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Groundwater Background Investigation Report

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June 2005

Responsible project leader:

John McCann		Project Leader	ENV-WQH	6-30-05
Printed Name	Signature	Title	Organization	Date

Responsible UC representative:

David McInroy		Deputy Program Director	ENV-ERS	6/30/05
Printed Name	Signature	Title	Organization	Date

Responsible DOE representative:

David Gregory		Federal Project Director	DOE-LASO	6/30/05
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

The March 1, 2005, Compliance Order on Consent signed by the New Mexico Environmental Department (NMED), the Department of Energy, and the Regents of the University of California, and the State of New Mexico Attorney General requires the Los Alamos National Laboratory (the Laboratory) to prepare and submit a groundwater background investigation report. The Consent Order was issued pursuant to the New Mexico Hazardous Waste Act, New Mexico Statutes Annotated (NMSA) 1978, § 74-4-10, and the New Mexico Solid Waste Act, NMSA 1978, § 74-9-36(D). This report describes work completed in accordance with the Consent Order.

This report presents background concentrations for naturally occurring metals and general chemistry parameters in groundwater and provides the bases for these concentrations. This report provides a comprehensive, validated database of 566 inorganic, selected organic, stable isotope, and radionuclide analyses of 196 groundwater samples collected from 13 background springs and wells and two other sites located in and around the Laboratory. Background values were determined for the three groundwater types, including alluvium, perched-intermediate volcanics, and the regional aquifer occurring beneath the Pajarito Plateau and the Laboratory. The majority of groundwater samples were collected before the Cerro Grande fire of May 2000, but additional samples at several locations were collected after the fire.

The region considered in this investigation extends from the western edge of the Jemez Mountains eastward to the Rio Grande and from Frijoles Canyon northward to Garcia Canyon. The alluvial groundwater is represented by well LAO-B and Pine Spring. The perched-intermediate groundwater is represented by Seven Springs (Bandelier Tuff), Apache Spring (Tschicoma Formation), Water Canyon Gallery (Bandelier Tuff), upper Cañon de Valle (Bandelier Tuff), and well LAOI(A)-1.1 (Bandelier Tuff). The regional aquifer is represented by well Otowi-4 (Santa Fe Group), well Guaje-5 (Santa Fe Group), Spring 9B (Cerros del Rio basalt), Doe Spring (hydromagmatic deposits), Pajarito Spring (Spring 4A) (Totavi gravels), Spring 1 (Santa Fe Group), La Mesita Spring (Santa Fe Group), and Sacred Spring (Santa Fe Group). La Mesita Spring, representing the Rio Grande Valley as a separate hydrogeochemical system, and Pajarito Spring, containing low concentrations of perchlorate (0.5 µg/L) and nitrate (as nitrogen) (1 mg/L) were not included as part of the remaining 13 sampling stations for statistical analyses. Statistical evaluation of these two springs has been conducted as two separate sites.

The term “background” is used in this report to refer to natural groundwater occurring at springs or penetrated by wells that have not been contaminated by the Laboratory or other municipal or industrial sources and that are representative of groundwater discharging from their respective host rocks or aquifer material. The sites are relatively easy to access and are readily sampled for chemical and radiochemical analyses. As a group, groundwater sampled as part of this investigation has low dissolved concentrations of major ions and trace elements (for example, chloride, nitrate, sulfate, boron, natural uranium). Atmospheric (fallout) tritium concentrations were detected in several springs discharging in the Sierra de los Valles, west and up (hydraulic) gradient of the Laboratory.

Spring sites are located around the periphery of the Laboratory. One spring site (Seven Springs) was chosen because it occurs roughly 30 km west of the Laboratory and discharges from the Bandelier Tuff (the most common rock type within Laboratory boundaries). Seven Springs water contains low concentrations of chemical solutes and anthropogenic tritium at levels approximately equal to that of precipitation in this region.

In 1997, 1998, 1999, and 2000, during six sampling events, filtered and nonfiltered water samples were collected and analyzed for chemical constituents and parameters. The samples had low turbidity values of less than five nephelometric turbidity units. Inorganic analytes include major ions, minor elements, and trace elements; organic solutes consist of naturally occurring humic substances (hydrophobic compounds) and small molecular-weight (hydrophilic) organic compounds; and natural and fallout-derived radionuclides. For each sample station, results of statistical analyses are provided for 9 major ion species; 39 trace element compounds; up to 3 stable isotopes of hydrogen, nitrogen, and oxygen; tritium; hydrophobic and hydrophilic organic compounds associated with dissolved organic carbon fractionation; 11 radiological isotopes; and gross alpha, beta, and gamma radionuclides.

The hydrochemistries of background alluvial and perched groundwater and the regional aquifer differ from each other. Variations in natural groundwater compositions within the three aquifer types are controlled by adsorption/desorption and precipitation/dissolution reactions, aquifer composition of reactive minerals and amorphous solids, solute residence times, types of microbial populations, and lengths of groundwater flow paths. Groundwater compositions include calcium-bicarbonate type water for alluvial and perched-intermediate aquifers. The regional aquifer ranges from a calcium-sodium-bicarbonate to a sodium-calcium bicarbonate type water. Alluvial and perched-intermediate groundwaters occur within the vadose zone above the regional water table.

Native alluvial groundwater contains the lowest total dissolved solids (TDS) with calcium, sodium, silica, and bicarbonate as the dominant solutes. Concentrations of major ions and trace elements also vary seasonally in response to recharge water consisting of snow melt, storm events, and base flow. Background activities of tritium exceed 30 pCi/L within alluvial groundwater.

Perched intermediate groundwater is characterized by higher TDS in comparison to alluvial groundwater. Concentrations of magnesium generally are the highest within perched zones. Background intermediate stations within the Sierra de los Valles sampled during this investigation contain tritium derived from the atmosphere (cosmogenic and residual bomb pulse). Perched intermediate groundwater beneath the Pajarito Plateau, however, contains background activities of tritium less than 2 pCi/L.

The natural aqueous geochemistry of the regional aquifer is characterized by residence times exceeding 10,000 years. The regional aquifer contains the highest natural concentrations of TDS, calcium, sodium, bicarbonate, barium, boron, and uranium in comparison to alluvial and perched-intermediate groundwater. Native groundwater within the regional aquifer most commonly contains less than 1 pCi/L of tritium.

The statistical analyses of the background data involve the use of several exploratory data analysis (EDA) tools. These tools include normal quantile plots of untransformed data, box plots to compare possible data groups, linear regression analysis and scatter plots, and statistical data summaries. The purpose of EDA is to identify possible outliers in these data, understand relationships between analytes, evaluate parametric and nonparametric statistical modeling options, and determine the frequency of nondetect values by analyte and by potential data subpopulations. Differences in water chemistry as a result of sample preparation, analytical methods, and aquifer type are evaluated for each analyte. Spatial and temporal trends in these data are also assessed.

The data provided here include field duplicate samples collected in the investigation and three samples collected by the NMED at the selected stations. An additional 56 water samples collected by NMED and analyzed for low-level perchlorate using liquid chromatography/ mass spectrometry/mass spectrometry have been statistically evaluated and results included as part of this investigation. These samples were collected from springs discharging within the Sierra de los Valles and White Rock Canyon. A single sample for the Rio Grande is also included in this statistical summary for geochemical comparison.

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List of Acronyms and Abbreviations

AA	atomic absorption
CL	contract laboratory
CLP	Contract Laboratory Program (EPA)
CV	coefficient of variation
CVAA	cold vapor atomic absorption
DOC	dissolved organic carbon
DOE	Department of Energy
DNAA	delayed neutron activation analysis
DQO	data-quality objective
EDA	exploratory data analysis
EES	Earth and Environmental Science Division
ENV-ERS	Environmental Stewardship—Environmental Remediation and Surveillance Program
EPA	(U.S.) Environmental Protection Agency
ER	Environmental Restoration (Project)
ESP	Environmental Surveillance Program
FIMAD	Facility for Information Management, Analysis, and Display
GEL	General Engineering Laboratory
GFAA	graphite furnace atomic absorption
GHAA	generation atomic absorption spectrometry
GPS	global positioning system
HAA	hydride atomic absorption
HE	high explosive
HFO	hydrous ferric oxide
HMO	hydrous ferric oxide
IC	ion chromatography
ICPAES	inductively coupled plasma atomic (optical) emission spectroscopy)
ICPMS	inductively coupled plasma mass spectrometry
ICPOES	inductively coupled argon plasma optical emission spectroscopy
IDL	instrument detection limit
IRMS	isotope ratio mass spectrometry
ISE	ion-specific electrode
JMML	Jemez Mountains meteoric line
JMWL	Jemez Mountains (meteoric) water line
Laboratory	Los Alamos National Laboratory
LC-MS/MS	liquid chromatography/mass spectrometry/mass spectrometry
LCS	laboratory control samples
LIKPA	laser-induced kinetic phosphorimetric analysis

NMSA	New Mexico Statutes Annotated
NURE	Natural Uranium Resource Evaluation
μg/L	microcuries per liter
μS/cm	microsieverts per centimeter
MCL	maximum contaminant level
NAA	neutron activation analysis
NATU	natural uranium
NIST	National Institute of Standards and Testing
NMED	New Mexico Environmental Department
NMTI	New Mexico Technical Institution
NTU	nephelometric turbidity unit
OB	(DOE) Oversight Bureau
PCB	polychlorinated biphenyl
ppb	parts per billion
QA	quality assurance
QC	quality control
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RDX	research department explosive
RPD	relative percent differences
RRES-R	Risk Reduction and Environmental Stewardship–Remediation
SI	saturation index
SOW	Statement of Work
TA	technical area
TCE	trichloroethylene
TDS	total dissolved solids
TNT	trinitrotoluene
TOC	total organic carbon
TSS	total suspended solids
TU	tritium unit
TUICPMS	total uranium inductively-coupled plasma mass spectrometry
TULIKPA	total uranium kinetic phosphorimetric analysis
UM	University of Miami
UNM	University of New Mexico
USGS	U.S. Geological Survey
UWM	University of Western Michigan
WMWL	worldwide meteoric water line

Metric to US Customary Unit Conversions

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (μm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (μg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

1.0 INTRODUCTION

1.1 Rationale for Investigation

The March 1, 2005, Compliance Order on Consent signed by the New Mexico Environmental Department (NMED), the Department of Energy (DOE), and the Regents of the University of California, and the State of New Mexico Attorney General requires the Los Alamos National Laboratory (the Laboratory) to prepare and submit a groundwater background investigation report. The Consent Order was issued pursuant to the New Mexico Hazardous Waste Act, New Mexico Statutes Annotated (NMSA) 1978, § 74-4-10, and the New Mexico Solid Waste Act, NMSA 1978, § 74-9-36(D). This report describes work completed in accordance with the Consent Order.

This report presents background concentrations for naturally occurring metals and general chemistry parameters in groundwater and provides the basis for these concentrations. Background hydrogeochemical data requirements are also addressed in the "Hydrogeologic Workplan," Sections 1.0 and 4.0 (LANL 1998, 59599), and within individual work plans prepared by the Environmental Stewardship–Environmental Remediation and Surveillance (ENV-ERS) Program. This background investigation is further addressed in the Groundwater Protection Management Program Plan, Section 4.0, Groundwater Protection Efforts at the Laboratory, and Section 5.0, Issues and Solutions (LANL 1996, 70215).

Background hydrogeochemical data with corresponding statistical information are required to distinguish between contaminated and noncontaminated waters for environmental investigations conducted at the Laboratory. Background hydrogeochemical data also provide information for environmental risk assessments; for Resource Conservation and Recovery Act (RCRA) site investigations; for evaluating hydrogeochemical processes occurring along groundwater flow paths; for defining recharge zones and hydrological pathways; and for establishing cleanup levels during the remediation of contaminated waters at the Laboratory.

1.2 Scope of Report

This report provides background hydrogeochemical data for the alluvial, perched-intermediate, and regional groundwater systems beneath the Pajarito Plateau and the Laboratory. It includes a comprehensive validated database of 566 natural inorganic and organic chemical, stable isotope, and radionuclide analyses of 196 groundwater samples collected from 13 background springs and wells and two other sites located in and around the Laboratory. The term "background" as used here refers to natural waters discharged by springs or penetrated by wells that have not been contaminated by Laboratory effluent or other municipal or industrial activities and that are representative of groundwater discharging from its respective aquifer material.

The region considered in this investigation extends from the western edge of the Jemez Mountains eastward to the Rio Grande and from Frijoles Canyon northward to Garcia Canyon. Figure 1.2-1 shows the fifteen stations sampled for this investigation. The choice of sampling sites was made by the authors using previously published knowledge of the Jemez Mountains/Pajarito Plateau region (Vuataz and Goff 1986, 73687; Shevenell et al. 1987, 06673; Shevenell and Goff 1995, 73689; Adams et al. 1995, 47192; and Blake et al. 1995, 49931). The locations of sampling sites were discussed with the NMED (Dale 2005, 88774). Based on these discussions, eleven springs and four wells were chosen, and the sites were separated into three aquifer material types: alluvium, perched-intermediate-depth volcanic rocks, and the regional aquifer sediments.

The sampling stations and associated aquifer types are listed below.

Alluvium

Well LAO-B and Pine Spring were selected as being representative of groundwaters in alluvial aquifers. Although a portion of groundwater that discharges at Pine Spring flows through the Puye Formation and lavas of the Polvadera Group, water samples were collected from the alluvium at the point of discharge.

Perched Intermediate Volcanic Rocks

Four springs or groups of springs and one well were selected as being representative of groundwaters in the perched-intermediate system. They are the Water Canyon Gallery (Bandelier Tuff), Seven Springs (Bandelier Tuff), Apache Spring (Tschicoma Formation), upper Cañon de Valle Spring (Bandelier Tuff), and well LAOI(A)-1.1 (Bandelier Tuff).

Regional Aquifer

Six springs and two wells were selected as being representative of groundwaters in the regional aquifer. They are La Mesita Spring (Santa Fe Group sediments), Spring 1 (landslide blocks in Cerros del Rio basalt, Santa Fe Group sediments, and Totavi Lentil), Sacred Spring (Santa Fe Group sediments), Doe Spring (phreatic [hydro]-magmatic deposits), Spring 9B (Cerros del Rio basalt), Pajarito Spring (4A) (landslide blocks in Cerros del Rio basalt and Totavi Lentil), supply well Otowi-4 (Santa Fe Group), and supply well Guaje-5 (Santa Fe Group).

1.3 Objectives

The primary objective of this report is to provide background hydrogeochemical background concentrations for naturally occurring analytes for the three groundwater systems beneath the Pajarito Plateau and the Laboratory. Secondary objectives of this investigation include the following:

1. to review available background hydrogeochemical data collected at the Laboratory and surrounding areas before 1997 to provide a technical basis for investigations conducted from 1997 to 2000;
2. to compile additional groundwater data from background stations (springs and wells) sampled in 1997 to 2000 and afterward for alluvial and perched-intermediate groundwater and the regional aquifer;
3. to provide confidence in results of the analyses by comparing interlaboratory values; and
4. to provide statistical distributions for the different analytes occurring within alluvial and perched-intermediate groundwater and the regional aquifer.

1.4 Methods

For the main body of data from 1997 to 2000, filtered and nonfiltered water samples were collected and analyzed for chemical constituents and parameters during six sampling events in 1997, 1998, 1999, and 2000. Inorganic chemicals analyzed included major ions, minor elements, and trace elements; organic solutes consisting mainly of naturally occurring humic substances (hydrophobic compounds) and small molecular weight (hydrophilic) organic compounds; and natural and fallout-derived radionuclides. The analytes fall into one or more of the following three categories: (1) RCRA metal or target analyte; (2) hydrogeologic framework indicators relevant to a geochemical conceptual model; and (3) analytes present in Laboratory discharge and not RCRA metals. These three categories are based on regulatory and scientific perspectives that serve to make decisions regarding the nature and extent of contamination and provide an understanding of geochemical reactions occurring along flowpaths within alluvial and perched-intermediate groundwater and within the regional aquifer. Trace elements such as arsenic, barium, chromium, and uranium fall into category 1, but these analytes plus calcium, total organic carbon, stable isotopes, and bromide are of interest to category 2. Category 3 includes bicarbonate, sodium, calcium, and other constituents that are of site interest and are lacking MCLs.

For each sample station, results of statistical analyses are provided in this report for 9 major ion species; 39 trace elements; up to 3 stable isotopes of hydrogen, nitrogen, and oxygen; tritium; hydrophobic and hydrophilic organic compounds associated with dissolved organic carbon (DOC) fractionation; and 11 radiogenic isotopes, including gross alpha, beta, and gamma radiological measurements. Anthropogenic organic compounds such as trichloroethene (TCE), high-explosive (HE) compounds, polychlorinated biphenyls (PCBs), and other volatile and semivolatile chemicals were not included as part of this investigation because they were deemed to be introduced and are not indicative of background or natural values. Because technetium-99 is synthetically prepared, it also was not analyzed as part of this investigation.

Various statistical and design methods were developed for the assessment of background groundwater data. Section 4 of this report provides details and results of statistical analyses of groundwater samples collected as part of this investigation in 1997 and afterward. The assessment factors in the requirement that certain U.S. Environmental Protection Agency (EPA) and NMED regulations specify the location, frequency of sampling, and laboratory analytical methods for groundwater contaminant monitoring. From the statistical analyses, supported by confidence in interlaboratory comparisons, values for different analytes in each groundwater system could be determined.

