1
Sac. R.–Verona	11/14/96	2/2	0.0076 ± 0.0049	0.026 ± 0.001	0.0052 ± 0.0006	0.39 ± 0.07	23 ± 0
Sac. R.–Verona	12/18/96	1/2	0.0079 ± 0.0012	0.046 ± 0.003	0.0078 ± 0.0005	0.64 ± 0.03	45 ± 0
Sac. R.–Verona	12/18/96	2/2	0.0062 ± 0.0014	0.043 ± 0.002	0.0071 ± 0.0005	0.91 ± 0.04	41 ± 1
Sac. R.–Verona	06/04/97	1/2	0.0045 ± 0.0006	0.020 ± 0.001	0.0073 ± 0.0004	<0.2 ± 0.0	26 ± 1
Sac. R.–Verona	06/04/97	2/2	0.0061 ± 0.0007	0.022 ± 0.003	0.0068 ± 0.0002	0.29 ± 0.06	28 ± 3
Sac. R.–Freeport	07/17/96	1/2	0.0084 ± 0.0010	0.026 ± 0.001	0.0037 ± 0.0004	0.17 ± 0.14	20 ± 0
Sac. R.–Freeport	07/17/96	2/2	0.0040 ± 0.0001	0.022 ± 0.002	0.0032 ± 0.0002	0.24 ± 0.10	21 ± 1
Sac. R.–Freeport	09/24/96	1/2	<0.003 ± 0.000	0.025 ± 0.002	0.0034 ± 0.0017	0.67 ± 0.14	18 ± 1
Sac. R.–Freeport	09/24/96	2/2	0.0032 ± 0.0006	0.016 ± 0.002	0.0025 ± 0.0006	<0.1 ± 0.1	15 ± 0
Sac. R.–Freeport	11/12/96	1/2	<0.003 ± 0.001	0.0052 ± 0.0013	0.0025 ± 0.0000	0.66 ± 0.04	6.9 ± 0.7
Sac. R.–Freeport	11/12/96	2/2	<0.003 ± 0.002	0.0064 ± 0.0019	0.0017 ± 0.0003	0.51 ± 0.10	6.4 ± 0.3
Sac. R.–Freeport	12/17/96	1/2	0.0084 ± 0.0016	0.059 ± 0.002	0.0082 ± 0.0004	0.46 ± 0.00	51 ± 1
Sac. R.–Freeport	12/17/96	2/2	0.0090 ± 0.0012	0.060 ± 0.001	0.0086 ± 0.0002	0.33 ± 0.02	53 ± 1
Sac. R.–Freeport	01/06/97	1/2	0.054 ± 0.001	1.1 ± 0.0	0.036 ± 0.002	0.26 ± 0.00	329 ± 2
Sac. R.–Freeport	01/06/97	1/2	0.055 ± 0.001	1.1 ± 0.0	0.037 ± 0.000	0.28 ± 0.03	318 ± 11
Sac. R.–Freeport	06/05/97	1/2	0.0036 ± 0.0009	0.018 ± 0.001	0.0043 ± 0.0007	0.10 ± 0.05	17 ± 0
Sac. R.–Freeport	06/05/97	2/2	0.0033 ± 0.0014	0.015 ± 0.000	0.0035 ± 0.0011	0.89 ± 0.07	18 ± 1
Sac. R.–Freeport, dup	06/05/97	1/2	0.0036 ± 0.0017	0.010 ± 0.001	0.0022 ± 0.0003	0.11 ± 0.01	11 ± 1

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Thallium (µg/L) ICP–MS	Thorium (µg/L) ICP–MS	Thulium (µg/L) ICP–MS	Tin (µg/L) ICP–MS	Titanium (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.0061 ± 0.0001	0.012 ± 0.001	0.0032 ± 0.0007	<0.06 ± 0.01	11 ± 1
Flat Cr.	12/11/96	1/2	0.0039 ± 0.0034	0.0042 ± 0.0008	0.0091 ± 0.0007	0.80 ± 0.02	2.4 ± 0.1
Flat Cr.	12/11/96	2/2	0.0030 ± 0.0015	0.0053 ± 0.0008	0.0081 ± 0.0004	0.84 ± 0.06	2.3 ± 0.3
Flat Cr.	05/29/97	1/2	0.0099 ± 0.0005	0.0030 ± 0.0010	0.0037 ± 0.0009	0.23 ± 0.03	<0.1 ± 0.3
Flat Cr.	05/29/97	2/2	0.0060 ± 0.0022	<0.003 ± 0.001	0.0037 ± 0.0008	<0.06 ± 0.04	<0.1 ± 0.1
Spring Cr.–Weir	12/11/96	1/2	0.038 ± 0.001	0.0085 ± 0.0004	0.11 ± 0.00	0.27 ± 0.01	1.9 ± 0.2
Spring Cr.–Weir	12/11/96	2/2	0.038 ± 0.002	0.0076 ± 0.0009	0.11 ± 0.00	0.33 ± 0.01	2.1 ± 0.2
Spring Cr.–Weir	05/28/97	1/2	0.44 ± 0.03	0.0034 ± 0.0008	0.25 ± 0.02	0.21 ± 0.06	0.55 ± 0.31
Spring Cr.–Weir	05/28/97	2/2	0.44 ± 0.02	0.0041 ± 0.0004	0.23 ± 0.01	0.19 ± 0.12	0.56 ± 0.37
Spring Cr.–Road	01/02/97	1/2	0.15 ± 0.00	0.016 ± 0.004	0.071 ± 0.000	0.37 ± 0.01	5.0 ± 0.2
Spring Cr.–Road	01/02/97	2/2	0.15 ± 0.00	0.014 ± 0.000	0.068 ± 0.000	0.39 ± 0.04	5.3 ± 0.2
Whiskeytown	12/11/96	1/2	<0.002 ± 0.001	<0.003 ± 0.001	0.0010 ± 0.0005	0.83 ± 0.03	0.83 ± 0.18
Whiskeytown	12/11/96	2/2	<0.003 ± 0.001	<0.003 ± 0.001	0.0010 ± 0.00058	0.78 ± 0.05	0.87 ± 0.23
Whiskeytown	05/29/97	1/2	0.0060 ± 0.0011	0.012 ± 0.003	0.0019 ± 0.0004	0.33 ± 0.13	8.2 ± 0.4
Whiskeytown	05/29/97	2/2	<0.002 ± 0.001	0.013 ± 0.001	0.0017 ± 0.0003	0.31 ± 0.12	8.2 ± 0.5
Spring Cr. arm	07/12/96	1/2	<0.003 ± 0.000	<0.003 ± 0.001	<0.0005 ± 0.0001	0.72 ± 0.04	0.54 ± 0.02
Spring Cr. arm	07/12/96	2/2	<0.003 ± 0.001	<0.003 ± 0.001	0.0006 ± 0.00036	<0.1 ± 0.0	0.57 ± 0.28
Spring Cr. arm	09/18/96	1/2	<0.003 ± 0.001	<0.003 ± 0.001	0.0006 ± 0.00027	0.27 ± 0.02	0.63 ± 0.13
Spring Cr. arm	09/18/96	2/2	<0.003 ± 0.003	0.0037 ± 0.0007	0.0011 ± 0.0007	0.75 ± 0.06	0.95 ± 0.20
Spring Cr. arm	11/20/96	1/2	<0.003 ± 0.005	0.0036 ± 0.0013	0.0056 ± 0.0007	0.18 ± 0.10	1.1 ± 0.1
Spring Cr. arm	11/20/96	2/2	0.0055 ± 0.0022	<0.003 ± 0.002	0.0062 ± 0.0014	0.26 ± 0.12	1.0 ± 0.2
Spring Cr. arm	12/11/96	1/2	0.0059 ± 0.0033	0.0046 ± 0.0010	0.016 ± 0.000	0.26 ± 0.04	0.99 ± 0.08
Spring Cr. arm	12/11/96	2/2	0.0048 ± 0.0020	0.0038 ± 0.0023	0.015 ± 0.001	0.48 ± 0.05	0.96 ± 0.20
Spring Cr. arm	05/28/97	1/2	0.0044 ± 0.0025	0.010 ± 0.002	0.0024 ± 0.0002	0.35 ± 0.17	8.1 ± 0.1
Spring Cr. arm	05/28/97	2/2	0.0020 ± 0.0024	0.013 ± 0.001	0.0030 ± 0.0002	0.23 ± 0.05	8.3 ± 0.9
Colusa Basin Drain	06/06/97	1/2	0.021 ± 0.001	0.12 ± 0.00	0.029 ± 0.002	0.50 ± 0.22	79 ± 1
Colusa Basin Drain	06/06/97	2/2	0.023 ± 0.005	0.13 ± 0.00	0.030 ± 0.001	<0.2 ± 0.0	75 ± 1
Yolo Bypass	01/07/97	1/2	0.031 ± 0.001	0.29 ± 0.02	0.039 ± 0.000	0.20 ± 0.04	191 ± 1
Yolo Bypass	01/07/97	2/2	0.032 ± 0.001	0.29 ± 0.01	0.038 ± 0.001	0.17 ± 0.05	190 ± 2

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (mg/L) ICP–AES	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS	Zinc (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	0.089 ± 0.002	0.0074 ± 0.0020	0.010 ± 0.003	0.12 ± 0.00	4.0 ± 0.1
Sac. R.–Shasta	07/12/96	2/2	0.092 ± 0.003	<0.004 ± 0.001	0.010 ± 0.002	0.12 ± 0.01	3.8 ± 0.1
Sac. R.–Shasta	09/19/96	1/2	0.080 ± 0.002	<0.003 ± 0.001	0.0064 ± 0.0007	0.088 ± 0.006	4.8 ± 0.1
Sac. R.–Shasta	09/19/96	2/2	0.089 ± 0.006	0.0042 ± 0.0016	0.011 ± 0.003	0.097 ± 0.005	6.2 ± 0.0
Sac. R.–Shasta	11/19/96	1/2	0.13 ± 0.00	<0.003 ± 0.002	0.0072 ± 0.0030	0.063 ± 0.004	3.1 ± 0.8
Sac. R.–Shasta	11/19/96	2/2	0.13 ± 0.01	0.0048 ± 0.0009	0.0077 ± 0.0022	0.064 ± 0.002	2.4 ± 0.0
Sac. R.–Shasta	12/12/96	1/2	0.13 ± 0.01	<0.004 ± 0.001	0.0079 ± 0.0015	0.11 ± 0.00	6.3 ± 0.3
Sac. R.–Shasta	12/12/96	2/2	0.13 ± 0.00	0.0043 ± 0.0018	0.0086 ± 0.0022	0.11 ± 0.00	7.2 ± 0.4
Sac. R.–Shasta	05/29/97	1/2	0.10 ± 0.01	<0.005 ± 0.001	0.016 ± 0.003	0.20 ± 0.02	2.9 ± 0.1
Sac. R.–Shasta	05/29/97	2/2	0.10 ± 0.00	0.0057 ± 0.0003	0.017 ± 0.002	0.19 ± 0.01	3.0 ± 0.5
Sac. R.–Keswick	07/11/96	1/2	0.075 ± 0.004	<0.004 ± 0.000	0.0088 ± 0.0015	0.10 ± 0.01	3.6 ± 0.0
Sac. R.–Keswick	07/11/96	2/2	0.078 ± 0.002	0.0061 ± 0.0006	0.0095 ± 0.0023	0.10 ± 0.00	3.1 ± 0.1
Sac. R.–Keswick	09/19/96	1/2	0.060 ± 0.004	<0.003 ± 0.001	0.011 ± 0.001	0.10 ± 0.00	4.3 ± 0.4
Sac. R.–Keswick	09/19/96	2/2	0.055 ± 0.005	0.0041 ± 0.0013	0.0079 ± 0.0014	0.090 ± 0.004	3.2 ± 0.1
Sac. R.–Keswick	11/21/96	1/2	0.10 ± 0.01	0.0046 ± 0.0008	0.025 ± 0.001	0.25 ± 0.01	8.6 ± 0.6
Sac. R.–Keswick	11/21/96	2/2	0.10 ± 0.01	0.0062 ± 0.0015	0.028 ± 0.003	0.26 ± 0.02	7.8 ± 0.2
Sac. R.–Keswick	12/11/96	1/2	0.11 ± 0.00	0.0045 ± 0.0006	0.018 ± 0.001	0.25 ± 0.01	11 ± 1
Sac. R.–Keswick	12/11/96	2/2	0.12 ± 0.00	0.0041 ± 0.0020	0.019 ± 0.001	0.26 ± 0.01	11 ± 0
Sac. R.–Keswick	01/02/97	1/2	0.11 ± 0.00	0.0048 ± 0.0012	0.041 ± 0.002	0.55 ± 0.01	27 ± 1
Sac. R.–Keswick	01/02/97	2/2	0.11 ± 0.00	0.0051 ± 0.0015	0.042 ± 0.005	0.56 ± 0.02	25 ± 2
Sac. R.–Keswick	05/28/97	1/2	0.086 ± 0.002	<0.005 ± 0.000	0.016 ± 0.002	0.18 ± 0.01	4.0 ± 0.3
Sac. R.–Keswick	05/28/97	2/2	0.087 ± 0.007	0.0049 ± 0.0014	0.015 ± 0.001	0.18 ± 0.01	4.2 ± 0.4
Sac. R.–Bend Br.	07/11/96	1/2	0.071 ± 0.000	<0.005 ± 0.002	0.0090 ± 0.0008	0.11 ± 0.00	3.6 ± 0.1
Sac. R.–Bend Br.	07/11/96	2/2	0.073 ± 0.002	<0.004 ± 0.002	0.012 ± 0.002	0.11 ± 0.01	3.5 ± 0.2
Sac. R.–Bend Br.	09/20/96	1/2	0.055 ± 0.000	<0.003 ± 0.001	0.0073 ± 0.0012	0.10 ± 0.00	4.9 ± 0.2
Sac. R.–Bend Br.	09/20/96	2/2	0.057 ± 0.001	<0.003 ± 0.001	0.012 ± 0.001	0.11 ± 0.01	5.2 ± 0.4
Sac. R.–Bend Br.	11/22/96	1/2	0.095 ± 0.003	0.0041 ± 0.0014	0.031 ± 0.002	0.31 ± 0.00	9.3 ± 0.7
Sac. R.–Bend Br.	11/22/96	2/2	0.10 ± 0.01	0.0045 ± 0.0028	0.030 ± 0.004	0.32 ± 0.00	9.6 ± 0.5
Sac. R.–Bend Br.	12/12/96	1/2	0.12 ± 0.00	0.0059 ± 0.0018	0.055 ± 0.004	0.66 ± 0.01	11 ± 0
Sac. R.–Bend Br.	12/12/96	2/2	0.12 ± 0.00	0.0057 ± 0.0011	0.056 ± 0.006	0.67 ± 0.03	12 ± 0
Sac. R.–Bend Br.	01/03/97	1/2	0.22 ± 0.01	0.015 ± 0.002	0.18 ± 0.01	2.2 ± 0.1	24 ± 0
Sac. R.–Bend Br.	01/03/97	2/2	0.21 ± 0.01	0.015 ± 0.002	0.18 ± 0.00	2.1 ± 0.1	23 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (mg/L) ICP–AES	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS	Zinc (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.077 ± 0.002	<0.005 ± 0.001	0.016 ± 0.003	0.19 ± 0.01	4.5 ± 0.2
Sac. R.–Bend Br.	05/30/97	2/2	0.074 ± 0.004	<0.005 ± 0.002	0.019 ± 0.002	0.19 ± 0.00	3.9 ± 0.3
Sac. R.–Colusa	07/16/96	1/1	0.12 ± 0.02	0.0092 ± 0.0020	0.056 ± 0.002	0.68 ± 0.03	11 ± 0
Sac. R.–Colusa	09/25/96	1/2	0.11 ± 0.01	0.0041 ± 0.0021	0.022 ± 0.002	0.19 ± 0.00	3.4 ± 0.2
Sac. R.–Colusa	09/25/96	2/2	0.11 ± 0.01	0.0052 ± 0.0007	0.013 ± 0.000	0.19 ± 0.01	3.4 ± 0.3
Sac. R.–Colusa	11/13/96	1/2	0.13 ± 0.01	<0.005 ± 0.008	0.025 ± 0.001	0.27 ± 0.01	4.3 ± 0.1
Sac. R.–Colusa	11/13/96	2/2	0.13 ± 0.00	0.0060 ± 0.0018	0.021 ± 0.004	0.26 ± 0.01	4.6 ± 0.0
Sac. R.–Colusa	12/16/96	1/2	0.15 ± 0.00	0.011 ± 0.002	0.093 ± 0.006	1.1 ± 0.0	15 ± 0
Sac. R.–Colusa	12/16/96	2/2	0.15 ± 0.00	0.010 ± 0.000	0.10 ± 0.00	1.2 ± 0.0	20 ± 0
Sac. R.–Colusa	01/04/97	1/2	0.44 ± 0.01	0.039 ± 0.002	0.60 ± 0.01	6.5 ± 0.0	59 ± 1
Sac. R.–Colusa	01/04/97	2/2	0.42 ± 0.00	0.040 ± 0.001	0.61 ± 0.00	6.7 ± 0.0	60 ± 1
Sac. R.–Colusa	06/03/97	1/2	0.12 ± 0.01	<0.005 ± 0.003	0.036 ± 0.004	0.39 ± 0.01	5.3 ± 0.2
Sac. R.–Colusa	06/03/97	2/2	0.12 ± 0.02	0.0075 ± 0.0014	0.037 ± 0.003	0.42 ± 0.02	5.6 ± 0.5
Sac. R.–Verona	07/18/96	1/2	0.14 ± 0.01	0.0060 ± 0.0010	0.033 ± 0.006	0.36 ± 0.01	4.5 ± 0.3
Sac. R.–Verona	07/18/96	2/2	0.14 ± 0.01	0.0060 ± 0.0013	0.033 ± 0.005	0.35 ± 0.02	4.3 ± 0.3
Sac. R.–Verona	09/26/96	1/2	0.19 ± 0.00	0.0068 ± 0.0013	0.036 ± 0.003	0.44 ± 0.01	5.6 ± 0.2
Sac. R.–Verona	09/26/96	2/2	0.18 ± 0.01	0.0059 ± 0.0009	0.041 ± 0.002	0.45 ± 0.01	5.3 ± 0.1
Sac. R.–Verona	11/14/96	1/2	0.22 ± 0.01	0.0052 ± 0.0027	0.030 ± 0.004	0.35 ± 0.02	4.4 ± 0.1
Sac. R.–Verona	11/14/96	2/2	0.21 ± 0.00	0.0053 ± 0.0045	0.031 ± 0.004	0.38 ± 0.00	4.5 ± 0.4
Sac. R.–Verona	12/18/96	1/2	0.14 ± 0.01	0.0046 ± 0.0010	0.052 ± 0.001	0.61 ± 0.03	8.3 ± 0.2
Sac. R.–Verona	12/18/96	2/2	0.14 ± 0.00	<0.004 ± 0.002	0.050 ± 0.004	0.57 ± 0.03	6.3 ± 0.2
Sac. R.–Verona	06/04/97	1/2	0.21 ± 0.01	0.0056 ± 0.0022	0.045 ± 0.002	0.45 ± 0.00	5.5 ± 0.3
Sac. R.–Verona	06/04/97	2/2	0.23 ± 0.00	0.0069 ± 0.0011	0.045 ± 0.008	0.49 ± 0.02	5.8 ± 0.0
Sac. R.–Freeport	07/17/96	1/2	0.12 ± 0.00	<0.005 ± 0.001	0.028 ± 0.001	0.30 ± 0.00	3.5 ± 0.2
Sac. R.–Freeport	07/17/96	2/2	0.12 ± 0.01	<0.004 ± 0.001	0.026 ± 0.001	0.29 ± 0.02	3.3 ± 0.1
Sac. R.–Freeport	09/24/96	1/2	0.23 ± 0.01	0.0035 ± 0.0015	0.022 ± 0.000	0.28 ± 0.00	3.6 ± 0.3
Sac. R.–Freeport	09/24/96	2/2	0.19 ± 0.00	0.0049 ± 0.0019	0.021 ± 0.002	0.23 ± 0.00	3.1 ± 0.1
Sac. R.–Freeport	11/12/96	1/2	0.17 ± 0.01	0.0035 ± 0.0036	0.012 ± 0.002	0.14 ± 0.01	3.2 ± 0.1
Sac. R.–Freeport	11/12/96	2/2	0.16 ± 0.00	<0.003 ± 0.001	0.013 ± 0.001	0.14 ± 0.00	3.3 ± 0.2
Sac. R.–Freeport	12/17/96	1/2	0.13 ± 0.01	0.0072 ± 0.0034	0.059 ± 0.002	0.67 ± 0.02	8.1 ± 0.1
Sac. R.–Freeport	12/17/96	2/2	0.13 ± 0.00	<0.005 ± 0.001	0.061 ± 0.003	0.69 ± 0.03	7.6 ± 0.3
Sac. R.–Freeport	01/06/97	1/2	0.67 ± 0.00	0.017 ± 0.001	0.27 ± 0.01	2.9 ± 0.0	18 ± 0
Sac. R.–Freeport	01/06/97	1/2	0.67 ± 0.00	0.015 ± 0.001	0.28 ± 0.00	2.8 ± 0.1	17 ± 0
Sac. R.–Freeport	06/05/97	1/2	0.17 ± 0.00	0.0070 ± 0.0012	0.025 ± 0.001	0.31 ± 0.01	3.3 ± 0.1
Sac. R.–Freeport	06/05/97	2/2	0.16 ± 0.00	<0.005 ± 0.002	0.026 ± 0.005	0.32 ± 0.01	3.5 ± 0.3
Sac. R.–Freeport, dup	06/05/97	1/2	0.16 ± 0.00	0.0051 ± 0.0017	0.018 ± 0.002	0.22 ± 0.01	2.7 ± 0.2

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Uranium (µg/L) ICP–MS	Vanadium (mg/L) ICP–AES	Ytterbium (µg/L) ICP–MS	Yttrium (µg/L) ICP–MS	Zinc (µg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.16 ± 0.00	0.0050 ± 0.0013	0.019 ± 0.002	0.21 ± 0.00	2.8 ± 0.2
Flat Cr.	12/11/96	1/2	0.0081 ± 0.0022	<0.004 ± 0.000	0.055 ± 0.002	0.56 ± 0.00	26 ± 0
Flat Cr.	12/11/96	2/2	0.0072 ± 0.0024	<0.004 ± 0.002	0.054 ± 0.001	0.56 ± 0.01	26 ± 2
Flat Cr.	05/29/97	1/2	0.0023 ± 0.0017	<0.005 ± 0.001	0.028 ± 0.003	0.29 ± 0.01	5.5 ± 0.3
Flat Cr.	05/29/97	2/2	<0.002 ± 0.002	<0.005 ± 0.000	0.026 ± 0.004	0.29 ± 0.00	5.6 ± 0.4
Spring Cr.–Weir	12/11/96	1/2	0.092 ± 0.005	<0.005 ± 0.001	0.75 ± 0.01	9.9 ± 0.0	482 ± 16
Spring Cr.–Weir	12/11/96	2/2	0.094 ± 0.001	<0.004 ± 0.002	0.77 ± 0.01	10 ± 0	471 ± 41
Spring Cr.–Weir	05/28/97	1/2	0.12 ± 0.01	<0.005 ± 0.002	1.3 ± 0.0	18 ± 1	913 ± 43
Spring Cr.–Weir	05/28/97	2/2	0.12 ± 0.01	<0.005 ± 0.003	1.3 ± 0.1	17 ± 0	909 ± 19
Spring Cr.–Road	01/02/97	1/2	0.19 ± 0.01	<0.004 ± 0.004	0.49 ± 0.01	6.2 ± 0.1	1343 ± 97
Spring Cr.–Road	01/02/97	2/2	0.19 ± 0.01	<0.004 ± 0.001	0.47 ± 0.01	6.2 ± 0.1	1396 ± 5
Whiskeytown	12/11/96	1/2	0.040 ± 0.005	<0.004 ± 0.002	0.0052 ± 0.0015	0.067 ± 0.003	1.4 ± 0.1
Whiskeytown	12/11/96	2/2	0.038 ± 0.001	<0.005 ± 0.002	0.0050 ± 0.0013	0.067 ± 0.002	0.81 ± 0.15
Whiskeytown	05/29/97	1/2	0.045 ± 0.003	<0.005 ± 0.002	0.013 ± 0.002	0.14 ± 0.00	1.1 ± 0.1
Whiskeytown	05/29/97	2/2	0.041 ± 0.001	<0.005 ± 0.001	0.014 ± 0.003	0.14 ± 0.00	1.1 ± 0.1
Spring Cr. arm	07/12/96	1/2	0.026 ± 0.001	<0.005 ± 0.001	0.0061 ± 0.0034	0.054 ± 0.009	0.96 ± 0.09
Spring Cr. arm	07/12/96	2/2	0.024 ± 0.003	<0.004 ± 0.001	0.0045 ± 0.0021	0.055 ± 0.004	0.86 ± 0.05
Spring Cr. arm	09/18/96	1/2	0.023 ± 0.001	<0.003 ± 0.002	0.0042 ± 0.0002	0.080 ± 0.006	2.8 ± 0.1
Spring Cr. arm	09/18/96	2/2	0.029 ± 0.002	<0.003 ± 0.002	0.0073 ± 0.0023	0.092 ± 0.003	4.4 ± 0.5
Spring Cr. arm	11/20/96	1/2	0.034 ± 0.004	<0.003 ± 0.001	0.044 ± 0.003	0.54 ± 0.00	20 ± 0
Spring Cr. arm	11/20/96	2/2	0.041 ± 0.004	<0.003 ± 0.002	0.043 ± 0.001	0.54 ± 0.01	21 ± 1
Spring Cr. arm	12/11/96	1/2	0.047 ± 0.003	<0.004 ± 0.000	0.088 ± 0.000	1.4 ± 0.0	60 ± 3
Spring Cr. arm	12/11/96	2/2	0.048 ± 0.005	<0.004 ± 0.001	0.096 ± 0.002	1.4 ± 0.0	60 ± 4
Spring Cr. arm	05/28/97	1/2	0.039 ± 0.001	<0.005 ± 0.000	0.016 ± 0.001	0.21 ± 0.01	4.8 ± 0.5
Spring Cr. arm	05/28/97	2/2	0.046 ± 0.002	<0.005 ± 0.000	0.016 ± 0.002	0.20 ± 0.01	4.8 ± 0.5
Colusa Basin Drain	06/06/97	1/2	1.6 ± 0.1	0.024 ± 0.001	0.16 ± 0.00	1.9 ± 0.0	18 ± 0
Colusa Basin Drain	06/06/97	2/2	1.6 ± 0.0	0.022 ± 0.001	0.16 ± 0.01	1.9 ± 0.0	19 ± 0
Yolo Bypass	01/07/97	1/2	0.28 ± 0.01	0.018 ± 0.001	0.28 ± 0.01	3.0 ± 0.0	25 ± 0
Yolo Bypass	01/07/97	2/2	0.29 ± 0.01	0.020 ± 0.002	0.28 ± 0.00	3.0 ± 0.0	25 ± 0

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Zirconium (μg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/2	0.27 ± 0.01
Sac. R.–Shasta	07/12/96	2/2	0.26 ± 0.00
Sac. R.–Shasta	09/19/96	1/2	0.089 ± 0.003
Sac. R.–Shasta	09/19/96	2/2	0.12 ± 0.01
Sac. R.–Shasta	11/19/96	1/2	0.033 ± 0.010
Sac. R.–Shasta	11/19/96	2/2	0.026 ± 0.008
Sac. R.–Shasta	12/12/96	1/2	0.062 ± 0.016
Sac. R.–Shasta	12/12/96	2/2	0.086 ± 0.010
Sac. R.–Shasta	05/29/97	1/2	0.31 ± 0.04
Sac. R.–Shasta	05/29/97	2/2	0.36 ± 0.01
Sac. R.–Keswick	07/11/96	1/2	0.23 ± 0.00
Sac. R.–Keswick	07/11/96	2/2	0.21 ± 0.01
Sac. R.–Keswick	09/19/96	1/2	0.14 ± 0.03
Sac. R.–Keswick	09/19/96	2/2	0.049 ± 0.004
Sac. R.–Keswick	11/21/96	1/2	0.066 ± 0.008
Sac. R.–Keswick	11/21/96	2/2	0.039 ± 0.009
Sac. R.–Keswick	12/11/96	1/2	0.054 ± 0.006
Sac. R.–Keswick	12/11/96	2/2	0.043 ± 0.007
Sac. R.–Keswick	01/02/97	1/2	0.22 ± 0.01
Sac. R.–Keswick	01/02/97	2/2	0.21 ± 0.01
Sac. R.–Keswick	05/28/97	1/2	0.27 ± 0.04
Sac. R.–Keswick	05/28/97	2/2	0.31 ± 0.01
Sac. R.–Bend Br.	07/11/96	1/2	0.22 ± 0.01
Sac. R.–Bend Br.	07/11/96	2/2	0.23 ± 0.01
Sac. R.–Bend Br.	09/20/96	1/2	0.067 ± 0.002
Sac. R.–Bend Br.	09/20/96	2/2	0.088 ± 0.003
Sac. R.–Bend Br.	11/22/96	1/2	0.16 ± 0.01
Sac. R.–Bend Br.	11/22/96	2/2	0.16 ± 0.01
Sac. R.–Bend Br.	12/12/96	1/2	0.31 ± 0.00
Sac. R.–Bend Br.	12/12/96	2/2	0.36 ± 0.02
Sac. R.–Bend Br.	01/03/97	1/2	0.36 ± 0.02
Sac. R.–Bend Br.	01/03/97	2/2	0.32 ± 0.01

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Zirconium (µg/L) ICP–MS
Sac. R.–Bend Br.	05/30/97	1/2	0.22 ± 0.02
Sac. R.–Bend Br.	05/30/97	2/2	0.16 ± 0.01
Sac. R.–Colusa	07/16/96	1/1	0.47 ± 0.02
Sac. R.–Colusa	09/25/96	1/2	0.18 ± 0.00
Sac. R.–Colusa	09/25/96	2/2	0.18 ± 0.01
Sac. R.–Colusa	11/13/96	1/2	0.29 ± 0.02
Sac. R.–Colusa	11/13/96	2/2	0.27 ± 0.02
Sac. R.–Colusa	12/16/96	1/2	0.39 ± 0.01
Sac. R.–Colusa	12/16/96	2/2	0.48 ± 0.02
Sac. R.–Colusa	01/04/97	1/2	0.68 ± 0.01
Sac. R.–Colusa	01/04/97	2/2	0.62 ± 0.02
Sac. R.–Colusa	06/03/97	1/2	0.20 ± 0.01
Sac. R.–Colusa	06/03/97	2/2	0.22 ± 0.01
Sac. R.–Verona	07/18/96	1/2	0.28 ± 0.00
Sac. R.–Verona	07/18/96	2/2	0.28 ± 0.01
Sac. R.–Verona	09/26/96	1/2	0.31 ± 0.00
Sac. R.–Verona	09/26/96	2/2	0.31 ± 0.01
Sac. R.–Verona	11/14/96	1/2	0.28 ± 0.01
Sac. R.–Verona	11/14/96	2/2	0.28 ± 0.01
Sac. R.–Verona	12/18/96	1/2	0.46 ± 0.00
Sac. R.–Verona	12/18/96	2/2	0.32 ± 0.00
Sac. R.–Verona	06/04/97	1/2	0.19 ± 0.00
Sac. R.–Verona	06/04/97	2/2	0.20 ± 0.02
Sac. R.–Freeport	07/17/96	1/2	0.22 ± 0.00
Sac. R.–Freeport	07/17/96	2/2	0.22 ± 0.01
Sac. R.–Freeport	09/24/96	1/2	0.25 ± 0.00
Sac. R.–Freeport	09/24/96	2/2	0.19 ± 0.00
Sac. R.–Freeport	11/12/96	1/2	0.12 ± 0.01
Sac. R.–Freeport	11/12/96	2/2	0.14 ± 0.01
Sac. R.–Freeport	12/17/96	1/2	0.42 ± 0.01
Sac. R.–Freeport	12/17/96	2/2	0.39 ± 0.01
Sac. R.–Freeport	01/06/97	1/2	1.1 ± 0.0
Sac. R.–Freeport	01/06/97	1/2	1.1 ± 0.0
Sac. R.–Freeport	06/05/97	1/2	0.18 ± 0.02
Sac. R.–Freeport	06/05/97	2/2	0.16 ± 0.02
Sac. R.–Freeport, dup	06/05/97	1/2	0.15 ± 0.02

Table A4-2. Concentrations of major cations and trace elements in unfiltered (whole) water samples—Continued

Site	Date	Split replicate	Zirconium (μg/L) ICP–MS
Sac. R.–Freeport, dup	06/05/97	2/2	0.19 ± 0.01
Flat Cr.	12/11/96	1/2	0.040 ± 0.006
Flat Cr.	12/11/96	2/2	0.022 ± 0.003
Flat Cr.	05/29/97	1/2	0.038 ± 0.010
Flat Cr.	05/29/97	2/2	0.012 ± 0.005
Spring Cr.–Weir	12/11/96	1/2	0.048 ± 0.007
Spring Cr.–Weir	12/11/96	2/2	0.051 ± 0.003
Spring Cr.–Weir	05/28/97	1/2	0.044 ± 0.017
Spring Cr.–Weir	05/28/97	2/2	0.046 ± 0.006
Spring Cr.–Road	01/02/97	1/2	0.069 ± 0.004
Spring Cr.–Road	01/02/97	2/2	0.083 ± 0.002
Whiskeytown	12/11/96	1/2	<0.01 ± 0.01
Whiskeytown	12/11/96	2/2	0.033 ± 0.005
Whiskeytown	05/29/97	1/2	0.12 ± 0.01
Whiskeytown	05/29/97	2/2	0.10 ± 0.01
Spring Cr. arm	07/12/96	1/2	0.026 ± 0.009
Spring Cr. arm	07/12/96	2/2	0.017 ± 0.003
Spring Cr. arm	09/18/96	1/2	0.031 ± 0.011
Spring Cr. arm	09/18/96	2/2	0.025 ± 0.011
Spring Cr. arm	11/20/96	1/2	0.017 ± 0.006
Spring Cr. arm	11/20/96	2/2	0.021 ± 0.002
Spring Cr. arm	12/11/96	1/2	0.023 ± 0.008
Spring Cr. arm	12/11/96	2/2	0.036 ± 0.011
Spring Cr. arm	05/28/97	1/2	0.11 ± 0.02
Spring Cr. arm	05/28/97	2/2	0.10 ± 0.02
Colusa Basin Drain	06/06/97	1/2	0.69 ± 0.00
Colusa Basin Drain	06/06/97	2/2	0.86 ± 0.01
Yolo Bypass	01/07/97	1/2	0.54 ± 0.00
Yolo Bypass	01/07/97	2/2	0.63 ± 0.01

Table A4-3. Lead concentrations in filtered water samples collected at a single point in the stream cross section

[Br., bridge; Cap, capsule filter (Gelman); Cr., creek; dup, duplicate; ICP–MS, inductively coupled plasma/mass spectrometry; Mem, membrane filter (Nuclepore); R., River; Sac., Sacramento; Split replicate (1/2), first number identifies which replicate was analyzed, second number represents number of replicate samples. Tan, tangential-flow ultrafilter (Millpore Minitan); kd, kilodalton; mm/dd/yy, month-day-year. µg/L, microgram per liter; µm, micrometer; <, less than the detection limit]