The Cerro Grande fire burned several major watersheds west of and within the Laboratory in May 2000. These include Guaje Canyon, Pueblo Canyon, Los Alamos Canyon, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, and Cañon de Valle. Section 2.2.2.4 discusses the short-term impact of the fire on springs and wells in those canyons. Sampling of springs, surface water, and alluvial groundwater from 2001 to 2003 has shown that most analytes have decreased to concentration levels before the fire (Gallaher and Koch 2004, 88747).

2.0 BACKGROUND

2.1 Regional Geologic Framework and Conceptual Hydrogeologic Framework

An understanding of the regional geologic framework is key to developing a conceptual model for hydrology. The hydrogeologic setting of springs and wells and controls on the mode of groundwater occurrence (alluvial, perched-intermediate, and regional aquifer) place constraints on groundwater residence times (more rapid fracture versus slower porous media flow). These variables can influence major ion and trace element aqueous chemistry through adsorption/desorption and precipitation/dissolution reactions.

A technically defensible conceptual hydrogeologic model is essential for characterizing background hydrochemistry, for selecting suitable sampling sites, and for correctly ascribing the sites to various parts of the hydrologic system. To develop the conceptual hydrogeologic model presented in Section 2.1.5, it is necessary to understand the geologic framework of the region and how it controls the occurrence and movement of groundwater. This geologic framework is presented in Sections 2.1.1 through 2.1.4.

2.1.1 Previous Work, Regional Geology

The Pajarito Plateau lies on the east flank of the Jemez Mountains and on the west margin of the Española Basin (Figure 2.1-1). For the hydrogeologic discussions that follow, the Pajarito Plateau and underlying rock units are considered as a geologic feature of the Española Basin segment of the Rio Grande Rift (Manley 1979, 11714). The upper surface of the Pajarito Plateau, however, is composed primarily of the eroded top of the Tshirege Member of the Bandelier Tuff, a large-volume rhyolitic ash-flow tuff (ignimbrite) erupted from the Valles Caldera of the Jemez volcanic field (Smith and Bailey 1966, 21584).

Regional geologic maps that cover all or part of the Pajarito Plateau include those of Griggs (1964, 08795) for hydrogeologic investigations centered around Los Alamos; Smith et al. (1970, 09752) for volcanologic investigations of the Jemez Mountains; Kelley (1978, 11659) for tectonic investigations associated with the Rio Grande Rift; and Rogers (1995, 54419) for Laboratory waste management studies. Several geologic maps of nearby areas focus on a variety of subjects in the Española Basin/Pajarito Plateau region. They include those of Galusha and Blick (1971, 21526); Aubele (1978, 86539); Dethier and Manley (1985, 21506); Goff et al. (1990, 21574; 2002, 88776); and Dethier (1997, 49843).

Detailed geologic studies of the Bandelier Tuff are found in Broxton and Eller (1995, 58207). Syntheses of geology and tectonics on the Pajarito Plateau have been published by Dransfield and Gardner (1985, 06612) and Gardner and House (1987, 06682) as part of Laboratory investigations of the seismic hazard potential. Gardner et al. (1993, 12582; 1998, 63496) described drilling results around the Laboratory and high-precision mapping along the Pajarito fault zone. Collections of papers discussing geologic, geochemical, geophysical, and environmental aspects of the Jemez Mountains, Pajarito Plateau, and Rio Grande Rift are found in Riecker (1979, 21502); Baldridge et al. (1984, 88745); Keller (1986, 88740); and Goff et al. (1996, 56025). Geology and cross sections of the Frijoles 7.5-minute quadrangle, on which most of the Laboratory is found, was published by Goff et al. (2002, 88776).

2.1.2 Regional Tectonic Setting

The Pajarito Plateau lies on the west side of the Española Basin, one of several late Tertiary basins of the Rio Grande Rift (Chapin 1979, 00597). Figure 2.1-2 shows generalized geologic relations beneath the Pajarito Plateau. The Rio Grande Rift is a major tectonic feature stretching from Colorado to northern Mexico and first developed about 25 to 30 Ma (million years ago). The Rio Grande Rift is characterized by crustal extension with predominantly normal faults, elevated seismicity along faults within and along margins of the basins, large negative gravity anomalies indicating thick basin fill, high conductive heat flow (to 120 megawatts/meter^2 [MW/m^2]), and localized basaltic volcanism. Within the Pajarito Plateau region, the rift is bounded on the west by the Colorado Plateau and on the east by the Sangre de Cristo range, part of the southern Rocky Mountains (Aldrich 1986, 21497) (Figure 2.1-1). Because of similarities in age and tectonic style, the rift is considered by some to be a part of the southern Basin and Range tectonic province (Kelley 1978, 11659).

The transverse structural zone separating the Española Basin from the southern end of the San Luis Basin (Figure 2.1-3) (Broxton and Vaniman 2005, 88707) is called the Embudo fault zone. This fault is but one structural element of a major northeast-trending crustal discontinuity called the Jemez Lineament. As originally defined, the Jemez Lineament consists of an alignment of Miocene to Quaternary volcanic centers stretching from western Arizona to southeastern Colorado (Mayo 1958, 21573). No systematic trends in eruption ages or magma compositions are apparent among the various volcanic centers. By far the largest volcanic center is the Jemez volcanic field, which has formed at the intersection of the Jemez Lineament and the Rio Grande Rift.

The transverse structural zone separating the Española Basin from the northern Albuquerque-Belen Basin (sometimes called the Santo Domingo Basin) is the northwest-trending La Bajada fault zone (Figure 2.1-3). The largest zone of rift-related basaltic volcanism occurs in the Cerros del Rio volcanic field located primarily north of and along the La Bajada fault zone (Figure 2.1-3). The Cerros del Rio field, referred to in some reports as "Basalt of Chino Mesa," is considered by some to be a peripheral part of the greater Jemez volcanic field (Smith et al. 1970, 09752). Volcanic rocks from both the Cerros del Rio and Jemez volcanic centers interfinger with sedimentary rocks filling the Española Basin beneath the Pajarito Plateau.

2.1.3 Regional Volcanism

The evolution of the Jemez and Cerros del Rio volcanic fields has been outlined by Gardner and Goff (1984, 44021); Gardner et al. (1986, 21527); Self et al. (1986, 21579); Goff et al. (1989, 54783); Dunker et al. (1991, 88739); and WoldeGabriel et al. (1996, 54427). Volcanic rocks of the Jemez Mountains can be subdivided into three major groups named from the oldest to the youngest: the Keres, Polvadera, and Tewa Groups (Figure 2.1-4) (Broxton and Vaniman 2005, 88707). Volcanic rocks of the Keres Group consist of mafic basalt through silicic rhyolite in composition, although the unit is dominated volumetrically by intermediate-composition andesite. Published ages for the Keres Group range from about 13 to 6 Ma (Gardner et al. (1986, 21527). Rocks of the Polvadera Group also consist of basalt through rhyolite, but the dominant rock type is dacite and the published ages range from about 14 to 2 Ma (Gardner et al. (1986, 21527). Rocks of the Tewa Group consist almost exclusively of rhyolite, and they range in age from 1.75 to 0.06 Ma (Gardner et al. 1986, 21527; Goff et al. 1989, 54783). In general, a progression can be seen from mostly mafic to exclusively rhyolitic compositions with time in the main (or central) Jemez volcanic field.

Rocks of the Cerros del Rio field are not formally included within the three major groups of Jemez volcanic rocks. Cerros del Rio rocks compositionally consist of basalt and subordinate evolved rocks (hawaiite, mugearite, benmoreite, and dacite) ranging in age from 4.6 to <1.2 Ma (Bachman and Mehnert 1978, 88741; Dunker et al. 1991, 88739; WoldeGabriel et al. 1996, 54427). The most comprehensive study to date has focused on White Rock Canyon where the ages range from 2.8 to 2.3 Ma (WoldeGabriel et al. 1996, 54427). These authors have also dated a single lava flow at the bottom of the canyon just south of the mouth of Ancho Canyon at 9.3 Ma, a date consistent with ages of the Santa Fe Group.

Volcanism began in the Pajarito Plateau region about 16.5 to 14 Ma as small-volume eruptions of basalt that can be observed interbedded with older sedimentary rocks of the Española Basin both southwest and north of the Plateau (Dethier and Manley 1985, 21506; Gardner et al. 1986, 21527; Goff et al. 1990, 21574; Aldrich and Dethier 1990, 49681). During the period from 10 to 7 Ma, the major volume of Jemez volcanic rocks was erupted, mostly as andesite domes and flows in the central and southern Jemez Mountains (estimated volume 1000 km^3). Smaller volumes of predominately dacite (about 500 km^3) were vented during the period 7 to 2.5 Ma (Gardner et al. 1986, 21527; Goff et al. 1989, 54783). The Sierra de los Valles west of Los Alamos consists of these dacitic domes and flows. During these voluminous andesitic and dacitic phases, large debris aprons of volcaniclastic rocks (Cochiti and Puye Formations) were shed eastward into the Española Basin. These deposits interfinger with axial sediments of the basin. Lavas within the entire compositional range of the Cerros del Rio were erupted primarily from 4 to 2 Ma and formed cinder cones, shield lavas, intercanyon flows, and maar deposits. The latter interfinger with dacitic rocks, fan deposits, and fluvial sediments in the basin fill beneath the Pajarito Plateau.

2.1.4 Pajarito Plateau Stratigraphy

Figure 2.1-4 (Broxton and Vaniman 2005, 88707) shows the most recent representation of the stratigraphy of the Pajarito Plateau. Stratigraphic nomenclature on the Pajarito Plateau has been refined many times during the last 50 years (Denny 1940, 88738; Spiegel and Baldwin 1963, 54259; Griggs 1964, 08795; Baltz et al. 1963, 08402; Bailey et al. 1969, 08406; Galusha and Blick 1971, 21526; Manley 1979, 11714; Purtymun 1995, 45344). Griggs's nomenclature was based on mapping and lithologic descriptions of water well cuttings on Laboratory property. Griggs's nomenclature has continued to be used in later hydrogeologic investigations conducted by Laboratory personnel as additional water wells were drilled (Dransfield and Gardner 1985, 06612). These authors combined well data with geophysical investigations and surface mapping to produce a structure contour map of the top of the pre-Bandelier Tuff surface (ca 1.6 Ma). Dransfield and Gardner (1985, 06612) provide information that the pre-Bandelier topography beneath the Pajarito Plateau is dominated by dacitic rocks of the Polvadera Group in the west, fanglomerates of the Puye Formation in the northeast, and mafic shield volcanoes and flows of the Cerros del Rio volcanic field in the southeast.

The stratigraphy of three deep (>600 m) wells on the Pajarito Plateau was compiled by Goff (1995, 49682), based on lithologic descriptions of Stoker et al. (1992, 12017) and Purtymun et al. (1993, 15371). Detailed stratigraphy of several recent characterization wells has been documented in a series of Laboratory reports (i.e., Broxton et al. 2001, 71251; Broxton et al. 2001, 71252; Ball et al. 2002, 71471).

Generalized cross sections of Pajarito Plateau stratigraphy may be found in Turbeville et al. (1989, 21587), Purtymun (1995, 45344), and Robinson et al. (2005, 88767). Four detailed cross sections projected through different sectors of the Pajarito Plateau are shown in Goff et al. (2002, 49682). These sections use stratigraphic data from many of the observation wells. Goff et al. (2002, 49682) also provide detailed lithologic descriptions of the primary rock units in the region (Table 2.1-1).

2.1.5 Conceptual Hydrogeologic Model

The current conceptual hydrogeologic model for the Pajarito Plateau is a synthesis of much previous hydrologic work spanning many years. The growth of the Laboratory, as well as Los Alamos townsite, led to various investigations that characterized general hydrology of the Pajarito Plateau and water chemistry of springs discharging within White Rock Canyon (Purtymun et al. 1980, 00208, Purtymun and Johansen 1974, 11835); the hydrogeology of the Bandelier Tuff and other rock units (Rogers and Gallaher 1995, 48845; Abeele et al. 1981, 06273) and water supply wells (Theis and Conover 1962, 11878; Griggs 1964, 8795; Cushman 1965, 08584; Purtymun 1975, 11787; Purtymun 1984, 06513; Purtymun and Cooper 1969, 11831). Concerns over the occurrence of, or potential for, groundwater contamination by waste-disposal practices at the Laboratory prompted additional hydrogeologic studies (Baltz et al. 1963, 08204; Purtymun et al. 1966, 09653; DeVaurs and Purtymun 1985, 07415; Stoker et al. 1991, 07530). Pathway analysis (Geologic, Inc. 1989, 31492) and numerical modeling studies have further contributed to understanding both shallow and deep, local and regional, unsaturated and saturated groundwater systems at Los Alamos (Hearne 1985, 88749; McAda and Wasiolek 1988, 88737; Umari and Szeliga 1989, 88735; Koenig and McLin 1992, 56029; Geddis 1992, 31592; Frenzel 1995, 56028; Stone 1995, 56043; Birdsell et al. 1995, 70012; Gray 1997, 58208; Dander 1998, 88743; Keating et al. 1999, 88746).

In spite of this previous work, the conceptual hydrogeologic model for the Pajarito Plateau and the Laboratory is continuously being refined (Stone 1996, 63989; Robinson et al. 2005, 88767). However, the 25 deep (regional aquifer) wells installed under the "Hydrogeologic Workplan" (LANL 1998, 59599) have contributed much-needed information (Robinson et al. 2005, 88767). The next subsections provide an overview of the hydrogeologic model, including groundwater occurrence and movement, and serve as the framework for the hydrogeochemical model discussed in Section 2.2.

2.1.5.1 Overview

The simplest conceptual hydrogeologic model for the Pajarito Plateau and the Laboratory includes saturated porous media in which the surface of saturated zone(s) mimics topography. For example, the regional water table slopes eastward from a recharge zone in the Sierra de los Valles west of the Laboratory toward the Rio Grande groundwater discharge zone. Complicating this simple model, however, are zones of saturation perched above the regional water table in shallow alluvium and perched-intermediate-depth volcanic rocks (Purtymun 1995, 45344).

2.1.5.2 Groundwater Occurrence

Groundwater occurrence is generally described in terms of geography. For example, groundwater may be more accessible or plentiful in one area than in another, perhaps as a result of changes in aquifer thickness and sedimentary facies within the aquifer or the hydrogeologic unit. Although groundwater productivity in supply wells varies with the hydrogeologic unit making up the regional aquifer, the depth to the water table is primarily the result of topography. The regional zone of saturation is more accessible in canyons than on mesas.

The occurrence of groundwater is more commonly described in terms of stratigraphy (the saturated hydrogeologic unit), hydrologic condition (unconfined or confined), and scale (local perched or regional saturation). At the Laboratory, groundwater has been observed to occur in three modes:

- perched at shallow depth (alluvium in canyon bottoms),
- perched at intermediate depth (the Guaje Pumice Bed, Cerros del Rio basalt, Tschicoma Formation, and Puye Formation), and
- at greater depth within various units that make up the regional aquifer (Tschicoma Formation, Cerros del Rio basalt, Puye Formation, and Santa Fe Group), depending on the location.

Figure 2.1-5 depicts a conceptual hydrogeologic model for canyon settings, which includes alluvial and perched-intermediate groundwater and the regional aquifer. Groundwater in the perched zones is generally unconfined. Groundwater in the regional zone of saturation is also generally unconfined, but confined conditions have been documented in older supply wells in lower Los Alamos Canyon (Purtymun 1995, 45344). Some springs discharging in and near lower Los Alamos Canyon (Sacred Spring, Spring 1, and La Mesita Spring) are also probably artesian.

Perching of groundwater in the shallow and intermediate-depth zones occurs in different ways. The occurrence of perched water in the alluvium is restricted to canyon floors, and saturation does not appear to extend beneath the adjacent mesas. In alluvial environments, infiltration and percolation of stream flow readily recharge the zone of perched saturation. Ephemeral streams, such as those occurring in canyons at the Laboratory, lose much water along their courses (transmission loss). The weathered Bandelier Tuff underlying the alluvium is less permeable and provides a perching layer or aquitard.

The occurrence of intermediate-depth perched groundwater in the Cerros del Rio basalt and other hydrostratigraphic units is less readily explained. Perching at intermediate depths requires the downward percolation of groundwater through the alluvium and the Bandelier Tuff, which suggests that the Bandelier Tuff is capable of transmitting groundwater. In places where the Bandelier Tuff is absent, having been scoured out by stream flow, no low-permeability barrier exists between the alluvium and underlying units.

This is the case in Los Alamos Canyon east of the confluence with DP Canyon, where the Bandelier Tuff is missing and where alluvium rests directly on the permeable deposits of the Puye Formation (LANL 2004, 87390). Perching of intermediate-depth groundwater is caused by the presence of less permeable material, including massive basalt and basaltic tephra, as observed at well R-9 (Broxton et al. 2001, 71250); clay-rich lake beds encountered at R-12 (Broxton et al. 2001, 71252); or clay-rich rock observed at R-15 (Longmire et al. 2001, 70103).