Site	Date (mm/dd/yy)	Filter	Split replicate	Lead (Pb) (µg/L) ICP–MS
Sac. R.–Shasta	07/12/96	40 µm Mem	1/1	< 0.005 ± 0.001
Sac. R.–Shasta	07/12/96	45 µm Cap	1/1	0.020 ± 0.004
Sac. R.–Shasta	07/12/96	10 kd Tan	1/1	0.006 ± 0.002
Sac. R.–Shasta	09/19/96	40 µm Mem	1/1	< 0.005 ± 0.001
Sac. R.–Shasta	09/19/96	45 µm Cap	1/1	< 0.008 ± 0.005
Sac. R.–Shasta	09/19/96	10 kd Tan	1/1	0.022 ± 0.015`
Sac. R.–Shasta	11/19/96	40 µm Mem	1/1	< 0.018 ± 0.009
Sac. R.–Shasta	11/19/96	45 µm Cap	1/1	< 0.018 ± 0.001
Sac. R.–Shasta	11/19/96	10 kd Tan	1/1	< 0.018 ± 0.006
Sac. R.–Keswick	07/11/96	40 µm Mem	1/1	0.005 ± 0.001
Sac. R.–Keswick	07/11/96	45 µm Cap	1/1	0.036 ± 0.000
Sac. R.–Keswick	07/11/96	10 kd Tan	1/2	0.031 ± 0.001
Sac. R.–Keswick	07/11/96	10 kd Tan	2/2	< 0.005 ± 0.004
Sac. R.–Keswick	09/19/96	40 µm Mem	1/1	0.007 ± 0.002
Sac. R.–Keswick	09/19/96	45 µm Cap	1/1	0.021 ± 0.003
Sac. R.–Keswick	09/19/96	10 kd Tan	1/2	< 0.005 ± 0.002
Sac. R.–Keswick	09/19/96	10 kd Tan	2/2	< 0.008 ± 0.004
Sac. R.–Keswick	11/21/96	40 µm Mem	1/1	0.016 ± 0.003
Sac. R.–Keswick	11/21/96	45 µm Cap	1/1	< 0.012 ± 0.015
Sac. R.–Keswick	11/21/96	10 kd Tan	1/1	< 0.012 ± 0.013
Sac. R.–Keswick	05/28/97	40 µm Mem	1/1	< 0.008 ± 0.008
Sac. R.–Keswick	05/28/97	45 µm Cap	1/1	0.066 ± 0.005
Sac. R.–Keswick	05/28/97	10 kd Tan	1/1	< 0.008 ± 0.004
Sac. R.–Bend Br.	07/11/96	40 µm Mem	1/1	0.006 ± 0.002
Sac. R.–Bend Br.	07/11/96	45 µm Cap	1/1	0.005 ± 0.000
Sac. R.–Bend Br.	07/11/96	10 kd Tan	1/1	0.008 ± 0.006
Sac. R.–Bend Br.	09/20/96	40 µm Mem	1/1	< 0.005 ± 0.003
Sac. R.–Bend Br.	09/20/96	45 µm Cap	1/1	0.009 ± 0.002
Sac. R.–Bend Br.	09/20/96	10 kd Tan	1/1	< 0.005 ± 0.001
Sac. R.–Verona	11/14/96	10 kd Tan	1/1	0.005 ± 0.004
Sac. R.–Verona	12/18/96	40 µm Mem	1/1	< 0.012 ± 0.002
Sac. R.–Verona	12/18/96	45 µm Cap	1/1	0.021 ± 0.008
Sac. R.–Verona	12/18/96	10 kd Tan	1/1	< 0.012 ± 0.023
Sac. R.–Verona	06/04/97	40 µm Mem	1/1	< 0.008 ± 0.003
Sac. R.–Verona	06/04/97	45 µm Cap	1/1	< 0.008 ± 0.002
Sac. R.–Bend Br.	11/22/96	40 µm Mem	1/1	< 0.018 ± 0.004
Sac. R.–Bend Br.	11/22/96	45 µm Cap	1/1	< 0.018 ± 0.006
Sac. R.–Bend Br.	11/22/96	10 kd Tan	1/1	< 0.018 ± 0.003
Sac. R.–Bend Br.	01/03/97	40 µm Mem	1/1	0.015 ± 0.004
Sac. R.–Bend Br.	01/03/97	45 µm Cap	1/1	0.042 ± 0.007
Sac. R.–Colusa	07/16/96	40 µm Mem	1/1	0.041 ± 0.003
Sac. R.–Colusa	07/16/96	45 µm Cap	1/1	0.039 ± 0.004
Sac. R.–Colusa	07/16/96	10 kd Tan	1/1	0.033 ± 0.001
Sac. R.–Colusa	09/25/96	40 µm Mem	1/1	0.020 ± 0.002
Sac. R.–Colusa	09/25/96	45 µm Cap	1/1	0.014 ± 0.003
Sac. R.–Colusa	09/25/96	10 kd Tan	1/2	< 0.005 ± 0.001
Sac. R.–Colusa	09/25/96	10 kd Tan	2/2	< 0.009 ± 0.002
Sac. R.–Colusa	11/13/96	40 µm Mem	1/1	0.017 ± 0.003
Sac. R.–Colusa	11/13/96	45 µm Cap	1/1	0.015 ± 0.007
Sac. R.–Colusa	11/13/96	10 kd Tan	1/1	0.010 ± 0.012
Sac. R.–Colusa	01/04/97	40 µm Mem	1/1	0.014 ± 0.004
Sac. R.–Colusa	01/04/97	45 µm Cap	1/1	0.048 ± 0.006
Sac. R.–Colusa	01/04/97	10 kd Tan	1/1	0.007 ± 0.001
Sac. R.–Colusa	06/03/97	40 µm Mem	1/1	0.012 ± 0.001
Sac. R.–Colusa	06/03/97	45 µm Cap	1/1	0.049 ± 0.004
Sac. R.–Colusa	06/03/97	10 kd Tan	1/1	< 0.008 ± 0.003
Sac. R.–Verona	07/18/96	40 µm Mem	1/1	0.017 ± 0.002
Sac. R.–Verona	07/18/96	45 µm Cap	1/1	0.030 ± 0.004
Sac. R.–Verona	07/18/96	10 kd Tan	1/1	0.007 ± 0.009
Sac. R.–Verona	09/26/96	40 µm Mem	1/1	0.043 ± 0.003
Sac. R.–Verona	09/26/96	45 µm Cap	1/1	0.012 ± 0.003
Sac. R.–Verona	09/26/96	10 kd Tan	1/1	0.006 ± 0.001
Sac. R.–Verona	11/14/96	40 µm Mem	1/1	0.015 ± 0.011
Sac. R.–Verona	11/14/96	45 µm Cap	1/1	0.042 ± 0.011
Spring Cr.–Weir	05/28/97	45 µm Cap	1/1	3.4 ± 0.2
Spring Cr. arm	07/12/96	40 µm Mem	1/1	< 0.005 ± 0.002
Spring Cr. arm	07/12/96	45 µm Cap	1/1	0.032 ± 0.009
Spring Cr. arm	07/12/96	10 kd Tan	1/1	0.096 ± 0.001
Spring Cr. arm	09/18/96	40 µm Mem	1/1	0.008 ± 0.002
Spring Cr. arm	09/18/96	45 µm Cap	1/1	0.011 ± 0.003

Table A4-3. Lead concentrations in filtered water samples collected at a single point in the stream cross section—*Continued*

Site	Date (mm/dd/yy)	Filter	Split replicate	Lead (Pb) (µg/L) ICP–MS
Sac. R.–Verona	06/04/97	10 kd Tan	1/1	< 0.008 ± 0.002
Sac. R.–Freeport	07/17/96	40 µm Mem	1/1	0.013 ± 0.000
Sac. R.–Freeport	07/17/96	45 µm Cap	1/1	0.038 ± 0.002
Sac. R.–Freeport	07/17/96	10 kd Tan	1/1	0.97 ± 0,00
Sac. R.–Freeport	09/24/96	40 µm Mem	1/1	0.009 ± 0.002
Sac. R.–Freeport	09/24/96	45 µm Cap	1/1	0.011 ± 0.003
Sac. R.–Freeport	09/24/96	10 kd Tan	1/1	0.005 ± 0.002
Sac. R.–Freeport	11/12/96	40 µm Mem	1/1	0.010 ± 0.004
Sac. R.–Freeport	11/12/96	45 µm Cap	1/1	0.011 ± 0.004
Sac. R.–Freeport	11/12/96	10 kd Tan	1/1	0.074 ± 0.004
Sac. R.–Freeport	12/17/96	40 µm Mem	1/1	< 0.012 ± 0.005
Sac. R.–Freeport	12/17/96	45 µm Cap	1/1	< 0.012 ± 0.003
Sac. R.–Freeport	12/17/96	10 kd Tan	1/1	< 0.012 ± 0.002
Sac. R.–Freeport	01/06/97	40 µm Mem	1/1	0.035 ± 0.004
Sac. R.–Freeport	01/06/97	45 µm Cap	1/1	0.062 ± 0.005
Sac. R.–Freeport	01/06/97	10 kd Tan	1/1	0.007 ± 0.008
Sac. R.–Freeport	06/05/97	40 µm Mem	1/1	0.012 ± 0.003
Sac. R.–Freeport	06/05/97	45 µm Cap	1/1	0.009 ± 0.001
Sac. R.–Freeport	06/05/97	10 kd Tan	1/1	< 0.008 ± 0.003
Sac. R.–Freeport, dup.	06/05/97	45 µm Cap	1/1	0.008 ± 0.008
Spring Cr. arm	09/18/96	10 kd Tan	1/2	< 0.005 ± 0.002
Spring Cr. arm	09/18/96	10 kd Tan	2/2	< 0.005 ± 0.004
Spring Cr. arm	11/20/96	40 µm Mem	1/1	0.012 ± 0.003
Spring Cr. arm	11/20/96	45 µm Cap	1/1	0.016 ± 0.006
Spring Cr. arm	11/20/96	10 kd Tan	1/1	< 0.012 ± 0.004
Colusa Basin Drain	06/06/97	40 µm Mem	1/1	0.022 ± 0.005
Colusa Basin Drain	06/06/97	45 µm Cap	1/1	0.023 ± 0.007
Colusa Basin Drain	06/06/97	10 kd Tan	1/1	< 0.008 ± 0.004
Yolo Bypass	01/07/97	40 µm Mem	1/1	0.013 ± 0.001
Yolo Bypass	01/07/97	45 µm Cap	1/1	0.028 ± 0.004
Yolo Bypass	01/07/97	10 kd Tan	1/2	0.029 ± 0.004
Yolo Bypass	01/07/97	10 kd Tan	2/2	< 0.005 ± 0.004

Table A4-4. Lead concentrations in unfiltered (whole) water samples collected from a single point in the stream cross section

[Br., bridge; Cr., creek; dup, duplicate; ICP–MS, inductively coupled plasma/mass spectrometry; R., River; Sac., Sacramento; Split replicate (1/2), first number identifies which replicate was analyzed, second number represents number of replicate samples. mm/dd/yy, month/day/year. µg/L, microgram per liter]

Site	Date (mm/dd/yy)	Split replicate	Lead (mg/L) ICP–MS
Sac. R.–Shasta	07/12/96	1/1	0.04 ± 0.01
Sac. R.–Shasta	09/19/96	1/1	0.026 ± 0.001
Sac. R.–Shasta	11/19/96	1/1	0.041 ± 0.010
Sac. R.–Keswick	07/11/96	1/1	0.05 ± 0.00
Sac. R.–Keswick	09/19/96	1/1	0.029 ± 0.004
Sac. R.–Keswick	11/21/96	1/1	0.31 ± 0.01
Sac. R.–Keswick	05/28/97	1/1	0.16 ± 0.00
Sac. R.–Bend Br.	07/11/96	1/1	0.09 ± 0.00
Sac. R.–Bend Br.	09/20/96	1/1	0.065 ± 0.010
Sac. R.–Bend Br.	11/22/96	1/1	0.32 ± 0.00
Sac. R.–Bend Br.	01/03/97	1/1	4.2 ± 0.2
Sac. R.–Colusa	07/16/96	1/1	0.32 ± 0.02
Sac. R.–Colusa	09/25/96	1/1	0.073 ± 0.000
Sac. R.–Colusa	11/13/96	1/1	0.076 ± 0.002
Sac. R.–Colusa	01/04/97	1/1	8.3 ± 0.1
Sac. R.–Colusa	06/03/97	1/1	0.39 ± 0.02
Sac. R.–Verona	07/18/96	1/1	0.24 ± 0.00
Sac. R.–Verona	09/26/96	1/1	0.26 ± 0.01
Sac. R.–Verona	11/14/96	1/1	0.36 ± 0.02
Sac. R.–Verona	12/18/96	1/1	0.52 ± 0.00
Sac. R.–Verona	06/04/97	1/1	0.49 ± 0.02
Sac. R.–Verona	07/18/96	1/1	0.24 ± 0.00
Sac. R.–Verona	09/26/96	1/1	0.26 ± 0.01
Sac. R.–Verona	11/14/96	1/1	0.36 ± 0.02
Sac. R.–Verona	12/18/96	1/1	0.52 ± 0.00
Sac. R.–Verona	06/04/97	1/1	0.49 ± 0.02
Sac. R.–Freeport	07/17/96	1/1	0.33 ± 0.00
Sac. R.–Freeport	09/24/96	1/1	0.30 ± 0.00
Sac. R.–Freeport	11/12/96	1/1	0.17 ± 0.00
Sac. R.–Freeport	12/17/96	1/1	0.88 ± 0.01
Sac. R.–Freeport	01/06/97	1/1	4.5 ± 0.0
Sac. R.–Freeport	06/05/97	1/1	0.35 ± 0.01
Freeport, dup.	06/05/97	1/1	0.28 ± 0.01
Spring Cr.	05/28/97	1/1	3.7 ± 0.0
Spring Cr. arm	07/12/96	1/1	0.02 ± 0.01
Spring Cr. arm	09/18/96	1/1	0.044 ± 0.007
Spring Cr. arm	11/20/96	1/1	0.11 ± 0.01
Colusa Basin Drain	06/06/97	1/1	2.1 ± 0.1
Yolo Bypass	01/07/97	1/2	3.4 ± 0.0
Yolo Bypass	01/07/97	2/2	3.5 ± 0.0

Appendix 5. Metal Concentrations in Sediment and Colloid Samples

Table A5-1. Concentrations of selected elements in streambed sediment samples.

Table A5-2. Concentrations of selected elements in suspended colloid samples.

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples.

Table A5-1. Concentrations of selected elements in streambed sediment samples

[Br., Bridge; Cr., Creek; R., River; Sac., Sacramento. mm/yy, month/year; µg/g, microgram per gram; µm, micrometer. <, less than the indicated detection limit]

Sampling Site	Size Fraction	Date (mm/yy)	Aluminum (µg/g)	Antimony (µg/g)	Barium (µg/g)	Beryllium (µg/g)	Bismuth (µg/g)	Cadmium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	76,000 ± 0	3.4 ± 0	350 ± 10	< 0.7 ± 0.07	1.6 ± 0.1	2.7 ± 0
Sac. R.–Churn Cr.	< 62 µm	10/96	67,000 ± 1,000	2.7 ± 0	400 ± 0	0.75 ± 0.05	0.92 ± 0.04	3.6 ± 0.2
Sac. R.–Balls Ferry	< 62 µm	10/96	84,000 ± 2,000	1.5 ± 0	510 ± 10	1.2 ± 0.1	0.53 ± 0.03	1.5 ± 0.1
Sac. R.–Bend Br.	< 62 µm	10/96	75,000 ± 2,000	1.1 ± 0	500 ± 0	0.99 ± 0.03	< 0.4 ± 0.02	0.91 ± 0.16
Sac. R.–Tehama	< 62 µm	10/96	58,000 ± 2,000	2.2 ± 0.1	260 ± 0	1.1 ± 0.1	0.53 ± 0.03	1.3 ± 0.1
Sac. R.–Colusa,	< 62 µm	11/96	71,000 ± 2,000	0.85 ± 0.02	460 ± 0	0.88 ± 0.06	< 0.4 ± 0.03	0.9 ± 0.09
Sac. R.–Verona	< 62 µm	11/96	76,000 ± 2,000	1.0 ± 0.1	470 ± 0	1.3 ± 0	< 0.5 ± 0.03	0.84 ± 0.02
Sac. R.–Freeport	< 62 µm	11/96	67,000 ± 2,000	0.97 ± 0.02	400 ± 0	1.1 ± 0.1	< 0.4 ± 0.01	0.82 ± 0.04
Cottonwood Cr.	< 62 µm	10/96	70,000 ± 0	1.1 ± 0	480 ± 0	1.2 ± 0.2	< 0.5 ± 0.01	0.39 ± 0.03
Cottonwood Cr.	< 62 µm	6/97	68,000 ± 1,000	1.1 ± 0	440 ± 0	1 ± 0.1	0.73 ± 0.03	0.37 ± 0.06
Cottonwood Cr.	whole sediment	6/97	62,000 ± 1,000	< 0.8 ± 0.05	490 ± 0	1 ± 0	0.66 ± 0.05	0.19 ± 0.04

Sampling Site	Size Fraction	Date (mm/yy)	Calcium (µg/g)	Cerium (µg/g)	Chromium (µg/g)	Cobalt (µg/g)	Copper (µg/g)	Dysprosium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	12,000 ± 0	13 ± 1	110 ± 0	18 ± 0	240 ± 10	3.4 ± 0.2
Sac. R.–Churn Cr.	< 62 µm	10/96	13,000 ± 0	15 ± 0	140 ± 10	17 ± 0	250 ± 0	3.4 ± 0
Sac. R.–Balls Ferry	< 62 µm	10/96	15,000 ± 0	20 ± 0	140 ± 0	21 ± 0	100 ± 0	3.1 ± 0.1
Sac. R.–Bend Br.	< 62 µm	10/96	15,000 ± 0	25 ± 0	230 ± 0	22 ± 1	75 ± 2	3.4 ± 0
Sac. R.–Tehama	< 62 µm	10/96	19,000 ± 1,000	14 ± 0	180 ± 10	22 ± 0	78 ± 2	2.7 ± 0
Sac. R.–Colusa,	< 62 µm	11/96	16,000 ± 0	21 ± 0	210 ± 0	19 ± 0	70 ± 1	3.3 ± 0.2
Sac. R.–Verona	< 62 µm	11/96	18,000 ± 0	27 ± 0	250 ± 10	24 ± 1	78 ± 1	3.8 ± 0
Sac. R.–Freeport	< 62 µm	11/96	19,000 ± 0	22 ± 0	260 ± 0	22 ± 0	67 ± 2	3.2 ± 0.1
Cottonwood Cr.	< 62 µm	10/96	12,000 ± 0	18 ± 1	230 ± 0	23 ± 0	61 ± 2	2.8 ± 0
Cottonwood Cr.	< 62 µm	6/97	11,000 ± 0	17 ± 0	240 ± 0	21 ± 0	62 ± 3	2.6 ± 0
Cottonwood Cr.	whole sediment	6/97	11,000 ± 0	17 ± 0	240 ± 0	21 ± 0	45 ± 1	2.1 ± 0.1

Table A5-1. Concentrations of selected elements in streambed sediment samples—*Continued*

Sampling Site	Size Fraction	Date (mm/yy)	Erbium (µg/g)	Europium (µg/g)	Gadolinium (µg/g)	Holmium (µg/g)	Iron (µg/g)	Lanthanum (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	2.2 ± 0.2	0.7 0 ± 0.01	4.5 ± 0.3	0.64 ± 0.04	56,000 ± 1,000	4.7 ± 0.3
Sac. R.–Churn Cr.	< 62 µm	10/96	2.2 ± 0.1	0.62 ± 0.02	4.1 ± 0.1	0.61 ± 0	56,000 ± 2,000	5.4 ± 0.2
Sac. R.–Balls Ferry	< 62 µm	10/96	2.0 ± 0	0.67 ± 0.03	3.8 ± 0.1	0.58 ± 0.03	61,000 ± 2,000	6.9 ± 0
Sac. R.–Bend Br.	< 62 µm	10/96	2.1 ± 0.1	0.79 ± 0.02	4.5 ± 0	0.61 ± 0.01	49,000 ± 2,000	11 ± 0
Sac. R.–Tehama	< 62 µm	10/96	1.7 ± 0.1	0.63 ± 0	3.4 ± 0	0.53 ± 0	48,000 ± 2,000	4.8 ± 0
Sac. R.–Colusa,	< 62 µm	11/96	1.9 ± 0	0.76 ± 0.03	4.4 ± 0.2	0.62 ± 0.01	48,000 ± 1,000	8.1 ± 0
Sac. R.–Verona	< 62 µm	11/96	2.3 ± 0	0.87 ± 0.05	5.2 ± 0.1	0.68 ± 0.01	58,000 ± 2,000	11 ± 0
Sac. R.–Freeport	< 62 µm	11/96	2.0 ± 0.1	0.77 ± 0.02	4.4 ± 0.1	0.57 ± 0.02	54,000 ± 2,000	7.9 ± 0.2
Cottonwood Cr.	< 62 µm	10/96	1.8 ± 0.1	0.61 ± 0.01	3.5 ± 0.1	0.5 ± 0.02	50,000 ± 2,000	6.0 ± 0.2
Cottonwood Cr.	< 62 µm	6/97	1.6 ± 0.1	0.64 ± 0.03	3.8 ± 0.2	0.47 ± 0.02	55,000 ± 0	5.5 ± 0.2
Cottonwood Cr.	whole sediment	6/97	1.4 ± 0.1	0.57 ± 0.02	3.1 ± 0.2	0.37 ± 0.01	45,000 ± 0	701 ± 0.1

Sampling Site	Size Fraction	Date (mm/yy)	Lead (µg/g)	Lithium (µg/g)	Lutetium (µg/g)	Magnesium (µg/g)	Manganese (µg/g)	Mercury (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	36 ± 2	19 ± 2	0.33 ± 0	14,000 ± 0	680 ± 10	0.40 ± 0.01
Sac. R.–Churn Cr.	< 62 µm	10/96	36 ± 1	21 ± 0	0.36 ± 0	13,000 ± 0	640 ± 0	0.39 ± 0
Sac. R.–Balls Ferry	< 62 µm	10/96	24 ± 0	31 ± 0	0.33 ± 0.02	10,000 ± 0	760 ± 30	0.15 ± 0.01
Sac. R.–Bend Br.	< 62 µm	10/96	14 ± 1	29 ± 0	0.34 ± 0.02	19,000 ± 0	810 ± 10	0.08 ± 0
Sac. R.–Tehama	< 62 µm	10/96	14 ± 1	30 ± 1	0.26 ± 0.01	13,000 ± 0	700 ± 30	0.25 ± 0.02
Sac. R.–Colusa,	< 62 µm	11/96	12 ± 1	38 ± 1	0.33 ± 0.01	16,000 ± 0	690 ± 10	0.10 ± 0.01
Sac. R.–Verona	< 62 µm	11/96	19 ± 0	36 ± 0	0.35 ± 0.01	17,000 ± 0	980 ± 0	0.07 ± 0.01
Sac. R.–Freeport	< 62 µm	11/96	16 ± 1	33 ± 1	0.32 ± 0	15,000 ± 0	810 ± 10	0.27 ± 0.01
Cottonwood Cr.	< 62 µm	10/96	14 ± 0	46 ± 0	0.30 ± 0.02	17,000 ± 1,000	880 ± 40	0.06 ± 0.01
Cottonwood Cr.	< 62 µm	6/97	12 ± 0	48 ± 3	0.28 ± 0.01	18,000 ± 0	730 ± 10	0.06 ± 0.01
Cottonwood Cr.	whole sediment	6/97	9.7 ± 0.6	39 ± 0	0.23 ± 0	19,000 ± 0	650 ± 0	0.03 ± 0.01

Table A5-1. Concentrations of selected elements in streambed sediment samples—*Continued*

Sampling Site	Size Fraction	Date (mm/yy)	Molybdenum (µg/g)	Neodymium (µg/g)	Nickel (µg/g)	Potassium (µg/g)	Praseodymium (µg/g)	Rhenium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	< 3 ± 0.9	8.3 ± 0.7	49 ± 3	5,100 ± 200	1.6 ± 0.1	< 0.009 ± 0.001
Sac. R.–Churn Cr.	< 62 µm	10/96	< 3 ± 0.6	8.8 ± 0.3	69 ± 1	5,900 ± 100	1.8 ± 0.1	< 0.009 ± 0.003
Sac. R.–Balls Ferry	< 62 µm	10/96	< 3 ± 0.4	10 ± 0	56 ± 0	8,200 ± 500	2.2 ± 0.1	< 0.009 ± 0.002
Sac. R.–Bend Br.	< 62 µm	10/96	< 3 ± 0.2	12 ± 0	150 ± 0	9,400 ± 300	2.8 ± 0	< 0.008 ± 0
Sac. R.–Tehama	< 62 µm	10/96	< 3 ± 0.2	8.1 ± 0.2	110 ± 0	4,600 ± 100	1.7 ± 0	< 0.009 ± 0.001
Sac. R.–Colusa,	< 62 µm	11/96	< 3 ± 0.2	11 ± 0	100 ± 0	9,000 ± 100	2.4 ± 0.1	< 0.008 ± 0.002
Sac. R.–Verona	< 62 µm	11/96	< 3 ± 0.2	14 ± 0	130 ± 0	9,300 ± 0	3.1 ± 0	< 0.009 ± 0.002
Sac. R.–Freeport	< 62 µm	11/96	< 3 ± 0	12 ± 0	110 ± 0	6,800 ± 0	2.4 ± 0.1	< 0.008 ± 0.003
Cottonwood Cr.	< 62 µm	10/96	< 3 ± 0.3	9.2 ± 0.2	150 ± 0	9,500 ± 500	2.0 ± 0.1	< 0.009 ± 0.001
Cottonwood Cr.	< 62 µm	6/97	< 3 ± 0.2	9.4 ± 0.5	160 ± 0	7,800 ± 0	1.9 ± 0.1	< 0.008 ± 0.003
Cottonwood Cr.	whole sediment	6/97	< 3 ± 0.4	8.7 ± 0.7	170 ± 0	9,300 ± 200	2.0 ± 0	< 0.009 ± 0.002

Sampling Site	Size Fraction	Date (mm/yy)	Rubidium (µg/g)	Samarium (µg/g)	Silica (µg/g)	Silver (µg/g)	Sodium (µg/g)	Strontium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	16 ± 0	2.6 ± 0.2	660,000 ± 10,000	< 1 ± 0.4	19,000 ± 0	100 ± 0
Sac. R.–Churn Cr.	< 62 µm	10/96	10 ± 0	2.7 ± 0.1	600,000 ± 40,000	< 1 ± 0.4	14,000 ± 1,000	110 ± 0
Sac. R.–Balls Ferry	< 62 µm	10/96	13 ± 0	2.9 ± 0.1	600,000 ± 400,00	< 1 ± 0.3	14,000 ± 1,000	170 ± 0
Sac. R.–Bend Br.	< 62 µm	10/96	30 ± 0	3.5 ± 0	630,000 ± 40,000	< 1 ± 0.2	17,000 ± 1,000	150 ± 0
Sac. R.–Tehama	< 62 µm	10/96	4.4 ± 0.4	2.5 ± 0.1	680,000 ± 50,000	< 1 ± 0.2	18,000 ± 2,000	160 ± 0
Sac. R.–Colusa,	< 62 µm	11/96	19 ± 0	3.2 ± 0.1	670,000 ± 40,000	< 1 ± 0.1	19,000 ± 1,000	130 ± 0
Sac. R.–Verona	< 62 µm	11/96	21 ± 0	3.9 ± 0	610,000 ± 50,000	< 1 ± 0.3	15,000 ± 1,000	140 ± 0
Sac. R.–Freeport	< 62 µm	11/96	9.3 ± 0.1	3.2 ± 0	640,000 ± 50,000	< 1 ± 0.2	16,000 ± 1,000	140 ± 10
Cottonwood Cr.	< 62 µm	10/96	12 ± 0	2.7 ± 0	650,000 ± 50,000	< 1 ± 0.3	17,000 ± 2,000	120 ± 0
Cottonwood Cr.	< 62 µm	6/97	12 ± 0	2.5 ± 0	630,000 ± 20,000	< 1 ± 0.2	14,000 ± 0	110 ± 0
Cottonwood Cr.	whole sediment	6/97	25 ± 0	2.1 ± 0.1	680,000 ± 20,000	< 1 ± 0.2	16,000 ± 0	130 ± 0

Table A5-1. Concentrations of selected elements in streambed sediment samples—*Continued*

Sampling Site	Size Fraction	Date (mm/yy)	Terbium (µg/g)	Thallium (µg/g)	Thorium (µg/g)	Thulium (µg/g)	Tin (µg/g)	Titanium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	0.55 ± 0.01	0.19 ± 0.02	1.5 ± 0.1	0.24 ± 0.01	< 5 ± 0.1	3,800 ± 0
Sac. R.–Churn Cr.	< 62 µm	10/96	0.58 ± 0	0.28 ± 0.04	2.0 ± 0	0.26 ± 0.01	150 ± 20	3,900 ± 0
Sac. R.–Balls Ferry	< 62 µm	10/96	0.52 ± 0.01	0.34 ± 0.02	4.1 ± 0	0.23 ± 0.01	130 ± 20	5,500 ± 0
Sac. R.–Bend Br.	< 62 µm	10/96	0.59 ± 0.02	0.24 ± 0.01	4.3 ± 0.2	0.24 ± 0.01	150 ± 20	4,700 ± 0
Sac. R.–Tehama	< 62 µm	10/96	0.52 ± 0.03	0.24 ± 0.01	3.3 ± 0.1	0.22 ± 0.03	68 ± 3	4,800 ± 200
Sac. R.–Colusa,	< 62 µm	11/96	0.59 ± 0	0.27 ± 0.01	3.6 ± 0.3	0.23 ± 0	130 ± 10	5,400 ± 0
Sac. R.–Verona	< 62 µm	11/96	0.63 ± 0.04	0.27 ± 0.01	4.4 ± 0	0.26 ± 0.02	140 ± 20	5,900 ± 0
Sac. R.–Freeport	< 62 µm	11/96	0.55 ± 0.01	0.27 ± 0.02	4.5 ± 0	0.24 ± 0.01	130 ± 10	6,000 ± 100
Cottonwood Cr.	< 62 µm	10/96	0.46 ± 0.01	0.32 ± 0.01	3.7 ± 0	0.21 ± 0.01	160 ± 40	5,100 ± 200
Cottonwood Cr.	< 62 µm	6/97	0.46 ± 0.01	0.30 ± 0	3.8 ± 0.1	0.18 ± 0	< 4 ± 0.3	5,100 ± 0
Cottonwood Cr.	whole sediment	6/97	0.34 ± 0.02	0.24 ± 0.02	3.0 ± 0	0.15 ± 0	< 5 ± 0.4	4,100 ± 0

Sampling Site	Size Fraction	Date (mm/yy)	Uranium (µg/g)	Vanadium (µg/g)	Ytterbium (µg/g)	Yttrium (µg/g)	Zinc (µg/g)	Zirconium (µg/g)
Sac. R.–Rodeo	< 62 µm	10/96	1.5 ± 0.1	150 ± 0	2.3 ± 0.1	16 ± 0	410 ± 10	150 ± 0
Sac. R.–Churn Cr.	< 62 µm	10/96	1.7 ± 0	170 ± 10	2.0 ± 0	15 ± 0	550 ± 20	150 ± 0
Sac. R.–Balls Ferry	< 62 µm	10/96	2.2 ± 0	190 ± 10	1.9 ± 0.1	14 ± 0	310 ± 10	240 ± 0
Sac. R.–Bend Br.	< 62 µm	10/96	2.1 ± 0	160 ± 10	1.9 ± 0	16 ± 0	220 ± 10	160 ± 0
Sac. R.–Tehama	< 62 µm	10/96	1.7 ± 0	160 ± 10	1.8 ± 0.1	11 ± 0	230 ± 10	240 ± 0
Sac. R.–Colusa,	< 62 µm	11/96	1.7 ± 0	160 ± 0	1.9 ± 0	15 ± 0	170 ± 10	210 ± 0
Sac. R.–Verona	< 62 µm	11/96	2.2 ± 0	190 ± 0	2.0 ± 0.1	17 ± 0	150 ± 0	190 ± 0
Sac. R.–Freeport	< 62 µm	11/96	2.2 ± 0.1	190 ± 10	1.8 ± 0.1	14 ± 0	160 ± 10	200 ± 0
Cottonwood Cr.	< 62 µm	10/96	2.1 ± 0	160 ± 10	1.7 ± 0.1	12 ± 0	110 ± 0	170 ± 0
Cottonwood Cr.	< 62 µm	6/97	2.1 ± 0	160 ± 0	1.7 ± 0	11 ± 0	120 ± 10	240 ± 10
Cottonwood Cr.	whole sediment	6/97	1.7 ± 0.1	130 ± 0	1.4 ± 0.1	9.6 ± 0.3	100 ± 10	200 ± 10

Table A5-2. Concentrations of selected elements in suspended colloid samples

[Values in parenthesis represent minimum values from incomplete dissolution, reported to one significant figure. Split replicate (1/2), first number identifies which replicate was analyzed, second number reporesents number of replicate samples. Ax, axial; Cap, capsule filter (Gelman); conc., concentration; CV–AFS, cold–vapor/atomic fluorescence spectrometry; dup, duplicate; ICP–AES,inductively coupled plasma–atomic emission spectrometry; ICP–MS, inductively coupled plasma–mass spectrometry; na, not analyzed; nd, not determined; R., River; Sac., Sacramento; mm/dd/yy, month/day/year; mg/L, milligram per liter; µg/g, microgram per gram; µm, micrometer]

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Colloid conc. (mg/L)	Sediment conc. (mg/L)	Aluminum (µg/g) ICP–AES	Antimony (µg/g) ICP–MS	Barium (µg/g) ICP–AES	Beryllium (µg/g) ICP–MS	Bismuth (µg/g) ICP–MS
Sac. R.– Shasta	07/12/96	(1/1)	2.9	3	85,000 ± 1,000	< 1 ± 0	280 ± 0	1.3 ± 0.2	< 0.6 ± 0.01
Sac. R.– Shasta	11/19/96	(1/1)	0.9	7	86,000 ± 1,000	3.4 ± 0.2	740 ± 10	< 2 ± 0.2	< 2 ± 0.1
Sac. R.– Shasta	12/12/96	(1/1)	1.4	2	(100,000) ± 0	(10) ± 0	(700) ± 0	(< 1) ± 0.1	(20) ± 1
Sac. R.– Shasta	05/29/97	(1/1)	9	7	110,000 ± 0	1.0 ± 0.0	470 ± 10	1.4 ± 0.1	< 0.5 ± 0.02
Sac. R.– Keswick	07/11/96	(1/1)	2.4	5	89,000 ± 1,000	1.9 ± 0.1	340 ± 0	< 1 ± 0	1.6 ± 0.0
Sac. R.– Keswick	11/21/96	(1/1)	3.3	3	98,000 ± 1,000	7.3 ± 0.1	310 ± 20	0.95 ± 0.16	5.1 ± 0.0
Sac. R.– Keswick	12/11/96	(1/1)	2.1	3	100,000 ± 3,600	3.9 ± 0.2	790 ± 20	1.3 ± 0.4	2.0 ± 0.1
Sac. R.– Keswick	01/02/97	(1/1)	13	11	72,000 ± 0	3.5 ± 0.0	780 ± 0	1.4 ± 0.0	0.87 ± 0.04
Sac. R.– Keswick	05/28/97	(1/1)	9	8	100,000 ± 0	1.4 ± 0.1	430 ± 0	1.3 ± 0.1	< 0.5 ± 0.03
Sac. R.– Bend Br.	07/11/96	(1/1)	4.3	5	66,000 ± 2,000	1.1 ± 0.1	280 ± 10	< 0.9 ± 0.11	< 0.6 ± 0.03
Sac. R.– Bend Br.	09/20/96	(1/1)	2.4	4	78,000 ± 3,000	1.4 ± 0.0	570 ± 20	1.5 ± 0.2	< 0.5 ± 0
Sac. R.– Bend Br.	11/22/96	(1/1)	7.7	15	100,000 ± 1,000	3.8 ± 0.2	600 ± 10	< 3 ± 0.1	4.2 ± 0.2
Sac. R.– Bend Br.	12/12/96	(1/1)	30	51	87,000 ± 0	1.6 ± 0.1	760 ± 0	1.9 ± 0.1	< 0.5 ± 0.02
Sac. R.– Bend Br.	01/03/97	(1/1)	113	355	83,000 ± 0	1.8 ± 0.0	720 ± 0	2.0 ± 0.0	< 0.4 ± 0.03
Sac. R.– Bend Br.	05/30/97	(1/2)	10	14	96,000 ± 1,000	1.5 ± 0.1	430 ± 0	1.3 ± 0.1	< 0.5 ± 0
Sac. R.– Bend Br.	05/30/97	(2/2)	10	14	96,000 ± 4,000	1.2 ± 0.0	420 ± 0	1.3 ± 0.1	< 0.5 ± 0.03
Sac. R.– Colusa	07/16/96	(1/1)	51	32	68,000 ± 1,000	1.2 ± 0.0	350 ± 10	0.96 ± 0.18	< 0.5 ± 0
Sac. R.– Colusa	09/25/96	(1/1)	15	30	51,000 ± 3,000	< 3 ± 0.1	420 ± 10	< 3 ± 0.5	< 2 ± 0
Sac. R.– Colusa	11/13/96	(1/1)	26	46	59,000 ± 1,000	1.2 ± 0.1	390 ± 0	1.1 ± 0.1	1.6 ± 0.0
Sac. R.– Colusa	12/16/96	(1/1)	110	51	47,000 ± 600	1.4 ± 0.1	260 ± 0	1.4 ± 0.1	0.31 ± 0.01
Sac. R.– Colusa	01/04/97	(1/1)	379	579	88,000 ± 1,000	1.9 ± 0.1	750 ± 10	2.0 ± 0.1	< 0.4 ± 0.03
Sac. R.– Colusa	06/03/97	(1/1)	27	37	93,000 ± 5,000	1.6 ± 0.1	510 ± 30	1.2 ± 0.1	2.6 ± 0.0
Sac. R.– Verona	07/18/96	(1/1)	21	28	70,000 ± 0	1.4 ± 0.0	440 ± 0	1.2 ± 0.0	< 0.5 ± 0.05
Sac. R.– Verona	09/26/96	(1/1)	27	32	80,000 ± 3,000	1.2 ± 0.0	590 ± 10	1.2 ± 0.1	< 0.7 ± 0.02
Sac. R.– Verona	11/14/96	(1/1)	21	24	79,000 ± 0	1.4 ± 0.0	470 ± 0	< 1 ± 0.1	< 0.8 ± 0.12
Sac. R.– Verona	12/18/96	(1/1)	50	52	53,700 ± 700	1.5 ± 0.1	350 ± 10	1.6 ± 0.0	0.32 ± 0.01
Sac. R.– Verona	06/04/97	(1/1)	34	38	85,000 ± 1,000	1.2 ± 0.0	550 ± 10	1.7 ± 0.2	< 0.4 ± 0.01
Sac. R.– Freeport	07/17/96	(1/1)	29	20	(40,000) ± 0	(2) ± 0.2	(300) ± 10	(2) ± 0.2	(0.5) ± 0.02
Sac. R.– Freeport	09/24/96	(1/1)	34	28	(30,000) ± 0	(2) ± 0.1	(300) ± 0	(2) ± 0.2	(0.6) ± 0.02
Sac. R.– Freeport	11/12/96	(1/1)	5.8	12	79,000 ± 2,000	1.1 ± 0.1	510 ± 10	1.5 ± 0.2	< 0.6 ± 0.02
Sac. R.– Freeport	12/17/96	(1/1)	36	64	82,000 ± 0	2.2 ± 0.0	550 ± 0	1.7 ± 0.1	< 0.5 ± 0.02

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Colloid conc. (mg/L)	Sediment conc. (mg/L)	Aluminum (µg/g) ICP–AES	Antimony (µg/g) ICP–MS	Barium (µg/g) ICP–AES	Beryllium (µg/g) ICP–MS	Bismuth (µg/g) ICP–MS
Sac. R.– Freeport	01/06/97	(1/2)	146	193	110,000 ± 0	1.3 ± 0.1	1,100 ± 0	2.6 ± 0.0	< 0.5 ± 0.02
Sac. R.– Freeport	01/06/97	(2/2)	146	193	100,000 ± 0	1.2 ± 0.1	940 ± 10	2.4 ± 0.2	< 0.4 ± 0.02
Sac. R.– Freeport	06/05/97	(1/1)	22	18	90,000 ± 1,000	1.2 ± 0.0	580 ± 20	1.6 ± 0.2	< 0.5 ± 0.05
Sac. R.– Freeport, dup	06/05/97	(1/1)	13	18	85,000 ± 0	1.2 ± 0.0	500 ± 0	1.5 ± 0.0	< 0.5 ± 0.02
Spring Cr.–Weir	12/11/96	(1/1)	6.1	na	98,000 ± 2,000	6.6 ± 0.1	290 ± 0	0.73 ± 0.33	3.7 ± 0.0
Spring Cr.–Weir	05/28/97	(1/1)	86	na	40,000 ± 1,000	6.0 ± 0.1	200 ± 0	2.0 ± 0.5	1.0 ± 0.2
Spring Cr.–Road	01/02/97	(1/1)	14	na	69,000 ± 6,000	12 ± 0	230 ± 20	< 2 ± 0.3	2.4 ± 0.1
Spring Cr. arm	07/12/96	(1/1)	0.6	na	33,000 ± 1,000	< 2 ± 0.1	280 ± 0	< 2 ± 0.2	< 1 ± 0.1
Spring Cr. arm	11/20/96	(1/1)	2.4	na	100,000 ± 0	< 3 ± 0.1	280 ± 10	< 2 ± 0.5	< 1 ± 0
Spring Cr. arm	12/11/96	(1/1)	4.5	na	100,000 ± 4,000	1.7 ± 0.2	120 ± 10	2.5 ± 0.3	0.80 ± 0.06
Spring Cr. arm	05/28/97	(1/1)	11	na	88,000 ± 2,000	2.0 ± 0.2	350 ± 10	1.3 ± 0.2	< 0.6 ± 0.03
Colusa Basin Drain	06/06/97	(1/1)	161	154	81,000 ± 1,000	1.2 ± 0.0	640 ± 10	1.8 ± 0.0	< 0.5 ± 0.01
Yolo Bypass	01/07/97	(1/1)	144	183	100,000 ± 0	2.0 ± 0.0	840 ± 10	2.2 ± 0.1	< 0.5 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Cadmium (µg/g) ICP–MS	Calcium (µg/g) ICP–AES	Cerium (µg/g) ICP–MS	Chromium (µg/g) ICP–AES	Cobalt (µg/g) ICP–MS	Copper (µg/g) ICP–MS/ICP–AES
Sac. R.– Shasta	07/12/96	(1/1)	2.2 ± 0.2	19,000 ± 0	15 ± 1	98 ± 1	14 ± 0	170 ± 0
Sac. R.– Shasta	11/19/96	(1/1)	6.5 ± 0.2	8,500 ± 0	35 ± 1	93 ± 17	21 ± 1	300 ± 10
Sac. R.– Shasta	12/12/96	(1/1)	(3) ± 0.2	(4,000) ± 0	(6) ± 0.6	(200) ± 0	(20) ± 4	(900) ± 0
Sac. R.– Shasta	05/29/97	(1/1)	1.0 ± 0.1	8,500 ± 700	18 ± 0	140 ± 10	19 ± 0	130 ± 0
Sac. R.– Keswick	07/11/96	(1/1)	3.9 ± 0.0	22,000 ± 0	23 ± 1	89 ± 3	13 ± 1	170 ± 10
Sac. R.– Keswick	11/21/96	(1/1)	5.1 ± 0.1	6,200 ± 400	14 ± 0	130 ± 10	35 ± 0	510 ± 10
Sac. R.– Keswick	12/11/96	(1/1)	5.4 ± 0.1	7,000 ± 100	43 ± 1	100 ± 4	32 ± 0	991 ± 37
Sac. R.– Keswick	01/02/97	(1/1)	4.8 ± 0.1	5,100 ± 200	15 ± 0	110 ± 0	27 ± 0	760 ± 0
Sac. R.– Keswick	05/28/97	(1/1)	1.2 ± 0.1	8,100 ± 500	28 ± 1	370 ± 0	35 ± 0	140 ± 0
Sac. R.– Bend Br.	07/11/96	(1/1)	2.5 ± 0.1	23,000 ± 0	17 ± 1	91 ± 2	15 ± 1	180 ± 0
Sac. R.– Bend Br.	09/20/96	(1/1)	1.4 ± 0.0	17,000 ± 1,000	36 ± 1	160 ± 10	23 ± 0	140 ± 0
Sac. R.– Bend Br.	11/22/96	(1/1)	2.6 ± 0.3	6,300 ± 200	25 ± 1	300 ± 0	27 ± 1	710 ± 10
Sac. R.– Bend Br.	12/12/96	(1/1)	1.4 ± 0.1	9,700 ± 0	43 ± 0	320 ± 0	32 ± 0	200 ± 10
Sac. R.– Bend Br.	01/03/97	(1/1)	0.92 ± 0.11	9,800 ± 0	37 ± 1	200 ± 0	27 ± 0	140 ± 0
Sac. R.– Bend Br.	05/30/97	(1/2)	1.1 ± 0.0	8,300 ± 500	30 ± 0	360 ± 0	34 ± 0	140 ± 0
Sac. R.– Bend Br.	05/30/97	(2/2)	1.2 ± 0.1	8,200 ± 100	17 ± 0	360 ± 0	33 ± 0	150 ± 0
Sac. R.– Colusa	07/16/96	(1/1)	1.7 ± 0.0	18,000 ± 0	19 ± 0	120 ± 0	18 ± 0	170 ± 0
Sac. R.– Colusa	09/25/96	(1/1)	2.0 ± 0.2	59,000 ± 3,000	23 ± 1	110 ± 10	19 ± 0	220 ± 10
Sac. R.– Colusa	11/13/96	(1/1)	2.3 ± 0.1	9,100 ± 400	20 ± 0	130 ± 0	18 ± 0	170 ± 0
Sac. R.– Colusa	12/16/96	(1/1)	0.87 ± 0.12	9,600 ± 300	18 ± 1	184 ± 10	27 ± 0	130 ± 0
Sac. R.– Colusa	01/04/97	(1/1)	0.63 ± 0.01	10,000 ± 500	31 ± 0	190 ± 10	27 ± 0	100 ± 0
Sac. R.– Colusa	06/03/97	(1/1)	1.3 ± 0.1	9,000 ± 500	28 ± 1	250 ± 20	26 ± 0	130 ± 0
Sac. R.– Verona	07/18/96	(1/1)	2.8 ± 0.1	20,000 ± 0	23 ± 0	180 ± 0	22 ± 0	330 ± 0
Sac. R.– Verona	09/26/96	(1/1)	1.4 ± 0.1	36,000 ± 0	32 ± 0	170 ± 0	23 ± 0	180 ± 0
Sac. R.– Verona	11/14/96	(1/1)	1.8 ± 0.1	11,000 ± 0	20 ± 1	190 ± 10	25 ± 0	180 ± 0
Sac. R.– Verona	12/18/96	(1/1)	0.84 ± 0.05	10,000 ± 200	15 ± 0	193 ± 7	29 ± 0	130 ± 0
Sac. R.– Verona	06/04/97	(1/1)	0.97 ± 0.05	9,100 ± 500	36 ± 2	190 ± 10	25 ± 0	110 ± 0
Sac. R.– Freeport	07/17/96	(1/1)	(2) ± 0.1	(10,000) ± 0	(8) ± 0.1	(200) ± 10	(20) ± 1	(200) ± 10
Sac. R.– Freeport	09/24/96	(1/1)	(4) ± 0	(10,000) ± 0	(10) ± 0	(90) ± 1	(10) ± 2	(200) ± 20
Sac. R.– Freeport	11/12/96	(1/1)	1.2 ± 0.1	9,300 ± 200	27 ± 1	160 ± 0	23 ± 0	140 ± 0
Sac. R.– Freeport	12/17/96	(1/1)	0.78 ± 0.11	11,000 ± 0	29 ± 2	230 ± 0	26 ± 0	110 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Cadmium (µg/g) ICP–MS	Calcium (µg/g) ICP–AES	Cerium (µg/g) ICP–MS	Chromium (µg/g) ICP–AES	Cobalt (µg/g) ICP–MS	Copper (µg/g) ICP–MS/ICP–AES
Sac. R.– Freeport	01/06/97	(1/2)	0.57 ± 0.04	15,000 ± 0	95 ± 0	140 ± 0	28 ± 0	120 ± 0
Sac. R.– Freeport	01/06/97	(2/2)	0.56 ± 0.08	13,000 ± 0	85 ± 0	150 ± 0	29 ± 1	110 ± 0
Sac. R.– Freeport	06/05/97	(1/1)	1.1 ± 0.1	9,000 ± 300	36 ± 0	180 ± 0	24 ± 0	130 ± 0
Sac. R.– Freeport, dup	06/05/97	(1/1)	1.1 ± 0.1	8,800 ± 200	29 ± 1	190 ± 0	23 ± 1	140 ± 10
Spring Cr.–Weir	12/11/96	(1/1)	1.4 ± 0.1	1,000 ± 0	8.4 ± 0.1	60 ± 4	11 ± 0	470 ± 10
Spring Cr.–Weir	05/28/97	(1/1)	0.60 ± 0.19	600 ± 10	< 1 ± 0.01	30 ± 4	6.0 ± 0.8	300 ± 110
Spring Cr.–Road	01/02/97	(1/1)	0.56 ± 0.00	910 ± 160	8.8 ± 0.4	43 ± 5	11 ± 0	230 ± 0
Spring Cr. arm	07/12/96	(1/1)	2.5 ± 0.1	28,000 ± 0	14 ± 1	130 ± 10	19 ± 1	190 ± 10
Spring Cr. arm	11/20/96	(1/1)	6.5 ± 0.3	3,900 ± 200	58 ± 0	180 ± 10	18 ± 1	2,400 ± 0
Spring Cr. arm	12/11/96	(1/1)	12 ± 0	3,800 ± 200	101 ± 1	113 ± 5	14 ± 0	9,400 ± 122
Spring Cr. arm	05/28/97	(1/1)	1.2 ± 0.0	7,400 ± 200	24 ± 1	870 ± 30	71 ± 3	220 ± 10
Colusa Basin Drain	06/06/97	(1/1)	0.44 ± 0.07	9,100 ± 600	33 ± 1	180 ± 10	24 ± 0	85 ± 1
Yolo Bypass	01/07/97	(1/1)	0.80 ± 0.02	9,800 ± 400	39 ± 0	210 ± 10	28 ± 0	130 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Dysprosium (µg/g) ICP–MS	Erbium (µg/g) ICP–MS	Europium (µg/g) ICP–MS	Gadolinium (µg/g) ICP–MS	Holmium (µg/g) ICP–MS	Iron (µg/g) ICP–AES
Sac. R.– Shasta	07/12/96	(1/1)	3.7 ± 0.1	2.1 ± 0.1	0.76 ± 0.00	4.6 ± 0.1	0.66 ± 0.01	57,000 ± 2,000
Sac. R.– Shasta	11/19/96	(1/1)	5.8 ± 0.0	3.2 ± 0.2	1.4 ± 0.1	8.6 ± 0.4	0.96 ± 0.03	54,000 ± 0
Sac. R.– Shasta	12/12/96	(1/1)	(1) ± 0.1	(0.9) ± 0.01	(0.2) ± 0.01	(0.9) ± 0.09	(0.2) ± 0	60,000 ± 1,000
Sac. R.– Shasta	05/29/97	(1/1)	3.6 ± 0.1	2.4 ± 0.0	0.79 ± 0.02	4.7 ± 0.1	0.70 ± 0.03	66,000 ± 5,000
Sac. R.– Keswick	07/11/96	(1/1)	3.8 ± 0.0	2.2 ± 0.1	0.94 ± 0.02	5.9 ± 0.2	0.66 ± 0.02	53,000 ± 0
Sac. R.– Keswick	11/21/96	(1/1)	7.1 ± 0.1	4.4 ± 0.0	1.1 ± 0.0	8.1 ± 0.1	1.4 ± 0.0	84,000 ± 6,000
Sac. R.– Keswick	12/11/96	(1/1)	12 ± 0	8.5 ± 0.2	2.2 ± 0.0	18 ± 1	2.5 ± 0.2	75,000 ± 1,700
Sac. R.– Keswick	01/02/97	(1/1)	5.1 ± 0.1	3.4 ± 0.1	0.78 ± 0.01	5.9 ± 0.2	0.99 ± 0.01	81,000 ± 0
Sac. R.– Keswick	05/28/97	(1/1)	4.0 ± 0.1	2.5 ± 0.0	0.89 ± 0.01	5.5 ± 0.0	0.73 ± 0.01	74,000 ± 5,000
Sac. R.– Bend Br.	07/11/96	(1/1)	3.2 ± 0.1	2.0 ± 0.1	0.68 ± 0.01	4.3 ± 0.1	0.59 ± 0.00	46,000 ± 2,000
Sac. R.– Bend Br.	09/20/96	(1/1)	3.9 ± 0.1	2.4 ± 0.1	0.99 ± 0.03	5.4 ± 0.1	0.72 ± 0.01	59,000 ± 2,000
Sac. R.– Bend Br.	11/22/96	(1/1)	4.5 ± 0.1	2.8 ± 0.3	0.88 ± 0.04	6.0 ± 0.3	0.81 ± 0.05	70,000 ± 0
Sac. R.– Bend Br.	12/12/96	(1/1)	4.8 ± 0.0	2.9 ± 0.1	1.2 ± 0.0	7.4 ± 0.0	0.82 ± 0.01	63,000 ± 0
Sac. R.– Bend Br.	01/03/97	(1/1)	4.1 ± 0.1	2.8 ± 0.0	1.0 ± 0.1	6.0 ± 0.0	0.80 ± 0.01	70,000 ± 0
Sac. R.– Bend Br.	05/30/97	(1/2)	4.1 ± 0.1	2.6 ± 0.0	0.94 ± 0.01	5.5 ± 0.1	0.76 ± 0.01	71,000 ± 4,000
Sac. R.– Bend Br.	05/30/97	(2/2)	3.3 ± 0.0	2.2 ± 0.0	0.66 ± 0.00	4.3 ± 0.0	0.62 ± 0.01	70,000 ± 1,000
Sac. R.– Colusa	07/16/96	(1/1)	3.3 ± 0.1	2.0 ± 0.0	0.70 ± 0.03	4.3 ± 0.2	0.60 ± 0.03	56,000 ± 3,000
Sac. R.– Colusa	09/25/96	(1/1)	3.0 ± 0.2	1.8 ± 0.1	0.71 ± 0.04	4.4 ± 0.4	0.54 ± 0.04	38,000 ± 2,000
Sac. R.– Colusa	11/13/96	(1/1)	3.6 ± 0.0	2.3 ± 0.1	0.79 ± 0.01	4.9 ± 0.1	0.68 ± 0.01	51,000 ± 2,000
Sac. R.– Colusa	12/16/96	(1/1)	2.7 ± 0.0	2.1 ± 0.1	0.53 ± 0.00	3.5 ± 0.0	0.59 ± 0.01	65,000 ± 2,200
Sac. R.– Colusa	01/04/97	(1/1)	3.7 ± 0.1	2.6 ± 0.1	0.85 ± 0.01	4.7 ± 0.0	0.73 ± 0.02	69,000 ± 4,000
Sac. R.– Colusa	06/03/97	(1/1)	3.9 ± 0.2	2.4 ± 0.2	0.87 ± 0.01	5.3 ± 0.0	0.74 ± 0.01	64,000 ± 4,000
Sac. R.– Verona	07/18/96	(1/1)	3.2 ± 0.0	2.0 ± 0.1	0.75 ± 0.00	4.4 ± 0.1	0.57 ± 0.02	55,000 ± 3,000
Sac. R.– Verona	09/26/96	(1/1)	3.6 ± 0.1	2.2 ± 0.1	0.86 ± 0.03	5.1 ± 0.1	0.65 ± 0.01	59,000 ± 2,000
Sac. R.– Verona	11/14/96	(1/1)	2.2 ± 0.1	1.4 ± 0.1	0.63 ± 0.01	3.5 ± 0.2	0.40 ± 0.02	67,000 ± 1,000
Sac. R.– Verona	12/18/96	(1/1)	2.3 ± 0.1	1.9 ± 0.1	0.49 ± 0.02	3.0 ± 0.0	0.50 ± 0.00	66,000 ± 1,000
Sac. R.– Verona	06/04/97	(1/1)	3.8 ± 0.0	2.4 ± 0.0	0.97 ± 0.03	5.4 ± 0.0	0.70 ± 0.01	64,000 ± 4,000
Sac. R.– Freeport	07/17/96	(1/1)	(1) ± 0.04	(0.5) ± 0.02	(0.2) ± 0.01	(1) ± 0.2	(0.2) ± 0.02	(50,000) ± 1,000
Sac. R.– Freeport	09/24/96	(1/1)	(1) ± 0	(0.7) ± 0.01	(0.3) ± 0.01	(2) ± 0.2	(0.2) ± 0	(40,000) ± 0
Sac. R.– Freeport	11/12/96	(1/1)	3.3 ± 0.1	2.1 ± 0.0	0.86 ± 0.00	4.8 ± 0.0	0.62 ± 0.01	65,000 ± 1,000
Sac. R.– Freeport	12/17/96	(1/1)	3.0 ± 0.2	1.9 ± 0.0	0.82 ± 0.06	4.8 ± 0.0	0.57 ± 0.00	67,000 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Dysprosium (µg/g) ICP–MS	Erbium (µg/g) ICP–MS	Europium (µg/g) ICP–MS	Gadolinium (µg/g) ICP–MS	Holmium (µg/g) ICP–MS	Iron (µg/g) ICP–AES
Sac. R.– Freeport	01/06/97	(1/2)	4.9 ± 0.1	2.8 ± 0.0	1.3 ± 0.0	7.2 ± 0.0	0.88 ± 0.01	69,000 ± 1,000
Sac. R.– Freeport	01/06/97	(2/2)	4.6 ± 0.0	2.6 ± 0.0	1.3 ± 0.0	7.7 ± 0.2	0.77 ± 0.01	65,000 ± 1,000
Sac. R.– Freeport	06/05/97	(1/1)	3.7 ± 0.1	2.3 ± 0.0	1.0 ± 0.0	5.9 ± 0.0	0.65 ± 0.02	62,000 ± 1,000
Sac. R.– Freeport, dup	06/05/97	(1/1)	3.3 ± 0.0	2.0 ± 0.1	0.83 ± 0.02	4.6 ± 0.0	0.55 ± 0.01	61,000 ± 0
Spring Cr.–Weir	12/11/96	(1/1)	4.3 ± 0.3	3.8 ± 0.1	0.57 ± 0.06	4.9 ± 0.2	0.98 ± 0.06	110,000 ± 1,600
Spring Cr.–Weir	05/28/97	(1/1)	0.20 ± 0.00	0.20 ± 0.07	< 0.04 ± 0.005	0.30 ± 0.03	0.050 ± 0.005	500,000 ± 0
Spring Cr.–Road	01/02/97	(1/1)	2.6 ± 0.2	2.0 ± 0.1	0.34 ± 0.02	2.7 ± 0.0	0.55 ± 0.02	180,000 ± 0
Spring Cr. arm	07/12/96	(1/1)	4.0 ± 0.1	2.5 ± 0.0	0.91 ± 0.03	6.7 ± 0.1	0.72 ± 0.02	34,000 ± 1,000
Spring Cr. arm	11/20/96	(1/1)	31 ± 1	17 ± 0	4.3 ± 0.2	38 ± 2	5.2 ± 0.3	95,000 ± 1,000
Spring Cr. arm	12/11/96	(1/1)	50 ± 1	32 ± 0	7.7 ± 0.3	75 ± 3	10 ± 0	72,000 ± 2,200
Spring Cr. arm	05/28/97	(1/1)	3.4 ± 0.0	2.2 ± 0.2	0.85 ± 0.01	5.2 ± 0.0	0.63 ± 0.02	89,000 ± 2,000
Colusa Basin Drain	06/06/97	(1/1)	3.4 ± 0.0	2.1 ± 0.1	0.83 ± 0.02	4.5 ± 0.1	0.63 ± 0.00	69,000 ± 5,000
Yolo Bypass	01/07/97	(1/1)	4.4 ± 0.1	2.9 ± 0.0	0.95 ± 0.01	5.5 ± 0.0	0.82 ± 0.02	72,000 ± 3,000

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Lanthanum (µg/g) ICP–MS	Lead (µg/g) ICP–MS	Lithium (µg/g) ICP–MS	Lutetium (µg/g) ICP–MS	Magnesium (µg/g) ICP–AES	Manganese (µg/g) ICP–AES
Sac. R.– Shasta	07/12/96	(1/1)	5.3 ± 0.2	13 ± 0	33 ± 0	0.35 ± 0.02	11,000 ± 0	660 ± 20
Sac. R.– Shasta	11/19/96	(1/1)	18 ± 1	23 ± 1	33 ± 4	0.47 ± 0.05	9,300 ± 0	18,000 ± 0
Sac. R.– Shasta	12/12/96	(1/1)	(1.0) ± 0.07	(40) ± 1	(80) ± 5	(0.2) ± 0.01	(300) ± 0	(3,000) ± 0
Sac. R.– Shasta	05/29/97	(1/1)	7.2 ± 0.0	14 ± 1	37 ± 1	0.35 ± 0.02	16,000 ± 0	500 ± 50
Sac. R.– Keswick	07/11/96	(1/1)	10 ± 0	16 ± 0	31 ± 1	0.33 ± 0.02	16,000 ± 0	820 ± 0
Sac. R.– Keswick	11/21/96	(1/1)	4.2 ± 0.1	87 ± 1	25 ± 1	0.60 ± 0.01	19,000 ± 0	3,400 ± 100
Sac. R.– Keswick	12/11/96	(1/1)	18 ± 0	72 ± 2	26 ± 1	1.0 ± 0.0	14,800 ± 300	2,000 ± 30
Sac. R.– Keswick	01/02/97	(1/1)	5.0 ± 0.1	39 ± 1	24 ± 0	0.52 ± 0.01	14,000 ± 0	1,100 ± 0
Sac. R.– Keswick	05/28/97	(1/1)	12 ± 0	13 ± 0	37 ± 0	0.36 ± 0.01	33,000 ± 0	630 ± 50
Sac. R.– Bend Br.	07/11/96	(1/1)	6.7 ± 0.1	16 ± 0	28 ± 1	0.32 ± 0.00	15,000 ± 0	730 ± 0
Sac. R.– Bend Br.	09/20/96	(1/1)	16 ± 0	25 ± 1	50 ± 1	0.34 ± 0.02	22,000 ± 0	1,800 ± 0
Sac. R.– Bend Br.	11/22/96	(1/1)	9.2 ± 0.4	46 ± 1	50 ± 2	0.51 ± 0.03	34,000 ± 0	1,500 ± 0
Sac. R.– Bend Br.	12/12/96	(1/1)	18 ± 1	21 ± 1	53 ± 1	0.46 ± 0.01	37,000 ± 0	1,300 ± 0
Sac. R.– Bend Br.	01/03/97	(1/1)	15 ± 0	24 ± 1	51 ± 2	0.41 ± 0.01	24,000 ± 0	1,100 ± 0
Sac. R.– Bend Br.	05/30/97	(1/2)	13 ± 0	18 ± 0	35 ± 1	0.37 ± 0.02	32,000 ± 0	600 ± 30
Sac. R.– Bend Br.	05/30/97	(2/2)	6.5 ± 0.0	20 ± 0	36 ± 1	0.36 ± 0.01	32,000 ± 0	610 ± 0
Sac. R.– Colusa	07/16/96	(1/1)	6.7 ± 0.2	18 ± 0	38 ± 1	0.33 ± 0.02	16,000 ± 0	1,300 ± 0
Sac. R.– Colusa	09/25/96	(1/1)	10 ± 0	20 ± 1	37 ± 2	0.28 ± 0.04	37,000 ± 0	1,300 ± 100
Sac. R.– Colusa	11/13/96	(1/1)	7.8 ± 0.1	29 ± 1	38 ± 1	0.32 ± 0.01	13,000 ± 0	1,700 ± 100
Sac. R.– Colusa	12/16/96	(1/1)	8.0 ± 0.4	19 ± 1	49 ± 1	0.30 ± 0.01	15,000 ± 100	1,380 ± 40
Sac. R.– Colusa	01/04/97	(1/1)	13 ± 0	20 ± 1	60 ± 0	0.43 ± 0.02	22,000 ± 1,000	1,100 ± 100
Sac. R.– Colusa	06/03/97	(1/1)	11 ± 0	21 ± 2	47 ± 1	0.36 ± 0.01	25,000 ± 1,000	970 ± 60
Sac. R.– Verona	07/18/96	(1/1)	9.0 ± 0.1	24 ± 1	40 ± 1	0.32 ± 0.01	19,000 ± 0	1,600 ± 0
Sac. R.– Verona	09/26/96	(1/1)	14 ± 0	19 ± 0	51 ± 0	0.34 ± 0.02	34,000 ± 0	1,900 ± 0
Sac. R.– Verona	11/14/96	(1/1)	7.5 ± 0.4	31 ± 0	46 ± 2	0.22 ± 0.01	17,000 ± 0	2,200 ± 0
Sac. R.– Verona	12/18/96	(1/1)	7.1 ± 0.0	22 ± 1	47 ± 2	0.28 ± 0.02	16,000 ± 0	1,450 ± 0
Sac. R.– Verona	06/04/97	(1/1)	16 ± 0	20 ± 0	45 ± 1	0.35 ± 0.01	19,000 ± 0	1,100 ± 0
Sac. R.– Freeport	07/17/96	(1/1)	(3) ± 0	(20) ± 0	(40) ± 0	(0.06) ± 0.005	(10,000) ± 100	(2,000) ± 0
Sac. R.– Freeport	09/24/96	(1/1)	(4) ± 0	(20) ± 0	(30) ± 1	(0.09) ± 0.005	(10,000) ± 0	(1,000) ± 0
Sac. R.– Freeport	11/12/96	(1/1)	13 ± 0	26 ± 1	42 ± 2	0.34 ± 0.00	16,000 ± 0	1,900 ± 0
Sac. R.– Freeport	12/17/96	(1/1)	12 ± 1	24 ± 1	41 ± 0	0.31 ± 0.02	20,000 ± 0	1,300 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Lanthanum (µg/g) ICP–MS	Lead (µg/g) ICP–MS	Lithium (µg/g) ICP–MS	Lutetium (µg/g) ICP–MS	Magnesium (µg/g) ICP–AES	Manganese (µg/g) ICP–AES
Sac. R.– Freeport	01/06/97	(1/2)	39 ± 1	32 ± 1	39 ± 1	0.38 ± 0.01	20,000 ± 0	1,200 ± 0
Sac. R.– Freeport	01/06/97	(2/2)	32 ± 0	34 ± 1	39 ± 1	0.41 ± 0.01	16,000 ± 0	1,100 ± 0
Sac. R.– Freeport	06/05/97	(1/1)	15 ± 0	22 ± 0	48 ± 0	0.36 ± 0.01	18,000 ± 0	1,300 ± 0
Sac. R.– Freeport, dup	06/05/97	(1/1)	12 ± 0	22 ± 0	45 ± 2	0.29 ± 0.00	17,000 ± 0	1,200 ± 0
Spring Cr.–Weir	12/11/96	(1/1)	2.0 ± 0.1	76 ± 1	17 ± 0	0.63 ± 0.05	15,000 ± 200	450 ± 10
Spring Cr.–Weir	05/28/97	(1/1)	< 0.6 ± 0	100 ± 0	7.0 ± 1.0	0.050 ± 0.006	< 100 ± 0	< 20 ± 1
Spring Cr.–Road	01/02/97	(1/1)	2.5 ± 0.1	49 ± 2	16 ± 1	0.35 ± 0.02	12,000 ± 1,000	240 ± 30
Spring Cr. arm	07/12/96	(1/1)	8.4 ± 0.5	10 ± 0	14 ± 2	0.34 ± 0.02	39,000 ± 0	3,200 ± 0
Spring Cr. arm	11/20/96	(1/1)	12 ± 1	47 ± 3	17 ± 2	2.1 ± 0.0	5,500 ± 0	2,100 ± 0
Spring Cr. arm	12/11/96	(1/1)	45 ± 0	62 ± 0	9.3 ± 0.8	3.1 ± 0.1	3,400 ± 200	990 ± 30
Spring Cr. arm	05/28/97	(1/1)	9.2 ± 0.4	9.3 ± 0.4	34 ± 1	0.31 ± 0.01	65,000 ± 2,000	970 ± 30
Colusa Basin Drain	06/06/97	(1/1)	14 ± 0	18 ± 0	72 ± 0	0.30 ± 0.02	22,000 ± 1,000	1,500 ± 100
Yolo Bypass	01/07/97	(1/1)	16 ± 0	22 ± 0	59 ± 1	0.44 ± 0.00	25,000 ± 1,000	1,000 ± 0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Mercury (µg/g) CVAFS	Molybdenum (µg/g) ICP–MS	Neodymium (µg/g) ICP–MS	Nickel (µg/g) ICP–MS	Potassium (µg/g) ICP–AES-Ax	Praseodymium (µg/g) ICP–MS
Sac. R.– Shasta	07/12/96	(1/1)	0.19 ± 0.01	< 4 ± 0.4	10 ± 0	80 ± 1	4,300 ± 100	2.0 ± 0.1
Sac. R.– Shasta	11/19/96	(1/1)	0.45 ± 0.00	< 10 ± 2	23 ± 1	98 ± 2	4,100 ± 400	4.7 ± 0.2
Sac. R.– Shasta	12/12/96	(1/1)	0.63 ± 0.02	(7) ± 0.6	(1) ± 0.1	(60) ± 14	(< 1,000) ± 0	(0.3) ± 0.03
Sac. R.– Shasta	05/29/97	(1/1)	0.17 ± 0.00	< 3 ± 0.2	12 ± 0	220 ± 0	6,600 ± 100	2.4 ± 0.0
Sac. R.– Keswick	07/11/96	(1/1)	0.31 ± 0.01	< 6 ± 0.2	15 ± 0	98 ± 4	5,600 ± 100	3.1 ± 0.1
Sac. R.– Keswick	11/21/96	(1/1)	0.50 ± 0.01	< 3 ± 0.1	12 ± 0	76 ± 1	5,700 ± 200	2.1 ± 0.0
Sac. R.– Keswick	12/11/96	(1/1)	0.87 ± 0.03	< 8 ± 4	37 ± 1	127 ± 0	6,400 ± 400	6.7 ± 0.5
Sac. R.– Keswick	01/02/97	(1/1)	0.62 ± 0.01	4.1 ± 0.1	9.9 ± 0.2	110 ± 0	6,800 ± 300	1.9 ± 0.0
Sac. R.– Keswick	05/28/97	(1/1)	0.24 ± 0.02	< 3 ± 0.3	15 ± 0	800 ± 20	6,000 ± 100	3.3 ± 0.1
Sac. R.– Bend Br.	07/11/96	(1/1)	0.22 ± 0.01	< 4 ± 0.3	11 ± 0	83 ± 0	5,500 ± 200	2.2 ± 0.0
Sac. R.– Bend Br.	09/20/96	(1/1)	0.26 ± 0.03	< 3 ± 0	17 ± 0	130 ± 0	12,000 ± 0	4.0 ± 0.1
Sac. R.– Bend Br.	11/22/96	(1/1)	0.43 ± 0.02	< 10 ± 1	13 ± 0	200 ± 0	13,000 ± 2,000	2.8 ± 0.1
Sac. R.– Bend Br.	12/12/96	(1/1)	0.19 ± 0.03	< 3 ± 0.2	20 ± 0	250 ± 0	15,000 ± 0	4.6 ± 0.1
Sac. R.– Bend Br.	01/03/97	(1/1)	0.24 ± 0.01	< 3 ± 0	17 ± 1	160 ± 0	12,000 ± 1,000	4.0 ± 0.1
Sac. R.– Bend Br.	05/30/97	(1/2)	0.20 ± 0.02	< 3 ± 0	16 ± 0	790 ± 10	5,800 ± 100	3.5 ± 0.0
Sac. R.– Bend Br.	05/30/97	(2/2)	0.20 ± 0.01	< 3 ± 0.1	10 ± 0	780 ± 10	5,600 ± 100	2.1 ± 0.1
Sac. R.– Colusa	07/16/96	(1/1)	0.22 ± 0.01	< 3 ± 0.1	11 ± 0	98 ± 1	6,900 ± 100	2.2 ± 0.1
Sac. R.– Colusa	09/25/96	(1/1)	0.30 ± 0.02	< 10 ± 0	13 ± 0	92 ± 3	13,000 ± 0	2.7 ± 0.1
Sac. R.– Colusa	11/13/96	(1/1)	0.45 ± 0.02	< 3 ± 0.1	12 ± 0	99 ± 2	8,000 ± 0	2.5 ± 0.0
Sac. R.– Colusa	12/16/96	(1/1)	0.20 ± 0.02	< 2 ± 0.47	11 ± 1	168 ± 1	4,900 ± 200	2.3 ± 0.1
Sac. R.– Colusa	01/04/97	(1/1)	0.23 ± 0.02	< 3 ± 0.2	15 ± 0	140 ± 0	15,000 ± 0	3.5 ± 0.0
Sac. R.– Colusa	06/03/97	(1/1)	0.22 ± 0.01	< 3 ± 0.1	14 ± 0	430 ± 0	9,200 ± 200	3.1 ± 0.1
Sac. R.– Verona	07/18/96	(1/1)	0.30 ± 0.01	< 3 ± 0.1	12 ± 0	120 ± 0	9,400 ± 100	2.6 ± 0.1
Sac. R.– Verona	09/26/96	(1/1)	0.58 ± 0.01	< 4 ± 0.6	16 ± 0	120 ± 0	14,000 ± 0	3.5 ± 0.1
Sac. R.– Verona	11/14/96	(1/1)	0.25 ± 0.02	< 5 ± 1.9	11 ± 0	130 ± 0	8,900 ± 200	2.3 ± 0.1
Sac. R.– Verona	12/18/96	(1/1)	0.24 ± 0.02	< 2 ± 0.61	9.8 ± 0.2	165 ± 2	6,400 ± 400	2.1 ± 0.1
Sac. R.– Verona	06/04/97	(1/1)	0.23 ± 0.00	< 2 ± 0.1	17 ± 1	240 ± 0	9,500 ± 100	4.1 ± 0.0
Sac. R.– Freeport	07/17/96	(1/1)	na ± na	(3) ± 0.3	(3) ± 0	(100) ± 0	na ± na	(0.7) ± 0.03
Sac. R.– Freeport	09/24/96	(1/1)	na ± na	(4) ± 0.3	(4) ± 0.2	(80) ± 2	(< 500) ± 0	(0.9) ± 0.01
Sac. R.– Freeport	11/12/96	(1/1)	0.29 ± 0.02	< 4 ± 0.3	15 ± 0	120 ± 0	8,900 ± 200	3.3 ± 0.0
Sac. R.– Freeport	12/17/96	(1/1)	0.25 ± 0.01	< 3 ± 0.2	15 ± 0	160 ± 0	8,900 ± 0	3.3 ± 0.0