The regional water table occurs within the Puye Formation and Santa Fe Group beneath the Pajarito Plateau. The slope of the regional water table decreases to the east (Figure 2.1-6) and is influenced by pumping wells. Groundwater in the regional aquifer discharges as springs in White Rock Canyon. The hydraulic gradient within the regional aquifer east of the Sierra de los Valles is downward, and overlying alluvial and perched-intermediate groundwater systems provide recharge to the regional aquifer (Broxton et al. 2002, 76006). Groundwater flow rates within the regional aquifer vary, depending on the grain size of the aquifer material, hydraulic conductivity, and hydraulic gradient. Flow within the regional aquifer occurs under porous (wells R-25, R-19, R-15, R-13, R-14) and fracture (R-26, R-9, R-12) conditions.

2.1.5.3 Groundwater Movement

The movement of groundwater consists of three basic elements: recharge, flow, and discharge. Recharge and discharge each involve an area, a process, and a rate, but flow involves a direction and a rate.

2.1.5.3.1 Recharge

Groundwater flows from areas of higher-pressure potentials (west) to areas of lower potentials (east) (Figure 2.1-6), indicating that recharge occurs in the higher elevations (Sierra de los Valles) west of the Laboratory, probably in response to the higher amounts of precipitation at these higher elevations. Recharge processes include the infiltration of rainfall, snowmelt, or runoff and then deep percolation of any moisture that escapes evapotranspiration. Recharge is especially effective along stream channels, where larger volumes of water occur at any given place and time. Recharge of the shallow, intermediate, and deep groundwater systems probably occurs at different rates.

2.1.5.3.2 Flow

From limited hydrologic data and information, groundwater flow direction seems to be the same for the shallow, intermediate, and deep systems. In canyons where numerous wells have been drilled to allow for observations, such as in Mortandad Canyon, the water table for the shallow groundwater perched in the alluvium slopes toward the east, as does the canyon floor (Stone 1995, 56043). The intermediate-depth perched groundwater zones are still too poorly bounded to characterize flow direction with any certainty. As shown by Figure 2.1-6, groundwater flow in the regional aquifer generally is to the east and southeast toward the Rio Grande.

The rate of groundwater flow depends on the hydraulic properties of the various saturated materials beneath the Pajarito Plateau. The actual flow rate or groundwater velocity (v) at a given point of interest depends on the hydraulic conductivity (K) for the material, effective porosity (n_e), and the slope of the water table or hydraulic gradient (I), according to Darcy's law (Freeze and Cherry 1979, 88742):

$$v = KI/n_e. \tag{1}$$

Hydraulic conductivity values, however, are a proxy for at least the potential rate of groundwater flow. Sparse data for K are available from hydrologic testing of observation, water supply, test, and regional characterization wells in the area. The mean K value for the alluvium in Los Alamos Canyon, based on slug tests in nine observation wells, is 9.6×10^{-3} cm/s with an error of ±10% (Gallaher 1995, 49679). Laboratory testing of cores from two wells in Mortandad Canyon yielded saturated K values of 5×10^{-5} to 1×10^{-3} cm/s for the Tshirege Member (unit 1A) of the Bandelier Tuff and 7×10^{-5} to 1×10^{-3} cm/s for the Tsankawi Pumice Bed (Stoker et al. 1991, 07530). Aquifer performance data for deeper units are available from pumping tests conducted on water supply and test wells. Unfortunately, some of the wells are screened across more than one stratum, and K values for specific geologic units at these locations are not available. Hydraulic conductivity values obtained from pumping tests conducted on water supply and test wells screened in a single unit vary by one to two orders of magnitude: 4 to 241 gal./day/ft^2 for the Puye Formation and 3 to 11.3 gal./day/ft^2 for the Santa Fe Group (Purtymun 1995, 45344). More recent testing in characterization wells installed under the “Hydrogeologic Workplan” (LANL 1998, 59599) has provided K values of 2.79×10^{-3} to 1.31×10^{-2} cm/s for intervals of the Cerros del Rio basalt at well R-9i (Broxton et al. 2001, 71251); 7.27×10^{-4} cm/s for the Puye Formation at well R-15 (Longmire et al. 2001, 70103); 6.17×10^{-3} and 6.91×10^{-3} cm/s for the Santa Fe Group at well R-19 (Broxton et al. 2001, 71254); 2.32×10^{-3} and 1.28×10^{-3} cm/s for the Cerros del Rio basalt at well R-31 (Vaniman et al. 2002, 72615); and 8.21×10^{-3} cm/s for the Puye Formation at well R-31 (Vaniman et al. 2002, 72615).

Radiocarbon dating of groundwater is another method of calculating flow rates, although it is difficult to collect groundwater samples not impacted by atmospheric carbon dioxide. Such dating of regional aquifer groundwater at the Laboratory suggests preliminary flow rates ranging from a minimum of 1.93×10^{-5} cm/s for the Tesuque Formation in lower Los Alamos Canyon to a maximum of 3.33×10^{-4} cm/s for the Puye Formation, in the area between Water Canyon and upper Ancho Canyon (Purtymun 1984, 06513).

2.1.5.3.3 Discharge

Alluvial, intermediate, and regional aquifer groundwaters discharge in different ways, depending on hydrogeologic conditions. Alluvial groundwater is either forced to the surface by bedrock highs where it supports stream flow for some distance downcanyon or it seeps into the underlying hydrogeologic unit. Intermediate-depth perched groundwater either discharges eventually at downgradient springs along canyon walls or continues to percolate downward toward the regional water table. Regional groundwater discharges at springs within White Rock Canyon.

2.2 Conceptual Hydrogeochemical Model

This section presents a conceptual hydrogeochemical model for the Pajarito Plateau, which focuses on natural distributions of inorganic and organic solutes or dissolved species. This model is based on geochemical data collected to date and includes water chemistry and mineralogy of aquifer material. This conceptualization is essential for characterizing background and site hydrochemistry and includes a hydrogeologic-mineralogic framework. Reactive minerals, such as $CaCO_3$ (calcite), $Fe(OH)_3$, clay minerals, and SiO_2 glass, and ion exchange-adsorption reactions are important in controlling groundwater composition for major solutes and some trace elements.

2.2.1 Previous Work

The current conceptual hydrogeochemical model for the Pajarito Plateau is a synthesis of previous geochemical investigations conducted over the past several years and is summarized in Robinson et al. (2005, 88767). Characterization of site geochemistry has taken place over the past decade with investigations conducted on mesa tops and within canyon bottoms (Gallaher and Koch 2004, 88747;

Adams et al. 1995, 47192; Blake et al. 1995, 49931; Broxton and Eller 1995, 58207; Longmire et al. 1996, 54168; Longmire and Goff 2002, 75905). Concerns over the occurrence of, or potential for, groundwater contamination by waste-disposal practices at the Laboratory prompted annual monitoring (Laboratory Environmental Surveillance Program [ESP] reports) since the 1950s and additional hydrogeochemical studies (Longmire 2002, 72614; 2002, 72713; 2002, 72800; 2002, 73282; 2002, 73676; and 2005, 88510). Geochemical modeling studies have further contributed to an understanding of geochemical processes occurring in both shallow and deep, local and regional, unsaturated and saturated groundwater systems (Broxton et al. 2002, 76006; Keating et al. 1999, 88746).

2.2.2 Elements of the Conceptual Hydrogeochemical Model

This subsection summarizes different elements contributing to the geochemical conceptual model. The ten elements that follow represent the conceptual hydrogeochemical model that integrates geochemistry, hydrogeology, and contaminant transport. Geochemical processes occurring over time and space are implicit to this conceptual model. The elements include natural chemical compositions of groundwater, redox conditions, adsorption and precipitation reactions, residence time, chemical speciation, and colloids. Reactive minerals are considered to be most important for controlling groundwater composition and solute mobility.

Geochemistry Element 1: Because of geochemical processes, the **natural composition** of groundwater can vary within and between the alluvium, perched-intermediate zones, and the regional aquifer and along flow paths from recharge to discharge zones.

Geochemistry Element 2: **Residence times** of groundwater and chemical solutes (mass of water or solute/flux of water or solute) increase with depth and from west to east across the Pajarito Plateau. Accordingly, increasing concentrations of major ions and trace elements are observed along the flow paths in perched systems and the regional aquifer.

Geochemistry Element 3: **Reactive constituents**, consisting of $CaCO_3$, Ca-smectite, Na-feldspar, amorphous SiO_2, and $Fe(OH)_3$, may control groundwater composition for the major solutes and selected trace elements, including iron and aluminum. These reactive minerals and solid phases approach equilibrium with groundwater when the residence time exceeds the reaction half time (amount of time required for 50% of reactant A to form product B with B not initially present).

Geochemistry Element 4: **Alluvial aquifer material** provides the largest reservoir for effluent-discharged constituents such as strontium-90, cesium-137, uranium, plutonium-238, plutonium-239/240, and americium-241 because the constituents readily adsorb onto clay and silt-sized particles coated with clay minerals and ferric (oxy)hydroxide.

Geochemistry Element 5: In general, **adsorption** of radionuclides and organic and inorganic species in the Bandelier Tuff decreases as follows: cesium-137 (highest sorption) = americium-241 > plutonium-238 = plutonium-239/240 > strontium-90 > uranium > nitrate = sulfate = chloride = perchlorate = trichloroethylene (TNT) = research department explosive (RDX) = tritium (lowest sorption). Adsorption affinities are based on experimental (Longmire et al. 1996, 56030) and field data (ESP 2000, 68661; ESP 2001, 71301). Adsorption capacities of sediments and aquifer material may change over time and location as a result of changes in solution speciation and mineralogy.

Geochemistry Element 6: **Activities** of adsorbing radionuclides and concentrations of inorganic species, which are Laboratory derived, generally decrease downgradient along the groundwater flow path.

Geochemistry Element 7: **Non- and weakly adsorbing constituents** (tritium, perchlorate, nitrate, chloride, fluoride, ([RDX, TNT], and uranium) can migrate from alluvial groundwater to perched-intermediate zones and to the regional water table.

Geochemistry Element 8: Adsorption processes generally dominate over **mineral precipitation** for removing metals and radionuclides from alluvial groundwater. However, in isolated cases where effluent discharges have changed major ion chemistry and pH, trace solutes such as strontium and barium may precipitate as $SrCO_3$ and $BaSO_4$ or coprecipitate as $(Sr\text{-}Ba)SO_4$ in alluvial groundwater.

Geochemistry Element 9: **Transport** of constituents in groundwater occurs as both dissolved solutes and as colloids. Colloids may include natural material (silica, clay minerals, organic matter, and ferric oxyhydroxide) and possibly solid phases associated with the treated Laboratory discharges.

Geochemistry Element 10: **Young ages**, a component of groundwater within perched zones in the Sierra de los Valles and the regional aquifer, is less than 60 yr old. This observation is based on measurable tritium considerably above 1 pCi/L (Broxton et al. 2001, 71252; Broxton et al. 2002, 76006; Longmire et al. 2001, 70103). The initial cosmogenic baseline for tritium is approximately 17 pCi/L (Clark and Fritz 1997, 59168); however, cosmogenic tritium has decayed to less than 1 pCi/L as water moved from the surface to the regional water table over several decades. Measurable concentrations of tritium in the regional aquifer above the cosmogenic baseline occur in Pueblo Canyon, Los Alamos Canyon, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, and Cañon de Valle downgradient from release sites (ESP, 2001, 71301; Longmire 2002, 73282; Longmire 2002, 72800; Longmire 2002, 73676; Longmire 2002, 72614; Longmire 2005, 88510).

2.2.2.1 Hydrochemistry, Natural Distribution of Solutes, and Residence Times (Elements 1 and 2)

This section describes physical and chemical characteristics of recharge and discharge zones and groundwater chemistry.

The temperature of the recharge water is generally less than 15°C, but with increasing depth, groundwaters in the perched-intermediate zones within the Cerros del Rio basalt and Puye Formation and regional aquifer are generally greater than 15°C, reflecting the geothermal gradient associated with heat flow beneath the Jemez Mountains.

Figure 2.2-1 shows the average concentrations of several analytes at the fifteen stations measured from 1996 to 2000. A recharge zone occurs within the Sierra de Los Valles, and a discharge zone occurs in White Rock Canyon. Groundwater in the recharge zone is characterized by a calcium-sodium-bicarbonate ionic composition with a specific conductance generally less than 110 μS/cm. Concentrations of dissolved calcium, magnesium, sodium, chloride, and bicarbonate increase in groundwater from the Sierra de los Valles eastward toward the Rio Grande (Figure 2.2-1). Concentrations of dissolved iron and manganese are less than 0.5 and 0.05 parts per million (ppm), respectively, which also suggest overall oxidizing conditions within the recharge zone. Groundwater discharging from springs in this region is generally oxidizing because concentrations of chemical reductants, including hydrogen sulfide, methane, and ammonium are less than detection.

Concentrations of tritium vary in recharge water because of local and seasonal variations. Recharge water derived from precipitation near the Sierra de los Valles contains tritium (19 to 71 pCi/L), which decays to less than 3 pCi/L along groundwater flow paths within noncontaminated perched-intermediate zones and the regional aquifer beneath the Pajarito Plateau (Figure 2.2-1). Dilution of water containing tritium also occurs within the vadose zone and regional aquifer. Concentrations of tritium at Spring 9B, discharging from the Cerros del Rio basalt in White Rock Canyon, are less than 0.40 pCi/L, which suggests that the age of this groundwater is greater than 60 yr.

Groundwaters within the three aquifer types contain silica as a major solute. Higher concentrations of dissolved silica occur within the volcanic-derived rocks than in the Santa Fe Group sediments.

Figure 2.2-2 shows average dissolved concentrations of several natural trace elements within alluvial and perched-intermediate groundwater and the regional aquifer. Average concentrations of natural arsenic and fluoride are the highest within the Cerros del Rio basalt (Spring 9B). Average concentrations of barium, boron, bromide, strontium, and uranium are the highest within the regional aquifer at La Mesita Spring. Background concentrations of dissolved uranium are typically less than 1 part per billion (ppb) in groundwater within volcanic rocks, sediments, and alluvium west of the Rio Grande. Average concentrations of dissolved natural uranium are 9.1 μg/L at La Mesita Spring, which is 300 times greater than that observed at alluvial well LAO-B (Figure 2.2-2). Variations in trace-element concentration depend on solute residence time and the extent of water-rock interactions. Older groundwater within the regional aquifer tends to have higher concentrations of trace elements as a result of desorption processes.

Concentrations of trace elements within the three aquifer types are controlled by speciation (the form and structure of solute), oxidation state, and their affinity to adsorb onto aquifer material. Figure 2.2-3 shows calculated speciation of dissolved uranium(VI) at Spring 9B, in which uranyl dicarbonate dominates between pH values 6.6 and 8.4. Barium and strontium are predicted to occur as Ba^{2+} and Sr^{2+} and undergo cation exchange reactions. Boron is stable as the hydrolysis species $B(OH)_3^0$, and this neutrally charged solute does not adsorb onto aquifer material, making it an excellent tracer or nonreactive species. Fluoride and bromide are stable as F^- and Br^-, respectively, and these two anions are also excellent tracers. Other trace elements, including copper (II), form complexes with carbonate and sulfate, making them less adsorptive than the noncomplexed forms.

Trace-element concentrations and major ion ratios in the regional aquifer beneath the Pajarito Plateau are dramatically different from waters sampled in the western Valles Caldera region (Shevenell et al. 1987, 06673; Blake et al. 1995, 49931). Therefore, it can be concluded that the western half of the Valles Caldera is not a plausible recharge area for the regional aquifer beneath the Pajarito Plateau. Water samples collected in the western portion of the Sierra de los Valles, although sparse, are geochemically similar to Pajarito Plateau perched groundwater and the regional aquifer (Robinson et al. 2005, 88767; thus, this region cannot be excluded from the potential recharge area based on geochemical evidence alone.

Isotopic data ($\delta^{18}O$ and δD ratios) from cold springs discharging from the regional aquifer (Vuataz and Goff 1986, 73687; Blake et al. 1995, 49931; Longmire 2002, 72614; 2002, 72713; 2005, 88510) may be used to distinguish between recharge in the Valles Caldera, Sierra de los Valles, and possibly the Sangre de Cristo mountains (for well samples near the Rio Grande). Paleotemperatures of colder climate indicative of the Pleistocene produce lighter δD and $\delta^{18}O$ values (Clark and Fritz 1997, 59168); temperature effects need to be considered in evaluating samples collected from deep wells in lower Los Alamos Canyon and within San Ildefonso Pueblo. Available isotopic data do not support a hydrologic connection between the regional aquifer beneath the Pajarito Plateau and the Valles Caldera.

The most likely source of recharge for the western part of the Pajarito Plateau occurs within the Sierra de los Valles. Major ion compositions of Apache Spring, upper Cañon de Valle Spring, surface water in both upper Cañon de Valle and Water Canyon, and the perched-intermediate zone observed at wells R-18, R-25, and R-26 are very similar (calcium-sodium-bicarbonate ionic composition), suggesting common host rocks and a common recharge zone.

Residence times of groundwater and chemical solutes increase both with depth and from west to east across the Pajarito Plateau (Figure 2.2-1). Accordingly, increasing concentrations of major ions and trace elements are observed along the flow paths, but concentrations of tritium tend to decrease with depth. Residence times of the recharge groundwater may be short, based on the open fracture flow within the Bandelier Tuff, Tschicoma Formation, and Cerros del Rio basalt and within porous media flow in the coarse-grained alluvium in upper Los Alamos Canyon and other canyons. Increasing residence times occur within perched-intermediate zones and in the regional aquifer. A recent component of groundwater, based on tritium observed within the perched zones and/or at the regional water table is observed at wells R-4, R-5, R-6, R-6i, R-8, R-9, R-9i, R-11, R-12, R-15, R-22, R-23, R-25, R-28, and MCOBT-4.4. Tritium has been measured at these wells at concentrations above the initial cosmogenic baseline.

2.2.2.2 Reactive Minerals (Element 3)

Geochemically reactive minerals and amorphous solids react with groundwater along flow paths to varying degrees. These solids approach equilibrium with groundwater when the residence time exceeds the reaction half time. These reactive constituents, consisting of calcite ($CaCO_3$), Na-feldspar, Ca-smectite, amorphous SiO_2, and $Fe(OH)_3$, may control groundwater composition for the major ions and selected trace elements, including iron and aluminum. Reactive minerals have varying adsorption capacities for trace elements, including arsenic, chromium, nickel, lead, selenium, and uranium. Each of the major reactive constituents along flow paths beneath the Pajarito Plateau is discussed below.

Calcite: Concentrations of dissolved calcium and bicarbonate increase in depth within perched-intermediate zones and the regional aquifer (Longmire 2002, 72713; 2002, 72800; 2002, 73282; ESP 2000, 68661; ESP 2001, 71301), reflecting the increase in residence times within the deeper saturated zones. Figure 2.2-4 shows saturation indices for calcite versus calcium and bicarbonate concentrations (millimoles/liter) at background springs and wells. The saturation index (SI) is defined as the $\log_{10}$(activity product/solubility product). The computer program MINTEQA2 (Allison et al. 1991, 49930) was used to perform SI calculations. For a given solid phase at equilibrium, saturation is equal to 0 ± 0.05. Oversaturation (positive SI) implies precipitation, but undersaturation (negative SI) implies dissolution. Alluvial and perched-intermediate groundwaters are calculated to be undersaturated with respect to calcite, and dissolution of this mineral takes place. This calculation is consistent with the absence of calcite within the saturated alluvium upgradient from the Laboratory. Calcite is an important reactive mineral controlling dissolved concentrations of calcium and bicarbonate in the regional aquifer. The regional aquifer (Santa Fe Group sediments and basalt) is calculated to be in close equilibrium with respect to calcite. Groundwater samples collected at wells R-9, R-12, and Otowi-4 and La Mesita Spring generally are saturated with respect to calcite, whereas the perched-intermediate well LAOI(A)-1.1 is not. Activities of dissolved calcium and bicarbonate at well LAOI(A)-1.1 are not sufficient enough to allow for calcite precipitation. Calcite typically is not observed in native groundwater within the alluvium and Bandelier Tuff.

Smectite: Extensive zones of smectite were encountered in the Puye Formation in core and cutting samples collected from R-9 and R-12 (Broxton et al. 2001, 71250; 2001, 71252). Smectite has also been observed in rock samples collected from the Santa Fe Group sediments in lower Los Alamos Canyon. Figure 2.2-5 shows log activity H_4SiO_4 (silicic acid) versus log activity $Ca^{2+}/[H^+]^2$ at 25°C for wells R-9, Otowi-4, R-12 (screen #3), and LAOI(A)-1.1 and La Mesita Spring. Groundwater samples collected from these stations dominantly plot within the stability field of calcium smectite, suggesting that most groundwater is oversaturated with respect to this mineral. One sample collected from La Mesita Spring, however, plots within the stability field for kaolinite, because of the more acidic pH measured during the sampling round. Smectite increases the adsorption capacity of the aquifer material for cations (metals and radionuclides) under circumneutral pH conditions.

Silica: Silica glass derived from volcanic rocks is an important component of the Bandelier Tuff, pumice-rich zones of the Puye Formation, and Cerros del Rio basalt. Groundwater (alluvial, perched-intermediate, and regional aquifer) reacting with silica glass produces dissolved silica, in the form of silicic acid [$Si(OH)_4$]. Concentrations of dissolved silica vary as a function of the solubility of silica glass containing sodium, potassium, and calcium (Lindsay 1979, 00883). Groundwaters collected from selected wells and springs are oversaturated with respect to silica-rich soil and undersaturated with respect to SiO_2 glass (Figure 2.2-5). These groundwaters are also oversaturated with respect to quartz, cristobalite, and tridymite based on thermochemical data provided by Lindsay (1979, 00883). These SiO_2 phases are present within the Guaje Pumice Bed, as identified in core collected from borehole LAOI(A)-1.1. La Mesita Spring is undersaturated with respect to silica-rich soil and silica glass because of lower concentrations of silica relative to those measured in groundwater samples collected at wells R-9, Otowi-4, R-12, and LAOI(A)-1.1.

Na-feldspar: Sodium-rich feldspar (albite) is present in the Santa Fe Group sediments, and over thousands of years this phase has reacted with groundwater, releasing sodium and silica to solution under basic pH conditions. The mineral chemically alters to form clay minerals, including kaolinite and sodium-rich smectite (Langmuir 1997, 56037), although volcanic-derived silica glass is more reactive.

$Fe(OH)_3$: Hydrous ferric oxide (HFO) is ubiquitously found in hydrogeologic environments and is an important adsorbent for many trace elements, including arsenic, chromium, lead, and uranium. This phase has a specific surface area of 600 m^2/g (Langmuir 1997, 56037) that contributes to its high adsorptive capacity. HFO has been observed as a component of fracture-fill material at borehole R-9 within the Cerros del Rio basalt (Broxton et al. 2001, 71250). Chemical and mineralogical data collected from the borehole indicate that uranium is associated with HFO and smectite within the fracture-filling material. Oxidation-reduction reactions are also controlled by HFO and dissolved ferrous iron (Langmuir 1997, 56037) under acidic to neutral pH conditions. In addition to HFO, hydrous manganese oxide (HMO) is an important adsorbent within volcanic and sedimentary rocks. This phase is found at lower concentrations than HFO, based on elemental analysis of core samples and nonfiltered water samples containing suspended particles.

2.2.2.3 Contaminant Distributions and Transport (Elements 4 through 10)

Background distributions of chemicals in groundwater have direct relevance to defining the nature and extent of contamination. Geochemical processes controlling distributions of background solutes also occur in contaminated groundwater.

The largest mass distribution of adsorbing contaminants in Los Alamos Canyon and Mortandad Canyon occurs within the alluvium (Laboratory ESP reports). Alluvial groundwater in both Los Alamos Canyon and Mortandad Canyon contains elevated concentrations of strontium-90, cesium-137, uranium, plutonium-238, plutonium-239/240, and americium-241. This observation supports the concept that most of these radionuclides, except uranium and tritium, significantly adsorb onto aquifer material. Concentrations of adsorbing radionuclides and cationic metals generally decrease downgradient along the groundwater flow path. One or more of the nonadsorbing contaminants (tritium, perchlorate, chloride, nitrate, uranium, RDX, and/or TNT) has been observed at wells Otowi-1, MCOBT-4.4, R-4, R-5, R-6, R-6i, R-8, R-9, R-9i, R-11, R-12, R-15, R-25, and R-28.

The presence of colloids may enhance the movement of contaminants, especially those that are adsorbed onto fine-grained particles in the shallow subsurface. Colloid transport in alluvial groundwater has been documented in Mortandad Canyon (Penrose et al. 1990, 11770). The sources of colloids probably include natural materials (clay minerals, silica glass, ferric (oxy)hydroxide, and solid organic matter) and possibly solid phases (silica glass and calcium carbonate) associated with the treated Technical Area 50 (TA-50) discharge. These colloids partly influence the distribution of suspended radionuclides within alluvial groundwater in Mortandad Canyon because constituents adsorbed onto colloids are transported more rapidly than they would be transported as dissolved solutes.

2.2.2.4 Cerro Grande Fire

The Cerro Grande fire of May 2000 perturbed surface water and alluvial groundwater chemistry (Gallaher and Koch 2004, 88747; Katzman et al. 2000, 69055; Longmire et al. 2001, 70103). Ash produced from the fire has been transported within canyon systems reacting with rain and surface water. Increasing concentrations of total organic carbon (TOC) and DOC, carbonate alkalinity, calcium, potassium, iron, manganese, and other solutes occurred in surface water and alluvial groundwater for a few years (2000 to 2003) following the Cerro Grande fire (Gallaher and Koch 2004, 88747). In most canyons, carbonate alkalinity in surface water increased by factors of three to six after the fire. Surface water and alluvial groundwater showed increases in turbidity from ash and enhanced erosion.

Storm events remobilized contaminated sediments, and desorption of contaminants took place, resulting in a redistribution of contaminants for several years (Gallaher and Koch 2004, 88747). Cation exchange reactions involving strontium-90 and calcium and complexation reactions of uranium and bicarbonate are examples of hypothesized geochemical processes occurring in surface water and alluvial groundwater since the fire. On the whole, metal, radionuclide, and anion concentrations have decreased and are approaching pre-Cerro Grande fire concentrations in alluvial groundwater.

Oxidation and reduction reactions occurring between organic-rich ash and metals and radionuclides influence aqueous speciation of solutes and adsorption processes. It is hypothesized that DOC produced from the fire serves as an electron donor (reducing agent) during complete oxidation to bicarbonate and carbonic acid. Concurrently, iron(III) and manganese(IV) solids become electron acceptors (oxidizing agents) and are reduced to more soluble aqueous species. Geochemical data collected in Pueblo Canyon, Los Alamos Canyon, and Pajarito Canyon support the occurrence of these oxidation-reduction reactions with respect to DOC and dissolved iron and manganese (Gallaher and Koch 2004, 88747).

2.2.2.5 Summary of Geochemical Conceptual Model

The preceding hydrogeochemical conceptual model applies to both background and Laboratory-induced conditions. This model addresses recharge and discharge zones, geochemical reactions, residence times, reaction half times, and temporal and spatial relationships.

Stable isotope ratios (δD and $\delta^{18}O$) strongly suggest that the Sierra de los Valles provides most of the recharge to groundwater beneath the Pajarito Plateau. This finding is based on similarities in isotopic ratios between springs discharging within the Sierra de los Valles and perched-intermediate groundwater and the regional aquifer beneath the Plateau. Recharge from the Valles Caldera to deep groundwater beneath the Pajarito Plateau is not significant. Additional recharge to the regional aquifer occurs along wet canyon bottoms on the Pajarito Plateau.

Measurable activities of tritium observed in springs discharging within the Sierra de los Valles (>10 pCi/L) suggest that a component of groundwater is less than 60 yr old within this recharge zone. Most of the springs discharging within White Rock Canyon, however, do not contain tritium, and the age of groundwater probably ranges between 3000 and 10,000 yr (Vuataz and Goff 1986, 73687).

Major ion chemistry of the regional aquifer varies from west to east across the Pajarito Plateau, from a calcium-sodium-bicarbonate to a sodium-calcium-bicarbonate ionic composition. Most notably, calcite precipitation is observed in regional aquifer groundwater east of the Pajarito Plateau in wells near the Rio Grande. This finding is notable because of higher carbonate and bicarbonate concentrations in groundwaters at the eastern part of the Laboratory that enhance the precipitation of calcite. Total dissolved solids (TDS) generally increase along groundwater flow paths in the alluvium, perched-intermediate zones, and the regional aquifer.

Concentrations of trace elements increase from alluvial groundwater to perched-intermediate zones to the regional aquifer. They also increase from west to east within the regional aquifer as a result of increasing solute residence times and water/rock interactions. Concentrations of natural dissolved uranium are the highest within the regional aquifer, ranging from 0.5 μg/L at Los Alamos to over 1800 μg/L east of the Rio Grande.

3.0 SCOPE OF ACTIVITIES AND METHODS

3.1 Data-Quality Objectives

Before conducting this investigation, the Laboratory used the EPA data-quality objective (DQO) process (EPA 1987, 57589; 1992, 54947; and 1994, 48639), a strategic planning approach for a data collection activity. By using the DQO process, the Laboratory has ensured that the type, quantity, and quality of background hydrogeochemical data and information used in the decision-making process will be appropriate to meet the objective of determining natural background concentrations of inorganic and organic solutes and radionuclides in groundwater.

The DQO process used in this investigation consisted of seven steps, which are described below. The output from each step influences the choices that will be made in the next steps of the DQO process. This process is iterative; therefore, the outputs from one step may lead to reconsideration of previous steps. The DQO process consists of the following: (1) problem definition, (2) data evaluation or decision criteria, (3) data input for the different aquifer types, (4) spatial and temporal boundaries for sample stations, (5) decision rules, (6) uncertainty (statistical testing), and (7) design optimization.

3.1.1 Problem Definition

Adequate data to represent the distribution of solutes and total (suspended and dissolved fractions) concentrations in groundwater that represent background (or pre-Laboratory-induced) conditions are generally lacking before 1997. The ability to distinguish between natural and Laboratory-impacted conditions is essential for assessing data collected during site investigations, establishing cleanup levels, and understanding hydrologic and geochemical processes.

Although the Laboratory, U.S. Geological Survey, DOE, University of New Mexico, and consulting companies have published hydrogeochemical data collected before 1997, there are problems with using these data to represent background groundwater conditions because of issues with consistency. For example, many of the groundwater samples collected by the Laboratory were not filtered before analyses. Subsequently, analytical accuracy and precision vary from sample to sample, depending on the amount of suspended solids.

In 1997, groundwater-quality databases were reviewed in terms of sample collection and preservation, chemistry, hydrogeology, time of sample collection, and completeness and accuracy of reported analytical results. From this evaluation, both analytical and data gaps were identified. Different sample preparation and analytical techniques had been used. Thus, groundwater-quality data collected under different Laboratory programs generally were not directly comparable. Background subsurface databases provided for the former Environmental Restoration (ER) Project before 1997 were generally internally consistent in terms of sample collection, filtering, field preservation, selection of analytes, analytical methods, and precision and accuracy.

Statistical analyses of the pre-1997 groundwater background data considered issues relating to data quality and exploratory data analysis of various sample locations. Only filtered data were evaluated because nonfiltered samples are known to have a positive bias for inorganic chemicals typically found in suspended sediments. High-quality data for major ions are evidenced in the pre-1997 data by the close agreement in the calculated charge balance of anions and cations. In addition, variability of the measurement process through laboratory duplicate samples was measured at ±20% (with one outlier value excluded). The analysis of the pre-1997 samples showed variability between aquifer types (alluvial, perched-intermediate, and the regional aquifer) with concentrations of bicarbonate and TDS being greatest in groundwater samples collected from the regional aquifer (Santa Fe Group and Puye Formation). However, the nonuniform sample intervals and timing of sampling events between locations hinder the use of the pre-1997 data as possible background sample locations. Appendix D provides additional information on geochemical and statistical analyses using the pre-1997 hydrogeochemical data.

Numerous nonfiltered groundwater samples have been collected and analyzed for inorganic chemicals and radionuclides. Analytical results for these samples are not useful because the nonfiltered samples contained suspended particles. When the turbid water samples are acidified with nitric acid at a pH of 2, suspended particles consisting of clay minerals, ferric (oxy)hydroxide, manganese oxide, calcium carbonate, and feldspar partially or completely dissolve. This dissolution results in elevated concentrations of major ions (calcium, magnesium, potassium, and sodium) and trace elements (aluminum, iron, barium, beryllium, manganese, and uranium), which produce false positives in analytical results.

Because of the limited number of background wells completed in the alluvium, Bandelier Tuff, Cerros del Rio basalt, and Puye Formation, background hydrogeochemical data available up to 1997 do not include the full range of natural concentrations for all analytes of environmental concern. Before 1994, very limited background hydrogeochemical data were available for alluvial (well LAO-B) and perched-intermediate aquifers (well LAOI(A)-1.1 and well R-7 [screen #1]). Limited hydrogeochemical data (filtered samples) were collected from selected springs that discharge from the Cerros del Rio basalt (Spring 9B) and hydro (phreatic)-magmatic deposits (Doe Spring) within White Rock Canyon.

For the above reasons, the decision was made in 1997 to establish background hydrogeochemical data sets using wells and springs that are representative of various groundwater bodies along flow paths beneath the Pajarito Plateau.

3.1.2 Data Evaluation Criteria

If analytical results for both filtered and nonfiltered groundwater samples, with turbidity values of less than five nephalometric turbidity units (NTUs), are considered to be free from Laboratory influence and meet the data assessment criteria, then those groundwater data will be considered representative of background conditions. The Laboratory uses quantitative and qualitative approaches to data evaluation, which are supported by statistical analyses and geochemical evaluation. Statistical analyses include outlier assessments and distribution analysis. Geochemical evaluation of the background data includes comparing cation-anion distributions; determining the presence or absence of tritium in relation to recharge and discharge zones; observing the absence of specific Laboratory-derived contaminants, including chlorate, perchlorate, and nitrate; evaluating trace-element geochemistry; and measuring stable isotope ratios of hydrogen, nitrogen, and oxygen.