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Mercury (µg/g) CVAFS	Molybdenum (µg/g) ICP–MS	Neodymium (µg/g) ICP–MS	Nickel (µg/g) ICP–MS	Potassium (µg/g) ICP–AES-Ax	Praseodymium (µg/g) ICP–MS
Sac. R.– Freeport	01/06/97	(1/2)	0.14 ± 0.01	< 3 ± 0.1	33 ± 0	130 ± 0	15,000 ± 0	8.4 ± 0.0
Sac. R.– Freeport	01/06/97	(2/2)	0.19 ± 0.01	< 3 ± 0.4	31 ± 0	120 ± 0	12,000 ± 0	7.7 ± 0.2
Sac. R.– Freeport	06/05/97	(1/1)	0.18 ± 0.00	< 3 ± 0.1	18 ± 0	220 ± 0	9,700 ± 0	3.9 ± 0.0
Sac. R.– Freeport, dup	06/05/97	(1/1)	0.26 ± 0.01	< 3 ± 0.1	14 ± 0	220 ± 10	8,400 ± 100	3.2 ± 0.1
Spring Cr.–Weir	12/11/96	(1/1)	2.7 ± 0.1	8.9 ± 2.8	8.2 ± 0.3	37 ± 7	6,300 ± 500	1.3 ± 0.1
Spring Cr.–Weir	05/28/97	(1/1)	0.28 ± 0.01	20 ± 2	< 0.5 ± 0.04	60 ± 8	< 1,000 ± 0	< 0.1 ± 0
Spring Cr.–Road	01/02/97	(1/1)	3.8 ± 0.1	8.5 ± 0.2	4.8 ± 0.2	53 ± 0	7,400 ± 500	0.96 ± 0.02
Spring Cr. arm	07/12/96	(1/1)	0.41 ± 0.05	< 8 ± 0.6	13 ± 1	240 ± 0	4,100 ± 300	2.4 ± 0.1
Spring Cr. arm	11/20/96	(1/1)	0.49 ± 0.03	< 9 ± 0.8	45 ± 1	140 ± 10	2,700 ± 1,000	7.5 ± 0.3
Spring Cr. arm	12/11/96	(1/1)	0.97 ± 0.08	< 5 ± 0.3	127 ± 5	100 ± 9	< 900 ± 300	21 ± 0
Spring Cr. arm	05/28/97	(1/1)	0.25 ± 0.02	< 4 ± 0.1	11 ± 1	2,100 ± 0	3,400 ± 100	2.5 ± 0.1
Colusa Basin Drain	06/06/97	(1/1)	0.097 ± 0.019	< 3 ± 0	15 ± 0	170 ± 0	13,000 ± 0	3.6 ± 0.0
Yolo Bypass	01/07/97	(1/1)	0.34 ± 0.02	< 3 ± 0.1	18 ± 0	170 ± 0	16,000 ± 0	4.1 ± 0.1

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Rhenium (µg/g) ICP–MS	Rubidium (µg/g) ICP–MS	Samarium (µg/g) ICP–MS	Silica (as SiO_2) (µg/g) ICP–AES	Silver (µg/g) ICP–MS	Sodium (µg/g) ICP–AES
Sac. R.– Shasta	07/12/96	(1/1)	< 0.01 ± 0.004	4.9 ± 0.1	3.3 ± 0.1	420,000 ± 40,000	< 2 ± 0.2	9,100 ± 600
Sac. R.– Shasta	11/19/96	(1/1)	< 0.03 ± 0.006	32 ± 1	5.5 ± 0.2	740,000 ± 20,000	< 4 ± 0.8	12,000 ± 1,000
Sac. R.– Shasta	12/12/96	(1/1)	(< 0.02) ± 0.002	(20) ± 2	(0.6) ± 0.08	nd ± nd	(4) ± 0.5	(70,000) ± 2,000
Sac. R.– Shasta	05/29/97	(1/1)	< 0.009 ± 0.0013	16 ± 0	3.5 ± 0.0	440,000 ± 30,000	< 1 ± 0.3	3,000 ± 300
Sac. R.– Keswick	07/11/96	(1/1)	< 0.02 ± 0.003	19 ± 1	3.9 ± 0.1	580,000 ± 10,000	< 2 ± 0.2	17,000 ± 1,000
Sac. R.– Keswick	11/21/96	(1/1)	< 0.01 ± 0	8.6 ± 0.7	4.9 ± 0.1	590,000 ± 50,000	< 1 ± 0.1	12,000 ± 1,000
Sac. R.– Keswick	12/11/96	(1/1)	< 0.01 ± 0.00	18 ± 0	12 ± 1	470,000 ± 9,000	< 2 ± 0	4,500 ± 200
Sac. R.– Keswick	01/02/97	(1/1)	< 0.008 ± 0.0004	5.8 ± 0.5	3.6 ± 0.1	510,000 ± 70,000	< 1 ± 0	5,900 ± 100
Sac. R.– Keswick	05/28/97	(1/1)	< 0.009 ± 0.0012	33 ± 0	4.1 ± 0.1	410,000 ± 20,000	< 1 ± 0.4	2,700 ± 100
Sac. R.– Bend Br.	07/11/96	(1/1)	< 0.01 ± 0.002	6.4 ± 0.2	3.1 ± 0.1	480,000 ± 50,000	< 2 ± 0.2	14,000 ± 1,000
Sac. R.– Bend Br.	09/20/96	(1/1)	< 0.009 ± 0.0011	48 ± 0	4.5 ± 0.1	450,000 ± 20,000	< 1 ± 0.1	11,000 ± 1,000
Sac. R.– Bend Br.	11/22/96	(1/1)	< 0.04 ± 0.017	30 ± 0	3.7 ± 0.3	780,000 ± 30,000	< 5 ± 0.3	14,000 ± 1,000
Sac. R.– Bend Br.	12/12/96	(1/1)	< 0.009 ± 0.0034	78 ± 0	5.2 ± 0.0	510,000 ± 50,000	< 1 ± 0.3	8,400 ± 600
Sac. R.– Bend Br.	01/03/97	(1/1)	< 0.008 ± 0.0012	24 ± 1	4.7 ± 0.3	520,000 ± 80,000	< 1 ± 0.1	5,900 ± 0
Sac. R.– Bend Br.	05/30/97	(1/2)	< 0.009 ± 0.0014	25 ± 0	4.2 ± 0.0	420,000 ± 20,000	< 1 ± 0.1	3,100 ± 200
Sac. R.– Bend Br.	05/30/97	(2/2)	< 0.009 ± 0.0017	5.7 ± 0.3	3.0 ± 0.1	520,000 ± 70,000	< 1 ± 0.2	3,600 ± 200
Sac. R.– Colusa	07/16/96	(1/1)	< 0.009 ± 0.0014	8.0 ± 0.5	3.1 ± 0.2	460,000 ± 40,000	< 1 ± 0.1	10,000 ± 1,000
Sac. R.– Colusa	09/25/96	(1/1)	< 0.03 ± 0.011	36 ± 1	3.2 ± 0.2	490,000 ± 60,000	< 5 ± 0.2	40,000 ± 5,000
Sac. R.– Colusa	11/13/96	(1/1)	< 0.009 ± 0.0009	16 ± 0	3.4 ± 0.1	720,000 ± 40,000	< 1 ± 0.1	16,000 ± 1,000
Sac. R.– Colusa	12/16/96	(1/1)	0 ± 0	8.0 ± 1.2	3.0 ± 0.2	510,000 ± 15,000	< 2 ± 0.19	9,100 ± 400
Sac. R.– Colusa	01/04/97	(1/1)	< 0.008 ± 0.0013	27 ± 0	4.0 ± 0.1	470,000 ± 30,000	< 1 ± 0.4	8,200 ± 400
Sac. R.– Colusa	06/03/97	(1/1)	< 0.01 ± 0.0018	20 ± 1	3.9 ± 0.0	710,000 ± 50,000	< 1 ± 0.3	15,000 ± 1,000
Sac. R.– Verona	07/18/96	(1/1)	< 0.01 ± 0.0032	16 ± 1	3.2 ± 0.1	510,000 ± 50,000	< 1 ± 0.2	13,000 ± 1,000
Sac. R.– Verona	09/26/96	(1/1)	< 0.01 ± 0.004	56 ± 1	3.9 ± 0.1	500,000 ± 50,000	< 2 ± 0.2	29,000 ± 3,000
Sac. R.– Verona	11/14/96	(1/1)	< 0.01 ± 0.002	23 ± 1	2.6 ± 0.2	570,000 ± 10,000	< 2 ± 1.6	8,200 ± 500
Sac. R.– Verona	12/18/96	(1/1)	0 ± 0	8.3 ± 0.6	2.6 ± 0.1	480,000 ± 7,000	< 2 ± 0.29	7,600 ± 400
Sac. R.– Verona	06/04/97	(1/1)	< 0.008 ± 0.0007	33 ± 0	4.4 ± 0.2	440,000 ± 50,000	< 1 ± 0.1	5,400 ± 500
Sac. R.– Freeport	07/17/96	(1/1)	(0.04) ± 0.005	(40) ± 1	(1) ± 0.06	(400,000) ± 0	(< 1) ± 0.1	(10,000) ± 0
Sac. R.– Freeport	09/24/96	(1/1)	(0.05) ± 0.006	(30) ± 2	(1) ± 0.1	(400,000) ± 0	(< 1) ± 0.1	(10,000) ± 0
Sac. R.– Freeport	11/12/96	(1/1)	< 0.01 ± 0.002	24 ± 0	3.5 ± 0.1	500,000 ± 60,000	< 2 ± 0.1	6,000 ± 700
Sac. R.– Freeport	12/17/96	(1/1)	< 0.009 ± 0.0036	15 ± 0	3.6 ± 0.1	470,000 ± 10,000	< 1 ± 0.2	7,600 ± 500

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Rhenium (µg/g) ICP–MS	Rubidium (µg/g) ICP–MS	Samarium (µg/g) ICP–MS	Silica (as SiO_2) (µg/g) ICP–AES	Silver (µg/g) ICP–MS	Sodium (µg/g) ICP–AES
Sac. R.– Freeport	01/06/97	(1/2)	< 0.009 ± 0.0006	65 ± 1	7.4 ± 0.1	530,000 ± 80,000	< 1 ± 0.1	9,500 ± 500
Sac. R.– Freeport	01/06/97	(2/2)	< 0.008 ± 0.0035	24 ± 0	6.4 ± 0.2	450,000 ± 10,000	< 1 ± 0.2	8,700 ± 200
Sac. R.– Freeport	06/05/97	(1/1)	< 0.009 ± 0.0032	30 ± 0	4.3 ± 0.1	470,000 ± 0	< 1 ± 0.3	6,200 ± 400
Sac. R.– Freeport, dup	06/05/97	(1/1)	< 0.009 ± 0.0025	21 ± 1	3.4 ± 0.1	470,000 ± 0	< 1 ± 0.1	5,800 ± 300
Spring Cr.–Weir	12/11/96	(1/1)	< 0.01 ± 0.01	5.0 ± 0.3	3.5 ± 0.2	380,000 ± 2,000	< 8 ± 4.21	4,300 ± 100
Spring Cr.–Weir	05/28/97	(1/1)	< 0.02 ± 0.015	10 ± 2	< 0.1 ± 0.02	< 200,000 ± 20,000	< 7 ± 2.28	< 5,000 ± 200
Spring Cr.–Road	01/02/97	(1/1)	< 0.02 ± 0.002	8.2 ± 0.4	1.8 ± 0.1	270,000 ± 30,000	4.4 ± 1.2	< 6,000 ± 800
Spring Cr. arm	07/12/96	(1/1)	< 0.02 ± 0.006	16 ± 1	3.7 ± 0.1	340,000 ± 30,000	< 3 ± 0.8	13,000 ± 1,000
Spring Cr. arm	11/20/96	(1/1)	< 0.03 ± 0.013	5.8 ± 0.4	19 ± 0	390,000 ± 20,000	< 4 ± 0.2	< 8,000 ± 400
Spring Cr. arm	12/11/96	(1/1)	< 0.01 ± 0	1.5 ± 0.2	46 ± 1	230,000 ± 8,000	< 2 ± 0	9,000 ± 300
Spring Cr. arm	05/28/97	(1/1)	< 0.01 ± 0.001	21 ± 1	3.2 ± 0.1	370,000 ± 10,000	< 2 ± 0.1	< 3,000 ± 100
Colusa Basin Drain	06/06/97	(1/1)	< 0.009 ± 0.0007	43 ± 1	3.9 ± 0.0	450,000 ± 30,000	< 1 ± 0	4,800 ± 400
Yolo Bypass	01/07/97	(1/1)	< 0.009 ± 0.0011	44 ± 1	4.7 ± 0.1	450,000 ± 50,000	< 1 ± 0.1	5,800 ± 100

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Strontium (µg/g) ICP–MS	Terbium (µg/g) ICP–MS	Thallium (µg/g) ICP–MS	Thorium (µg/g) ICP–MS	Thulium (µg/g) ICP–MS	Tin (µg/g) ICP–MS
Sac. R.– Shasta	07/12/96	(1/1)	93 ± 1	0.62 ± 0.02	0.25 ± 0.03	3.3 ± 0.0	0.25 ± 0.02	200 ± 30
Sac. R.– Shasta	11/19/96	(1/1)	85 ± 1	1.0 ± 0.0	0.20 ± 0.01	3.4 ± 0.1	0.33 ± 0.00	160 ± 0
Sac. R.– Shasta	12/12/96	(1/1)	(70) ± 6	(0.2) ± 0.01	(0.6) ± 0.03	(2) ± 0.2	(0.1) ± 0.01	(300) ± 0
Sac. R.– Shasta	05/29/97	(1/1)	78 ± 1	0.71 ± 0.10	0.33 ± 0.01	4.2 ± 0.1	0.29 ± 0.04	71 ± 2
Sac. R.– Keswick	07/11/96	(1/1)	120 ± 0	0.64 ± 0.02	0.20 ± 0.02	3.4 ± 0.1	0.24 ± 0.00	9.9 ± 0.2
Sac. R.– Keswick	11/21/96	(1/1)	50 ± 1	1.3 ± 0.1	0.27 ± 0.03	2.7 ± 0.1	0.53 ± 0.07	360 ± 10
Sac. R.– Keswick	12/11/96	(1/1)	61 ± 3	2.5 ± 0.5	0.37 ± 0.03	4.8 ± 0.2	0.98 ± 0.04	313 ± 12
Sac. R.– Keswick	01/02/97	(1/1)	44 ± 1	0.95 ± 0.18	0.72 ± 0.03	2.3 ± 0.0	0.43 ± 0.07	59 ± 6
Sac. R.– Keswick	05/28/97	(1/1)	68 ± 0	0.79 ± 0.10	0.26 ± 0.00	4.3 ± 0.1	0.31 ± 0.04	120 ± 0
Sac. R.– Bend Br.	07/11/96	(1/1)	130 ± 0	0.54 ± 0.02	0.22 ± 0.01	2.9 ± 0.0	0.21 ± 0.00	210 ± 30
Sac. R.– Bend Br.	09/20/96	(1/1)	150 ± 0	0.82 ± 0.13	0.38 ± 0.01	5.7 ± 0.1	0.30 ± 0.05	58 ± 1
Sac. R.– Bend Br.	11/22/96	(1/1)	59 ± 5	0.75 ± 0.03	0.33 ± 0.10	4.4 ± 0.2	0.34 ± 0.01	83 ± 3
Sac. R.– Bend Br.	12/12/96	(1/1)	96 ± 2	0.78 ± 0.00	0.51 ± 0.01	6.1 ± 0.3	0.31 ± 0.03	36 ± 1
Sac. R.– Bend Br.	01/03/97	(1/1)	91 ± 2	0.76 ± 0.02	0.57 ± 0.02	6.4 ± 0.0	0.36 ± 0.05	48 ± 1
Sac. R.– Bend Br.	05/30/97	(1/2)	72 ± 0	0.80 ± 0.10	0.25 ± 0.01	4.7 ± 0.1	0.32 ± 0.04	110 ± 0
Sac. R.– Bend Br.	05/30/97	(2/2)	72 ± 1	0.56 ± 0.01	0.25 ± 0.01	3.8 ± 0.0	0.25 ± 0.01	270 ± 10
Sac. R.– Colusa	07/16/96	(1/1)	110 ± 0	0.55 ± 0.02	0.28 ± 0.03	3.7 ± 0.0	0.23 ± 0.01	170 ± 30
Sac. R.– Colusa	09/25/96	(1/1)	320 ± 10	0.54 ± 0.02	0.23 ± 0.06	3.1 ± 0.1	0.21 ± 0.00	640 ± 90
Sac. R.– Colusa	11/13/96	(1/1)	85 ± 2	0.80 ± 0.02	0.31 ± 0.01	3.4 ± 0.1	0.28 ± 0.04	110 ± 10
Sac. R.– Colusa	12/16/96	(1/1)	76 ± 4	0.52 ± 0.10	0.39 ± 0.04	3.6 ± 0.2	0.24 ± 0.01	14 ± 0
Sac. R.– Colusa	01/04/97	(1/1)	100 ± 0	0.73 ± 0.11	0.60 ± 0.02	5.4 ± 0.1	0.33 ± 0.05	54 ± 1
Sac. R.– Colusa	06/03/97	(1/1)	94 ± 1	0.79 ± 0.07	0.28 ± 0.03	4.9 ± 0.3	0.30 ± 0.04	100 ± 0
Sac. R.– Verona	07/18/96	(1/1)	140 ± 0	0.53 ± 0.02	0.28 ± 0.01	4.3 ± 0.0	0.23 ± 0.00	190 ± 40
Sac. R.– Verona	09/26/96	(1/1)	270 ± 0	0.63 ± 0.01	0.31 ± 0.02	4.8 ± 0.1	0.26 ± 0.01	230 ± 40
Sac. R.– Verona	11/14/96	(1/1)	92 ± 3	0.39 ± 0.02	0.33 ± 0.01	3.4 ± 0.1	0.16 ± 0.01	48 ± 1
Sac. R.– Verona	12/18/96	(1/1)	77 ± 1	0.45 ± 0.08	0.37 ± 0.01	3.4 ± 0.1	0.21 ± 0.00	11 ± 1
Sac. R.– Verona	06/04/97	(1/1)	94 ± 1	0.79 ± 0.11	0.34 ± 0.03	5.7 ± 0.2	0.29 ± 0.04	60 ± 3
Sac. R.– Freeport	07/17/96	(1/1)	(170) ± 0	(0.2) ± 0	(0.3) ± 0.02	(1) ± 0.1	(0.06) ± 0.007	(30) ± 0
Sac. R.– Freeport	09/24/96	(1/1)	(100) ± 0	(0.2) ± 0.02	(0.2) ± 0	(1) ± 0.3	(0.09) ± 0.005	(90) ± 0
Sac. R.– Freeport	11/12/96	(1/1)	95 ± 2	0.59 ± 0.01	0.35 ± 0.05	4.1 ± 0.1	0.22 ± 0.01	140 ± 0
Sac. R.– Freeport	12/17/96	(1/1)	91 ± 4	0.50 ± 0.02	0.42 ± 0.03	4.7 ± 0.0	0.22 ± 0.01	12 ± 1

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Strontium (µg/g) ICP–MS	Terbium (µg/g) ICP–MS	Thallium (µg/g) ICP–MS	Thorium (µg/g) ICP–MS	Thulium (µg/g) ICP–MS	Tin (µg/g) ICP–MS
Sac. R.– Freeport	01/06/97	(1/2)	180 ± 0	1.0 ± 0.2	0.61 ± 0.00	21 ± 0	0.34 ± 0.07	49 ± 1
Sac. R.– Freeport	01/06/97	(2/2)	170 ± 0	0.84 ± 0.06	0.59 ± 0.01	17 ± 0	0.28 ± 0.01	< 4 ± 0.6
Sac. R.– Freeport	06/05/97	(1/1)	100 ± 0	0.63 ± 0.00	0.34 ± 0.01	5.4 ± 0.1	0.24 ± 0.00	17 ± 0
Sac. R.– Freeport, dup	06/05/97	(1/1)	94 ± 1	0.55 ± 0.01	0.34 ± 0.03	4.2 ± 0.1	0.21 ± 0.01	13 ± 1
Spring Cr.–Weir	12/11/96	(1/1)	15 ± 0	0.82 ± 0.22	0.55 ± 0.05	2.4 ± 0.0	0.48 ± 0.03	223 ± 2
Spring Cr.–Weir	05/28/97	(1/1)	10 ± 2	0.050 ± 0.005	0.40 ± 0.00	< 0.3 ± 0.47	0.040 ± 0.011	60 ± 2
Spring Cr.–Road	01/02/97	(1/1)	25 ± 0	0.46 ± 0.09	0.50 ± 0.03	1.7 ± 0.0	0.28 ± 0.05	190 ± 0
Spring Cr. arm	07/12/96	(1/1)	130 ± 0	0.69 ± 0.03	0.11 ± 0.03	1.8 ± 0.0	0.24 ± 0.02	19 ± 1
Spring Cr. arm	11/20/96	(1/1)	33 ± 3	4.9 ± 0.3	0.16 ± 0.05	3.5 ± 0.2	1.7 ± 0.0	730 ± 50
Spring Cr. arm	12/11/96	(1/1)	20 ± 1	10 ± 2	0.14 ± 0.01	2.5 ± 0.2	3.4 ± 0.0	323 ± 0
Spring Cr. arm	05/28/97	(1/1)	49 ± 1	0.59 ± 0.01	0.19 ± 0.01	3.5 ± 0.0	0.23 ± 0.02	24 ± 0
Colusa Basin Drain	06/06/97	(1/1)	120 ± 0	0.66 ± 0.10	0.44 ± 0.01	5.6 ± 0.1	0.26 ± 0.03	53 ± 2
Yolo Bypass	01/07/97	(1/1)	100 ± 0	0.84 ± 0.14	0.57 ± 0.04	6.9 ± 0.0	0.37 ± 0.07	63 ± 2

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Titanium (µg/g) ICP–AES	Uranium (µg/g) ICP–MS	Vanadium (µg/g) ICP–AES	Ytterbium (µg/g) ICP–MS	Yttrium (µg/g) ICP–MS	Zinc (µg/g) ICP–AES
Sac. R.– Shasta	07/12/96	(1/1)	3,400 ± 0	1.8 ± 0.1	150 ± 0	2.0 ± 0.1	16 ± 0	430 ± 20
Sac. R.– Shasta	11/19/96	(1/1)	3,300 ± 0	3.0 ± 0.3	220 ± 0	3.1 ± 0.2	27 ± 0	770 ± 40
Sac. R.– Shasta	12/12/96	(1/1)	(40,00) ± 0	(4) ± 0.1	(300) ± 0	(1) ± 0	(5) ± 0.5	(1,000) ± 0
Sac. R.– Shasta	05/29/97	(1/1)	3,800 ± 100	2.0 ± 0.1	160 ± 0	2.4 ± 0.0	15 ± 0	300 ± 30
Sac. R.– Keswick	07/11/96	(1/1)	3,200 ± 0	1.9 ± 0.2	130 ± 0	2.1 ± 0.1	18 ± 0	450 ± 10
Sac. R.– Keswick	11/21/96	(1/1)	3,900 ± 300	1.9 ± 0.1	270 ± 10	4.2 ± 0.1	26 ± 0	950 ± 60
Sac. R.– Keswick	12/11/96	(1/1)	3,580 ± 40	3.3 ± 0.2	267 ± 3	6.6 ± 0.2	57 ± 2	1,530 ± 30
Sac. R.– Keswick	01/02/97	(1/1)	3,300 ± 0	2.5 ± 0.1	330 ± 0	3.5 ± 0.0	21 ± 0	1,100 ± 0
Sac. R.– Keswick	05/28/97	(1/1)	3,400 ± 200	2.0 ± 0.0	170 ± 10	2.5 ± 0.0	19 ± 0	380 ± 30
Sac. R.– Bend Br.	07/11/96	(1/1)	3,200 ± 0	1.6 ± 0.0	130 ± 10	1.7 ± 0.1	15 ± 0	390 ± 20
Sac. R.– Bend Br.	09/20/96	(1/1)	4,000 ± 200	2.1 ± 0.0	170 ± 10	2.3 ± 0.1	19 ± 0	200 ± 10
Sac. R.– Bend Br.	11/22/96	(1/1)	4,000 ± 0	2.3 ± 0.0	200 ± 0	2.9 ± 0.1	22 ± 1	580 ± 10
Sac. R.– Bend Br.	12/12/96	(1/1)	3,800 ± 0	2.8 ± 0.1	180 ± 0	2.8 ± 0.2	23 ± 0	400 ± 0
Sac. R.– Bend Br.	01/03/97	(1/1)	4,300 ± 0	2.8 ± 0.1	230 ± 0	2.8 ± 0.0	20 ± 0	250 ± 10
Sac. R.– Bend Br.	05/30/97	(1/2)	3,500 ± 200	1.9 ± 0.0	170 ± 10	2.5 ± 0.1	19 ± 0	380 ± 20
Sac. R.– Bend Br.	05/30/97	(2/2)	3,500 ± 0	1.9 ± 0.1	160 ± 10	1.9 ± 0.0	15 ± 0	380 ± 10
Sac. R.– Colusa	07/16/96	(1/1)	3,500 ± 0	1.6 ± 0.1	140 ± 0	1.8 ± 0.0	14 ± 0	260 ± 0
Sac. R.– Colusa	09/25/96	(1/1)	2,400 ± 100	1.8 ± 0.2	120 ± 20	1.7 ± 0.1	15 ± 0	220 ± 20
Sac. R.– Colusa	11/13/96	(1/1)	3,400 ± 100	2.0 ± 0.0	150 ± 10	2.0 ± 0.0	16 ± 0	320 ± 20
Sac. R.– Colusa	12/16/96	(1/1)	4,520 ± 120	2.2 ± 0.2	210 ± 5	1.9 ± 0.0	12 ± 0	270 ± 10
Sac. R.– Colusa	01/04/97	(1/1)	5,000 ± 300	2.6 ± 0.0	240 ± 10	2.7 ± 0.1	16 ± 0	180 ± 10
Sac. R.– Colusa	06/03/97	(1/1)	3,800 ± 200	1.9 ± 0.1	170 ± 10	2.4 ± 0.1	18 ± 0	290 ± 20
Sac. R.– Verona	07/18/96	(1/1)	4,300 ± 0	2.0 ± 0.1	160 ± 10	1.7 ± 0.0	14 ± 0	280 ± 10
Sac. R.– Verona	09/26/96	(1/1)	4,100 ± 0	2.3 ± 0.1	180 ± 10	2.0 ± 0.1	17 ± 0	210 ± 20
Sac. R.– Verona	11/14/96	(1/1)	5,000 ± 0	2.4 ± 0.0	190 ± 0	1.4 ± 0.1	10 ± 0	290 ± 10
Sac. R.– Verona	12/18/96	(1/1)	4,650 ± 10	2.6 ± 0.0	209 ± 2	1.6 ± 0.0	9.5 ± 0.2	220 ± 10
Sac. R.– Verona	06/04/97	(1/1)	4,000 ± 100	2.2 ± 0.1	180 ± 10	2.2 ± 0.0	17 ± 0	220 ± 20
Sac. R.– Freeport	07/17/96	(1/1)	(4,000) ± 100	(2) ± 0.1	(170) ± 0	(0.4) ± 0.02	(4) ± 0.1	(300) ± 0
Sac. R.– Freeport	09/24/96	(1/1)	(2,000) ± 0	(2) ± 0.1	(100) ± 0	(0.6) ± 0.02	(7) ± 0.1	(500) ± 10
Sac. R.– Freeport	11/12/96	(1/1)	4,300 ± 100	2.6 ± 0.1	180 ± 0	2.1 ± 0.0	16 ± 0	310 ± 10
Sac. R.– Freeport	12/17/96	(1/1)	4,700 ± 0	2.6 ± 0.0	210 ± 0	1.9 ± 0.1	15 ± 0	200 ± 10

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Titanium (µg/g) ICP–AES	Uranium (µg/g) ICP–MS	Vanadium (µg/g) ICP–AES	Ytterbium (µg/g) ICP–MS	Yttrium (µg/g) ICP–MS	Zinc (µg/g) ICP–AES
Sac. R.– Freeport	01/06/97	(1/2)	4,900 ± 100	5.6 ± 0.0	180 ± 10	2.6 ± 0.1	21 ± 0	140 ± 10
Sac. R.– Freeport	01/06/97	(2/2)	4,700 ± 100	6.2 ± 0.0	170 ± 0	2.5 ± 0.0	19 ± 0	130 ± 10
Sac. R.– Freeport	06/05/97	(1/1)	4,100 ± 0	2.7 ± 0.1	170 ± 0	2.3 ± 0.0	18 ± 0	220 ± 10
Sac. R.– Freeport, dup	06/05/97	(1/1)	3,900 ± 0	2.7 ± 0.0	170 ± 0	2.0 ± 0.0	14 ± 0	210 ± 0
Spring Cr.–Weir	12/11/96	(1/1)	2,390 ± 10	1.2 ± 0.0	117 ± 3	3.6 ± 0.0	14 ± 1	460 ± 20
Spring Cr.–Weir	05/28/97	(1/1)	900 ± 10	0.50 ± 0.01	< 3 ± 2.8	0.40 ± 0.02	3.0 ± 0.4	100 ± 10
Spring Cr.–Road	01/02/97	(1/1)	1,800 ± 200	0.78 ± 0.04	93 ± 10	2.3 ± 0.2	12 ± 0	120 ± 10
Spring Cr. arm	07/12/96	(1/1)	1,000 ± 0	1.5 ± 0.2	78 ± 1	2.1 ± 0.1	22 ± 1	280 ± 20
Spring Cr. arm	11/20/96	(1/1)	2,100 ± 0	4.3 ± 0.1	140 ± 0	15 ± 1	130 ± 10	2,600 ± 100
Spring Cr. arm	12/11/96	(1/1)	1,410 ± 50	6.1 ± 0.1	91 ± 2	21 ± 1	229 ± 10	4,940 ± 70
Spring Cr. arm	05/28/97	(1/1)	2,300 ± 100	1.9 ± 0.1	160 ± 10	2.0 ± 0.1	17 ± 0	340 ± 30
Colusa Basin Drain	06/06/97	(1/1)	4,300 ± 100	1.8 ± 0.0	190 ± 0	2.1 ± 0.1	15 ± 0	170 ± 20
Yolo Bypass	01/07/97	(1/1)	4,900 ± 200	2.9 ± 0.0	250 ± 10	2.9 ± 0.0	19 ± 0	180 ± 20

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Zirconium (µg/g) ICP–MS
Sac. R.– Shasta	07/12/96	(1/1)	230 ± 0
Sac. R.– Shasta	11/19/96	(1/1)	< 400 ± 0
Sac. R.– Shasta	12/12/96	(1/1)	(1,000) ± 200
Sac. R.– Shasta	05/29/97	(1/1)	250 ± 0
Sac. R.– Keswick	07/11/96	(1/1)	410 ± 0
Sac. R.– Keswick	11/21/96	(1/1)	510 ± 0
Sac. R.– Keswick	12/11/96	(1/1)	200 ± 7
Sac. R.– Keswick	01/02/97	(1/1)	240 ± 0
Sac. R.– Keswick	05/28/97	(1/1)	200 ± 0
Sac. R.– Bend Br.	07/11/96	(1/1)	160 ± 0
Sac. R.– Bend Br.	09/20/96	(1/1)	170 ± 0
Sac. R.– Bend Br.	11/22/96	(1/1)	660 ± 30
Sac. R.– Bend Br.	12/12/96	(1/1)	200 ± 0
Sac. R.– Bend Br.	01/03/97	(1/1)	250 ± 0
Sac. R.– Bend Br.	05/30/97	(1/2)	200 ± 0
Sac. R.– Bend Br.	05/30/97	(2/2)	230 ± 0
Sac. R.– Colusa	07/16/96	(1/1)	190 ± 0
Sac. R.– Colusa	09/25/96	(1/1)	< 400 ± 10
Sac. R.– Colusa	11/13/96	(1/1)	280 ± 0
Sac. R.– Colusa	12/16/96	(1/1)	214 ± 1
Sac. R.– Colusa	01/04/97	(1/1)	270 ± 0
Sac. R.– Colusa	06/03/97	(1/1)	610 ± 0
Sac. R.– Verona	07/18/96	(1/1)	180 ± 0
Sac. R.– Verona	09/26/96	(1/1)	170 ± 0
Sac. R.– Verona	11/14/96	(1/1)	< 200 ± 0
Sac. R.– Verona	12/18/96	(1/1)	213 ± 10
Sac. R.– Verona	06/04/97	(1/1)	190 ± 0
Sac. R.– Freeport	07/17/96	(1/1)	(200) ± 0
Sac. R.– Freeport	09/24/96	(1/1)	(100) ± 10
Sac. R.– Freeport	11/12/96	(1/1)	170 ± 0
Sac. R.– Freeport	12/17/96	(1/1)	190 ± 10

Table A5-2. Concentrations of selected elements in suspended colloid samples—*Continued*

Site	Date	Split replicate	Zirconium (µg/g) ICP–MS
Sac. R.– Freeport	01/06/97	(1/2)	200 ± 0
Sac. R.– Freeport	01/06/97	(2/2)	200 ± 0
Sac. R.– Freeport	06/05/97	(1/1)	180 ± 0
Sac. R.– Freeport, dup	06/05/97	(1/1)	180 ± 0
Spring Cr.–Weir	12/11/96	(1/1)	202 ± 11
Spring Cr.–Weir	05/28/97	(1/1)	< 200 ± 0
Spring Cr.–Road	01/02/97	(1/1)	< 300 ± 0
Spring Cr. arm	07/12/96	(1/1)	< 300 ± 0
Spring Cr. arm	11/20/96	(1/1)	< 400 ± 10
Spring Cr. arm	12/11/96	(1/1)	74 ± 4
Spring Cr. arm	05/28/97	(1/1)	< 100 ± 0
Colusa Basin Drain	06/06/97	(1/1)	180 ± 0
Yolo Bypass	01/07/97	(1/1)	270 ± 0

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples

[Br., Bridge; Cr., Creek; dup, duplicate; R., River; Sac., Sacramento. Split replicate (1/2), first number identifies which replicate was analyzed, second number represents number of replicate samples. mm/dd/yy, month/day/year; na, not analyzed; µg/g, microgram per gram; <, less than the indicated detection limit]