3.1.3 Data Inputs

The hydrogeologic conceptual model for groundwater beneath the Pajarito Plateau (see Section 2.1.5) indicates that groundwater occurs in three modes: alluvial, perched-intermediate, and the regional aquifer. The groundwater chemistry within each mode varies because of differences in aquifer mineralogy (reactive phases controlling water composition), hydrogeochemical processes, including adsorption/desorption and mineral precipitation/dissolution reactions, source(s) of water, and residence time of groundwater and solutes (Section 2.2). Variations in groundwater temperature are also observed among the three aquifer types, where increasing temperature is observed with depth. Therefore, establishing background conditions requires the data inputs for each mode of groundwater provided in Table 3.1-1. Names and locations of background stations are provided in Table 3.1-2.

3.1.4 Spatial and Temporal Boundaries

Available groundwater-quality data were compiled, and the following specific criteria were applied to identify groundwater beneath the Pajarito Plateau that is not affected by Laboratory operations:

- greater than 60 yr old, based on the activity of tritium, except for alluvial groundwater upgradient from the Laboratory and springs discharging within Sierra de los Valles or within other recharge zones,
- located hydrologically upgradient from the Laboratory or downgradient in areas not containing Laboratory-derived contaminants, and
- generally known mode of groundwater occurrence (alluvial groundwater, perched-intermediate zones, and regional aquifer).

Groundwater quality at two alluvial sampling stations (Pine Spring and well LAO-B) may vary on a seasonal basis, particularly during seasons with greater precipitation that provide input to the hydrologic system. Hydrogeochemical data consist of verified analytical results from both filtered and nonfiltered samples collected on a quarterly basis over a period of 1 to 1.5 yr (6 rounds of sampling). Evaluation of the historical water-quality data suggests that the variability of major ions and trace solutes was greatest in alluvial groundwater because of chemical variability over time with recent recharge from surface water.

3.1.5 Decision Rules

If analytical results for groundwater samples collected from a single mode of groundwater occurrence meet the data assessment criteria, then these data will be included in statistical analyses to establish background distributions for each analyte for that mode of groundwater occurrence.

Steps in the data assessment are as follows:

- Evaluate the sample analytical results for each analyte to determine the overall variability and to verify the hypothesized differences between water sources (alluvial, perched-intermediate, and regional aquifer).
- Within a statistical population, determine if there are any outliers.

- Perform a regression analysis. Standardized residuals from regression analysis of milliequivalent total anions versus milliequivalent total cations for filtered samples should not be greater than ± 5%.
- Assess variability. Variability from laboratory analyses should be small compared to temporal/spatial variability of groundwater samples; a target value is to have less than 25% relative standard deviations from laboratory duplicates.

3.1.6 Uncertainty

Statistical testing is based on a nominal 5% significance level of a 95% confidence level. The power of these tests to detect variability depends largely on the seasonal variation measured at the background sample locations.

3.1.7 Design Optimization

Because groundwater sample locations for background must be defined (i.e., locations must be credible upgradient or in unimpacted areas), a statistical design optimization is not practical. Rather, the available locations were evaluated and selected using expert judgment to encompass geographic and hydrological variation.

Based on the spatial boundary criteria listed in Section 3.1.4, 14 of the 15 sampling stations (excluding Pajarito Spring) represent locations whose groundwater is hypothesized to be unaffected by Laboratory operations (Table 3.1-2). Pajarito Spring was separated from the other sites because of the occurrence of perchlorate and nitrate, based in part on data collected at the spring after 2000. Information on the geologic and hydrologic system at the Laboratory (see Section 2.0) was used to categorize background sampling sites as part of an alluvial system, an intermediate-depth perched system, or a deep regional system (Table 3.1-2). Different criteria were used for the assignment of waters from these sites, depending on whether they came from wells or springs.

Classification of groundwater was based on (1) well depth, (2) hydrogeologic units penetrated, (3) depth to the zone of saturation sampled and observed, or (4) the projected position of the regional water table at that location. Groundwater collected from well LAO-B was considered to be perched in the alluvium because it was the only well penetrating the alluvium upgradient of the Laboratory boundary. Water from well LAOI(A)-1.1 (Guaje Pumice Bed) was assigned to the intermediate-depth perched system because the saturated zone from which it came lies above the projected position of the regional water table. Groundwater samples collected from supply wells Otowi-4 and Guaje-5 were classified as regional groundwater because those wells are only screened in the deep groundwater system.

Classification of spring waters is more difficult because of a lack of subsurface data and information. Several criteria were applied in classification: position relative to the regional water table, geologic material at the spring outlet, hydrologic conditions in the area, height relative to the Rio Grande, and water chemistry. Several springs are within recharge boundaries in the Sierra de los Valles (Water Canyon Gallery, Pine Spring [alluvium], Apache Spring, and upper Cañon de Valle Spring). This hydrologic setting indicates that these groundwaters had relatively short travel or residence times within the volcanic rocks and alluvium. Several springs in White Rock Canyon discharge from the Cerros del Rio basalt (Spring 9B) and from hydromagmatic deposits (Doe Spring) and were assigned to the regional aquifer. Some spring waters discharging from elevations slightly above that of the Rio Grande were also assigned to the regional groundwater system. These springs occur in an area of known artesian conditions and had low tritium activity, suggesting that they have had a long travel time (Sacred Spring, Spring 1, and La Mesita Spring). Pajarito Spring (Spring 4A) discharges from Totavi gravels overlain by slump blocks consisting of Cerros del Rio basalt. Pajarito Spring is considered part of the regional aquifer system. Chemical data collected from Pajarito Spring were not combined with the other springs because nitrate and perchlorate were present. These two tracers are found at lower (background level) concentrations at Doe Spring and Spring 9B.

Although the position of the groundwater divide west of the Laboratory is uncertain, Seven Springs clearly lies west of the divide. Nonetheless, it is included here because it discharges from the Bandelier Tuff and its major ion chemistry is similar to that of well LAOI(A)-1.1. Similarly, La Mesita Spring is also included in this study for geochemical comparison purposes, even though it is located east of the Rio Grande and is not part of the hydrologic system associated with the Pajarito Plateau. Chemical data collected at La Mesita Spring, however, were not combined with the other springs for statistical analyses of the background distribution of chemicals. La Mesita Spring is a stand-alone sampling station with respect to statistical analyses.

The sampling design included an analysis of groundwater samples to characterize both inorganic constituents and radionuclides. Primary inorganic constituents of concern (anions) found in groundwater at the Laboratory include nitrate, chloride, perchlorate, sulfate, and fluoride. Radionuclides observed in groundwater at the Laboratory consist mainly of tritium, strontium-90, cesium-137, uranium-234, uranium-235, uranium-238, plutonium-238, plutonium-239/240, and americium-241. Background level distributions of these anions and radionuclides were determined by sampling:

- springs that discharge east, west, and north of the Laboratory boundary and east of the Rio Grande;
- upgradient characterization/monitoring wells installed by the former ER Project;
- supply wells, characterization wells, and springs that contain concentrations of anions less than those observed in contaminated groundwater; and
- supply wells, characterization wells, and springs downgradient of Laboratory releases that contain concentrations of tritium less than 1 pCi/L and/or activities of fallout-derived radionuclides (strontium-90, cesium-137, plutonium-238, plutonium-239/240, and americium-241) less than detection, except for naturally occurring uranium isotopes.

3.2 Field and Laboratory Analytical Methods

Over the course of this investigation, both the field instrumentation used and the types of groundwater samples collected for chemical analyses varied. From 1997 to 2000, six sampling rounds were completed. Results of field measurements taken at the sampling stations are provided in Table 3.2-1. Most of the groundwater samples were collected in 1997, 1998, and 2000; only a few additional samples were collected in late 1999. During 1998 and early 2000, supply well Guaje-5 was not available for sampling because the well was taken offline for pump repair; in 2000, supply well Otowi-4 was not available for sampling for the same reason. The following laboratories collected groundwater samples for chemical and radiochemical analyses:

- Los Alamos National Laboratory’s Earth and Environmental Sciences-6 (EES-6) geochemistry laboratory for general aqueous geochemistry (1997 through early 2000, five sampling rounds);
- University of Miami for low-level tritium analyses (1997 through 2000, six sampling rounds);
- Teledyne for tritium analyses (1998, two sampling rounds);

- Paragon Analytics, Inc., for radionuclides using both different analytes and different methods (1997 through 1998, three sampling rounds) and general aqueous geochemistry analyses (1998 through 2000, four sampling rounds);
- Huffman Laboratory for DOC fractionation analyses (1997 through 1998, three sampling rounds);
- Western Michigan University for stable isotope analyses of δD and $\delta^{18}O$ (1997 through 1998, four sampling rounds);
- Geochron Laboratory for stable isotope analyses of δD and $\delta^{18}O$ (1999 through 2000, two sampling rounds);
- General Engineering Laboratories (GEL) for selected trace elements (1999 through 2000, two sampling rounds); and
- Coastal Sciences Laboratory for $\delta^{15}N$ isotopes (late 1998 to 2000, two sampling rounds).

3.2.1 Field Methods

In general, most groundwater samples were collected in plastic bottles. Samples collected for stable isotope and DOC fractionation analyses were collected in clear and brown glass bottles, respectively. Samples for DOC fractionation were filtered through 0.45 μm silver filters to inhibit microbial degradation of organic carbon. Other filtered samples were processed using 0.45 μm acetate filter membranes. Before 1998, a hand-operated vacuum pump was used to filter groundwater samples. The samples were filtered on-site immediately following collection or within 6 hr of the collection time. In 1998 and subsequent sampling rounds, the field team used a battery-operated vacuum pump to filter the water. A sample duplicate was collected in the field for every five primary samples. The field duplicate samples were separate aliquots collected during the same sampling event for a location. Total carbonate alkalinity was determined in the laboratory using standard titration techniques within 48 hr of sample collection.

Groundwater samples were either preserved with ice at 4°C or using concentrated HNO_3 or concentrated H_2SO_4. The pH of acidified samples (metals, nitrogen isotopes, nitrate plus nitrite, and radionuclides excluding tritium) was lowered by the drop-wise addition of acid to a pH of <2. Care was taken to avoid the trapping of air in the nonacidified samples.

The field parameters recorded for each of the fifteen sampling stations included pH, temperature (°C), specific conductance (μS/cm), and turbidity (NTU). Appendix A provides the field-measured parameters taken at each sampling station and the sampling dates. In 1997, a Horiba meter was used to determine pH, conductivity, and turbidity. The meter was calibrated daily, according to manufacturer specifications, using Autocal solution. Temperatures were measured using a Fluke 52 K/J thermometer and probe.

After 1997 the field instrumentation changed. For the remainder of the investigation, an Orion temperature-compensated pH meter was used for temperature and pH. The meter was calibrated daily using three buffer solutions (pH = 4.01, 7.00, and 10.01). Specific conductance was measured with two Hanna temperature-compensated conductivity meters. The meters were calibrated at the beginning of the field season. The calibration was rechecked, and if necessary, corrected during the field season if discrepancies between the two meters occurred. Turbidity was measured with a Hach turbidmeter calibrated at the beginning of the field season. Over the course of the study, pH for a few samples was measured using limited-range pH indicator strips.

The Orion meter has a resolution of 0.01, and accuracy is reported as ±0.01 for pH. Temperature resolution and accuracy are 0.1°C and ±1.0°C, respectively. The Hanna conductivity meters have a resolution of 10 μS/cm, and accuracy is reported as ±40 μS/cm. The Hach turbidmeter has a resolution of 0.1 NTU below 100 NTU and an accuracy of ≤5% of the reading or ±0.1 NTU, whichever is greater.

Water samples at springs were generally collected through a funnel-tubing system that allowed for minimal disturbance of the bottom sediments. The funnel was placed in the spring, and the tubing was extended downhill. Sufficient time was allotted to allow the bottom sediments in the spring to settle and for the apparatus to be rinsed. The sample water was then collected from the end of the tubing. In some locations the spring consists of a deep basin with a seep-like outflow. These waters were collected by dipping a beaker into the pool, or in later samples, by pumping the water directly from the spring to the sample container. Except for turbidity measurements with the Hach meter, field parameters were collected by placing the individual meters directly into the pool of spring water. Samples collected for turbidity measurements using the Hach meter were dipped from the pool of water and were placed into a sample measurement cell.

Groundwater samples collected from supply wells Guaje-5 and Otowi-4 were collected from a spigot or from tubing connected in line with the pump. Groundwater pumped from the supply wells was collected after running the water for five minutes. Groundwater from wells LAO-B and LAOI(A)-1.1 was collected after removing at least three well volumes of groundwater to determine the field parameters had stabilized. At these wells, the field parameters were measured at 5-gal. intervals. Field parameters for all the wells were measured in a bucket filled with the well water.

3.2.2 Analytical Methods

Paragon Analytics, **Inc.**, also analyzed groundwater samples collected as part of this investigation. Paragon used standard techniques specified by the U.S. Geological Survey (USGS 1989, 88749), the American Public Health Association (American Public Health Association 1985, 88769), the Annual Book of ASTM Standards (ASTM 1988, 68413), and EPA method SW-846 (EPA 1987, 31732). Ion chromatography (IC) was the method used by Paragon to determine concentrations of bromide, chloride, fluoride, oxalate, nitrate, nitrite, phosphate, and sulfate in the water samples. Concentrations of aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silicon, silver, sodium, strontium, thallium, vanadium, and zinc were determined by inductively coupled plasma atomic (optical) emission spectroscopy (ICPAES). Colorimetry was used to analyze for total cyanide. Cold-vapor atomic absorption (CVAA) was used to analyze for mercury. Inductively coupled plasma mass spectrometry (ICPMS) was used to analyze for antimony, beryllium, cadmium, lead, thallium, and uranium for two sampling rounds (December 1999 and January 2000, and March and April 2000).

Paragon Analytics, Inc. performed radiochemical analyses on water samples. The methods used included laser-induced kinetic phosphorimetric analysis (LIKPA) for uranium; alpha spectrometry for americium-241, plutonium-238, plutonium-239/240, uranium-234, uranium-235, and uranium-238; gamma spectrometry for cesium-137, and other gamma-emitting isotopes; and gas proportional counting for strontium-90.

GEL analyzed groundwater samples collected in late 1999 and 2000 for antimony, beryllium, cadmium, lead, thallium, and uranium using ICPMS. Detection limits for these analytes generally range from 0.1 to 0.5 μg/L.

Huffman Laboratories performed DOC fractionation analyses using an in-house, EPA-modified method based on physical separation. This method consists of separating hydrophilic (acid, base, and neutral groups) from hydrophobic functional groups (acid, base, and neutral groups). This analysis method provides information on the distribution of naturally occurring organic compounds, including fulvic and humic acids (hydrophobic groups) and small molecular-weight organic compounds (hydrophilic groups).

Groundwater samples were also analyzed for inorganic chemicals at **EES-6** using additional techniques specified in EPA SW-846 (EPA 1987, 31732). Ion chromatography was used for determining concentrations of bromide, chloride, fluoride, nitrate, nitrite, oxalate, phosphate, and sulfate. EES-6 used graphite furnace atomic absorption (GFAA) in determining concentrations of cadmium, cesium, chromium, cobalt, copper, lead, molybdenum, nickel, rubidium, silver, thallium, and tin in the groundwater samples. Hydride atomic absorption (HAA) was used for measuring arsenic, antimony, and selenium concentrations in the samples. Mercury analysis was done by the CVAA method. ICPAES was the method used for determining concentrations of aluminum, barium, beryllium, boron, calcium, iron, lithium, magnesium, manganese, potassium, silicon, sodium, strontium, titanium, vanadium, and zinc in the groundwater samples. An ion-specific electrode (ISE) was used to measure ammonium concentrations in the samples.

The **University of Miami** performed tritium analyses using direct counting for tritium and electrolytic enrichment for low-level tritium (less than 3.2 pCi/L) . **Teledyne** performed tritium analyses using direct counting and/or liquid scintillation (300 pCi/L).

Stable isotopes of oxygen (oxygen-18 and oxygen-16, $\delta^{18}O$) and hydrogen (deuterium and hydrogen, δD) were analyzed by **Western Michigan University** (WMU) and **Geochron Laboratories,** Cambridge, Massachusetts, using isotope ratio mass spectrometry (IRMS). Stable isotopes of nitrogen (nitrogen-15 and nitrogen-14, $\delta^{15}N$) were analyzed at **Coastal Sciences Laboratories, Inc.**, Austin, Texas.

3.2.3 Analytes of Interest

Field parameters, major ions, neutral species, trace elements, DOC fractionation, stable isotopes, and radionuclides measured or analyzed as part of this investigation are provided in Table 3.2-2.

3.3 Scope of Groundwater Background Investigations in Time and Space

This subsection presents an overview of the fifteen sampling stations selected for the groundwater background investigations from 1997 to 2000. More detailed information is provided in Appendix E, including the sampling station name, location, land ownership, geologic setting, and a brief site description for each site. The sampled locations included four wells and eleven springs. Sample locations are shown in Figure 1.2-1.

Seven Springs is included as part of this investigation although it is separated from the Pajarito Plateau. This spring is located west of the recharge area for the Pajarito Plateau, but its major ion chemistry is similar to well LAOI(A)-1.1. Seven Springs and LAOI(A)-1.1 discharge and are completed, respectively, within the Otowi Member of the Bandelier Tuff and the Guaje Pumice Bed. Seven Springs discharges from the west side of Calaveras Canyon, about 400 m upstream of State Highway 126 and west of the Valles Caldera on the Jemez Plateau. There are several springs in the immediate vicinity; some discharge from alluvium and others from outcrops of densely welded rhyolite tuff. Samples were taken from the largest spring.

3.3.1 Springs within the Recharge Zone

Springs in the recharge area west of and upgradient of the Laboratory include Apache Spring, upper Cañon de Valle Spring, Pine Spring, and the Water Canyon Gallery. Apache Spring issues in the southern Sierra del los Valles (Figure 1.2-1). The spring discharges from colluvium consisting of blocks of the Tshirege Member of the Bandelier Tuff and Tschicoma Formation dacite in a matrix of volcanic sand and soil.

Upper Cañon de Valle Spring issues about 2.4 km west of State Highway 501. The spring is situated about 20 m above the bottom of upper Cañon de Valle in the Tshirege Member of the Bandelier Tuff. At this location, it appears that the Tshirege Member fills preexisting topography in the vicinity of the spring because downstream are major outcrops of preexisting Tschicoma Formation dacite.

Water Canyon Gallery is an improved spring occurring in the north branch of uppermost Water Canyon, about 1.3 km west of State Highway 501 and just west of the Pajarito Plateau. The spring issues from a tunnel that extends into a cliff of densely welded ignimbrite of the Tshirege Member of the Bandelier Tuff.

Pine Spring is located in upper Garcia Canyon about 6 km north of Los Alamos. Pine Spring discharges within the alluvium on the downthrown side of a north-south-trending fault juxtaposing boulder-bearing sediments of the Puye Formation (to the west) against mafic-to-intermediate composition lavas and overlying Puye deposits (to the east) (Smith et al. 1970, 09752; Kempter and Kelley 2002, 88777).

3.3.2 Sampling Stations on the Pajarito Plateau

Wells LAOI(a)-1.1 (intermediate-perched system), LAO-B (the only well completed in the alluvium), Otowi-4 (regional aquifer), and Guaje-5 (regional aquifer) are positioned along the regional flow path downgradient from the recharge zone for the Pajarito Plateau (Figure 1.2-1).

Well LAOI(a)-1.1 is an observation well that was drilled in upper Los Alamos Canyon in 1994. It is screened within a perched zone in the Guaje Pumice Bed at the base of the Otowi Member of the Bandelier Tuff. Perched intermediate groundwater at the well occurs at a depth of 94.5 m.

Well LAO-B is an observation well drilled into valley-fill alluvium in upper Los Alamos Canyon west of the Laboratory boundary. The groundwater occurs within alluvium.

Guaje Canyon Well G-5 was completed in May 1951 to a depth of 608.8 m (Purtymun 1995, 45344) and was reliably used as a water supply well until it was plugged and abandoned in 1998. The initial static water level was 125 m below surface but through time the water level has descended as a result of production and drawdown (148 m in 1991). The production rate was about 1960 L/min. The screened interval and production horizon of the well were entirely within the Santa Fe Group.

Otowi-4 is a water supply well in Los Alamos Canyon that was completed to a final depth of 788.1 m in March 1990 (Stoker et al. 1992, 12017). Aside from a section of Miocene basalts, the screened interval at Otowi-4 is entirely within older fanglomerates from 340-m to 785-m depth.

3.3.3 Sampling Stations within the Discharge Zone

Six springs are located within the discharge zone for the regional system. These include Spring 9B, Doe Spring, Spring 1, Pajarito Spring, Sacred Spring, and La Mesita Spring (Figure 1.2-1).

Spring 9B issues from the bottom of a basaltic lava flow on the northwest side of White Rock Canyon, roughly 200 m downstream of the mouth of Chaquehui Canyon. It is located in hydromagmatic deposits and flows of the Cerros del Rio volcanic field. The spring is about 25 m above the Rio Grande. Doe Spring is located in these same hydromagmatic deposits. It flows from lower Chaquehui Canyon, about 30 m above the canyon floor. Both springs discharge from the regional aquifer.

Spring 1 issues from a small bench about 40 m above the northeast side of the Rio Grande and about 1.5 km downstream of the Otowi Bridge. The bench occurs within a landslide complex made up of a variety of sediment types within the Santa Fe Group.

Pajarito Spring (Spring 4A of Purtymun 1995, 45344) issues from near the base of a landslide block in White Rock Canyon about 0.4 km west of the Rio Grande. This spring discharges from the regional aquifer. There are actually several discharge points for the spring, which collect to form a small creek. Rocks in the discharge channel of the spring consist primarily of Cerros del Rio basalt and minor rounded cobbles of quartzite, chert, and other lithologies. Parts of the matrix and fragments resemble lithologies in the Santa Fe Group.

Sacred Spring is a pool about 10 m in diameter located about 0.5 km north of the junction of State Highways 4 and 30 and about 100 m east of State Highway 30. Sacred Spring issues from unconsolidated sedimentary rocks of the Santa Fe Group.

La Mesita Spring is an outlier and is located in the discharge zone for the regional aquifer east of the Rio Grande. La Mesita Spring has been included in this investigation for geochemical comparison purposes. Statistical analyses from this spring, however, are not included with the other regional aquifer sampling stations because of its location and unique natural water chemistry. Groundwater representative of La Mesita Spring and wells at San Ildefonso Pueblo are characterized by higher concentrations of solutes, most notably of sodium, calcium, bicarbonate, and uranium, compared to supply wells on the Pajarito Plateau. La Mesita Spring issues on the northwest side of Buckman Mesa (La Mesita) about 500 m downstream of the Rio Grande Otowi Bridge. The uppermost source of water is about 20 m above river level. All rocks in this area consist of coalesced landslides (Dethier 1997, 49843). Older rocks within the landslides consist of unconsolidated sedimentary deposits of the Santa Fe Group. Along ridge crests, these older sediments are covered with coarse-grained gravels of the ancestral Rio Grande. Draperies of these gravels and basalt blocks derived from the Cerros del Rio volcanic field cover these slopes.

4.0 RESULTS

4.1 Sample Collection, Preparation, and Evaluation

The objective of this section is to describe methods of data validation conducted on groundwater samples collected during this investigation. Data validation considered holding times, experimental bias, and accuracy and precision of data.

The collection process consisted of taking filtered and nonfiltered groundwater samples at each of the 15 stations in up to 6 sampling rounds. One duplicate sample (filtered) was also collected per five groundwater samples for each sampling event. Groundwater samples analyzed for major cations, trace elements, metals, and radionuclides were either filtered through a 0.45-μm membrane or not filtered before sample preservation with concentrated nitric acid. Anion analyses, including sulfate, chloride, bromide, and fluoride, were performed on nonpreserved filtered and nonfiltered groundwater samples. Filtered samples were analyzed for DOC and DOC fractionation.

Chemical and radiochemical analyses performed by external contract laboratories (Paragon Analytics, Inc., Huffman Laboratories, and the University of Miami) are listed in Table 4.1-1. Paragon Analytics, Inc. also performed analyses for bicarbonate and anions using EPA methods (EPA 1987, 31732). In addition, Paragon Analytics, Inc. sent samples to a subcontractor laboratory, Huffman Laboratories, for DOC, DOC fractionation (humic acids), and dissolved silica analyses. These analyses were carried out using methods specific to the type of analysis (see Section 3.2.2). The external laboratory followed the

Environmental Restoration (ER) Project statement of work (SOW) (LANL 1995, 49738) for quality control (QC) of sample analyses for holding time and sample preservation, storage, and preparation.

Additional chemical analyses were provided by EES-6. Table 4.1-2 provides information on analytes, analytical instruments, EPA method numbers, and instrument detection limits (IDLs).

Analytical results of inorganic analytes were evaluated using the Laboratory QC data reported for laboratory blanks, laboratory duplicates, laboratory spike samples, laboratory control samples (LCSs), and calibration samples.

The data-validation process consisted of conducting a systematic baseline review followed by a more focused validation. Analytical results for trace metals and uranium (analyzed by LIKPA) were evaluated by following procedures identified in the ER Project baseline data validation standard operating procedure. This procedure applies a subset of the National Functional Guidelines for data review (EPA 1994, 48639; EPA 1994, 48640). The EPA National Functional Guidelines were also used to define the review conducted for the focused validation described in this section. The baseline validation used only the data reported by the laboratory on the forms provided as part of the deliverable, but the focused validation used the much more detailed information of the raw data provided by the laboratory. The focused validation included checks for sample-specific QC results, but the baseline validation applied QC results on a more global basis. The National Functional Guidelines (EPA 1994, 48639; EPA 1994, 48640) were applied as closely as possible to the anion, bicarbonate, dissolved silica, and total uranium analyses although these methods are not specifically covered by the guidelines.

4.1.1 Results of Data Validation

The results for all analyses were accepted as qualified except for several metals and anions associated with water samples collected in February 1998 and reported by Paragon Analytics, Inc. Analytical results for specific metals were rejected because of interferences indicated in the preparation blank analyses, (discussed further in this section). The results for several anions were rejected because the samples were analyzed after the 48-hr holding time for nitrate, nitrite, and orthophosphate. The holding time problems are discussed further in Section 4.1.2.

4.1.1.1 Trace Element Analyses

Groundwater samples were all prepared and analyzed following the EPA Contract Laboratory Program (CLP) SOW ILM 03.0 (EPA 1994, 48640). Technical holding times were met for all trace metal analyses. Analytes and IDLs for the trace elements and metals provided by Paragon Analytics, Inc. are given in Table 4.1-3.

The bias of the trace-element measurements was evaluated by the concurrent analysis of preparation and calibration blanks. There were several analytes detected above the IDL in several of the blanks reported by Paragon Analytics, Inc. in February 1998. Following the criteria given in the National Functional Guidelines for data review (EPA 1994, 48639), the results for these analytes were qualified as nondetected (“U”) because the reported sample results were less than five times the greatest amount found in an associated blank. In addition, several analytes were detected at a negative amount in the preparation blanks analyzed. Selected trace elements were detected in the blanks at levels that were negative (relative to the initial calibration) and greater in absolute value than the amounts detected in samples in the same batch. Following the criteria given in the National Functional Guidelines for Data Review (EPA 1994, 48639), the results for these analytes were qualified in one of two ways:

- The results were rejected (qualified with an "R") when the reported sample results were less than the estimated detection limit or less than the absolute value of the amount found in the blank, or
- The results were qualified as estimated with a potential low bias (qualified with a "J") when the reported sample results were greater than the absolute value of the amount found in the preparation blank, but less than five times the absolute value of the amount found in the preparation blank.

Rejected analytical results occurred for 36 groundwater samples, consisting of 47 analyses of aluminum (7 analyses), beryllium (1 analysis), copper (7 analyses), lead (1 analysis), manganese (8 analyses), mercury (21 analyses), and zinc (2 analyses), collected during February, April, July, September, and October 1998 (Paragon Analytics, Inc.).

The bias of the trace-element measurements was also assessed by analysis of matrix spike samples. All spike recoveries were acceptable with no apparent bias for all trace-metal analytes that were spiked into the water matrices.

The accuracy of the trace-element measurements was checked by the concurrent analysis of aqueous LCSs. Results for individual samples were qualified on the basis of the LCS analyzed in the same batch according to the criteria given in the National Functional Guidelines (EPA 1994, 48639). No data qualifiers were added to the sample results on the basis of the LCS recoveries.

The precision of the inorganic measurements was assessed by the analysis of laboratory duplicate samples. The results for one laboratory duplicate sample were reported for each batch in the data set. The relative percent differences (RPDs) for duplicate measurements of the target analytes were acceptable, and no results were qualified with deficiencies of laboratory-induced errors based on the duplicate sample analyses. The analytical data are useable as qualified by this process.

4.1.1.2 Anion and Bicarbonate Analyses

Groundwater samples were prepared and analyzed following EPA Method 310.0 for bicarbonate using titration and EPA Method 300.0 for anions using ion chromatography. Technical holding times were met for all analyses except nitrite, nitrate, and orthophosphate collected during February 1998, which were analyzed by Paragon Analytics, Inc. outside the 48-hr holding time. The results for these analytes were rejected for use (qualified "R") because of the missed holding times and because the concentrations of nitrite, nitrate, and orthophosphate are affected by the length of holding times. Sample duplicates were collected and analyzed within appropriate holding times by EES-6 in February 1998, and these results were used for data analysis and interpretation.

The bias of the anion measurements was evaluated by the concurrent analysis of blanks. Interference for orthophosphate was detected above the MDL in some of the blanks associated with several water samples collected in February 1998. The laboratory raised the detection limit for the affected samples to 0.2 mg/L so the interference would not be detected in the blank. The results were not qualified for blank contamination because orthophosphate was then not detected in the affected samples.

The accuracy of the anion and bicarbonate measurements was monitored by the concurrent analysis of aqueous LCSs. Results for individual samples were evaluated on the basis of the LCS analyzed in the same batch, according to the criteria given in the National Functional Guidelines (EPA 1994, 48639). No data qualifiers were added to the sample results on the basis of the LCS recoveries.

The precision of the anion and bicarbonate measurements was assessed by the analysis of laboratory duplicate samples. The results for one laboratory duplicate sample were reported for each batch in the data set. The RPDs for duplicate measurements of the target analytes were acceptable, and no results were qualified based on the duplicate sample analyses. The analytical data are useable as qualified by this process unless the results were rejected as described above.

4.1.1.3 Dissolved Silica Analyses

Groundwater samples were prepared and analyzed following the EPA Method 370.1 for silica analyses. The analyses were conducted using colorimetry. Technical holding times were met for all analyses. The bias of the dissolved silica measurements was monitored by the concurrent analysis of blanks. No problems were noted with the blanks.

The accuracy of the dissolved silica measurements was assessed by the concurrent analysis of aqueous LCSs. Results for individual samples were qualified on the basis of the LCS that was analyzed in the same batch, according to the criteria given in the National Functional Guidelines (EPA 1994, 48639). No data qualifiers were added to the sample results on the basis of the LCS recoveries.

The precision of the dissolved silica measurements was assessed by the analysis of laboratory duplicate samples. The results for one laboratory duplicate sample were reported for each batch in the data set. The RPDs for duplicate measurements of the target analytes were acceptable, and no results were qualified based on the duplicate sample analyses. The analytical data are useable as qualified by this process.

4.1.1.4 Uranium Analyses

Groundwater samples were prepared and analyzed for uranium following an external laboratory procedure (Paragon Analytics, Inc.). The analyses were conducted using LIKPA methods. Technical holding times were met for all analyses. The bias of the total uranium concentration measurements was monitored by the concurrent analysis of blanks. No problems were noted with the blanks.

The accuracy of the total uranium measurements was assessed by the concurrent analysis of aqueous LCSs. Results for individual samples were evaluated on the basis of the LCS that was analyzed in the same batch, according to the criteria given in the National Functional Guidelines for data review (EPA 1994, 48639). No data qualifiers were added to the sample results on the basis of the LCS recoveries.

The precision of the total uranium measurements was assessed by the analysis of laboratory duplicate samples. The results for one laboratory duplicate sample were reported for each batch in the data set. The RPDs for duplicate measurements of the target analytes were acceptable, and no data qualifiers were added to the results, based on the duplicate sample analyses. The analytical data are useable as qualified by this process.

4.2 Statistical Analyses of 1997 to 2000 Groundwater Data

This section provides results of statistical analyses of a comprehensive database of organic and inorganic chemical, stable isotope, and radionuclide analyses of 566 groundwater analyses from 196 samples collected from 15 springs and wells located in and around the Laboratory. The region considered in this investigation extends from the western edge of the Jemez Mountains eastward to the Rio Grande and from Frijoles Canyon northward to Garcia Canyon. Figure 1.2-1 shows the fifteen stations sampled for this investigation. The sampling stations, associated aquifer types, and coordinated formations are summarized in Table 4.2-1. La Mesita Spring and Pajarito Spring were not included with the other sampling stations for statistical analyses because La Mesita Spring represents a different hydrologic system (Rio Grande Valley) with its unique water chemistry, and Pajarito Spring (Spring 4A) contains nitrate (as nitrogen) (1 mg/L) and perchlorate (0.5 µg/L) concentrations that are greater than the other background sampling stations.

4.2.1 Statistical Methods and Results

4.2.1.1 Statistical Methods

Several data-preparation steps were needed before statistical analyses could be performed on the water chemistry data. First, the data were subjected to a systematic data validation (see Section 4.1.1). Second, the data were inspected for suspect values that were exceptionally high or low relative to the rest of the data. All analytical data, excluding low-level tritium and DOC fractionation, were the subject of focused data validation (also reported in Section 4.1.1). Third, the data qualifiers were reviewed, and any data identified as R-qualified were not used in statistical analyses. Fourth, nondetected sample results were noted. Nondetected sample results were typically reported as less than (<) the IDL for that chemical. Values reported as nondetected by the analytical laboratory were replaced by both the detection limit and one-half of the detection-limit value for statistical analyses. This replacement method is recommended by the EPA when the frequency of nondetected values is relatively low (EPA 1992, 54947).

Analytical suites, field parameters, and sampling dates for the background stations are provided in Appendix A. Sample results and data qualifiers based on systematic and focused validation for inorganic analytes and radionuclides are provided in Appendix B. Sample results and data qualifiers for other analytes (water-quality parameters and stable isotopes) are also provided in Appendix B.