Site	Date (mm/dd/yy)	Split Replicate	Aluminum µg/g (dry weight)				Antimony µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	4,800 ± 100	8,700 ± 100	38,000 ± 0	51,500 ± 200	< 0.2 ± 0.0	< 0.2 ± 0.0	0.8 ± 0.1	1.0 ± 0.3
Sac. R.–Keswick	01/02/97	1/1	4,500 ± 100	4,700 ± 700	45,000 ± 2,000	54,200 ± 2,800	< 0.2 ± 0.0	< 0.2 ± 0.0	3.3 ± 0.3	3.5 ± 0.5
Sac. R.–Keswick	05/28/97	1/1	4,500 ± 0	7,300 ± 300	89,000 ± 0	100,800 ± 300	< 0.2 ± 0.0	< 0.2 ± 0.0	1.0 ± 0.1	1.2 ± 0.3
Sac. R.–Bend Br.	12/12/96	1/1	3,100 ± 100	3,800 ± 100	64,000 ± 1,000	70,900 ± 1,200	< 0.2 ± 0.1	< 0.2 ± 0.1	1.4 ± 0.0	1.6 ± 0.2
Sac. R.–Bend Br.	01/03/97	1/1	4,400 ± 100	5,300 ± 300	62,000 ± 1,000	71,700 ± 1,400	< 0.2 ± 0.0	< 0.2 ± 0.1	1.7 ± 0.1	1.9 ± 0.3
Sac. R.–Bend Br.	05/30/97	1/1	4,600 ± 100	6,900 ± 0	na	na	< 0.2 ± 0.0	< 0.2 ± 0.0	na	na
Sac. R.–Colusa	12/16/96	1/1	3,200 ± 0	4,400 ± 500	51,000 ± 0	58,600 ± 500	< 0.2 ± 0.1	< 0.2 ± 0.0	1.0 ± 0.0	1.2 ± 0.2
Sac. R.–Colusa	01/04/97	1/2	3,600 ± 100	3,300 ± 300	71,000 ± 2,000	77,900 ± 2,400	< 0.2 ± 0.0	< 0.1 ± 0.0	1.6 ± 0.0	1.8 ± 0.2
Sac. R.–Colusa	01/04/97	2/2	3,800 ± 100	5,700 ± 500	97,000 ± 1,000	106,500 ± 1,600	< 0.2 ± 0.1	< 0.2 ± 0.0	1.7 ± 0.1	1.9 ± 0.3
Sac. R.–Colusa	06/03/97	1/1	3,900 ± 0	4,100 ± 800	81,000 ± 0	89,000 ± 800	< 0.2 ± 0.0	< 0.2 ± 0.1	1.1 ± 0.0	1.3 ± 0.2
Sac. R.–Verona	06/04/97	1/1	2,700 ± 0	4,400 ± 600	62,000 ± 0	69,100 ± 600	< 0.2 ± 0.0	< 0.2 ± 0.1	0.8 ± 0.0	1.0 ± 0.2
Sac. R.–Freeport	12/17/96	1/1	3,800 ± 200	4,300 ± 200	56,000 ± 2,000	64,100 ± 2,400	< 0.2 ± 0.0	< 0.2 ± 0.0	1.7 ± 0.1	1.9 ± 0.3
Sac. R.–Freeport	01/06/97	1/1	6,000 ± 100	7,200 ± 700	64,000 ± 1,000	77,200 ± 1,800	< 0.2 ± 0.1	< 0.2 ± 0.0	1.0 ± 0.0	1.2 ± 0.2
Sac. R.–Freeport	06/05/97	1/1	3,100 ± 100	4,500 ± 900	51,000 ± 2,000	58,600 ± 3,000	< 0.2 ± 0.0	< 0.2 ± 0.1	0.8 ± 0.0	1.0 ± 0.2
Sac. R.–Freeport, dup	06/05/97	1/1	3,500 ± 200	3,900 ± 1,000	51,000 ± 1,000	58,400 ± 2,200	< 0.2 ± 0.4	< 0.2 ± 0.0	0.9 ± 0.0	1.3 ± 0.4
Spring Cr.–Road	01/02/97	1/1	1,700 ± 200	3,000 ± 600	70,000 ± 1,000	74,700 ± 1,800	1.8 ± 0.2	2.2 ± 0.1	9.1 ± 0.1	13 ± 0
Spring Cr.–Weir	05/28/97	1/1	5,900 ± 0	5,700 ± 800	18,000 ± 1,000	29,600 ± 1,800	< 2 ± 0.0	< 1 ± 0	< 0.8 ± 0.3	< 4 ± 2
Spring Creek Arm	05/28/97	1/1	4,400 ± 0	6,700 ± 400	73,000 ± 1,000	84,100 ± 1,400	< 0.2 ± 0.0	< 0.2 ± 0.0	1.8 ± 0.1	2.0 ± 0.3
Yolo Bypass	01/07/97	1/1	4,100 ± 200	6,700 ± 400	91,000 ± 6,000	10,1800 ± 6,600	< 0.2 ± 0.0	< 0.2 ± 0.0	2.1 ± 0.0	2.3 ± 0.2
Colusa Basin Drain	06/06/97	1/1	2,800 ± 400	4,700 ± 600	70,000 ± 1,000	77,500 ± 2,000	< 0.2 ± 0.0	< 0.2 ± 0.0	1.4 ± 0.1	1.6 ± 0.3

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Barium µg/g (dry weight)				Cadmium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	210 ± 0	17 ± 0	93 ± 0	320 ± 0	0.7 ± 0.1	< 0.08 ± 0.03	< 0.08 ± 0.04	0.8 ± 0.2
Sac. R.–Keswick	01/02/97	1/1	140 ± 0	13 ± 0	360 ± 30	513 ± 30	3.9 ± 0.0	0.2 ± 0.1	0.2 ± 0.0	4.3 ± 0.1
Sac. R.–Keswick	05/28/97	1/1	180 ± 10	14 ± 1	250 ± 0	444 ± 11	0.7 ± 0.0	< 0.07 ± 0.08	< 0.08 ± 0.14	0.8 ± 0.1
Sac. R.–Bend Br.	12/12/96	1/1	140 ± 0	10 ± 0	490 ± 10	640 ± 10	0.6 ± 0.1	< 0.07 ± 0.02	0.1 ± 0.3	0.8 ± 0.3
Sac. R.–Bend Br.	01/03/97	1/1	220 ± 0	14 ± 0	420 ± 0	654 ± 0	0.5 ± 0.1	< 0.07 ± 0.12	0.2 ± 0.1	0.8 ± 0.3
Sac. R.–Bend Br.	05/30/97	1/1	180 ± 0	12 ± 0	na	na	0.6 ± 0.1	< 0.07 ± 0.03	na	na
Sac. R.–Colusa	12/16/96	1/1	200 ± 10	11 ± 0	280 ± 0	491 ± 10	0.6 ± 0.1	< 0.08 ± 0.11	0.1 ± 0.3	0.9 ± 0.4
Sac. R.–Colusa	01/04/97	1/2	200 ± 0	10 ± 1	520 ± 0	730 ± 1	0.3 ± 0.1	< 0.05 ± 0.08	< 0.06 ± 0.03	0.4 ± 0.2
Sac. R.–Colusa	01/04/97	2/2	220 ± 10	16 ± 1	700 ± 20	936 ± 31	0.3 ± 0.1	< 0.07 ± 0.05	< 0.08 ± 0.06	0.4 ± 0.2
Sac. R.–Colusa	06/03/97	1/1	180 ± 0	10 ± 1	330 ± 0	520 ± 1	0.9 ± 0.0	< 0.07 ± 0.07	< 0.08 ± 0.10	1.0 ± 0.1
Sac. R.–Verona	06/04/97	1/1	170 ± 0	10 ± 0	280 ± 0	460 ± 0	0.7 ± 0.0	< 0.07 ± 0.08	0.07 ± 0.00	0.8 ± 0.1
Sac. R.–Freeport	12/17/96	1/1	220 ± 0	15 ± 0	270 ± 0	505 ± 0	0.3 ± 0.0	0.1 ± 0.1	0.1 ± 0.1	0.5 ± 0.2
Sac. R.–Freeport	01/06/97	1/1	250 ± 0	20 ± 0	440 ± 0	710 ± 0	< 0.2 ± 0.0	< 0.07 ± 0.02	< 0.07 ± 0.04	< 0.3 ± 0.2
Sac. R.–Freeport	06/05/97	1/1	180 ± 0	11 ± 0	220 ± 10	411 ± 10	0.6 ± 0.1	0.6 ± 0.6	0.2 ± 0.2	1.4 ± 0.9
Sac. R.–Freeport, dup	06/05/97	1/1	200 ± 3	10 ± 0	160 ± 0	370 ± 3	0.8 ± 0.6	0.1 ± 0.1	0.2 ± 0.2	1.1 ± 0.9
Spring Cr.–Road	01/02/97	1/1	5.3 ± 0.2	3.3 ± 0.3	230 ± 0	239 ± 1	< 0.4 ± 0.2	< 0.2 ± 0.1	0.2 ± 0.3	< 1 ± 0.6
Spring Cr.–Weir	05/28/97	1/1	16 ± 0	12 ± 3	83 ± 5	111 ± 8	< 0.9 ± 0.00	< 0.5 ± 0.6	< 0.6 ± 0.6	< 3 ± 1.3
Spring Creek Arm	05/28/97	1/1	140 ± 20	11 ± 1	190 ± 0	341 ± 21	0.7 ± 0.1	< 0.07 ± 0.16	0.09 ± 0.09	0.9 ± 0.3
Yolo Bypass	01/07/97	1/1	240 ± 0	14 ± 0	670 ± 40	924 ± 40	0.2 ± 0.0	< 0.07 ± 0.07	0.1 ± 0.0	0.4 ± 0.1
Colusa Basin Drain	06/06/97	1/1	290 ± 0	14 ± 0	360 ± 0	664 ± 0	0.4 ± 0.1	< 0.07 ± 0.00	< 0.08 ± 0.02	0.5 ± 0.2

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Calcium µg/g (dry weight)				Chromium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	7,200 ± 200	290 ± 0	690 ± 30	8,180 ± 230	10 ± 0.5	19 ± 3	130 ± 0	159 ± 4
Sac. R.–Keswick	01/02/97	1/1	4,200 ± 100	< 50 ± 12	1,200 ± 0	5,425 ± 125	10 ± 4	11 ± 1	92 ± 1	113 ± 6
Sac. R.–Keswick	05/28/97	1/1	5,400 ± 300	250 ± 40	2,400 ± 0	8,050 ± 340	16 ± 1	60 ± 8	320 ± 0	396 ± 9
Sac. R.–Bend Br.	12/12/96	1/1	3,900 ± 100	340 ± 10	4,800 ± 100	9,040 ± 210	24 ± 7	54 ± 5	230 ± 0	308 ± 12
Sac. R.–Bend Br.	01/03/97	1/1	5,800 ± 100	360 ± 20	4,300 ± 100	10,460 ± 220	22 ± 3	42 ± 5	190 ± 0	254 ± 8
Sac. R.–Bend Br.	05/30/97	1/1	5,400 ± 100	260 ± 0	na	na	19 ± 1	68 ± 0	na	na
Sac. R.–Colusa	12/16/96	1/1	4,600 ± 200	530 ± 60	4,400 ± 0	9,530 ± 260	11 ± 2	32 ± 2	140 ± 0	183 ± 4
Sac. R.–Colusa	01/04/97	1/2	5,100 ± 0	260 ± 20	4,700 ± 0	10,060 ± 20	10 ± 0	20 ± 9	170 ± 0	200 ± 9
Sac. R.–Colusa	01/04/97	2/2	5,900 ± 300	460 ± 40	6,100 ± 0	12,460 ± 340	6.1 ± 1.3	26 ± 2	190 ± 10	222 ± 13
Sac. R.–Colusa	06/03/97	1/1	5,200 ± 0	150 ± 60	3,600 ± 0	8,950 ± 60	14 ± 1	31 ± 10	200 ± 0	245 ± 11
Sac. R.–Verona	06/04/97	1/1	4,500 ± 0	180 ± 40	2,700 ± 0	7,380 ± 40	8.3 ± 0.9	25 ± 4	120 ± 0	153 ± 5
Sac. R.–Freeport	12/17/96	1/1	6,000 ± 100	530 ± 0	6,000 ± 100	12,530 ± 200	11 ± 1	33 ± 3	200 ± 0	244 ± 4
Sac. R.–Freeport	01/06/97	1/1	4,500 ± 200	390 ± 10	9,200 ± 0	14,090 ± 210	6.7 ± 2.0	16 ± 4	130 ± 0	153 ± 6
Sac. R.–Freeport	06/05/97	1/1	4,900 ± 0	190 ± 60	2,800 ± 100	7,890 ± 160	9.3 ± 2.9	24 ± 6	120 ± 10	153 ± 19
Sac. R.–Freeport, dup	06/05/97	1/1	5,300 ± 90	140 ± 70	3,200 ± 0	8,640 ± 160	11 ± 3	20 ± 4	140 ± 0	171 ± 7
Spring Cr.–Road	01/02/97	1/1	< 100 ± 10	< 100 ± 10	820 ± 10	920 ± 110	9.4 ± 1.8	12 ± 10	31 ± 6	52 ± 18
Spring Cr.–Weir	05/28/97	1/1	< 400 ± 0	< 400 ± 200	< 1,000 ± 620	< 1,920 ± 960	< 30 ± 4	44 ± 39	< 50 ± 13	84 ± 79
Spring Creek Arm	05/28/97	1/1	3,100 ± 300	230 ± 20	4,300 ± 0	7,630 ± 320	38 ± 2	150 ± 10	640 ± 0	828 ± 12
Yolo Bypass	01/07/97	1/1	5,600 ± 100	500 ± 130	4,500 ± 200	10,600 ± 430	9.1 ± 2.9	42 ± 15	200 ± 0	251 ± 18
Colusa Basin Drain	06/06/97	1/1	6,400 ± 0	310 ± 40	1,800 ± 0	8,510 ± 40	8.4 ± 1	27 ± 6	140 ± 10	175 ± 17

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Cobalt µg/g (dry weight)				Copper µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	5.4 ± 0.1	3.1 ± 0.0	10 ± 1	19 ± 1	67 ± 1	12 ± 3	63 ± 0	142 ± 4
Sac. R.–Keswick	01/02/97	1/1	15 ± 0	2.1 ± 0.1	8.6 ± 0.4	26 ± 1	550 ± 10	67 ± 11	140 ± 0	757 ± 21
Sac. R.–Keswick	05/28/97	1/1	10 ± 0	4.8 ± 0.0	18 ± 2	33 ± 2	58 ± 4	15 ± 2	63 ± 1	136 ± 7
Sac. R.–Bend Br.	12/12/96	1/1	12 ± 0	4.2 ± 0.1	10 ± 1	26 ± 1	120 ± 0	25 ± 1	39 ± 0	184 ± 1
Sac. R.–Bend Br.	01/03/97	1/1	12 ± 1	3.9 ± 0.1	12 ± 0	28 ± 1	72 ± 2	18 ± 2	63 ± 1	153 ± 5
Sac. R.–Bend Br.	05/30/97	1/1	8.5 ± 0.1	5.9 ± 0.2	na	na	64 ± 1	18 ± 4	na	na
Sac. R.–Colusa	12/16/96	1/1	12 ± 1	3.4 ± 0.1	7.7 ± 1.0	23 ± 2	65 ± 3	18 ± 2	33 ± 0	116 ± 5
Sac. R.–Colusa	01/04/97	1/2	12 ± 0	2.9 ± 0.1	10 ± 0	25 ± 0	36 ± 3	9.7 ± 0.8	51 ± 0	97 ± 4
Sac. R.–Colusa	01/04/97	2/2	13 ± 0	4.0 ± 0.0	11 ± 1	28 ± 1	37 ± 2	18 ± 3	55 ± 1	110 ± 6
Sac. R.–Colusa	06/03/97	1/1	8.7 ± 0.3	3.4 ± 0.2	12 ± 0	24 ± 1	70 ± 1	12 ± 4	49 ± 1	131 ± 6
Sac. R.–Verona	06/04/97	1/1	7.4 ± 0.6	3.4 ± 0.1	8.8 ± 0.7	20 ± 1	46 ± 2	11 ± 2	34 ± 0	91 ± 4
Sac. R.–Freeport	12/17/96	1/1	11 ± 0	4.5 ± 0.0	11 ± 1	27 ± 1	57 ± 4	17 ± 2	49 ± 0	123 ± 6
Sac. R.–Freeport	01/06/97	1/1	11 ± 0	3.0 ± 0.1	13 ± 1	27 ± 1	29 ± 2	16 ± 3	65 ± 1	110 ± 6
Sac. R.–Freeport	06/05/97	1/1	7.6 ± 0.7	3.4 ± 0.0	8.8 ± 1.0	20 ± 2	59 ± 2	14 ± 4	34 ± 1	107 ± 7
Sac. R.–Freeport, dup	06/05/97	1/1	8.5 ± 0.2	2.9 ± 0.0	10 ± 1	21 ± 1	66 ± 10	17 ± 6	44 ± 1	127 ± 17
Spring Cr.–Road	01/02/97	1/1	1.2 ± 0.1	0.8 ± 0.1	5.3 ± 0.8	7.3 ± 1.0	38 ± 4	37 ± 10	160 ± 0	235 ± 14
Spring Cr.–Weir	05/28/97	1/1	1.1 ± 0.0	1.6 ± 0.2	< 5 ± 2	5 ± 3	120 ± 0	36 ± 12	39 ± 1	195 ± 13
Spring Creek Arm	05/28/97	1/1	21 ± 0	11.0 ± 0.0	37 ± 0	69 ± 0	120 ± 1	25 ± 6	78 ± 0	223 ± 7
Yolo Bypass	01/07/97	1/1	11 ± 0	4.1 ± 0.1	13 ± 0	28 ± 0	42 ± 2	22 ± 1	67 ± 1	131 ± 4
Colusa Basin Drain	06/06/97	1/1	7.9 ± 0.0	3.7 ± 0.0	8.4 ± 0.5	20 ± 1	31 ± 5	9 ± 1	30 ± 0	70 ± 6

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Iron µg/g (dry weight)				Lead µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	5,800 ± 200	7,400 ± 1,000	60,000 ± 1,000	73,200 ± 2,200	5.8 ± 0.2	1.9 ± 0.3	4.1 ± 0.4	12 ± 1
Sac. R.–Keswick	01/02/97	1/1	20,000 ± 0	6,800 ± 400	56,000 ± 1,000	82,800 ± 1,400	18 ± 0	2.7 ± 0.1	21 ± 1	42 ± 1
Sac. R.–Keswick	05/28/97	1/1	6,400 ± 300	8,200 ± 700	61,000 ± 1,000	75,600 ± 2,000	4.6 ± 0.2	1.5 ± 0.2	3.7 ± 0.1	10 ± 1
Sac. R.–Bend Br.	12/12/96	1/1	6,100 ± 100	6,800 ± 400	48,000 ± 1,000	60,900 ± 1,500	8.5 ± 0.3	2.1 ± 0.2	7.6 ± 1.5	18 ± 2
Sac. R.–Bend Br.	01/03/97	1/1	8,500 ± 200	8,400 ± 300	60,000 ± 1,000	76,900 ± 1,500	12 ± 2	2.5 ± 0.2	8.0 ± 0.1	23 ± 2
Sac. R.–Bend Br.	05/30/97	1/1	8,400 ± 100	8,600 ± 1,000	na	na	8.5 ± 0.2	1.7 ± 0.3	na	na
Sac. R.–Colusa	12/16/96	1/1	7,100 ± 300	7,900 ± 700	41,000 ± 0	56,000 ± 1,000	11 ± 3	1.9 ± 0.3	3.9 ± 0.3	17 ± 4
Sac. R.–Colusa	01/04/97	1/2	7,500 ± 100	5,400 ± 400	56,000 ± 0	68,900 ± 500	9.0 ± 0.2	1.9 ± 0.1	5.2 ± 0.2	16 ± 1
Sac. R.–Colusa	01/04/97	2/2	6,200 ± 300	9,000 ± 200	64,000 ± 0	79,200 ± 500	9.1 ± 0.2	3.2 ± 0.3	5.9 ± 0.2	18 ± 1
Sac. R.–Colusa	06/03/97	1/1	10,000 ± 0	4,900 ± 1,000	49,000 ± 0	63,900 ± 1,000	11 ± 0	1.0 ± 0.0	2.8 ± 0.5	15 ± 1
Sac. R.–Verona	06/04/97	1/1	7,000 ± 100	6,100 ± 600	40,000 ± 1,000	53,100 ± 1,700	14 ± 4	1.5 ± 0.3	3.1 ± 0.3	19 ± 5
Sac. R.–Freeport	12/17/96	1/1	9,600 ± 0	8,300 ± 800	56,000 ± 1,000	73,900 ± 1,800	14 ± 1	3.0 ± 0.3	6.6 ± 0.5	24 ± 2
Sac. R.–Freeport	01/06/97	1/1	6,400 ± 200	7,500 ± 800	57,000 ± 0	70,900 ± 1,000	12 ± 0	3.6 ± 0.1	12 ± 0	28 ± 0
Sac. R.–Freeport	06/05/97	1/1	8,100 ± 200	6,200 ± 1,000	39,000 ± 0	53,300 ± 1,200	13 ± 0	2.1 ± 0.8	3.3 ± 0.2	18 ± 1
Sac. R.–Freeport, dup	06/05/97	1/1	10,000 ± 10,000	4,900 ± 1,200	47,000 ± 0	61,900 ± 11,200	13 ± 3	1.2 ± 0.2	3.2 ± 0.2	17 ± 3
Spring Cr.–Road	01/02/97	1/1	120,000 ± 0	24,000 ± 0	60,000 ± 0	204,000 ± 0	13 ± 1	1.7 ± 0.5	27 ± 1	42 ± 3
Spring Cr.–Weir	05/28/97	1/1	280,000 ± 100	29,000 ± 6,000	15,000 ± 0	324,000 ± 6,100	66 ± 0	1.5 ± 0.9	4.4 ± 0.8	72 ± 2
Spring Creek Arm	05/28/97	1/1	8,800 ± 200	10,000 ± 1,000	72,000 ± 0	90,800 ± 1,200	4.1 ± 0.3	1.0 ± 0.2	2.6 ± 0.3	7.7 ± 0.8
Yolo Bypass	01/07/97	1/1	7,000 ± 0	8,500 ± 1,300	65,000 ± 0	80,500 ± 1,300	10 ± 0	2.5 ± 0.3	7.7 ± 0.2	20 ± 1
Colusa Basin Drain	06/06/97	1/1	6,000 ± 0	6,800 ± 200	49,000 ± 0	61,800 ± 200	9.5 ± 0	0.9 ± 0.5	3.6 ± 0.2	14 ± 1

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Lithium µg/g (dry weight)				Magnesium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	2.3 ± 0.4	7.1 ± 0.0	27 ± 2	36 ± 2	3,200 ± 100	3,700 ± 100	2,000 ± 100	8,900 ± 300
Sac. R.–Keswick	01/02/97	1/1	1.3 ± 0.3	3.4 ± 0.2	20 ± 2	25 ± 3	1,700 ± 0	2,400 ± 0	6,200 ± 500	10,300 ± 500
Sac. R.–Keswick	05/28/97	1/1	2.3 ± 0.5	5.1 ± 0.3	28 ± 1	35 ± 2	3,900 ± 200	7,200 ± 600	23,000 ± 0	34,100 ± 800
Sac. R.–Bend Br.	12/12/96	1/1	2.8 ± 0.6	6.5 ± 0.3	36 ± 2	45 ± 3	3,000 ± 100	5,900 ± 200	24,000 ± 0	32,900 ± 300
Sac. R.–Bend Br.	01/03/97	1/1	3.1 ± 0.7	8.3 ± 0.0	42 ± 6	53 ± 7	3,100 ± 0	4,100 ± 100	14,000 ± 0	21,200 ± 100
Sac. R.–Bend Br.	05/30/97	1/1	1.9 ± 0.3	6.0 ± 0.2	na	na	4,100 ± 100	7,900 ± 0	na	na
Sac. R.–Colusa	12/16/96	1/1	2.4 ± 0.7	6.1 ± 0.4	34 ± 6	43 ± 7	2,400 ± 100	3,800 ± 100	13,000 ± 0	19,200 ± 200
Sac. R.–Colusa	01/04/97	1/2	2.5 ± 0.0	6.1 ± 0.2	47 ± 0	56 ± 0	2,700 ± 0	2,200 ± 100	14,000 ± 0	18,900 ± 100
Sac. R.–Colusa	01/04/97	2/2	2.4 ± 0.0	8.4 ± 0.4	54 ± 3	65 ± 3	2,500 ± 100	3,500 ± 100	20,000 ± 0	26,000 ± 200
Sac. R.–Colusa	06/03/97	1/1	1.8 ± 0.0	5.2 ± 0.0	31 ± 2	38 ± 2	3,600 ± 100	4,000 ± 800	16,000 ± 0	23,600 ± 900
Sac. R.–Verona	06/04/97	1/1	1.4 ± 0.1	6.0 ± 0.4	29 ± 1	36 ± 2	2,400 ± 0	3,200 ± 100	10,000 ± 0	15,600 ± 100
Sac. R.–Freeport	12/17/96	1/1	2.0 ± 0.2	5.9 ± 0.3	38 ± 2	46 ± 3	2,700 ± 100	3,900 ± 0	12,000 ± 0	18,600 ± 100
Sac. R.–Freeport	01/06/97	1/1	2.3 ± 0.5	4.1 ± 0.2	31 ± 2	37 ± 3	1,700 ± 0	1,900 ± 200	8,500 ± 100	12,100 ± 300
Sac. R.–Freeport	06/05/97	1/1	1.7 ± 0.1	6.4 ± 0.6	26 ± 1	34 ± 2	2,600 ± 0	3,000 ± 500	7,900 ± 0	13,500 ± 500
Sac. R.–Freeport, dup	06/05/97	1/1	2.3 ± 1.3	5.0 ± 0.6	33 ± 0	40 ± 2	3,300 ± 70	2,600 ± 600	7,200 ± 0	13,100 ± 670
Spring Cr.–Road	01/02/97	1/1	< 0.7 ± 0.1	1.4 ± 0.6	9.5 ± 1.4	11 ± 2	340 ± 0	1,100 ± 200	11,000 ± 0	12,440 ± 200
Spring Cr.–Weir	05/28/97	1/1	< 2 ± 0	4.3 ± 3.1	< 8 ± 1	9 ± 8	98 ± 0	1,700 ± 300	2,700 ± 300	4,498 ± 600
Spring Creek Arm	05/28/97	1/1	1.8 ± 0.0	5.6 ± 0.3	25 ± 1	32 ± 1	6,300 ± 0	15,000 ± 0	46,000 ± 1000	67,300 ± 1,000
Yolo Bypass	01/07/97	1/1	2.9 ± 0.2	8.2 ± 0.7	51 ± 2	62 ± 3	2,700 ± 0	3,800 ± 700	17,000 ± 0	23,500 ± 700
Colusa Basin Drain	06/06/97	1/1	2.7 ± 0.2	9.7 ± 1.2	51 ± 0	63 ± 1	3,600 ± 0	3,600 ± 300	13,000 ± 0	20,200 ± 300

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Manganese µg/g (dry weight)				Mercury µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	300 ± 0	55 ± 3	190 ± 10	545 ± 13	< 0.05 ± 0.02	< 0.09 ± 0.04	< 0.05 ± 0.02	< 0.2 ± 0.1
Sac. R.–Keswick	01/02/97	1/1	730 ± 0	41 ± 2	330 ± 40	1,101 ± 42	< 0.05 ± 0.03	< 0.08 ± 0.05	0.2 ± 0.1	0.3 ± 0.2
Sac. R.–Keswick	05/28/97	1/1	370 ± 0	49 ± 2	230 ± 20	649 ± 22	< 0.05 ± 0.02	< 0.09 ± 0.08	< 0.04 ± 0.06	< 0.3 ± 0.1
Sac. R.–Bend Br.	12/12/96	1/1	630 ± 0	33 ± 1	510 ± 60	1,173 ± 61	< 0.05 ± 0.02	< 0.09 ± 0.17	< 0.05 ± 0.02	< 0.3 ± 0.2
Sac. R.–Bend Br.	01/03/97	1/1	590 ± 20	36 ± 2	570 ± 10	1,196 ± 32	< 0.05 ± 0.01	< 0.09 ± 0.03	< 0.04 ± 0.01	< 0.2 ± 0.1
Sac. R.–Bend Br.	05/30/97	1/1	340 ± 10	32 ± 2	na	na	< 0.05 ± 0.02	< 0.08 ± 0.02	na	na
Sac. R.–Colusa	12/16/96	1/1	730 ± 30	29 ± 1	370 ± 40	1,129 ± 71	< 0.05 ± 0.03	< 0.09 ± 0.03	< 0.05 ± 0.02	< 0.2 ± 0.1
Sac. R.–Colusa	01/04/97	1/2	470 ± 20	29 ± 1	510 ± 10	1,009 ± 31	< 0.04 ± 0.00	< 0.07 ± 0.05	0.07 ± 0.00	0.1 ± 0.1
Sac. R.–Colusa	01/04/97	2/2	500 ± 0	38 ± 1	580 ± 30	1,118 ± 31	< 0.05 ± 0.01	< 0.09 ± 0.05	< 0.04 ± 0.02	< 0.2 ± 0.1
Sac. R.–Colusa	06/03/97	1/1	670 ± 10	33 ± 0	240 ± 30	943 ± 40	< 0.05 ± 0.02	0.09 ± 0.22	0.06 ± 0.00	0.2 ± 0.2
Sac. R.–Verona	06/04/97	1/1	700 ± 0	26 ± 1	240 ± 10	966 ± 11	< 0.05 ± 0.02	< 0.08 ± 0.03	< 0.04 ± 0.00	< 0.2 ± 0.1
Sac. R.–Freeport	12/17/96	1/1	990 ± 0	120 ± 0	350 ± 40	1,460 ± 40	< 0.05 ± 0.01	< 0.09 ± 0.00	0.05 ± 0.02	0.1 ± 0.1
Sac. R.–Freeport	01/06/97	1/1	710 ± 0	37 ± 1	420 ± 40	1,167 ± 41	< 0.05 ± 0.03	< 0.08 ± 0.03	< 0.04 ± 0.03	< 0.2 ± 0.1
Sac. R.–Freeport	06/05/97	1/1	860 ± 10	28 ± 1	240 ± 20	1,128 ± 31	< 0.05 ± 0.01	< 0.09 ± 0.06	< 0.04 ± 0.06	< 0.2 ± 0.1
Sac. R.–Freeport, dup	06/05/97	1/1	920 ± 24	27 ± 3	260 ± 20	1,207 ± 47	< 0.05 ± 0.20	< 0.08 ± 0.06	0.1 ± 0.02	0.3 ± 0.2
Spring Cr.–Road	01/02/97	1/1	74 ± 3	25 ± 4	190 ± 10	289 ± 17	< 0.1 ± 0.0	0.7 ± 0.3	0.2 ± 0.10	1.0 ± 0.5
Spring Cr.–Weir	05/28/97	1/1	68 ± 10	72 ± 15	56 ± 3	196 ± 28	< 0.4 ± 0.02	< 0.6 ± 0.7	< 0.3 ± 0.2	< 2 ± 0.9
Spring Creek Arm	05/28/97	1/1	610 ± 50	34 ± 1	340 ± 20	984 ± 71	< 0.05 ± 0.01	< 0.09 ± 0.07	< 0.04 ± 0.03	< 0.2 ± 0.1
Yolo Bypass	01/07/97	1/1	540 ± 0	32 ± 2	520 ± 20	1,092 ± 22	< 0.05 ± 0.02	< 0.09 ± 0.01	< 0.04 ± 0.03	< 0.2 ± 0.1
Colusa Basin Drain	06/06/97	1/1	1,000 ± 10	26 ± 1	310 ± 20	1,336 ± 31	< 0.05 ± 0.02	< 0.09 ± 0.05	0.05 ± 0.06	< 0.3 ± 0.1

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Nickel µg/g (dry weight)				Silica (as SiO_2) µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	32 ± 1	53 ± 1	140 ± 10	225 ± 12	12,000 ± 0	19,000 ± 0	490,000 ± 10,000	521,000 ± 10,000
Sac. R.–Keswick	01/02/97	1/1	14 ± 1	14 ± 2	64 ± 1	92 ± 4	11,000 ± 0	9,200 ± 1,100	460,000 ± 20,000	480,200 ± 21,100
Sac. R.–Keswick	05/28/97	1/1	99 ± 2	160 ± 0	510 ± 30	769 ± 32	8,900 ± 100	14,000 ± 0	420,000 ± 10,000	442,900 ± 10,100
Sac. R.–Bend Br.	12/12/96	1/1	39 ± 0	46 ± 2	120 ± 0	205 ± 2	7,000 ± 300	10,000 ± 400	510,000 ± 10,000	527,000 ± 10,700
Sac. R.–Bend Br.	01/03/97	1/1	26 ± 1	32 ± 1	100 ± 0	158 ± 2	7,300 ± 100	11,000 ± 0	510,000 ± 10,000	528,300 ± 10,100
Sac. R.–Bend Br.	05/30/97	1/1	97 ± 4	200 ± 10	na	na	12,000 ± 0	17,000 ± 0	na	na
Sac. R.–Colusa	12/16/96	1/1	26 ± 0	30 ± 1	69 ± 6	125 ± 7	6,600 ± 200	11,000 ± 1,000	440,000 ± 10,000	457,600 ± 11,200
Sac. R.–Colusa	01/04/97	1/2	20 ± 0	20 ± 0	84 ± 1	124 ± 1	6,500 ± 0	6,900 ± 600	470,000 ± 10,000	483,400 ± 10,600
Sac. R.–Colusa	01/04/97	2/2	19 ± 1	26 ± 1	91 ± 3	136 ± 5	5,900 ± 300	12,000 ± 1,000	540,000 ± 0	557,900 ± 1,300
Sac. R.–Colusa	06/03/97	1/1	69 ± 6	91 ± 2	260 ± 10	420 ± 18	9,100 ± 100	11,000 ± 0	460,000 ± 50,000	480,100 ± 50,100
Sac. R.–Verona	06/04/97	1/1	26 ± 1	52 ± 0	130 ± 0	208 ± 1	7,300 ± 100	12,000 ± 1,000	340,000 ± 10,000	359,300 ± 11,100
Sac. R.–Freeport	12/17/96	1/1	25 ± 1	34 ± 0	100 ± 10	159 ± 11	8,100 ± 100	12,000 ± 1,000	540,000 ± 20,000	560,100 ± 21,100
Sac. R.–Freeport	01/06/97	1/1	14 ± 0	20 ± 1	82 ± 8	116 ± 9	8,600 ± 100	10,000 ± 1,000	500,000 ± 10,000	518,600 ± 11,100
Sac. R.–Freeport	06/05/97	1/1	25 ± 1	46 ± 0	110 ± 10	181 ± 11	6,800 ± 0	11,000 ± 2,000	390,000 ± 10,000	407,800 ± 12,000
Sac. R.–Freeport, dup	06/05/97	1/1	38 ± 0.9	44 ± 3	140 ± 10	222 ± 14	11,000 ± 400	10,000 ± 2,000	450,000 ± 20,000	471,000 ± 22,400
Spring Cr.–Road	01/02/97	1/1	< 1 ± 0	< 7 ± 2	< 30 ± 10	< 38 ± 19	3,300 ± 300	6,600 ± 1,300	310,000 ± 20,000	319,900 ± 21,600
Spring Cr.–Weir	05/28/97	1/1	< 3 ± 10	< 20 ± 10	< 100 ± 30	< 130 ± 66	7,700 ± 0	22,000 ± 2,000	< 500,000 ± 40,000	279,700 ± 252,000
Spring Creek Arm	05/28/97	1/1	250 ± 0	450 ± 0	1,300 ± 0	2,000 ± 0	13,000 ± 100	16,000 ± 0	400,000 ± 10,000	429,000 ± 10,100
Yolo Bypass	01/07/97	1/1	24 ± 1	34 ± 1	120 ± 0	178 ± 2	6,100 ± 0	12,000 ± 2,000	480,000 ± 20,000	498,100 ± 22,000
Colusa Basin Drain	06/06/97	1/1	16 ± 0	38 ± 0	87 ± 1	141 ± 1	5,500 ± 0	15,000 ± 2,000	400,000 ± 10,000	420,500 ± 12,000