The data were reviewed to identify laboratory-reporting or analysis errors. During this review process, two uranium results for samples collected on December 16, 1999, were found to be inconsistent between methods and with other uranium results for the locations sampled. Uranium results (using ICPMS) for sample numbers CABG-99-0006 (La Mesita Spring) and CABG-99-0007 (Sacred Spring) appeared to have been switched. Table B-1.2 has been corrected to place the samples under the correct spring location, as indicated above.

The statistical analysis of the background data involves several exploratory data analysis (EDA) tools, including normal quantile plots of untransformed data, box plots to compare possible data groups, linear regression analysis and scatterplots, and statistical data summaries. The purpose of EDA is to identify possible outliers in these data, understand relationships between analytes, evaluate parametric and nonparametric statistical modeling options, and determine the frequency of nondetect values by analyte and by potential data subpopulations. Four types of data plots were made, as explained below.

Normal quantile plots: A normal quantile plot is a particular type of quantile plot in which the data set concentrations are plotted in increasing order and spread out in a manner that allows comparison of their distribution to that of a theoretical distribution: the standard normal distribution. The quantiles of the data set (y-axis) are plotted against the quantiles for a standard normal (x-axis). The quantiles of a standard normal (i.e., a normal with a mean = 0 and a standard deviation = 1) are those for the theoretical distribution and can be found in published tables of the cumulative normal distribution. For example, the 50th quantile is 0, the 90th quantile is approximately 1.282, the 95th quantile is about 1.645, etc. If the data are derived from a normal statistical distribution, the points in the plot will lie close to the diagonal straight line overlying the data points. The subsets of the data set that differ the most from those expected from a normal distribution are seen as points straying from the line.

Box plots: Box plots are used to show differences between two or more sample locations or other data groupings. Box plots summarize information about the shape and spread of the distribution of concentrations for an analyte. Box plots consist of a box and a (median) line across the box. The *y*-axis displays the observed concentrations in the reported units. The area enclosed by the box shows the concentration range containing the middle half of the data; that is, the lower box edge is at the 25th percentile and the upper box edge is at the 75th percentile. The height of the box is a measure of the spread of the concentrations. The horizontal line across the box represents the median (50th percentile) of the data, a measure of the center of the concentration distribution. If the median line divides the box into two approximately equal parts, the shape of the distribution of concentrations is symmetric; if not, the distribution is skewed or nonsymmetrical. All concentrations are plotted as points overlying the box plot.

Regression analysis and scatter plots: Regression analysis provides a measure of the association between pairs of variables. An *x-y* scatter plot is used to graphically depict this relationship. Linear regression analysis provides a measure of the degree of fit (coefficient of determination or r^2) and the slope/intercept of the least-squares linear model. The coefficient of determination can potentially range between 0 and 1. A coefficient of determination of zero indicates no relationship between the two measurements, and a coefficient of determination of 1 indicates a linear relationship between the measurements.

Scatter plot matrix: The scatter plot matrix is used to illustrate the relationship between more than two measurements. The scatter plot matrix shows the paired sample results, and the ellipse shown on each scatter plot encloses 95% of the data. Cases where the ellipse approaches a line indicate a highly significant statistical correlation between measurements.

4.2.1.2 Statistical Results

Results of statistical analyses, including minimum, mean, median, maximum, one sigma (standard deviation) error, and percent coefficient of variation, number of samples, number of rejected samples, and number of nondetected values for alluvial groundwater, volcanic perched groundwater, and the regional aquifer are provided in Tables 4.2-2a through 4.2-2g; 4.2-3a through 4.2-3g; 4.2-4a through 4.2-4g; 4.2-5a through 4.2-5g; and 4.2-6a through 4.2-6g. Table 4.2-2b provides results of statistical analyses for alluvial groundwater (well LAO-B and Pine Spring), Tables 4.2-3a through 4.2-3g provide results for perched-intermediate groundwater (Apache Spring, Seven Springs, Water Canyon Gallery, upper Cañon de Valle, and well LAOI(A)-1.1), and Tables 4.2-4a through 4.2-4g provide results for the regional aquifer (wells Otowi-4 and Guaje-5 and Doe Spring, Spring 9B, Sacred Spring, and Spring 1). Pajarito Spring (Tables 4.2-6a through 4.2-6g) and La Mesita Spring (Tables 4.2-5a though 4.2-5g) are analyzed and summarized separately.

Statistical results for both filtered and nonfiltered samples are provided in Tables 4.2-2a through 4.2-2g, 4.2-3a through 4.2-3g, 4.2-4a through 4.2-4g, 4.2-5a through 4.2-5g, and 4.2-6a through 4.2-6g. They include pre- and post-1997 analytical results (combined and separate) using 0.5 and 1.0 detection limits. Several analytes, including antimony, beryllium, cadmium, lead, thallium, and uranium, had high IDLs, which increase the mean, median, maximum, standard deviation, and coefficient of variation for the pre-1997 data. For these reasons, the post-1997 data are also included separately because the IDLs for several analytes are lower using more advanced instrumentation. During the period from 1997 to 2000, the background locations were sampled during six sampling events to provide equal information over time at each location. The intended goal was to characterize background concentrations; therefore, analytical methods with low IDLs were specified. Figures B-1 through B-17 in Appendix B of this report present the concentration results over time for all analytes. The plots illustrate the improvement of detection limits for analytes with large pre-1997 IDLs and show the relative consistency attained, beginning in 1997. The post-1997 analytical results are more representative of background concentrations within the three aquifer types. Table 4.2-2e (Alluvial GW), Table 4.2-2e (alluvial groundwater), Table 4.2-3e (perched-intermediate volcanic rock), and Table 4.2-4e (regional aquifer) are recommended for evaluating the statistical properties of background concentrations of solutes within the three aquifer types. They also provide a more conservative approach for establishing background concentrations in groundwater.

Analytical results for major ions and trace elements reported by EES-6 and Paragon Analytics, Inc. have been combined for each analyte. This data summary includes the field duplicate samples collected during the investigation and the three samples collected by NMED. Tables 4.2-2a through 4.2-2g; 4.2-3a through 4.2-3g; 4.2-4a through 4.2-4g; 4.2-5a through 4.2-5g; and 4.2-6a through 4.2-6g list summaries for 111 analytes. The detection frequency for water chemistry analytes varies greatly from 0% to 100%. The background concentrations of antimony and cadmium with <20% detection rate were evaluated by considering minimum values, including the detection limit and half the detection limit. Beryllium, cadmium, cobalt, lead, selenium, silver, and thallium were typically not detected in the background water samples.

4.2.1.2.1 Evaluation of Field Duplicate Samples

As a quality assessment measure for the investigation, field duplicate samples were collected and submitted for analysis to contract analytical laboratories or the EES-6 analytical laboratory. Field duplicate samples provide a measure of the variability within a sampling event (sample collection and preparation) and analytical laboratory measurement variability.

The differences between field duplicate measurements for all water-chemistry analytes were assessed by comparing concentrations for samples noted as “duplicate” and “sample” in Appendix B. Fifteen analytes were selected as representatives of the more frequently detected analytes. A comparison of field duplicates to the original sample for these analytes is provided in Figure 4.2-1.

The scatter plots in Figure 4.2-1 illustrate that field duplicate sample results are identical, or nearly identical, to the original sample result for most of these analytes. The field duplicate sample results were also unbiased, as shown by the linear regression slope being close to or equal to 1.0 and the intercept being close to 0.0. The coefficient of determination (r^2) also illustrates the strong agreement of field duplicate results to original sample results.

Ammonium provides an example of the variability observed for less frequently detected analytes. Although a strong relationship occurs between the field duplicate results and the original sample results, more variation is evident on the ammonium scatter plot (Figure 4.2-1). Infrequently detected analytes tend to have more sample results near the IDL, which is a concentration range associated with greater variability in the laboratory measurement process. Thus, reported values for infrequently detected analytes need to be evaluated more carefully for use as background (no Laboratory impact) concentrations.

4.2.1.2.2 Comparison of Results by Analytical Laboratory and Method

For this investigation, sample results from the contract analytical laboratories were compared to the EES-6 analytical laboratory as another quality-assurance (QA) measure. The laboratories used different analytical methods for some analytes (e.g., uranium, tritium, and trace metals).

Contract and EES-6 analytical laboratory sample results for seven inorganic chemicals and six water-quality parameters (anions, cations, silica, and TDS) were compared. These analytes were selected based on the number of samples submitted to each laboratory and the detection frequency. Selection preference was given to analytes detected by both EES-6 and the contract laboratory so that measured values were compared rather than IDLs.

Charge balance errors calculated from groundwater samples analyzed at the EES analytical laboratory range from -3% to +61%. About 87% of the charge balance errors are within the EPA-recommended value of ±10%. The anomalous charge balance error of +61% occurs for a filtered water sample collected from the upper Cañon de Valle Spring.

Reporting limits and analytical methods provided by EES and Paragon Analytics, Inc. are shown in Table 4.2-7. The EES-6 laboratory generally provides additional analytes with lower reporting limits using atomic absorption (AA) methods (including GFAA and HAA) as compared to Paragon Analytics, Inc., using ICPAES. Paragon Analytics, Inc. generally reports concentrations of calcium, iron, and strontium above reporting limits, but concentrations of antimony, arsenic, beryllium, boron, cadmium, chromium, lead, mercury, molybdenum, selenium, silver, and tin are less than detection (U-qualified sample results are provided in Appendix B).

Concentrations of aluminum, barium, copper, manganese, nickel, thallium, titanium, vanadium, and zinc are generally detected, but sometimes they are below the limits of quantification or reporting limits (J-qualified sample results). Concentrations of chloride, sulfate, bicarbonate, calcium, magnesium, sodium, and potassium reported by EES-6 and Paragon Analytics, Inc. are in good agreement and are also within experimental error. The reporting limits are sample specific, depending on matrix interferences and the general nature of the groundwater sample.

The results of this comparison indicate that the analytical results from the EES-6 analytical laboratory are comparable to the values reported by the contract analytical laboratories (Figure 4.2-2). Results for barium, calcium, magnesium, potassium, and chloride are nearly identical between the EES-6 and contract analytical laboratories, as illustrated by the scatter plots for these analytes (Figure 4.2-2). The linear regression statistics for barium, calcium, potassium, magnesium, chloride, and nitrate are close to the ideal slope of 1.0, intercept of 0.0, and coefficient of determination of 1.0. Greater variability is seen for the between-laboratory comparisons (EES-6 and Paragon Analytics, Inc.) for selected analytes (e.g., barium, tritium, manganese, and TDS, as shown in Figures 4.2-1 and 4.2-2).

For other analytes, the sample results from the EES-6 analytical laboratory correlate to the contract analytical laboratory, but positive or negative bias between the laboratories can be found. The EES-6 analytical laboratory sample results for manganese, sodium, bicarbonate, and TDS are greater than the comparable contract analytical laboratory sample results (the slope is greater than 1.0 for these analytes; see Figure 4.2-2). The EES-6 analytical laboratory sample results for silica and fluoride are less than the comparable contract analytical laboratory sample results (the slope is less than 1.0 for these analytes; see Figure 4.2-2).

Two methods, ICPMS and LIKPA, were used to determine uranium concentrations in groundwater. These methods were used for 27 samples. The concentrations reported for ICPMS and LIKPA agree reasonably well, as noted in Section 4.2.1.1.

Tritium was determined at two contract laboratories: Teledyne and the University of Miami. The University of Miami's method is designed for low-level tritium detection, while Teledyne uses the more standard method that has a nominal IDL of 300 pCi/L. The results from these analytical methods correlate weakly (Figure 4.2-2). The University of Miami data are preferred for resolving differences in low levels of tritium.

Trace metals were analyzed by ICPMS in the last sampling round in 2000 to supplement previous inorganic chemical ICPAES results. The ICPMS method was needed to obtain IDLs at concentrations less than the EPA MCLs for antimony, beryllium, cadmium, lead, thallium, and uranium. Antimony was detected above the IDL of 0.1 µg/L in <3% of the samples.

4.2.1.2.3 Spatial Trends in Water Chemistry Results

Spatial trends for average dissolved concentrations of selected analytes are shown in Figure 2.2-1, which illustrates the spatial distribution of the background sampling stations for the three identified aquifer types: alluvium, perched-intermediate, and the regional aquifer. Five of the eight regional aquifer stations are located in a cluster northeast of the Laboratory boundary. The perched-intermediate stations are in the Jemez Mountains and Sierra de los Valles. There are two alluvial background sampling stations located northwest and west of the Laboratory.

The average tritium concentrations for sampling stations located near recharge areas (Water Canyon Gallery, Apache Spring, Upper Cañon de Valle, and Pine Spring) in the Sierra de los Valles are greater than from springs that discharge to the Rio Grande. In general, concentrations of other analytes (specific conductance and major cations and anions) follow an opposite pattern, where higher concentrations (increasing residence times) are reported for locations with low tritium (smaller amounts of recent recharge). Some sample locations are spaced closely together, and the pair of locations most closely spaced and also emerging from the same aquifer type (Doe Spring and Spring 9B) tend to have similar average concentrations for the analytes illustrated in Figure 4.2-3. Concentrations of dissolved uranium range from 0.1 to 0.8 µg/L in the Sierra de los Valles and beneath the Pajarito Plateau. Higher concentrations of natural dissolved uranium occur along the Rio Grande northeast of the Laboratory boundary. La Mesita Spring has an average concentration of dissolved uranium of 9.0 µg/L. Average concentrations of dissolved barium generally increase from the Sierra de los Valles to Sacred Spring and La Mesita Spring.

4.2.1.2.4 Evaluation of Analytes

The entire list of analytes from the contract analytical laboratories and the EES-6 analytical laboratory was trimmed to those that are most important, based on regulatory needs and conceptual geochemical and hydrogeologic framework understanding. Table 4.2-8 lists the analytes, the applicable regulatory agency (NMED, EPA, and DOE), the detection rates for the analytes, and the sources of the data (analytical laboratory). Statistical plots for these analytes are provided in Appendix C, and a brief narrative is provided below for each analyte. The statistical plots provide a visual summary of post-1997 data from the combined results from all laboratories.

Field Measurements: Temperature, turbidity, specific conductance (conductivity), and pH were measured for nearly all sampling events at each location. Temperature increases with depth in a geothermal gradient from the alluvial stations to the volcanic stations and is greatest in the regional sampling locations (Figure C-1). Specific conductance also varies with rock type (Figure C-2). The pH of these waters tends toward being slightly alkaline and is most variable for the volcanic rocks (Figure C-3).

Aluminum: This trace element was detected in about 62% of the samples. The aluminum sample results for Pine Spring were outliers and are roughly 10 to 100 times greater than sample results for other locations (Figure C-4). The sample results for most locations are variable. The aluminum data appear to be derived from a mixture distribution that suggests multiple populations. The volcanic rock aquifer appears to have locations with the highest and most variable aluminum concentrations.

Antimony: This trace element was detected in about 5% of the samples. The last round of sampling in late 1999 and early 2000 analyzed antimony by ICPMS and achieved IDLs (Figure C-5).

Arsenic: This trace element was detected in about 63% of the samples. No outliers are present, and most of the detected sample results appear to be from the regional aquifer (Figure C-6). Concentrations are typically consistent by sample location.

Barium: This trace element was detected in about 99% of the samples. No outliers and no significant differences occur by aquifer type (Figure C-7). Concentrations are typically consistent by sample location. Sample results are multimodal (perhaps bimodal), suggesting that two or more underlying statistical populations occur.

Beryllium: Statistical plots for beryllium are provided in Figure C-8. This trace element was detected in about 8% of the samples. Lower IDLs were obtained in the last two sampling rounds when this analyte was quantified by ICPMS.

Boron: This trace element was detected in about 77% of the samples. There are no outliers, and the regional aquifer has the greatest boron concentrations (Figure C-9).

Cadmium: Statistical plots for cadmium are provided in Figure C-10. This trace element was detected in about 3% of the samples.

Calcium: This major cation was detected in 100% of the samples. There are no outliers, and the regional aquifer has the greatest concentrations (Figure C-11). Sample results are generally consistent by location.

Chromium: This trace element was detected in about 48% of the samples. One outlier was noted: the result for sample RE16-98-9012 was 44.7 μg/L, or about a factor of ten larger than other total chromium results. The nonfiltered paired result was 3.2 μg/L, suggesting this filtered sample result for total chromium is anomalous. Most locations exhibit low variability, and little difference in concentration occurs by aquifer type (Figure C-12).

Cobalt: Statistical plots for cobalt are provided in Figure C-13. This trace element was detected in about 8% of the samples.

Copper: Statistical plots for copper are provided in Figure C-14. This trace element was detected in about 49% of the samples.

Iron: This trace element was detected in about 55% of the samples. The iron sample results for Pine Spring were outliers and are roughly 10 to 100 times larger than sample results for other locations (Figure C-15). The sample results for most locations are variable. The iron data appear to be derived from a mixture distribution that suggests multiple statistical populations.

Lead: Statistical plots for lead are provided in Figure C-16. This trace element was detected in about 15% of the samples.