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Strontium µg/g (dry weight)				Thallium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	40 ± 1	3.4 ± 0.1	9 ± 0	53 ± 1	0.04 ± 0.01	< 0.04 ± 0.00	0.3 ± 0.0	0.4 ± 0.0
Sac. R.–Keswick	01/02/97	1/1	24 ± 1	1.3 ± 0.2	14 ± 1	39 ± 2	0.05 ± 0.01	< 0.03 ± 0.01	0.6 ± 0.0	0.7 ± 0.0
Sac. R.–Keswick	05/28/97	1/1	30 ± 1	2.0 ± 0	29 ± 1	61 ± 2	0.03 ± 0.01	< 0.03 ± 0.01	0.2 ± 0.0	0.2 ± 0.0
Sac. R.–Bend Br.	12/12/96	1/1	24 ± 1	2.0 ± 0.1	48 ± 4	74 ± 5	0.03 ± 0.02	< 0.03 ± 0.00	0.4 ± 0.0	0.4 ± 0.0
Sac. R.–Bend Br.	01/03/97	1/1	39 ± 1	2.9 ± 0.2	50 ± 2	92 ± 3	0.04 ± 0.01	< 0.04 ± 0.01	0.5 ± 0.0	0.6 ± 0.0
Sac. R.–Bend Br.	05/30/97	1/1	30 ± 0	2.5 ± 0.2	na	na	0.03 ± 0.01	< 0.03 ± 0.01	na	na
Sac. R.–Colusa	12/16/96	1/1	34 ± 1	2.7 ± 0	47 ± 1	84 ± 2	0.03 ± 0.01	< 0.04 ± 0.01	0.3 ± 0.0	0.4 ± 0.0
Sac. R.–Colusa	01/04/97	1/2	46 ± 0	2.8 ± 0.1	49 ± 2	98 ± 2	0.03 ± 0.01	< 0.03 ± 0.01	0.5 ± 0.0	0.5 ± 0.0
Sac. R.–Colusa	01/04/97	2/2	50 ± 1	4.0 ± 0.2	69 ± 1	123 ± 2	0.09 ± 0.01	< 0.03 ± 0.01	0.5 ± 0.0	0.6 ± 0.0
Sac. R.–Colusa	06/03/97	1/1	35 ± 3	2.4 ± 0	46 ± 2	83 ± 5	< 0.02 ± 0.01	< 0.03 ± 0.00	0.2 ± 0.1	0.2 ± 0.1
Sac. R.–Verona	06/04/97	1/1	33 ± 1	2.3 ± 0.3	37 ± 0	72 ± 1	< 0.02 ± 0.01	< 0.03 ± 0.01	0.3 ± 0.0	0.3 ± 0.0
Sac. R.–Freeport	12/17/96	1/1	40 ± 0	3.9 ± 0.3	53 ± 3	97 ± 3	0.03 ± 0.01	< 0.04 ± 0.00	0.4 ± 0.0	0.5 ± 0.0
Sac. R.–Freeport	01/06/97	1/1	35 ± 1	5.9 ± 0.5	94 ± 2	135 ± 4	0.05 ± 0.01	< 0.03 ± 0.00	0.5 ± 0.0	0.6 ± 0.0
Sac. R.–Freeport	06/05/97	1/1	34 ± 0	2.3 ± 0.1	33 ± 1	69 ± 1	< 0.02 ± 0	< 0.03 ± 0.00	0.3 ± 0.0	0.3 ± 0.0
Sac. R.–Freeport, dup	06/05/97	1/1	42 ± 1	2.3 ± 0.2	38 ± 1	82 ± 2	< 0.02 ± 0.1	< 0.03 ± 0.01	0.3 ± 0.0	0.4 ± 0.1
Spring Cr.–Road	01/02/97	1/1	< 1 ± 0	< 0.4 ± 0.4	14 ± 1	15 ± 2	< 0.05 ± 0.01	< 0.08 ± 0.02	0.4 ± 0.0	0.5 ± 0.1
Spring Cr.–Weir	05/28/97	1/1	< 4 ± 0	< 1 ± 0	< 5 ± 0	< 10 ± 5	< 0.2 ± 0	< 0.3 ± 0.0	< 0.2 ± 0.1	< 0.7 ± 0.4
Spring Creek Arm	05/28/97	1/1	18 ± 0	1.5 ± 0.1	26 ± 1	46 ± 1	0.03 ± 0.01	< 0.03 ± 0.00	0.2 ± 0.0	0.2 ± 0.0
Yolo Bypass	01/07/97	1/1	49 ± 1	3.3 ± 0.2	50 ± 1	102 ± 2	0.03 ± 0.01	< 0.03 ± 0.00	0.6 ± 0.0	0.6 ± 0.0
Colusa Basin Drain	06/06/97	1/1	71 ± 2	3.0 ± 0.2	36 ± 0	110 ± 2	< 0.02 ± 0.01	< 0.03 ± 0.00	0.3 ± 0.0	0.3 ± 0.0

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Thorium µg/g (dry weight)				Titanium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	< 0.01 ± 0.00	1.8 ± 0.0	0.5 ± 0.0	2.3 ± 0.0	21 ± 2	120 ± 0	4,300 ± 100	4,441 ± 102
Sac. R.–Keswick	01/02/97	1/1	< 0.01 ± 0.00	0.9 ± 0.0	0.7 ± 0.0	1.6 ± 0.0	7 ± 0	40 ± 4	3,300 ± 0	3,347 ± 4
Sac. R.–Keswick	05/28/97	1/1	< 0.01 ± 0.00	1.6 ± 0.0	2.3 ± 0.1	3.9 ± 0.1	20 ± 1	82 ± 1	3,400 ± 100	3,502 ± 102
Sac. R.–Bend Br.	12/12/96	1/1	< 0.01 ± 0.00	1.4 ± 0.0	3.7 ± 0.3	5.1 ± 0.3	11 ± 1	52 ± 3	3,500 ± 100	3,563 ± 104
Sac. R.–Bend Br.	01/03/97	1/1	0.03 ± 0.00	2.5 ± 0.1	2.9 ± 0.2	5.4 ± 0.3	18 ± 2	58 ± 3	4,500 ± 100	4,576 ± 105
Sac. R.–Bend Br.	05/30/97	1/1	< 0.01 ± 0.00	1.6 ± 0.0	na	na	23 ± 0	83 ± 0	na	na
Sac. R.–Colusa	12/16/96	1/1	< 0.01 ± 0.00	1.4 ± 0.1	2.0 ± 0.1	3.4 ± 0.2	13 ± 1	61 ± 3	3,600 ± 0	3,674 ± 4
Sac. R.–Colusa	01/04/97	1/2	< 0.01 ± 0.00	2.0 ± 0.1	3.7 ± 0.0	5.7 ± 0.1	18 ± 2	42 ± 3	4,900 ± 0	4,960 ± 5
Sac. R.–Colusa	01/04/97	2/2	0.01 ± 0.00	2.4 ± 0.0	3.9 ± 0.2	6.3 ± 0.2	17 ± 2	74 ± 4	5,500 ± 0	5,591 ± 6
Sac. R.–Colusa	06/03/97	1/1	< 0.01 ± 0.00	0.9 ± 0.1	3.6 ± 0.1	4.5 ± 0.2	17 ± 0	54 ± 0	3,700 ± 0	3,771 ± 0
Sac. R.–Verona	06/04/97	1/1	< 0.01 ± 0.00	1.4 ± 0.1	2.8 ± 0.1	4.2 ± 0.2	13 ± 1	48 ± 3	3,300 ± 0	3,361 ± 4
Sac. R.–Freeport	12/17/96	1/1	< 0.01 ± 0.00	2.2 ± 0.1	2.7 ± 0.0	4.9 ± 0.1	13 ± 1	50 ± 5	4,900 ± 0	4,963 ± 6
Sac. R.–Freeport	01/06/97	1/1	0.07 ± 0.01	7.7 ± 0.1	5.8 ± 0.1	14 ± 0	49 ± 1	150 ± 10	4,700 ± 0	4,899 ± 11
Sac. R.–Freeport	06/05/97	1/1	< 0.01 ± 0.00	1.4 ± 0.1	2.1 ± 0.3	3.5 ± 0.4	16 ± 1	51 ± 7	3,400 ± 0	3,467 ± 8
Sac. R.–Freeport, dup	06/05/97	1/1	< 0.01 ± 0.05	1.5 ± 0.0	1.7 ± 0.1	3.2 ± 0.1	20 ± 9	43 ± 7	3,900 ± 0	3,963 ± 16
Spring Cr.–Road	01/02/97	1/1	0.05 ± 0.02	0.5 ± 0.1	0.9 ± 0.1	1.5 ± 0.2	47 ± 2	66 ± 5	1,800 ± 0	1,913 ± 7
Spring Cr.–Weir	05/28/97	1/1	< 0.1 ± 0.0	0.6 ± 0.2	0.4 ± 0.1	1.1 ± 0.4	< 7 ± 1	220 ± 10	380 ± 50	604 ± 64
Spring Creek Arm	05/28/97	1/1	< 0.01 ± 0.00	1.7 ± 0.0	2.0 ± 0.1	3.7 ± 0.1	16 ± 1	68 ± 2	2,200 ± 100	2,284 ± 103
Yolo Bypass	01/07/97	1/1	0.01 ± 0.01	2.5 ± 0.0	5.0 ± 0.1	7.5 ± 0.1	19 ± 1	75 ± 14	5,400 ± 0	5,494 ± 15
Colusa Basin Drain	06/06/97	1/1	< 0.01 ± 0.00	1.9 ± 0.0	3.8 ± 0.0	5.7 ± 0.0	9 ± 1	34 ± 1	4,000 ± 0	4,043 ± 2

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Uranium µg/g (dry weight)				Vanadium µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum	Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	0.7 ± 0.0	0.4 ± 0.0	1.0 ± 0.1	2.1 ± 0.1	31 ± 1	12 ± 1	130 ± 0	173 ± 2
Sac. R.–Keswick	01/02/97	1/1	0.6 ± 0.1	0.4 ± 0.0	1.6 ± 0.1	2.6 ± 0.2	67 ± 3	10 ± 0	260 ± 0	337 ± 3
Sac. R.–Keswick	05/28/97	1/1	0.7 ± 0.0	0.4 ± 0.0	0.9 ± 0.1	2.0 ± 0.1	30 ± 2	10 ± 0	130 ± 0	170 ± 2
Sac. R.–Bend Br.	12/12/96	1/1	0.3 ± 0.0	0.2 ± 0.0	1.6 ± 0.0	2.1 ± 0.0	19 ± 2	6.3 ± 0.2	150 ± 0	175 ± 2
Sac. R.–Bend Br.	01/03/97	1/1	0.5 ± 0.0	0.3 ± 0.0	2.4 ± 0.1	3.2 ± 0.1	26 ± 2	8.0 ± 0.3	210 ± 0	244 ± 2
Sac. R.–Bend Br.	05/30/97	1/1	0.5 ± 0.0	0.3 ± 0.0	na	na	33 ± 2	11 ± 0	na	na
Sac. R.–Colusa	12/16/96	1/1	0.3 ± 0.0	0.2 ± 0.0	1.4 ± 0.0	1.9 ± 0.0	24 ± 2	8.2 ± 0.3	140 ± 0	172 ± 2
Sac. R.–Colusa	01/04/97	1/2	0.4 ± 0.0	0.2 ± 0.0	2.1 ± 0.1	2.7 ± 0.1	22 ± 1	4.9 ± 0.1	210 ± 0	237 ± 1
Sac. R.–Colusa	01/04/97	2/2	0.4 ± 0.0	0.3 ± 0.0	2.2 ± 0.0	2.9 ± 0.0	18 ± 2	8.4 ± 0.4	230 ± 0	256 ± 2
Sac. R.–Colusa	06/03/97	1/1	0.3 ± 0.0	0.4 ± 0.0	1.1 ± 0.0	1.8 ± 0.0	38 ± 2	5.2 ± 0.1	130 ± 0	173 ± 2
Sac. R.–Verona	06/04/97	1/1	0.4 ± 0.0	0.4 ± 0.0	1.1 ± 0.0	1.9 ± 0.0	26 ± 2	6.5 ± 0.6	110 ± 0	143 ± 3
Sac. R.–Freeport	12/17/96	1/1	0.6 ± 0.0	0.4 ± 0.0	1.8 ± 0.1	2.8 ± 0.1	33 ± 3	7.8 ± 0	180 ± 0	221 ± 3
Sac. R.–Freeport	01/06/97	1/1	1.5 ± 0.0	1.3 ± 0.1	2.8 ± 0.1	5.6 ± 0.2	21 ± 2	11 ± 0	150 ± 0	182 ± 2
Sac. R.–Freeport	06/05/97	1/1	0.5 ± 0.0	0.4 ± 0.0	1.0 ± 0.0	1.9 ± 0.0	26 ± 1	7.1 ± 0.2	110 ± 0	143 ± 1
Sac. R.–Freeport, dup	06/05/97	1/1	0.6 ± 0.3	0.5 ± 0.0	1.3 ± 0.1	2.4 ± 0.4	36 ± 4	5.7 ± 0.6	130 ± 0	172 ± 5
Spring Cr.–Road	01/02/97	1/1	0.1 ± 0.0	0.1 ± 0.0	0.4 ± 0.1	0.6 ± 0.1	42 ± 1	9.4 ± 1.3	87 ± 2	138 ± 4
Spring Cr.–Weir	05/28/97	1/1	0.3 ± 0.0	0.2 ± 0.1	< 0.5 ± 0.1	0.8 ± 0.4	49 ± 1	< 8 ± 1	< 20 ± 6	63 ± 15
Spring Creek Arm	05/28/97	1/1	0.7 ± 0.0	0.3 ± 0.1	0.7 ± 0.0	1.7 ± 0.1	26 ± 2	11 ± 0	130 ± 0	167 ± 2
Yolo Bypass	01/07/97	1/1	0.6 ± 0.0	0.3 ± 0.0	2.3 ± 0.0	3.2 ± 0.0	28 ± 2	9.2 ± 0.1	240 ± 0	277 ± 2
Colusa Basin Drain	06/06/97	1/1	0.1 ± 0.0	0.1 ± 0.0	1.4 ± 0.0	1.6 ± 0.0	17 ± 2	4.4 ± 0.1	150 ± 0	171 ± 2

Table A5-3. Concentrations of selected elements in sequentially extracted suspended colloid samples—*Continued*

Site	Date (mm/dd/yy)	Split Replicate	Zinc µg/g (dry weight)			
			Reducible	Oxidizable	Residual	Sum
Sac. R.–Shasta	05/29/97	1/1	160 ± 0	26 ± 3	100 ± 10	286 ± 13
Sac. R.–Keswick	01/02/97	1/1	750 ± 20	100 ± 10	230 ± 40	1080 ± 70
Sac. R.–Keswick	05/28/97	1/1	220 ± 0	28 ± 2	98 ± 6	346 ± 8
Sac. R.–Bend Br.	12/12/96	1/1	220 ± 0	33 ± 4	86 ± 10	339 ± 14
Sac. R.–Bend Br.	01/03/97	1/1	99 ± 3	28 ± 2	110 ± 0	237 ± 5
Sac. R.–Bend Br.	05/30/97	1/1	210 ± 0	40 ± 10	na	na
Sac. R.–Colusa	12/16/96	1/1	100 ± 5	25 ± 2	73 ± 6	198 ± 13
Sac. R.–Colusa	01/04/97	1/2	36 ± 1	18 ± 3	96 ± 2	150 ± 6
Sac. R.–Colusa	01/04/97	2/2	36 ± 1	19 ± 2	110 ± 0	165 ± 3
Sac. R.–Colusa	06/03/97	1/1	140 ± 10	19 ± 3	79 ± 30	238 ± 43
Sac. R.–Verona	06/04/97	1/1	70 ± 3	26 ± 4	63 ± 5	159 ± 12
Sac. R.–Freeport	12/17/96	1/1	76 ± 2	24 ± 3	84 ± 6	184 ± 11
Sac. R.–Freeport	01/06/97	1/1	22 ± 1	15 ± 2	86 ± 13	123 ± 16
Sac. R.–Freeport	06/05/97	1/1	77 ± 5	29 ± 5	110 ± 3	216 ± 13
Sac. R.–Freeport, dup	06/05/97	1/1	86 ± 5	20 ± 3	76 ± 5	182 ± 13
Spring Cr.–Road	01/02/97	1/1	< 9 ± 0	24 ± 10	65 ± 5	94 ± 20
Spring Cr.–Weir	05/28/97	1/1	< 30 ± 0	< 60 ± 9	21 ± 4	66 ± 49
Spring Creek Arm	05/28/97	1/1	200 ± 2	32 ± 1	76 ± 2	308 ± 5
Yolo Bypass	01/07/97	1/1	40 ± 2	21 ± 0	120 ± 10	181 ± 12
Colusa Basin Drain	06/06/97	1/1	26 ± 3	24 ± 4	88 ± 2	138 ± 9

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Appendix 6. Particulate Size Distribution in Colloid and Sediment Samples

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry.

Table A6-2. Particulate size distribution of streambed sediment samples.

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry

[All samples analyzed at 90° goniometer setting. Br., Bridge; Cr., Creek; d, diamenter; nm, nanometers; RMS, root mean squared; R., River; Sac., Sacramento. % <, percent less than]

Sac. R.–Shasta		Sac. R.–Keswick		Sac. R.–Bend Br.		Sac. R.–Colusa		Sac. R.–Verona		Spring Cr. Arm	
July 1996		July 1996		July 1996		July 1996		July 1996		July 1996	
Mean (nm)	323.	Mean (nm)	222.	Mean (nm)	462.	Mean (nm)	326.	Mean (nm)	671.	Mean (nm)	466.
Variance	2.326	Variance	3.03	Variance	6.115	Variance	4.696	Variance	5.893	Variance	1.67
Skew	4.106	Skew	4.178	Skew	5.07	Skew	5.239	Skew	4.439	Skew	6.817
RMS	0.005	RMS	0.00697	RMS	0.00566	RMS	0.00609	RMS	0.00713	RMS	0.00553
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
118	14	35	0	102	14	67	2	128	15	183	12
144	28	42	5	134	29	89	18	169	31	240	26
174	48	51	12	177	49	117	39	223	48	317	53
212	65	62	22	233	66	154	57	294	64	417	72
257	80	76	32	307	81	202	73	387	79	550	87
312	94	92	43	404	95	267	89	509	94	724	98
379	94	111	57	532	95	351	91	671	94	954	98
460	94	135	67	701	95	463	93	884	94	1,256	98
558	94	164	76	923	95	610	95	1,165	94	1,655	98
677	94	199	82	1,216	95	803	96	1,535	94	2,180	98
822	94	242	87	1,602	95	1,058	96	2,021	94	2,872	98
998	94	294	91	2,111	95	1,394	96	2,662	94	3,783	98
1,212	94	356	91	2,781	96	1,836	96	3,507	95	4,983	100
1,471	95	433	92	3,663	97	2,418	97	4,619	96		
1,786	97	525	92	4,825	98	3,186	99	6,085	98		
2,168	98	638	93	6,356	99	4,196	99	8,016	99		
2,632	99	774	94	8,373	100	5,528	100	10,559	100		
3,195	100	940	94			7,282	100	13,909	100		
		1,141	96								
		1,385	97								
		1,682	98								
		2,042	99								
		1,479	100								
		3,009	100								

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Sac. R.–Shasta		Sac. R.–Keswick		Sac. R.–Bend Br.		Sac. R.–Colusa		Sac. R.–Verona		Sac. R.–Freeport	
Sept. 1996		Sept. 1996		Sept. 1996		Sept. 1996		Sept. 1996		Sept. 1996	
Mean (nm)	186.	Mean (nm)	219	Mean (nm)	427.	Mean (nm)	316.	Mean (nm)	232.	Mean (nm)	407.
Variance	1.321	Variance	1.432	Variance	1.491	Variance	0.913	Variance	0.327	Variance	0.923
Skew	3.208	Skew	4.134	Skew	3.566	Skew	2.504	Skew	2.238	Skew	1.9
RMS	0.00659	RMS	0.00516	RMS	0.00372	RMS	0.00329	RMS	0.0062	RMS	4.33
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
68	10	92	14	144	0	138	13	147	12	101	1
78	20	110	30	173	2	159	26	160	29	116	4
89	31	130	44	207	24	183	40	174	49	132	9
101	42	155	58	248	46	211	54	190	66	150	17
116	54	185	73	297	67	243	70	206	78	171	26
132	66	220	88	356	89	280	86	224	85	195	37
150	74	262	91	427	90	323	88	249	85	222	50
171	80	312	93	511	91	372	89	276	85	253	60
195	84	372	94	612	92	428	89	305	85	289	68
222	87	443	94	733	92	494	89	337	85	329	74
253	90	527	94	878	92	569	89	373	86	375	78
289	90	627	94	1,052	92	655	89	413	87	428	79
329	90	747	95	1,260	93	843	90	456	91	488	79
375	91	889	96	1,510	94	948	93	505	94	556	79
428	91	1,059	97	1,808	96	1,067	95	558	96	633	80
488	92	1,261	98	2,166	98	1,201	98	617	98	722	82
556	93	1,501	99	2,595	99	1,351	99	683	99	823	85
634	94	1,788	100	3,108	100	1,520	100	755	100	938	88
722	96									1,069	92
823	97									1,219	95
939	98									1,389	97
1,070	99									1,584	99
1,219	100									1,805	100
1,390	100									2,058	100

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Spring Cr. Arm		Sac. R.–Shasta		Sac. R.–Keswick		Sac. R.–Bend Br.		Sac. R.–Colusa		Sac. R.–Verona	
Sept. 1996		Nov. 1996		Nov. 1996		Nov. 1996		Nov. 1996		Nov. 1996	
Mean (nm)	362.	Mean (nm)	741.	Mean (nm)	575.	Mean (nm)	357.	Mean (nm)	936.	Mean (nm)	366.
Variance	2.376	Variance	2.319	Variance	3.63	Variance	2.341	Variance	0.983	Variance	0.289
Skew	3.786	Skew	4.202	Skew	5.72	Skew	4.003	Skew	0.719	Skew	0.17
RMS	0.0104	RMS	0.0055	RMS	0.0108	RMS	0.00418	RMS	0.00419	RMS	0.0108
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
125	14	276	13	179	13	128	14	66	2	122	6
152	29	335	28	236	28	156	29	76	4	135	13
184	47	407	49	311	50	189	48	87	7	151	23
224	64	494	66	409	69	230	64	100	11	168	31
272	79	599	81	539	84	279	79	116	15	186	38
330	93	728	94	710	97	339	93	133	20	207	44
400	93	883	94	935	97	411	93	153	26	231	44
486	93	1,073	94	1,232	97	499	93	176	31	257	44
590	93	1,302	94	1,623	97	606	93	203	36	286	44
716	93	1,581	94	2,138	97	736	93	234	41	318	44
869	93	1,919	94	2,816	97	893	93	269	46	354	45
1,055	93	2,330	94	3,710	97	1,084	93	310	49	394	46
1,281	94	2,828	95	4,887	98	1,317	94	357	52	438	62
1,555	95	3,433	96	6,437	99	1,598	95	411	55	488	75
1,888	97	4,168	97	8,479	100	1,940	97	473	57	543	84
2,292	98	5,060	98			2,356	98	544	58	604	91
2,783	99	6,143	99			2,860	99	626	59	672	96
3,378	100	7,458	100			3,472	100	779	59	748	100
								905	59		
								1,051	59		
								1,221	63		
								1,418	69		
								1,647	75		
								1,913	84		
								2,221	91		
								2,580	96		
								2,996	100		

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Sac.. R.–Freeport		Sac. R.–Shasta		Sac. R.–Keswick		Sac. R.–Bend Br.		Sac. R.–Colusa		Sac. R.–Verona	
Nov. 1996		Dec. 1996		Dec. 1996		Dec. 1996		Dec. 1996		Dec. 1996	
Mean (nm)	1322.	Mean (nm)	723.	Mean (nm)	1027.	Mean (nm)	966.	Mean (nm)	743.	Mean (nm)	653.
Variance	1.922	Variance	1.851	Variance	2.361	Variance	0.707	Variance	2.379	Variance	1.843
Skew	2.311	Skew	3.954	Skew	3.884	Skew	1.182	Skew	3.715	Skew	3.953
RMS	0.00021	RMS	0.00807	RMS	0.0083	RMS	0.00737	RMS	0.00754	RMS	0.00757
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
206	4	291	13	361	14	240	15	252	15	262	15
245	10	349	27	438	29	291	30	306	30	313	31
292	17	418	48	532	47	353	47	372	47	375	47
347	26	501	66	646	64	429	63	451	62	450	63
414	36	600	80	784	79	521	78	548	77	539	78
492	49	719	93	952	93	632	93	665	92	645	94
586	59	861	93	1,156	93	767	93	808	92	773	94
698	67	1,032	93	1,403	93	931	93	981	92	926	94
831	73	1,236	93	1,704	93	1,131	93	1,190	92	1,109	94
990	78	1,480	93	2,068	93	1,373	93	1,445	92	1,329	94
1,178	81	1,773	93	2,511	93	1,667	93	1,754	92	1,591	94
1,403	81	2,124	93	3,048	93	2,023	93	2,130	92	1,906	94
1,671	81	2,544	94	3,701	94	2,456	94	2,586	93	2,284	95
1,989	82	3,048	95	4,493	95	2,982	95	3,139	95	2,735	95
2,369	83	3,651	97	5,454	96	3,620	97	3,811	96	3,277	97
2,820	85	4,373	98	6,621	98	4,395	98	4,626	98	3,925	98
3,358	87	5,238	99	8,039	99	5,335	99	5,616	99	4,702	99
3,998	91	6,275	100	9,759	100	6,477	100	6,818	100	5,632	100
4,761	94										
5,669	96										
6,750	98										
8,037	99										
9,569	100										

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Sac. R.–Freeport		Spring Cr.–Weir		Spring Cr. arm		Sac. R.–Keswick		Sac. R.–Bend Br.		Sac. R.–Colusa	
Dec. 1996		Dec. 1996		Dec. 1996		Jan. 1997		Jan. 1997		Jan. 1997	
Mean (nm)	437.	Mean (nm)	965.	Mean (nm)	605.	Mean (nm)	781.	Mean (nm)	590.	Mean (nm)	1190.
Variance	0.38	Variance	2.341	Variance	2.359	Variance	3.475	Variance	0.543	Variance	0.744
Skew	0.585	Skew	3.974	Skew	3.42	Skew	5.085	Skew	1.146	Skew	2.901
RMS	0.00218	RMS	0.00412	RMS	0.0157	RMS	0.00393	RMS	0.0019	RMS	0.0022
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
160	7	344	15	197	12	142	1	187	4	569	10
177	18	418	30	240	25	187	4	208	9	651	22
196	30	507	47	291	48	246	25	231	16	744	35
217	40	615	63	353	66	324	45	256	25	851	51
240	48	747	78	429	79	426	62	284	34	973	68
266	52	907	93	521	91	562	79	316	45	1,113	88
300	52	1,101	93	632	91	740	84	351	53	1,273	90
339	52	1,337	93	767	91	975	88	389	58	1,456	90
392	53	1,623	93	931	91	1,284	92	432	62	1,665	90
437	55	1,970	93	1,131	91	1,691	94	480	64	1,905	90
488	59	2,392	93	1,373	91	2,228	96	533	65	2,178	90
544	65	2,904	93	1,666	91	2,935	96	592	65	2,491	90
607	72	3,525	94	2,023	92	3,866	96	657	66	2,849	92
678	80	4,279	95	2,456	94	5,093	97	730	69	3,259	93
756	88	5,195	97	2,982	96	6,709	98	811	72	3,727	95
844	94	6,307	98	3,620	97	8,838	99	900	77	4,262	97
941	98	9,657	99	4,394	99	11,642	100	999	81	4,875	98
1,051	100	9,295	100	5,335	100			1,110	86	5,575	100
								1,232	91		
								1,368	95		
								1,519	97		
								1,687	99		
								1,873	100		
								2,080	100		

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Sac. R.–Freeport		Spring Cr.–Road		Yolo Bypass		Sac. R.–Verona		Sac. R.–Shasta		Sac. R.–Keswick	
Jan. 1997		Jan. 1997		Jan. 1997		June 1997		May 1997		May 1997	
Mean (nm)	509.	Mean (nm)	749.	Mean (nm)	573.	Mean (nm)	388.	Mean (nm)	281.	Mean (nm)	389.
Variance	1.188	Variance	0.567	Variance	0.634	Variance	1.834	Variance	1.544	Variance	0.452
Skew	2.537	Skew	1.065	Skew	4.874	Skew	3.992	Skew	4.373	Skew	3.318
RMS	0.01	RMS	0.00061	RMS	0.00342	RMS	0.0113	RMS	0.0028	RMS	0.00288
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
152	5	175	1	129	2	156	15	114	1	222	11
174	12	196	2	170	17	187	30	136	18	250	23
200	21	220	5	224	39	224	47	163	39	281	37
230	31	248	10	296	57	269	63	195	58	317	53
264	42	278	16	389	74	322	79	234	77	357	71
302	55	312	25	513	89	386	93	280	94	402	92
347	65	351	35	676	91	462	93	336	94	452	93
398	73	394	44	890	93	554	93	402	94	510	93
457	79	443	53	1,172	95	663	93	482	94	574	93
525	83	498	60	1,544	96	765	93	577	94	647	93
602	85	559	64	2,034	96	952	93	692	94	728	93
691	86	628	65	2,680	96	1,140	93	828	94	820	93
793	86	705	65	3,530	97	1,366	94	992	95	924	94
911	86	792	66	4,650	98	1,636	95	1,189	96	1,041	95
1,045	87	890	68	6,126	99	1,960	97	1,424	97	1,172	96
1,200	89	1,000	70	8,069	100	2,347	98	1,706	98	1,320	98
1,377	91	1,123	74			2,812	99	2,043	99	1,487	99
1,580	93	1,262	81			3,368	100	2,448	100	1,675	100
1,814	96	1,418	87								
2,082	97	1,593	92								
2,339	99	1,789	95								
2,742	99	2,010	98								
3,147	100	2,258	100								
		2,537	100								

Table A6-1. Particulate size distribution of Sacramento River colloid samples as determined by photon correlation spectrometry —*Continued*

Sac. R.–Bend Br.		Sac. R.–Colusa		Sac. R.–Freeport		Spring Cr.–Weir		Spring Cr. arm		Colusa Basin Drain	
May 1997		May 1997		May 1997		May 1997		May 1997		May 1997	
Mean (nm)	262.	Mean (nm)	271.	Mean (nm)	432.	Mean (nm)	600.	Mean (nm)	290.	Mean (nm)	668.
Variance	0.717	Variance	1.881	Variance	0.213	Variance	3.191	Variance	1.552	Variance	0.723
Skew	1.491	Skew	3.746	Skew	–0.016	Skew	3.505	Skew	3.355	Skew	2.833
RMS	0.00365	RMS	0.00275	RMS	0.00332	RMS	0.0029	RMS	0.0074	RMS	0.00196
d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d	d(nm)	% < d
62	0	105	14	137	4	105	7	95	1	327	11
71	3	126	30	150	10	128	16	114	2	372	23
81	7	151	47	166	17	155	27	136	24	424	37
92	14	181	63	183	22	188	38	163	46	484	52
105	23	217	78	201	27	228	50	195	68	551	70
120	35	260	93	222	29	277	63	234	89	628	89
136	46	311	93	249	29	337	72	280	91	716	90
156	55	372	93	282	30	409	79	336	91	817	90
177	62	446	93	314	32	496	84	402	91	931	90
202	67	534	93	349	35	602	87	482	91	1,061	90
230	70	640	93	388	41	731	89	577	91	1,209	90
263	70	767	93	431	50	887	89	692	91	1,378	90
299	72	918	94	479	60	1,077	89	828	92	1,571	91
341	74	1,100	95	533	71	1,308	89	992	94	1,791	93
389	77	1,318	96	592	82	1,588	90	1,189	96	2,041	95
443	81	1,579	98	658	90	1,928	91	1,424	97	2,327	96
505	85	1,891	99	732	96	2,340	93	1,706	99	2,652	98
576	90	2,265	100	813	100	2,841	95	2,043	100	3,023	100
656	94					3,449	97				
748	97					4,187	98				
853	99					5,083	99				
972	100					6,171	100				
1,108	100					7,492	100				

Table A6-2. Particulate size distribution of streambed sediment samples

[Numbers denote percent finer than size indicated; Br., Bridge; R., River; Sac., Sacramento; mm, millimeter; mm/dd/yy, month/day/year]

Particulate Size	Site								
	Sac. R.–Rodeo Park	Sac. R.–Chum Creek	Sac. R.–Balls Ferry	Sac. R.–Bend Br.	Sac. R.–Tehama	Sac. R.–Colusa	Sac. R.–Verona	Sac. R.–Freeport	Cottonwood Creek
	Date Sampled (mm/dd/yy)								
	10/23/96	10/22/96	10/22/96	10/22/96	10/23/96	11/14/96	11/13/96	11/15/96	10/23/96
16.0 mm	100	100	100	90	100	100	100	100	100
8.0 mm	100	94	98	60	100	100	100	100	98
4.0 mm	99	92	91	47	100	100	100	100	96
2.0 mm	97	90	85	37	99	100	100	100	94
1.0 mm	94	89	80	35	97	100	100	100	92
0.5 mm	91	87	74	33	96	100	99	99	89
0.25 mm	75	70	52	22	91	99	93	91	74
0.125 mm	35	25	12	8	74	74	43	71	46
0.062 mm	10	6	3	3	44	36	11	31	35
0.031 mm	7	4	2	2	31	23	7	19	32
0.016 mm	4	3	2	1	18	14	5	12	23
0.008 mm	3	2	1	1	13	9	4	9	15
0.004 mm	2	2	1	1	9	7	2	7	10
0.002 mm	2	1	1	1	7	5	2	5	8
0.001 mm	1	1	0	0	5	3	1	4	6
0.005 mm	1	1	0	0	4	2	0	2	4
0.00025 mm	0	0	0	0	2	0	0	1	2

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Appendix 7. Trace-Element Data in Caddisfly Larvae

Table A7-1. Dry tissue weight and metal concentration data for caddisfly larvae.

Table A7-2. Dry tissue weight and metal concentration data for standard reference materials processed concurrently with caddisfly samples.

Table A7-3. Metal mass balance of body fractions prepared from caddisfly samples collected from the Sacramento River and Cottonwood Creek.

Table A7-1. Dry tissue weight and metal concentration data for caddisfly larvae

[Br., bridge; c, cytosol sample; Cr., creek; p, pellet sample; wb, whole body sample; s, spiked sample; R., River. Sac., Sacramento. Results given are the dry weight of tissue and raw concentrations of the tissue digest. Conversion to metal concentrations in the original tissue requires application of conversion factors (not given) that account for dilutions during sample preparation. Cytosolic and pellet concentrations were obtained from the same 7 millliliter subsample of the whole tissue homogenate, whereas the subsample for the whole body samples was usally 4–5 millliliters. µg, microgram; g, gram]

Station	Sample	Dry weight (g)	Aluminum (µg/sample)	Cadmium (µg/sample)	Copper (µg/sample)	Iron (µg/sample)	Lead (µg/sample)	Zinc (µg/sample)
Sac R.–Rodeo	SRRH1wb	0.1365	163 ± 7	0.28 ± 0.01	4.7 ± 0.1	177 ± 0	0.17 ± 0.00	22 ± 0
	SRRH2wb	0.1371	169 ± 9	0.30 ± 0.01	5.6 ± 0.1	219 ± 0	0.17 ± 0.00	23 ± 0
	SRRH3wb	0.1285	166 ± 8	0.29 ± 0.00	4.8 ± 0.0	193 ± 0	0.17 ± 0.00	23 ± 0
	SRRH4wb	0.1431	145 ± 1	0.30 ± 0.00	4.8 ± 0.0	186 ± 0	0.17 ± 0.01	27 ± 4
	SRRH1c	0.0500	1.2 ± 0.2	0.18 ± 0.01	2.8 ± 0.0	6 ± 1	0.033 ± 0.002	11 ± 0
	SRRH2c	0.0502	1.5 ± 0.2	0.16 ± 0.00	2.7 ± 0.0	6 ± 1	0.038 ± 0.002	11 ± 0
	SRRH3c	0.0484	1.2 ± 0.2	0.17 ± 0.00	2.8 ± 0.0	6 ± 0	0.030 ± 0.002	11 ± 0
	SRRH4c	0.0470	1.5 ± 0.2	0.16 ± 0.00	2.6 ± 0.0	3 ± 0	0.025 ± 0.000	11 ± 1
	SRRH1p	0.1030	151 ± 13	0.13 ± 0.00	1.6 ± 0.0	175 ± 10	0.11 ± 0.00	13 ± 2
	SRRH2p	0.1168	206 ± 25	0.20 ± 0.00	3.7 ± 0.1	304 ± 0	0.21 ± 0.01	18 ± 1
	SRRH3p	0.1145	182 ± 16	0.20 ± 0.00	3.3 ± 0.3	286 ± 11	0.27 ± 0.00	18 ± 1
	SRRH4p	0.1283	172 ± 7	0.19 ± 0.00	3.5 ± 0.3	244 ± 0	0.19 ± 0.01	18 ± 1
Sac R.–Churn Cr.	SRAH1wb	0.1081	149 ± 14	0.10 ± 0.00	4.2 ± 0.0	227 ± 0	0.13 ± 0.01	17 ± 0
	SRAH2wb	0.1108	141 ± 15	0.11 ± 0.00	4.0 ± 0.0	222 ± 0	0.14 ± 0.00	18 ± 0
	SRAH3wb	0.1086	147 ± 5	0.11 ± 0.00	4.0 ± 0.1	228 ± 0	0.14 ± 0.00	18 ± 1
	SRAH4wb	0.1090	154 ± 0	0.10 ± 0.00	4.3 ± 0.1	229 ± 0	0.14 ± 0.00	17 ± 1
	SRAH1wb/s	0.1070	166 ± 5	0.50 ± 0.00	14 ± 0	225 ± 0	1.0 ± 0.0	27 ± 2
	SRAH1c	0.0383	0.88 ± 0.46	0.064 ± 0.005	2.3 ± 0.0	7 ± 1	0.018 ± 0.002	11 ± 0
	SRAH2c	0.0380	0.96 ± 0.49	0.062 ± 0.001	2.4 ± 0.0	5 ± 3	0.019 ± 0.001	11 ± 0
	SRAH3c	0.0372	0.97 ± 0.08	0.059 ± 0.001	2.1 ± 0.0	7 ± 1	0.015 ± 0.002	9.9 ± 0.5
	SRAH4c	0.0378	0.87 ± 0.11	0.055 ± 0.003	2.3 ± 0.0	6 ± 2	0.015 ± 0.001	10 ± 0
	SRAH1p	0.1024	235 ± 2	0.059 ± 0.001	2.7 ± 0.0	287 ± 20	0.16 ± 0.00	15 ± 0
	SRAH2p	0.1076	219 ± 1	0.067 ± 0.003	3.1 ± 0.0	312 ± 0	0.16 ± 0.00	16 ± 0
	SRAH3p	0.1033	207 ± 6	0.063 ± 0.001	2.9 ± 0.0	310 ± 0	0.18 ± 0.00	16 ± 0
	SRAH4p	0.1041	210 ± 2	0.060 ± 0.002	2.6 ± 0.1	312 ± 0	0.16 ± 0.00	15 ± 0

Table A7-1. Dry tissue weight and metal concentration data for caddisfly larvae—*Continued*

Station	Sample	Dry weight (g)	Aluminum (µg/sample)	Cadmium (µg/sample)	Copper (µg/sample)	Iron (µg/sample)	Lead (µg/sample)	Zinc (µg/sample)
Sac R.– Balls Ferry	SRBFH1wb	0.1741	223 ± 6	0.16 ± 0.00	3.9 ± 0.0	209 ± 17	0.18 ± 0.00	30 ± 1
	SRBFH2wb	0.1694	218 ± 7	0.13 ± 0.00	4.3 ± 0.1	237 ± 0	0.16 ± 0.00	28 ± 1
	SRBFH3wb	0.1762	218 ± 16	0.13 ± 0.00	4.5 ± 0.0	136 ± 4	0.15 ± 0.00	31 ± 0
	SRBFH4wb	0.1926	243 ± 7	0.14 ± 0.00	4.7 ± 0.0	270 ± 0	0.15 ± 0.00	32 ± 0
	SRBFH5wb	0.1614	216 ± 2	0.11 ± 0.00	4.0 ± 0.0	274 ± 16	0.14 ± 0.00	27 ± 1
	SRBFH6wb	0.1466	192 ± 3	0.11 ± 0.00	3.8 ± 0.0	220 ± 15	0.15 ± 0.01	25 ± 0
	SRBFH1c	0.0335	0.99 ± 0.10	0.069 ± 0.004	1.2 ± 0.0	6 ± 0	0.024 ± 0.002	7.8 ± 0.4
	SRBFH2c	0.0414	1.1 ± 0.1	0.051 ± 0.002	1.5 ± 0.0	7 ± 3	0.019 ± 0.001	10 ± 0
	SRBFH3c	0.0330	1.2 ± 0.3	0.039 ± 0.000	1.2 ± 0.0	6 ± 0	0.015 ± 0.002	8.1 ± 0.0
	SRBFH4c	0.0322	0.99 ± 0.24	0.040 ± 0.002	1.2 ± 0.0	5 ± 0	0.013 ± 0.003	8.1 ± 0.3
	SRBFH5c	0.0379	0.91 ± 0.13	0.042 ± 0.004	1.4 ± 0.0	7 ± 0	0.016 ± 0.001	9.9 ± 0.8
	SRBFH6c	0.0380	0.98 ± 0.24	0.051 ± 0.004	1.5 ± 0.0	6 ± 0	0.015 ± 0.001	10 ± 0
	SRBFH1p	0.0992	192 ± 3	0.061 ± 0.003	1.8 ± 0.0	248 ± 10	0.19 ± 0.00	16 ± 0
	SRBFH2p	0.0948	188 ± 2	0.045 ± 0.002	1.7 ± 0.0	237 ± 0	0.12 ± 0.00	13 ± 1
	SRBFH3p	0.1009	171 ± 4	0.049 ± 0.002	1.7 ± 0.1	232 ± 0	0.12 ± 0.00	13 ± 0
	SRBFH4p	0.1004	191 ± 1	0.047 ± 0.001	1.8 ± 0.0	211 ± 10	0.11 ± 0.00	13 ± 1
	SRBFH5p	0.0970	188 ± 8	0.043 ± 0.001	1.8 ± 0.1	194 ± 58	0.12 ± 0.00	12 ± 0
	SRBFH6p	0.1043	187 ± 3	0.049 ± 0.005	1.9 ± 0.0	177 ± 94	0.12 ± 0.00	13 ± 0
Sac R.– Bend Br.	SRBH1wb	0.1047	206 ± 3	0.12 ± 0.00	3.3 ± 0.0	251 ± 10	0.12 ± 0.01	22 ± 0
	SRBH2wb	0.1042	202 ± 2	0.13 ± 0.00	3.4 ± 0.1	240 ± 0	0.11 ± 0.00	21 ± 1
	SRBH3wb	0.1069	203 ± 2	0.11 ± 0.00	2.9 ± 0.0	118 ± 21	0.11 ± 0.00	22 ± 0
	SRBH4wb	0.1118	221 ± 7	0.13 ± 0.00	3.6 ± 0.1	235 ± 22	0.12 ± 0.00	24 ± 0
	SRBH1wb/s	0.1064	212 ± 0	0.51 ± 0.02	12 ± 0	245 ± 11	1.1 ± 0.0	30 ± 1
	SRBH2wb/s	0.1026	197 ± 5	0.51 ± 0.00	11 ± 0	226 ± 10	1.0 ± 0.0	30 ± 2
	SRBH1c	0.0330	0.47 ± 0.15	0.066 ± 0.002	1.5 ± 0.0	7 ± 0	0.015 ± 0.001	9.2 ± 0.2
	SRBH2c	0.0310	0.42 ± 0.06	0.062 ± 0.003	1.5 ± 0.0	7 ± 0	0.012 ± 0.001	8.8 ± 0.2
	SRBH3c	0.0248	0.42 ± 0.16	0.044 ± 0.002	1.0 ± 0.0	5 ± 0	0.007 ± 0.000	6.7 ± 0.1
	SRBH4c	0.0323	0.49 ± 0.15	0.062 ± 0.004	1.4 ± 0.0	6 ± 0	0.025 ± 0.003	9.0 ± 0.1
	SRBH1c/s	0.0331	1.1 ± 0.2	0.26 ± 0.00	3.4 ± 0.1	4 ± 1	0.21 ± 0.00	11 ± 0
	SRBH2c/s	0.0320	1.5 ± 0.0	0.27 ± 0.00	3.3 ± 0.1	7 ± 0	0.20 ± 0.00	11 ± 0
	SRBH1p	0.1077	235 ± 11	0.069 ± 0.002	2.1 ± 0.0	215 ± 43	0.14 ± 0.00	15 ± 0
	SRBH2p	0.0975	269 ± 1	0.078 ± 0.004	2.4 ± 0.0	341 ± 0	0.15 ± 0.00	16 ± 0
	SRBH3p	0.1010	273 ± 9	0.076 ± 0.001	2.5 ± 0.0	273 ± 91	0.16 ± 0.00	16 ± 0
	SRBH4p	0.1102	253 ± 14	0.087 ± 0.002	2.7 ± 0.0	298 ± 33	0.16 ± 0.01	18 ± 0
	SRBH1p/s	0.1012	275 ± 2	0.46 ± 0.00	12 ± 0	283 ± 111	1.1 ± 0.1	26 ± 0
	SRBH2p/s	0.0983	255 ± 16	0.46 ± 0.01	12 ± 0	334 ± 0	1.1 ± 0.0	25 ± 0

Table A7-1. Dry tissue weight and metal concentration data for caddisfly larvae—*Continued*

Station	Sample	Dry weight (g)	Aluminum (µg/sample)	Cadmium (µg/sample)	Copper (µg/sample)	Iron (µg/sample)	Lead (µg/sample)	Zinc (µg/sample)
Sac R.–Tehama	SRTH1wb	0.1124	250 ± 3	0.073 ± 0.001	2.9 ± 0.0	315 ± 11	0.15 ± 0.00	18 ± 0
	SRTH2wb	0.1095	235 ± 3	0.072 ± 0.000	3.0 ± 0.0	329 ± 22	0.14 ± 0.00	17 ± 0
	SRTH3wb	0.1021	222 ± 2	0.070 ± 0.002	2.6 ± 0.0	306 ± 20	0.12 ± 0.00	17 ± 0
	SRTH4wb	0.1099	216 ± 4	0.074 ± 0.000	2.7 ± 0.0	286 ± 11	0.13 ± 0.00	18 ± 0
	SRTH1wb/s	0.1130	264 ± 7	0.46 ± 0.01	12 ± 0	305 ± 23	1.0 ± 0.0	27 ± 0
	SRTH2wb/s	0.1119	230 ± 2	0.47 ± 0.00	12 ± 0	325 ± 11	1.0 ± 0.0	27 ± 0
	SRTH3wb/s	0.1091	215 ± 2	0.47 ± 0.01	12 ± 0	284 ± 11	1.1 ± 0.0	27 ± 1
	SRTH4wb/s	0.1115	225 ± 0	0.47 ± 0.01	12 ± 0	256 ± 11	1.0 ± 0.0	27 ± 0
	SRTH1c	0.0386	0.73 ± 0.07	0.043 ± 0.001	1.4 ± 0.0	7 ± 2	0.021 ± 0.003	8.7 ± 0.0
	SRTH2c	0.0381	0.52 ± 0.13	0.039 ± 0.001	1.4 ± 0.0	6 ± 0	0.016 ± 0.002	8.7 ± 0.4
	SRTH3c	0.0376	0.63 ± 0.09	0.038 ± 0.002	1.3 ± 0.0	6 ± 1	0.018 ± 0.001	8.9 ± 0.5
	SRTH4c	0.0338	0.67 ± 0.07	0.037 ± 0.002	1.2 ± 0.0	5 ± 1	0.012 ± 0.003	8.5 ± 0.4
	SRTH1p	0.1297	338 ± 6	0.059 ± 0.002	2.7 ± 0.0	571 ± 26	0.21 ± 0.01	18 ± 0
	SRTH2p	0.1349	329 ± 7	0.064 ± 0.001	2.8 ± 0.0	540 ± 0	0.21 ± 0.01	19 ± 0
	SRTH3p	0.1207	325 ± 1	0.051 ± 0.002	2.6 ± 0.1	519 ± 0	0.19 ± 0.00	17 ± 0
	SRTH4p	0.1280	311 ± 1	0.056 ± 0.002	2.6 ± 0.0	461 ± 13	0.19 ± 0.00	18 ± 1
Cottonwood Cr.	SRCCH1wb	0.1149	162 ± 8	0.006 ± 0.001	1.6 ± 0.0	184 ± 34	0.064 ± 0.001	12 ± 1
	SRCCH2wb	0.1141	145 ± 1	0.009 ± 0.001	1.7 ± 0.0	217 ± 34	0.068 ± 0.002	13 ± 1
	SRCCH3wb	0.1102	152 ± 2	0.009 ± 0.001	1.6 ± 0.0	231 ± 11	0.068 ± 0.002	13 ± 0
	SRCCH4wb	0.1089	174 ± 3	0.004 ± 0.002	1.6 ± 0.0	218 ± 11	0.072 ± 0.002	12 ± 0
	SRCCH5wb	0.1163	137 ± 0	0.007 ± 0.003	1.7 ± 0.0	198 ± 12	0.061 ± 0.002	14 ± 0
	SRCCH1wb/s	0.1073	155 ± 0	0.41 ± 0.00	11 ± 0	193 ± 11	0.93 ± 0.03	21 ± 1
	SRCCH2wb/s	0.1136	139 ± 0	0.39 ± 0.00	10 ± 0	227 ± 23	0.99 ± 0.01	22 ± 0
	SRCCH1c	0.0395	0.39 ± 0.10	0.008 ± 0.001	0.83 ± 0.02	8 ± 1	0.007 ± 0.001	7.5 ± 0.2
	SRCCH2c	0.0406	0.30 ± 0.06	0.009 ± 0.001	0.82 ± 0.02	9 ± 0	0.004 ± 0.002	6.8 ± 0.3
	SRCCH3c	0.0403	0.38 ± 0.09	0.007 ± 0.001	0.78 ± 0.02	8 ± 0	0.007 ± 0.001	6.7 ± 0.3
	SRCCH4c	0.0380	0.33 ± 0.10	0.007 ± 0.002	0.71 ± 0.01	8 ± 1	0.005 ± 0.002	6.1 ± 0.2
	SRCCH5c	0.0391	0.42 ± 0.08	0.007 ± 0.001	0.74 ± 0.02	6 ± 0	< 0.003 ± 0.001	6.2 ± 0.1
	SRCCH1p	0.1058	165 ± 0	< 0.003 ± 0.002	1.1 ± 0.0	296 ± 0	0.083 ± 0.001	8.2 ± 0.2
	SRCCH2p	0.1073	180 ± 1	0.002 ± 0.002	1.3 ± 0.0	311 ± 0	0.081 ± 0.001	9.7 ± 0.5
	SRCCH3p	0.1058	181 ± 4	< 0.003 ± 0.001	1.2 ± 0.0	307 ± 0	0.083 ± 0.003	8.5 ± 0.0
	SRCCH4p	0.1059	197 ± 1	< 0.003 ± 0.001	1.3 ± 0.1	275 ± 42	0.082 ± 0.001	9.4 ± 0.0
	SRCCH5p	0.1105	168 ± 7	< 0.003 ± 0.001	1.3 ± 0.1	298 ± 0	0.078 ± 0.001	10 ± 1

Table A7-2. Dry tissue weight and metal concentration data for standard reference materials processed concurrently with caddisfly samples

[NIST, National Institute of Standards and Technology; SRM, Standard Reference Material. Results given are the dry weight of tissue and raw concentrations of the tissue digest. Conversion to metal concentrations in the original tissue requires application of conversion factors (not given) that account for dilutions during sample preparation. Certified concentration values reported by the NIST for SRM 1566a–Oyster tissue and SRM 50–Albacore tuna are presented in Table 22. g, gram; µg, microgram]

Standard	Dry weight (g)	Aluminum (µg/sample)	Cadmium (µg/sample)	Copper (µg/sample)	Iron (µg/sample)	Lead (µg/sample)	Zinc (µg/sample)
NIST SRM 1566A-1	0.3941	53 ± 1	1.7 ± 0.0	25 ± 0	205 ± 4	0.18 ± 0.01	335 ± 0
NIST SRM 1566A-2	0.4010	50 ± 2	1.7 ± 0.0	24 ± 0	205 ± 20	0.13 ± 0.01	321 ± 20
NIST SRM 1566A-3	0.4133	59 ± 0	1.8 ± 0.0	27 ± 0	227 ± 4	0.14 ± 0.00	335 ± 4
NIST SRM 1566A-4	0.4342	61 ± 1	1.9 ± 0.0	25 ± 0	221 ± 13	0.16 ± 0.00	365 ± 17
NIST SRM 1566A-5	0.4125	57 ± 1	1.9 ± 0.0	26 ± 0	206 ± 8	0.14 ± 0.01	338 ± 4
NIST SRM 50-1	0.3540	2.7 ± 0.1	0.026 ± 0.003	1.1 ± 0.0	19 ± 1	0.21 ± 0.00	4.9 ± 0.4
NIST SRM 50-2	0.4242	3.0 ± 0.0	0.018 ± 0.001	1.3 ± 0.0	22 ± 1	0.29 ± 0.00	6.1 ± 0.1
NIST SRM 50-3	0.3798	2.7 ± 0.1	0.017 ± 0.001	1.2 ± 0.0	20 ± 0	0.21 ± 0.00	5.5 ± 0.1
NIST SRM 50-4	0.4340	2.2 ± 0.2	0.021 ± 0.001	1.2 ± 0.0	22 ± 0	0.17 ± 0.00	5.7 ± 0.3
NIST SRM 50-5	0.4430	2.0 ± 0.1	0.043 ± 0.001	1.4 ± 0.0	24 ± 1	0.17 ± 0.00	5.8 ± 0.5

Table A7-3. Metal mass balance of body fractions prepared from caddisfly samples collected from the Sacramento River and Cottonwood Creek

[Results reported as percentage recovery from cytosol and pellet relative to concentration in whole body, for example, $100 \times (M_c + M_p)/ M_{wb}$, where (M) is the metal concentration, subscript c is the cytosol fraction, subscript p is the pellet fraction, and subscript wb is the whole body; na, not analyzed; Br., Bridge; Cr., creek, R., River; Sac., Sacramento]

Station	Sample	Aluminum	Cadmium	Copper	Iron	Lead	Zinc
Sac R.–Rodeo	SRRH1	67	97	84	74	66	92
	SRRH2	88	101	95	102	111	104
	SRRH3	79	108	107	109	131	104
	SRRH4	86	99	106	95	95	88
Sac R.–Churn Cr.	SRAH1	113	106	101	93	102	128
	SRAH2	112	100	115	103	95	125
	SRHA3	101	95	104	100	103	118
	SRHA4	98	98	97	100	92	122
Sac R.–Balls Ferry	SRBFH1	99	130	114	141	147	113
	SRBFH2	99	102	101	119	105	110
	SRBFH3	91	103	97	204	111	100
	SRBFH4	102	107	107	105	114	109
	SRBFH5	100	106	107	85	116	109
	SRBFH6	98	109	105	84	94	108
Sac R.–Bend Br.	SRBH1	82	110	102	65	99	101
	SRBH2	95	102	106	105	111	107
	SRBH3	96	116	119	172	115	103
	SRBH4	82	107	102	94	121	100
Sac R.–Tehama	SRTH1	78	105	101	106	94	105
	SRTH2	80	105	100	96	97	115
	SRTH3	84	96	107	99	105	109
	SRTH4	83	93	99	94	93	104
Cottonwood Cr.	SRCCH1	73	na	101	119	104	111
	SRCCH2	89	116	103	107	91	106
	SRCCH3	85	na	102	98	97	98
	SRCCH4	81	na	102	94	88	107
	SRCCH5	88	na	98	111	na	95
Statistical results:							
Median		88	105	102	100	102	107
Average		90	105	103	106	104	107
Standard Deviation		11	8	7	28	16	9

Appendix 8. Plots of Dissolved and Colloidal Metal Concentrations

Figure A8-1. Plots of calcium (Ca) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-2. Plots of cerium (Ce) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-3. Plots of cobalt (Co) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-4. Plots of chromium (Cr) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-5. Plots of gadolinium (Gd) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-6. Plots of potassium (K) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-7. Plots of manganese (Mn) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-8. Plots of nickel (Ni) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-9. Plots of antimony (Sb) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A*. Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-10. Plots of uranium (U) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-11. Plots of vanadium (V) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-12. Plots of yttrium (Y) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-13. Plots of ytterbium (Yb) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

Figure A8-14. Plots of zirconium (Zr) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

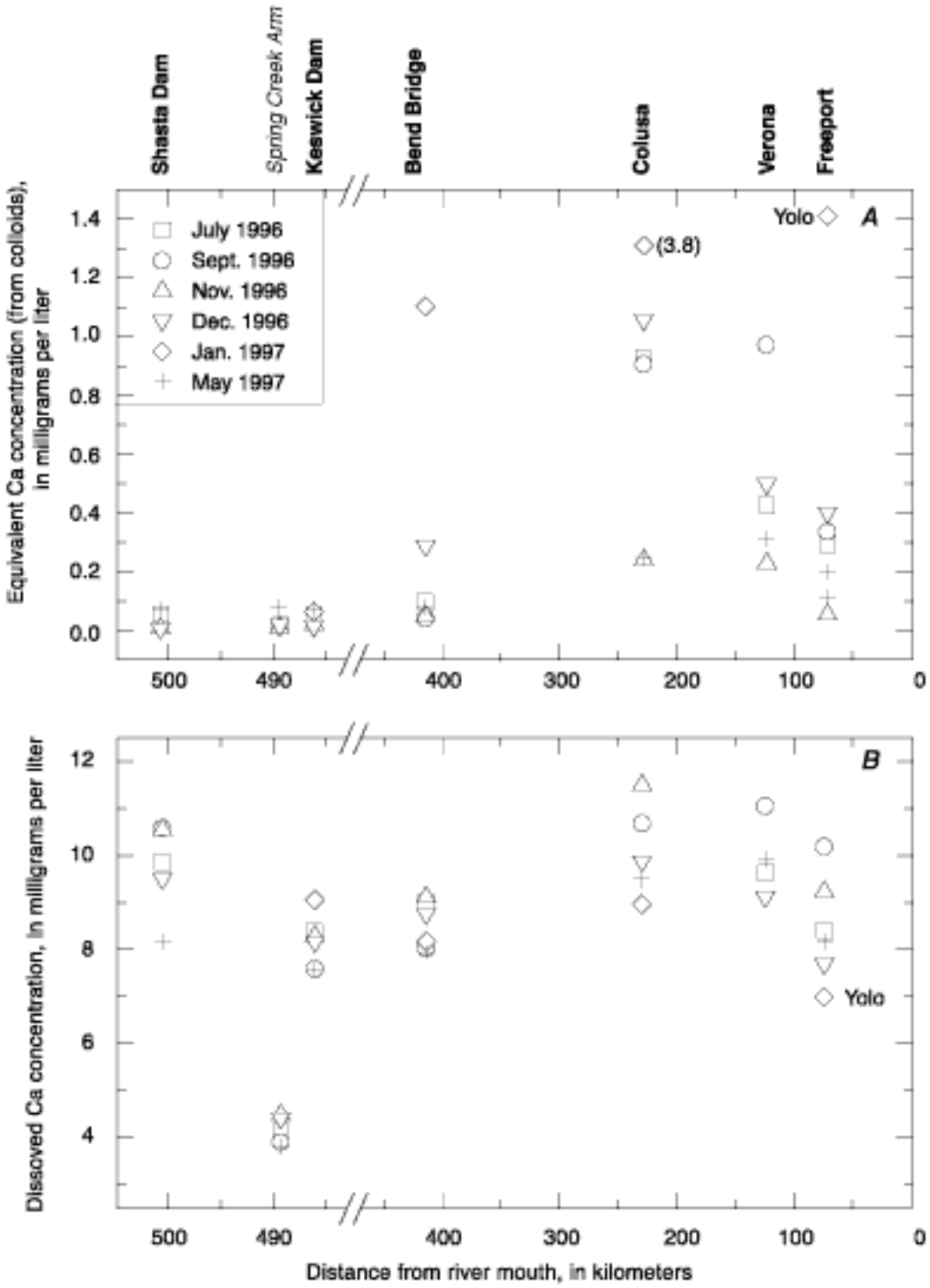

Figure A8-1. Plots of calcium (Ca) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

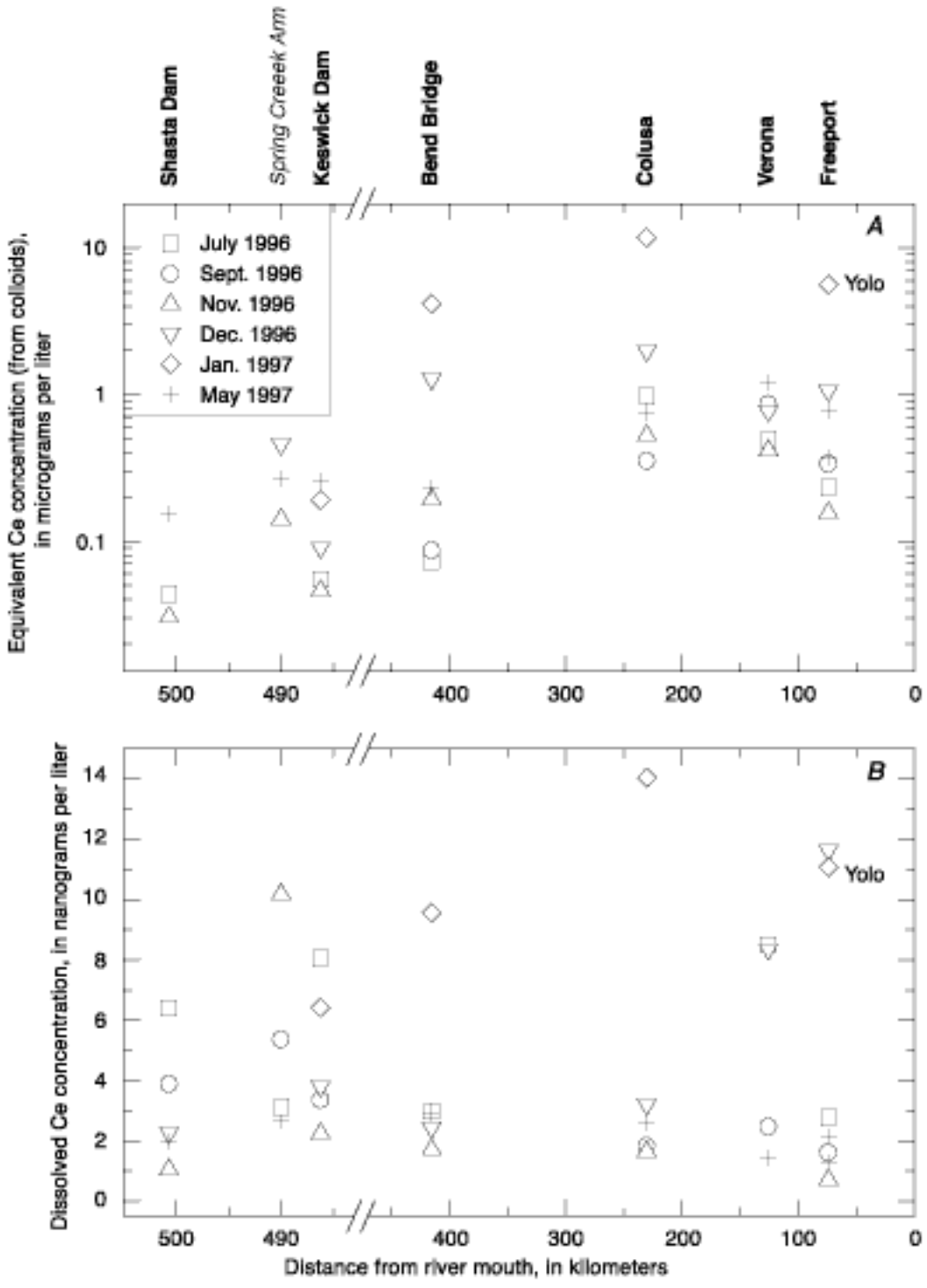

Figure A8-2. Plots of cerium (Ce) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

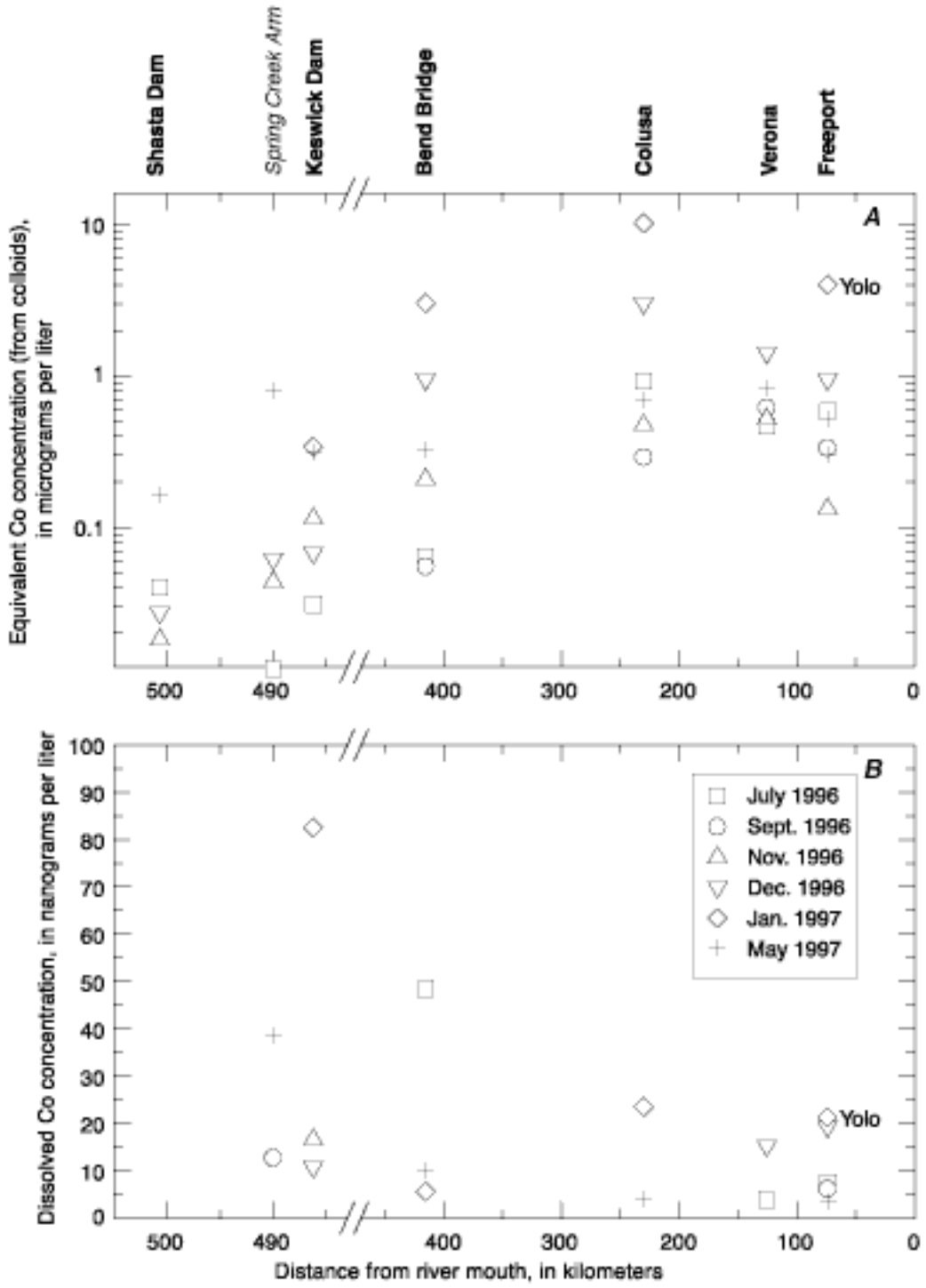

Figure A8-3. Plots of cobalt (Co) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

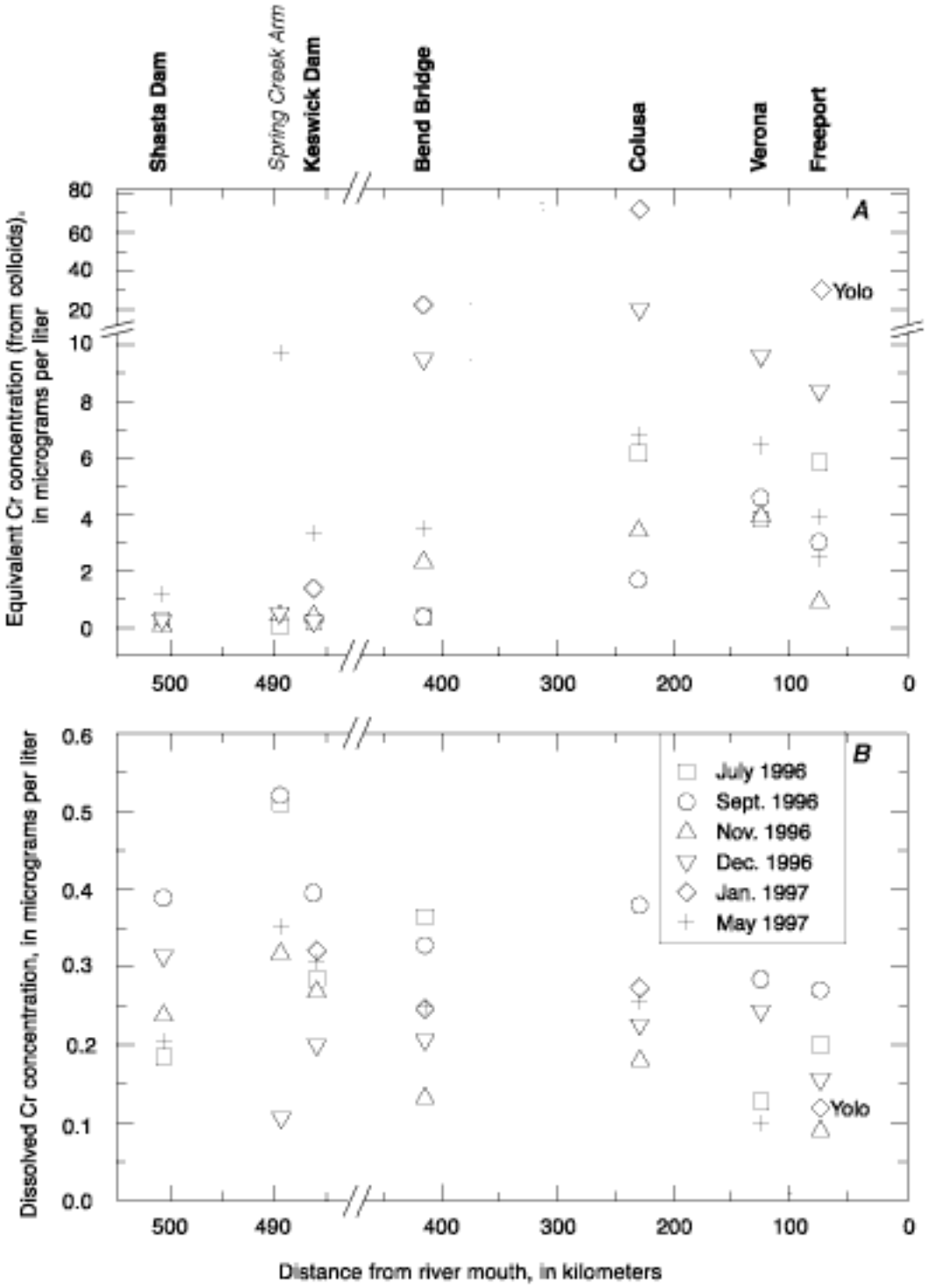

Figure A8-4. Plots of chromium (Cr) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

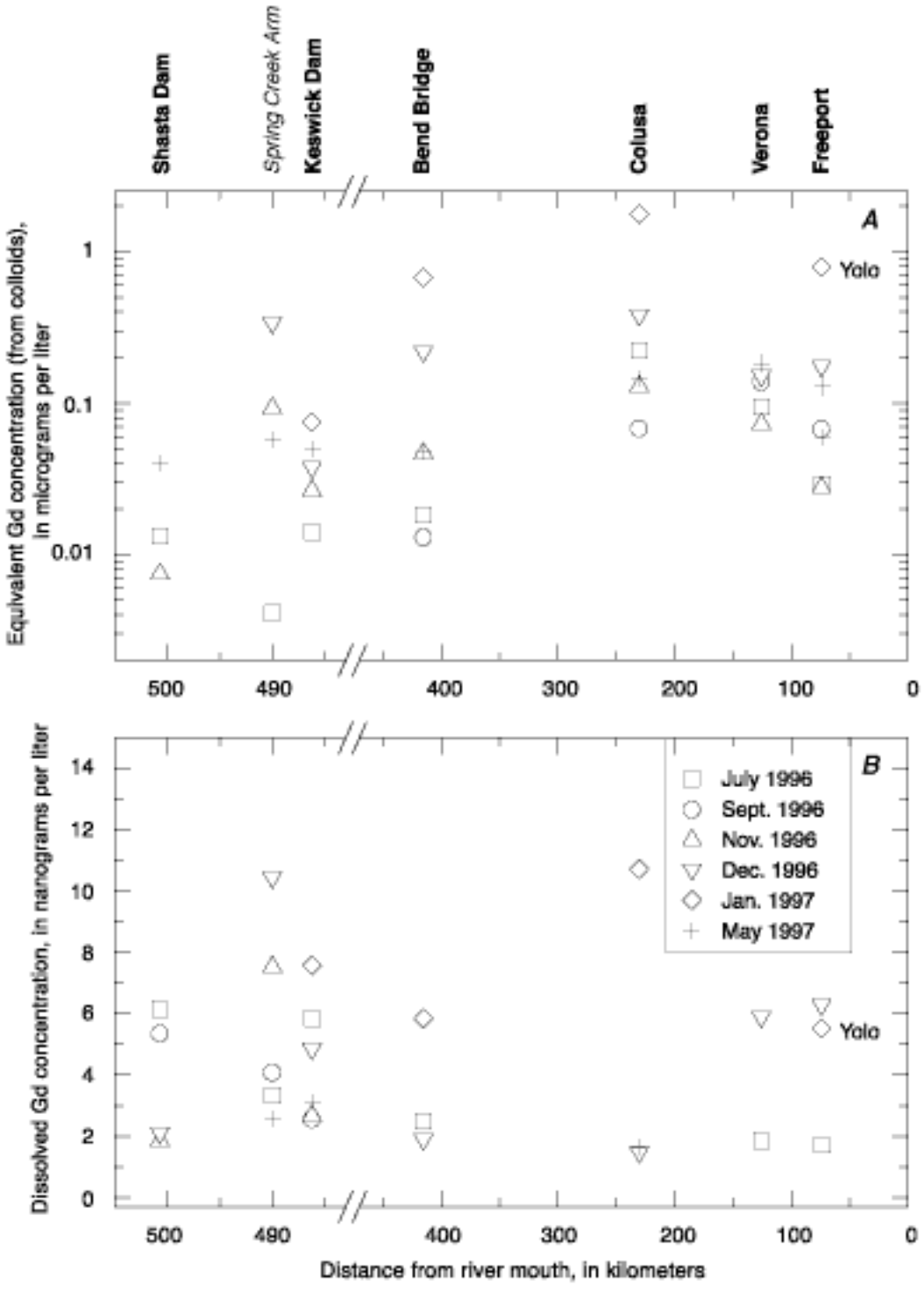

Figure A8-5. Plots of gadolinium (Gd) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

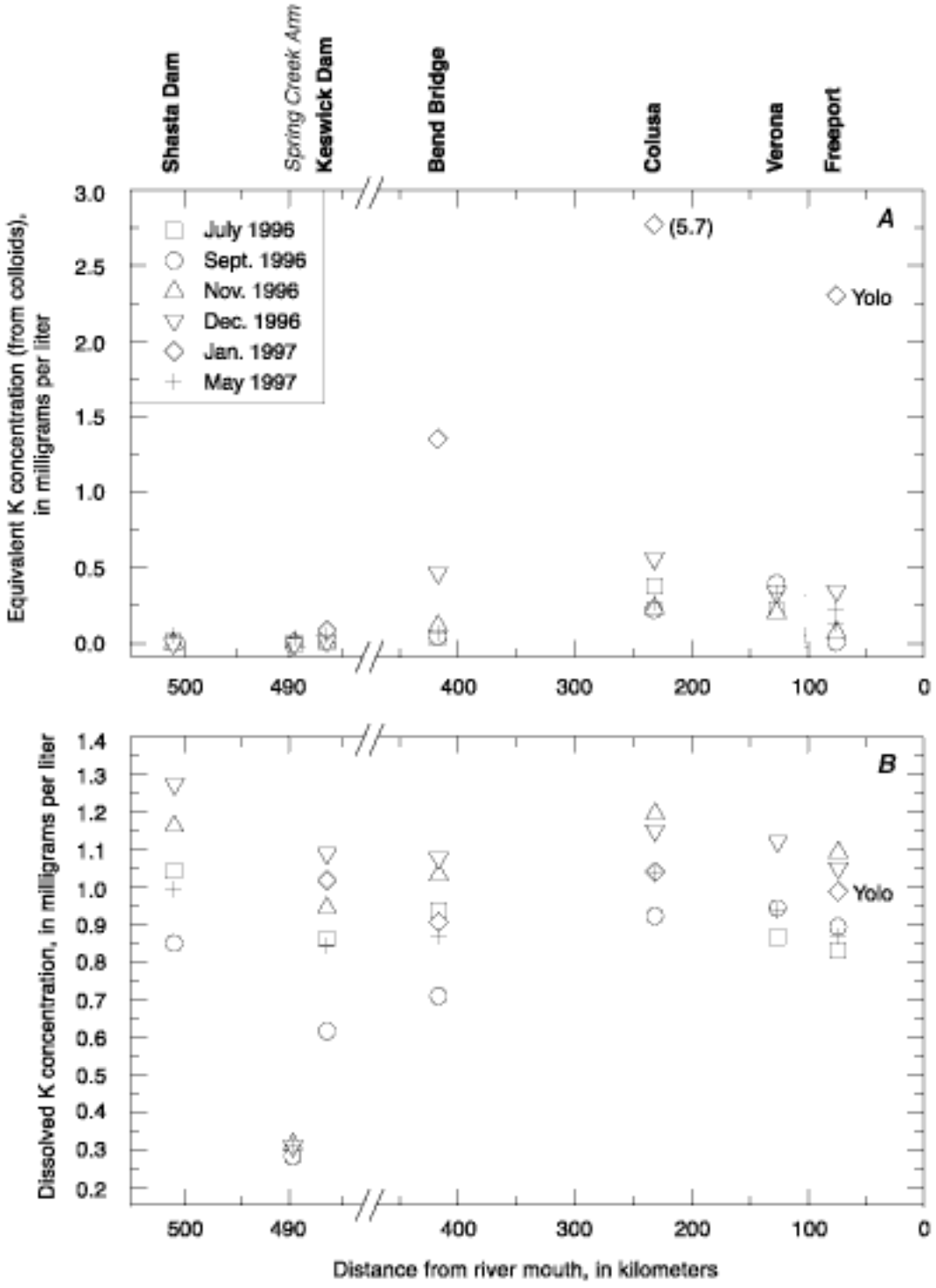

Figure A8-6. Plots of potassium (K) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

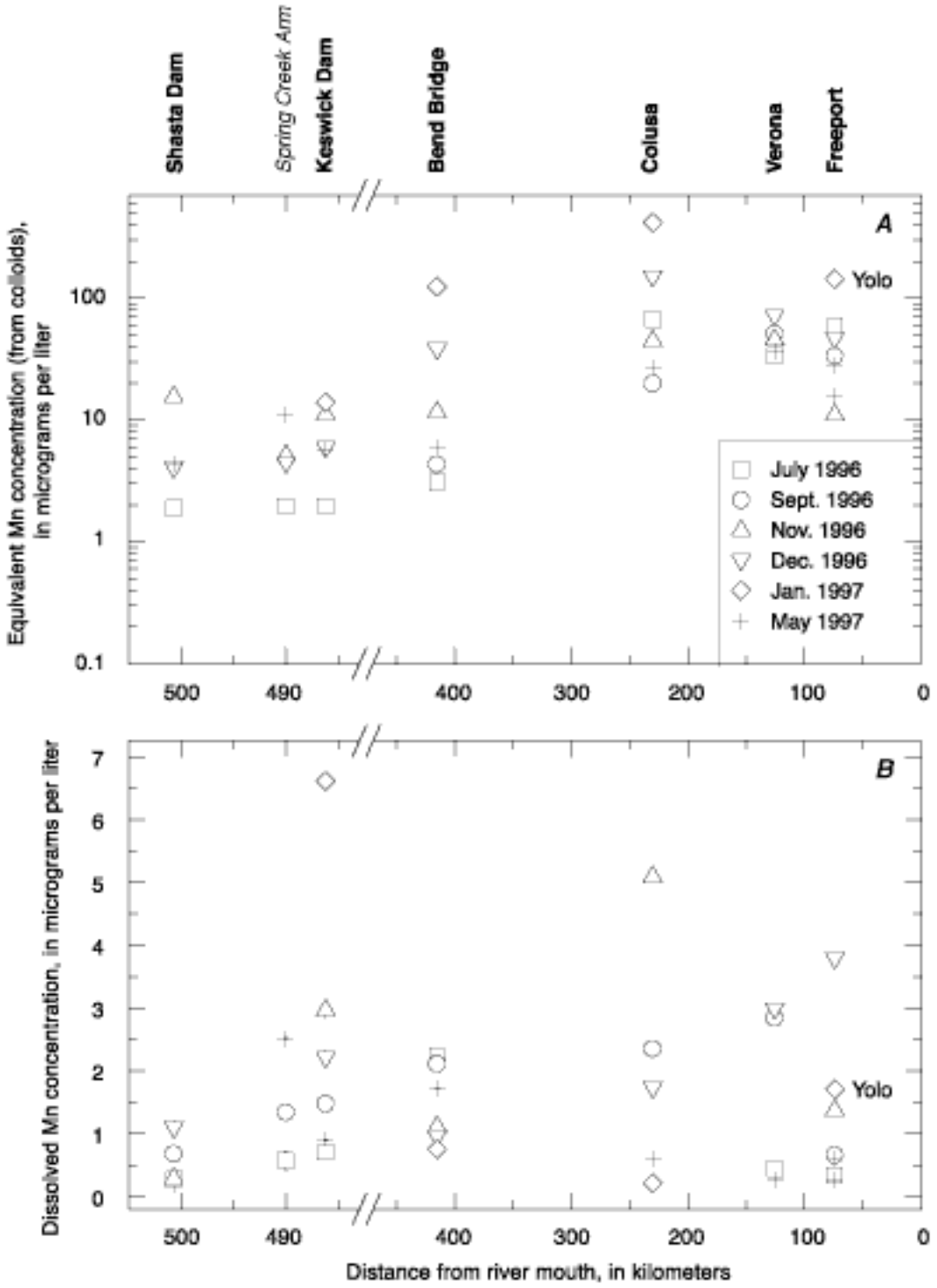

Figure A8-7. Plots of manganese (Mn) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

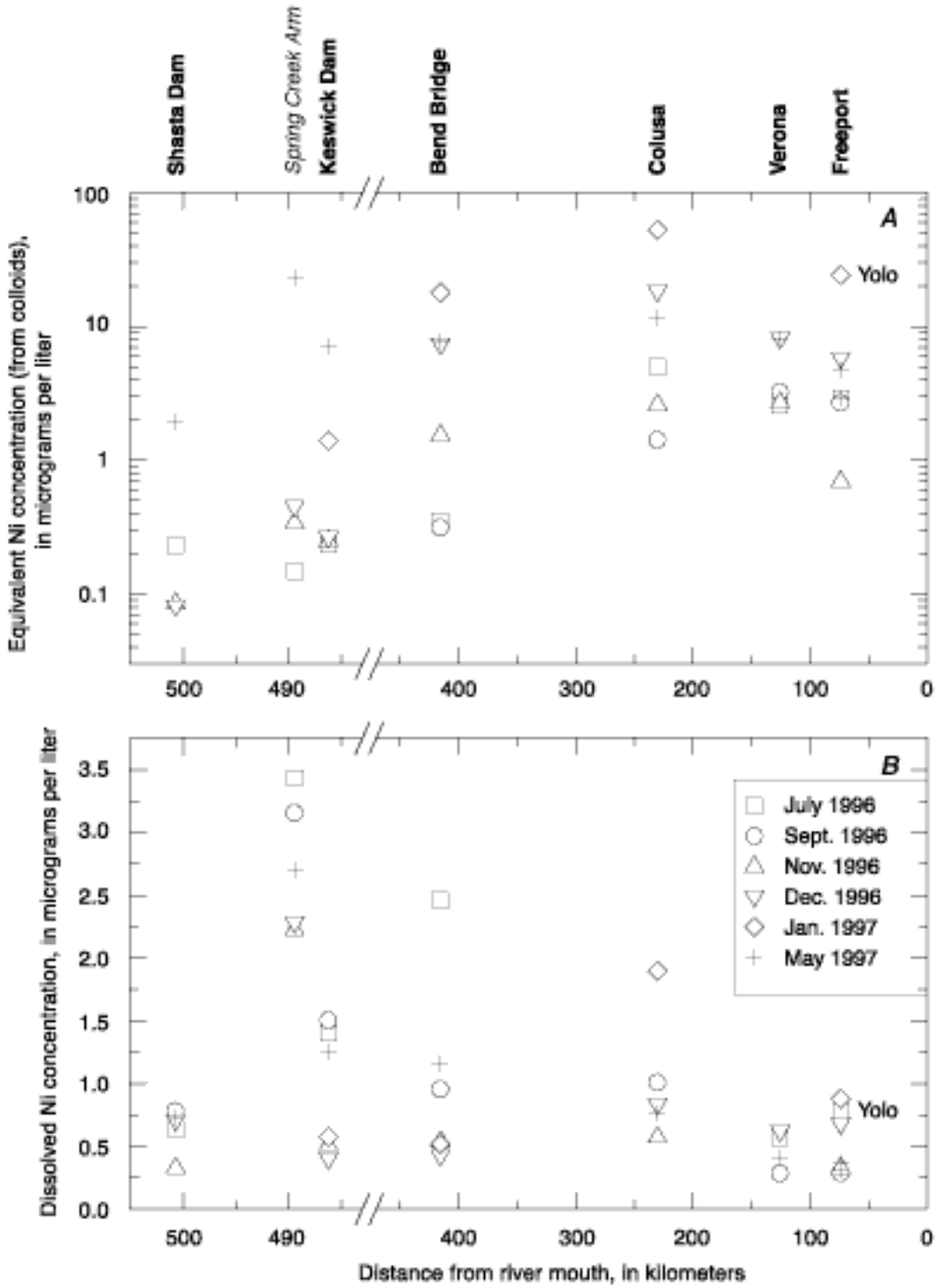

Figure A8-8. Plots of nickel (Ni) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

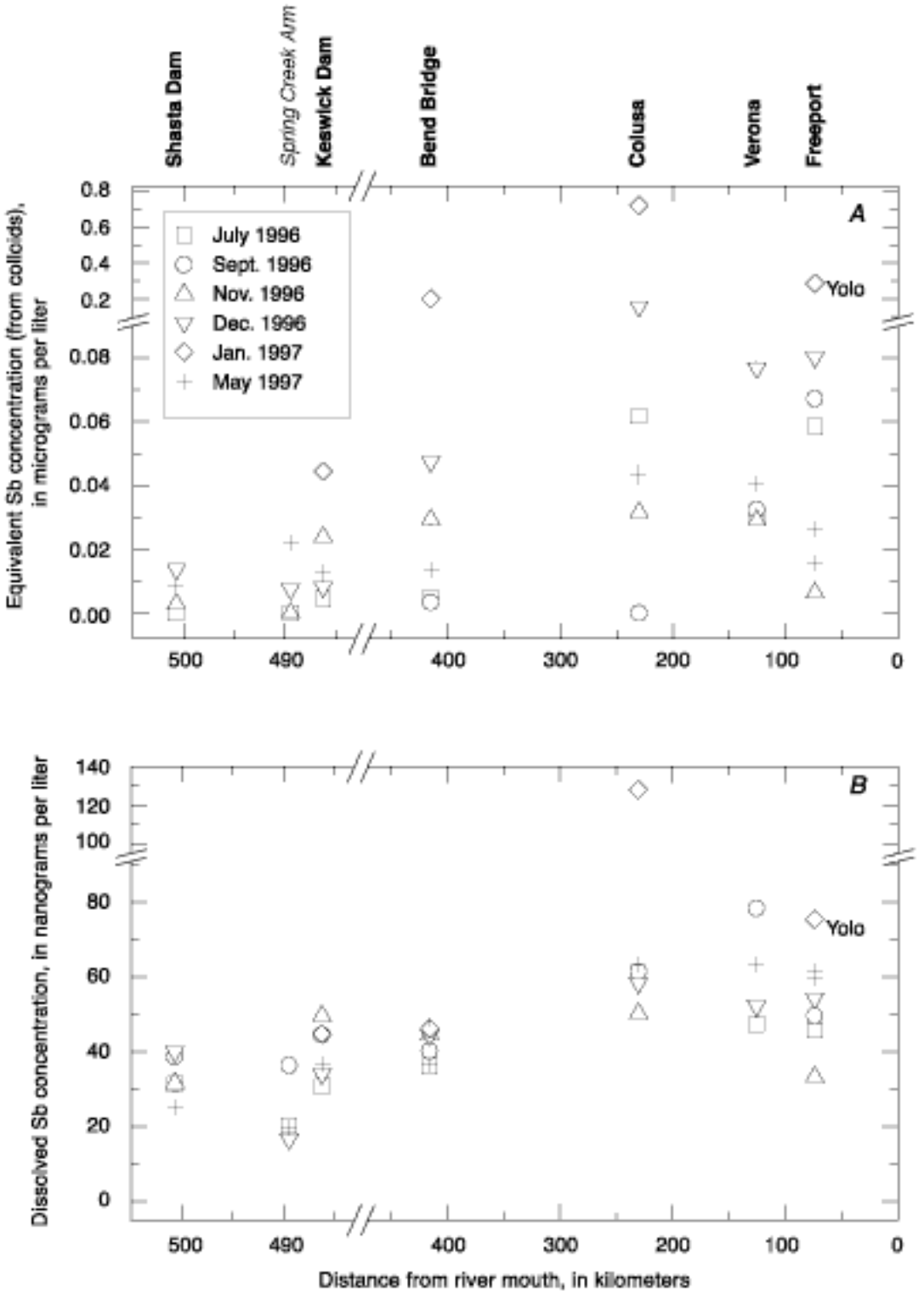

Figure A8-9. Plots of antimony (Sb) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

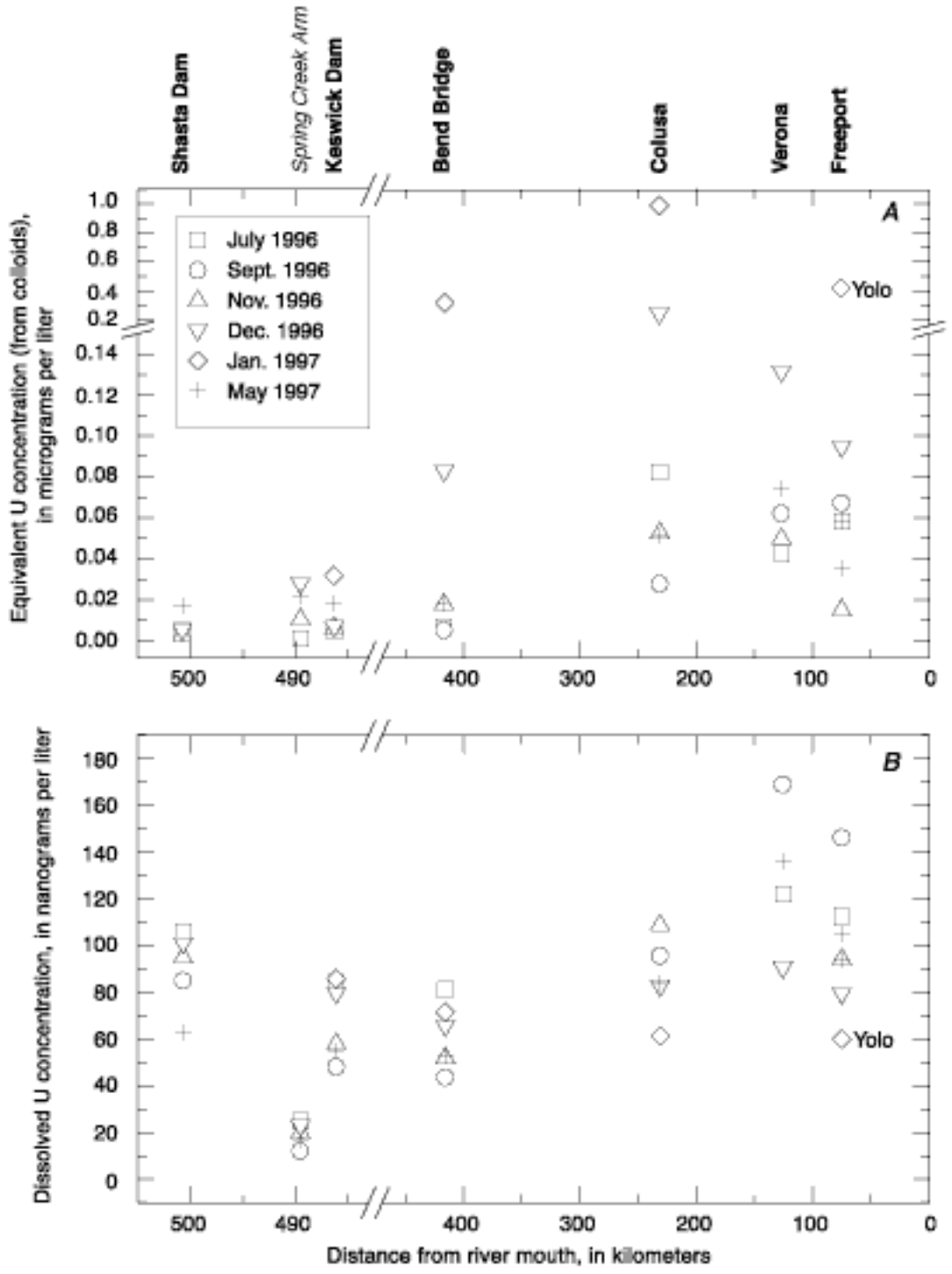

Figure A8-10. Plots of uranium (U) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

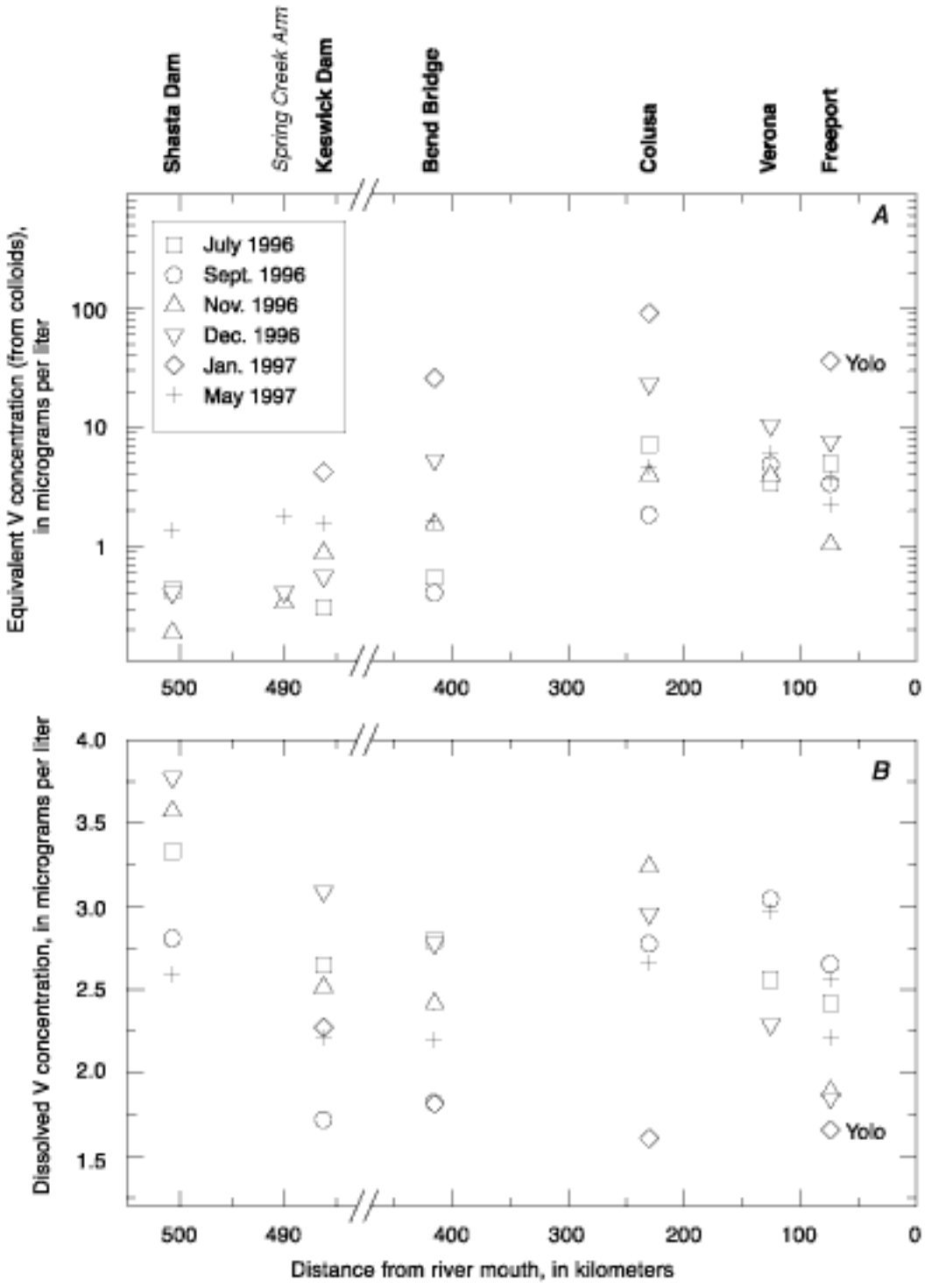

Figure A8-11. Plots of vanadium (V) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

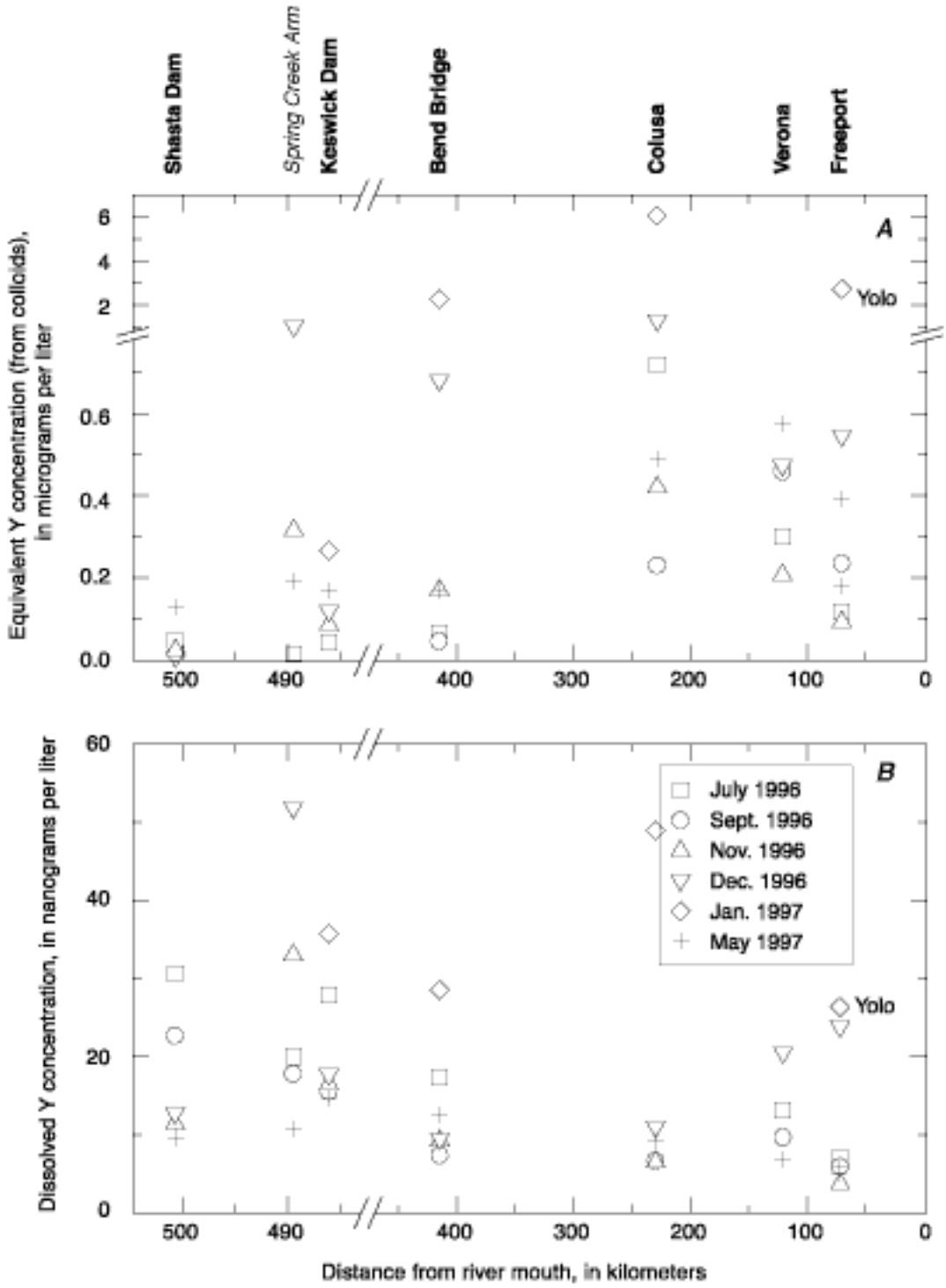

Figure A8-12. Plots of yttrium (Y) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

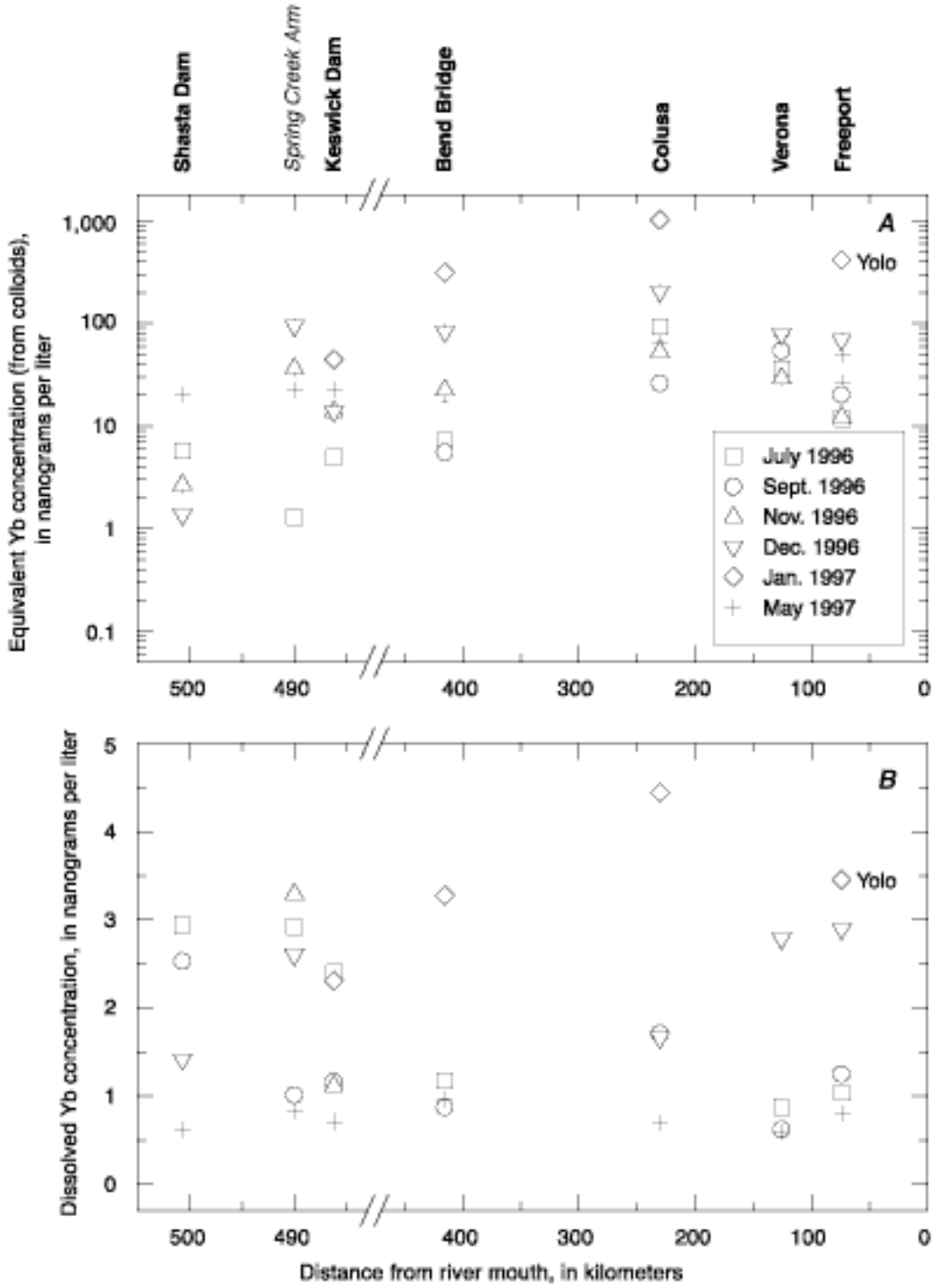

Figure A8-13. Plots of ytterbium (Yb) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.

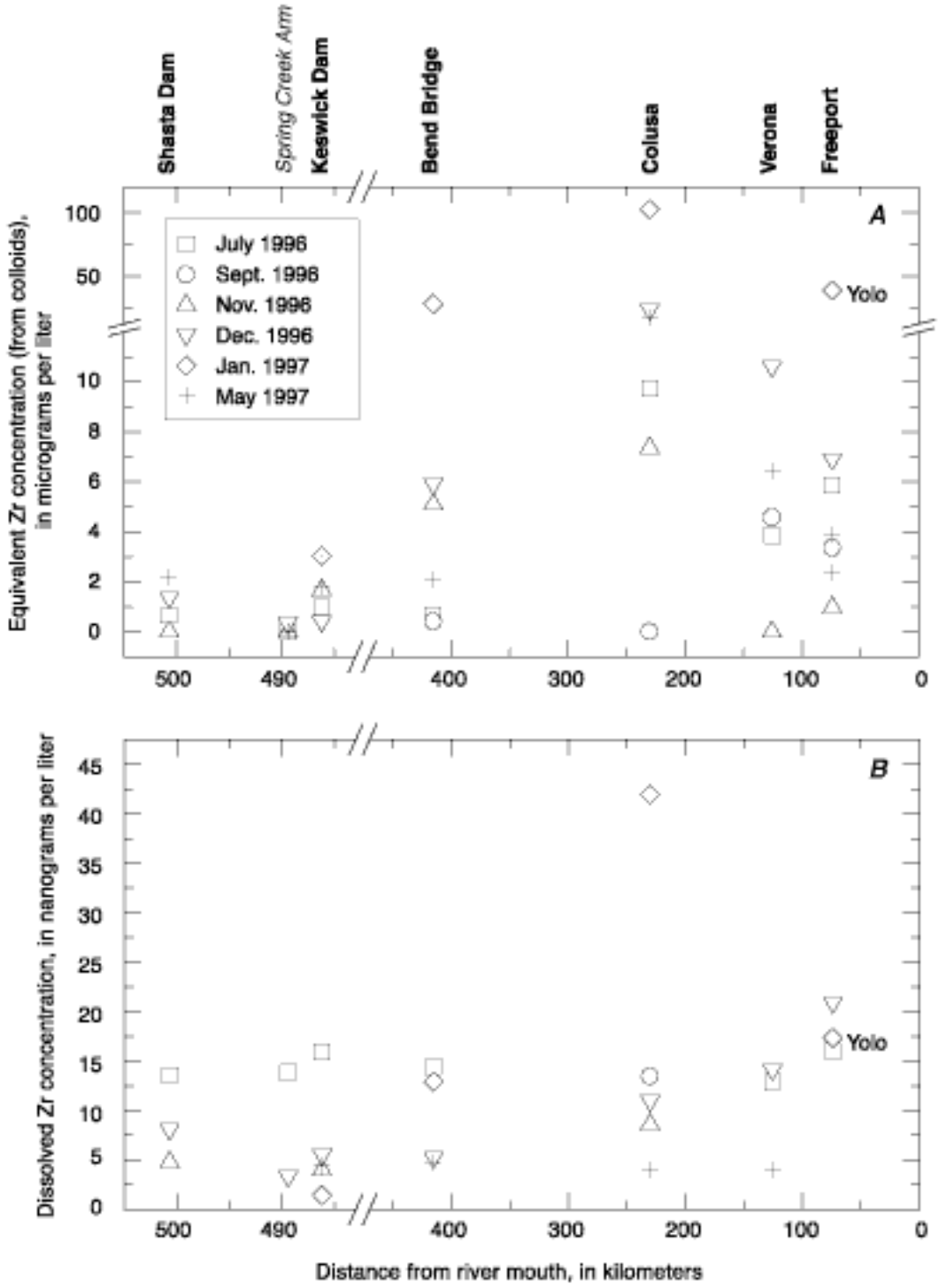

Figure A8-14. Plots of zirconium (Zr) concentration in relation to distance (broken scale) from the Sacramento River mouth, California. *A.* Equivalent colloid concentrations *B.* Dissolved (ultrafiltrate) concentrations. Yolo Bypass sample shown instead of Freeport for January 1997; site names in bold are mainstem sites and those in italics are tributary sites.