Magnesium: This major cation was detected in about 98% of the samples. Sample results for location Otowi-4 are outliers from the rest of the data (Figure C-17). Magnesium shows little variation by sample locations.

Manganese: This trace element was detected in about 57% of the samples. There are no outliers, and concentrations vary within a sampling location (Figure C-18). No significant differences between concentrations occur by aquifer type.

Mercury: Statistical plots for mercury are provided in Figure C-19. This trace element was detected in about 29% of the samples.

Molybdenum: Statistical plots for molybdenum are provided in Figure C-20. This trace element was detected in about 27% of the samples.

Nickel: This inorganic chemical was detected in about 18% of the samples (Figure C-21). One outlier was noted; the result for sample RE16-98-9012 was 19.8 μg/L or about two times larger than other nickel results. The nonfiltered paired result was 0.9 μg/L, suggesting that this filtered sample result for nickel is anomalous. The nickel sample result for sample CABG-00-0057 may also be an outlier, but it has no paired nonfiltered result for comparison. Nickel concentrations from Pine Spring are greater than for other locations (except for the two outliers discussed above).

Perchlorate: See Section 4.2.1.2.5.

Potassium: This major cation was detected in 100% of the samples. No outliers and no notable differences occur between aquifer types (Figure C-22). Concentrations are generally consistent for a location.

Selenium: Statistical plots for selenium are provided in Figure C-23. This trace element was detected in about 11% of the samples.

Silver: Statistical plots for silver are provided in Figure C-24. This trace element was detected in about 5% of the samples.

Sodium: This major cation was detected in 100% of the samples. There is one outlier for Apache Spring (sample CABG-00-0047). Apache Spring water contains a component of road salt runoff, based on measured concentrations of sodium and chloride. The regional aquifer concentrations are greater than other aquifer types, and sodium concentrations are mostly consistent values for a sampling location, except for Apache Spring, as noted above (Figure C-25).

Strontium: Statistical plots for strontium are provided in Figure C-26. This trace element was detected in 99% of the samples.

Thallium: This trace element was detected in about 7% of the samples (Figure C-27).

Uranium: This trace element was detected in 100% of the contract laboratory samples; the EES-6 results were not used to characterize this analyte. Uranium concentrations are much greater in selected regional aquifer locations (La Mesita Spring and Spring 1), and the concentration distribution is multimodal because of the low variability within locations and large differences between some locations (Figure C-28).

Zinc: This trace element was detected in about 44% of the samples. Otowi-4 sample results are greater than other locations, and the concentrations differ more by location than by aquifer type (Figure C-29). Moderate variation occurs within sampling locations.

Alkalinity: This water-quality parameter was detected in 100% of the samples. Alkalinity is greater in regional aquifer locations (Figure C-30).

Ammonium: This trace cation was detected in about 73% of the samples. Ammonium concentrations were greatest at location LAOI(A)-1.1 and otherwise did not differ greatly between locations or location groups (Figure C-31).

Bicarbonate: This major anion was detected in 100% of the samples. Bicarbonate is greater in regional aquifer locations (Figure C-32).

Dissolved organic carbon: This water-quality parameter was detected in 100% of the samples. DOC was greatest for the volcanic rock aquifer locations (Figure C-33).

Chloride: This major anion was detected in 100% of samples. Apache Spring water contains a component of road salt runoff, based on measured concentrations of sodium and chloride. Chloride was greatest in the first two sample events for Apache Spring; otherwise, chloride did not vary significantly between location groups (Figure C-34).

Fluoride: This major anion was detected in 94% of the samples. Fluoride concentrations varied with aquifer type (Figure C-35).

Nitrate: This major anion was detected in about 87% of the samples. Concentrations of nitrate varied by location but did not vary significantly by aquifer type (Figure C-36).

Nitrite: Statistical plots for nitrite are provided in Figure C-37. This major anion was detected in about 14% of the samples.

Silica: This water-quality parameter was detected in 99% of the samples. Silica varies by location but does not vary significantly by aquifer type (Figure C-38).

Total dissolved solids: This water-quality parameter was detected in 100% of the samples. TDS increase from the alluvial location to volcanic rock locations and are greatest for the regional aquifer locations (Figure C-39). The overall TDS distribution is multimodal because of this variation between aquifer types.

Stable isotopes: The statistical plots for stable isotopes are provided in Figures C-40 to C-43. The deuterium and oxygen plots show that Seven Springs differs from other sample locations because of its elevation and location west of the Laboratory.

Gross alpha radiation: This radioactivity measure was detected in about 76% of the samples. La Mesita Spring has greater gross alpha activity than other locations, and no other differences between location groups are significant (Figure C-44). The higher gross alpha activity is the result of natural uranium and its decay products.

Americium-241: This radionuclide was detected in about 16% of the samples. Nearly all of the detected sample results for this radionuclide came from a single sampling event in 1997 (Figure C-45), which raises questions regarding possible analytical laboratory problems with these values.

Plutonium-238: Statistical plots for plutonium-238 are provided in Figure C-46. This radionuclide was detected in about 5% of the samples.

Plutonium-239/240: Statistical plots for plutonium-239/240 are provided in Figure C-47. This radionuclide was detected in about 5% of the samples.

Isotopic uranium: The statistical plots for isotopic uranium are provided as Figures C-48 to C-50. These plots exhibit similar trends to those already discussed for uranium. Uranium sample results show disequilibrium between isotope ratios compared to natural uranium isotope ratios in solid media. This phenomenon has been noted in water samples collected in other parts of the world, and the ratios of natural uranium (and uranium daughters) have been shown to vary based on the temperature and mineral content of groundwater (Hakam et al. 2000, 70168).

Strontium-90: This radionuclide was not detected in the samples. Thus, the statistical plots (Figure C-51) present only instrument noise and not strontium-90 concentrations.

Tritium: This radionuclide was characterized using University of Miami results. It was detected in 100% of the samples. Tritium varies by location and exhibits a decreasing trend from the alluvial location to the volcanic rock location and to the regional aquifer locations (Figure C-52).

In summary, major cations (calcium, magnesium, sodium, and potassium), major anions (bicarbonate, chloride, and sulfate) and silica were measured in all background water samples. Fluoride was also measured in all of the samples, but nitrate, nitrite, and uranium had variable detections for the post-1997 analytical results. Other trace elements showed considerable ranges in which beryllium, cadmium, cobalt, copper, iron, lead, mercury, molybdenum, selenium, silver, and thallium were detected is less than 30% of the post-1997 sampling rounds.

The IDLs for antimony, arsenic, barium, beryllium cadmium, chromium, copper, lead, mercury, nickel, and selenium using ICPAES were below the respective IDLs promulgated by the EPA. The MDLs using ICPAES for other constituents, including aluminum, chloride, fluoride, iron, manganese, silver, sulfate, and zinc, are below their respective secondary levels. Radionuclides derived from fallout, including americium-241, plutonium-238, 239/240, and cesium-137, were generally not detected, except during one sampling round conducted in August 1997. Tritium was more frequently detected in groundwater samples collected from springs within the Sierra de los Valles, alluvial well LAO-B, Seven Springs, and perched-intermediate well LAOI(A)-1.1. Strontium-90 was not detected in the background water samples. On the whole, analytical results for background inorganic species and radionuclides are of high quality and may be applied to Laboratory sites.

Data for the other analytes (major ions, stable isotopes, DOC fractionation, and a majority of trace elements) are acceptable within their detectable ranges.

4.2.1.2.5 Low-Level Perchlorate

The ubiquitous nature of trace levels of perchlorate (<1 µg/L) in groundwater near the Laboratory and northern New Mexico was determined by both the NMED and the Laboratory (NMED 2004, 88768). Widespread and consistent low-level detection of the chemical in nonhuman-impacted groundwater samples collected from local springs and wells are the basis for this interpretation. The concentration and persistence of perchlorate in both spatial and temporal dimensions, however, are not yet fully understood. The NMED and the Laboratory undertook a preliminary investigation to determine the concentration of perchlorate in selected waters within the northern Rio Grande Basin.

Sampling sites for low-level perchlorate included Sandia Spring, Spring 1, Spring 2, Springs 5, 5A, 5B, Springs 6, 6A, Spring 8A, and Springs 9, 9A, 9B, 9C for the regional aquifer. Perched intermediate volcanic sites included Alamo Canyon 10.3 Spring, Barbara's Spring, Campsite Spring, CdV-5.0 Spring, PC Spring, Colonel Spring, Water Canyon Gallery, Yak Spring, Young Spring, Pajarito Ski Well #2, and well LAOI(A)-1.1.

NMED compiled 76 low-level perchlorate results from 47 groundwater wells and springs within the northern Rio Grande Basin, with 56 of these samples collected around the Pajarito Plateau (NMED 2004, 88768). All water samples were selected based on technical considerations such as aquifer location, age, and water quality. Six different groundwater zones were sampled, with about half representing the regional aquifer beneath the Laboratory.

The NMED-selected sample stations were verified as background candidates through the analysis of major ions, including chloride and nitrate. These supplemental water-quality parameters showed sample results indicative of natural levels of nitrate (as N) at less than 0.5 mg/L. Additionally, tritium was measured because it can be found as a naturally occurring radioactive isotope of hydrogen that is commonly used for groundwater dating and to provide estimates on residence times and flow paths. Tritium results, coupled with local hydrogeologic relationships, show that springs located on the east-facing slope of Sierra de Los Valles represent young water (<60 yr) in the early stage of the local hydrologic cycle. Most springs within White Rock Canyon illustrate old water (>60 yr) discharging at the end of the hydrologic cycle.

The NMED and Laboratory study exclusively used a more sensitive liquid chromatography-mass spectrometry/mass spectrometry (LC-MS/MS) method (EPA SW846 8321MA) that is able to detect perchlorate at 0.05 μg/L or ppb. The conventional EPA method (SW846 314.0) is less sensitive and can only detect perchlorate at 4 ppb.

The 56 analytical results for groundwater show an average Laboratory background perchlorate concentration of 0.27 ± 0.08 ($1\ \sigma$) ppb or μg/L (Table 4.2-9). The minimum and maximum concentrations of perchlorate were 0.05 and 0.46 μg/L, respectively (Table 4.2-9). Only one water sample collected near the Pajarito Plateau had a perchlorate concentration of less than 0.05 μg/L (Table 4.2-9), the IDL for LC-MS/MS.

Seven precipitation samples were collected and analyzed using the LC-MS/MS method to rule out the presence of trace levels in precipitation as a source for the perchlorate in groundwater. Perchlorate was not detected in these samples above the IDL of 0.05 μg/L. In late August 2004, two additional rain samples were collected and analyzed by NMED using a method similar to LC-MS/MS but with an IDL of 0.0012 μg/L or about 40 times lower than that of the LC-MS/MS method. Although preliminary and not yet validated, the results show that perchlorate may be present in these precipitation samples at 0.006 and 0.017 μg/L.

4.3 Summary of Interlaboratory Comparison of Stable Isotopes, Tritium, and Uranium

This section presents summaries of interlaboratory comparisons of analytical data for stable isotopes of hydrogen and oxygen, tritium, and uranium. The analyses for stable isotopes are performed for nonregulatory purposes, including determining the origin, recharge elevation, and relative age of the groundwater sample; however, uranium is measured for both regulatory and hydrogeochemical purposes. For this investigation, four separate university laboratories, one commercial laboratory, and a government laboratory performed stable isotope analyses. One university analytical laboratory and a commercial laboratory provided analytical results for tritium. Two commercial laboratories performed uranium analyses using LIKPA and ICPMS. Analytical results varied with each laboratory, depending on the precision, accuracy, and method of analysis.

4.3.1 Analytical Comparisons, Stable Isotopes

At the beginning of this investigation, EES-6 personnel used the UWM to provide analyses of stable isotopes (hydrogen and oxygen, δD, and $\delta^{18}O$) for background waters sampled as part of this investigation. Within a year, EES-6 personnel noticed that UWM's analytical results were shifted to slightly higher (heavier) isotope values compared to data received in the past from sites previously sampled. Figure 4.3-1 compares δD vs $\delta^{18}O$ "same-site" data reported by UWM and by previous laboratories. The UWM data from 1997 are systematically displaced roughly +5‰ in δD and about -0.5‰ to -1.5‰ in $\delta^{18}O$ compared to previous stable isotope data collected between 1978 to 1993.

Coincidentally, EES-6 personnel used UWM during 1996 and 1997 for stable isotope analyses of geothermal fluids for a project in Dixie Valley, Nevada (Goff et al. 2002, 88766). Figure 4.3-2 shows a comparison of "same-site" data analyzed by UWM and the U.S. Geological Survey (USGS) in Reston, Virginia. In this case, these data are generated from splits of the same water samples. Repeatedly, the UWM data are skewed roughly by the same amount as in Figure 4.3-1. However, the UWM data in both cases appear to be internally consistent, which are precise but not accurate. The trends and general characteristics of the data are similar, but, because they are skewed, the data are not comparable with data reported by other analytical laboratories.

Because of this problem, EES Division personnel decided to compare the results of numerous external laboratories performing stable isotope analyses on water samples. A large quantity of cold meteoric water was collected from S-Site (TA-16) and placed in a Teflon-lined, sealed, 55-gal. drum. Double or triple aliquots of this water were then sent to the following laboratories for analysis: Global, Geochron, New Mexico Technical Institution (NMTI), U.S. Geological Survey, University of Miami, University of New Mexico (UNM), and UWM. Three laboratories (Geochron, U.S. Geological Survey, and University of Miami) produced results that straddle the World Meteoric Water Line (WMWL) and the Jemez Mountains Meteoric Water Line (JMWL) (Figure 4.3-3) (Craig 1961, 88748; Vuataz and Goff 1986, 73687). These data provide the most reasonable results, considering previous analytical results for the springs (Figure 4.3-1). Because these were cold meteoric waters, it was impossible to evaluate which of these three laboratories was the most precise and accurate without performing additional analyses and thoroughly evaluating each laboratory's analytical procedures and methods. Stable isotope analyses are now performed by EES-6, producing appropriate QA, as required by the ENV-ERS Program.

In contrast, UWM data are considerably different than analytical data from the other laboratories, having higher δD values and lower δ^{18}O values. Analytical results provided by UNM are slightly skewed to higher δD values, but stable isotope data reported by Global and NMTI are skewed to lower δD and higher δ^{18}O values, respectively. It appears that each of the laboratories produces internally consistent data; however, the data do not compare well with analytical results provided by the other laboratories.

Stable isotope data reported from Geochron, U.S. Geological Survey, and University of Miami are most representative of the Pajarito Plateau and Sierra de los Valles. Stable isotope analyses for geochemical and hydrologic evaluation of groundwater for Laboratory sites may be compared to background and water derived from meteoric sources during environmental investigations.

4.3.2 Analytical Comparisons: Tritium Analyses Performed by the University of Miami and Teledyne

Hydrologic and geochemical information regarding groundwater residence times and flow paths are obtained by performing tritium analyses on water samples. The half-life for tritium is 12.33 yr, and this isotope decays by emission of a β particle (electron) to helium (^{3}He). The source and age of a particular water sample may be inferred by its tritium activity. Groundwater samples with less than 1 to 2 pCi/L generally are greater than 60 yr (Shevenell and Goff 1995, 73689) and have been isolated from recent sources of tritium, including treated Laboratory discharges and local precipitation.

The University of Miami performed tritium analyses on water samples using liquid scintillation, direct counting, and electrolytic enrichment, depending on the activity of tritium in a given sample. Electrolytic enrichment is the most sensitive method, providing an IDL of 0.5 pCi/L. Liquid scintillation is an appropriate method for water samples containing 300 pCi/L or greater of tritium. Direct counting is an appropriate method when activities of tritium range between 3.2 and 300 pCi/L.

4.3.2.1 Quality Assurance and Quality Control

The quality of analytical results reported by the University of Miami was evaluated through primary and duplicate water samples, analytical method(s), analytical consistency, and data-trend analysis. Analytical results of tritium, reported by the University of Miami and Teledyne, are discussed in this section. The groundwater samples were analyzed by Teledyne during 1997 and 1998.

The primary and duplicate water samples analyzed by the University of Miami show strong agreement, characterized by an r^2 value equal to 0.998, as shown in Figure 4.3-4. Figure 4.3-5 shows tritium activities reported by the University of Miami and Teledyne for the fifteen background stations sampled in 1997 and 1998. The two analytical laboratories show poor agreement. Only samples that contain activities of tritium near or at the IDL (0.5 pCi/L) compare reasonably well. Both laboratories used direct counting methods for groundwater samples containing activities of tritium greater than 3.2 pCi/L. Activities of tritium reported by the University of Miami generally are greater than those reported by Teledyne.

There is reasonable consistency in tritium activities reported by the University of Miami for several background sampling stations, as shown in Figures 4.3-6 (Apache Spring), 4.3-7 (well LAO-B), and 4.3-8 (Spring 9B). Variation in tritium activity at some sampling stations is expected because of varying tritium activities in precipitation that provide recharge to several springs within the Sierra de Los Valles (Apache Spring, Water Canyon Gallery, and upper Cañon de Valle Spring). The interlaboratory comparison also included well LAO-B (alluvial groundwater, upper Los Alamos Canyon), La Mesita Spring, Pine Spring, Seven Springs, Spring 9B, and Water Canyon Gallery. Water samples analyzed by Teledyne do not compare well with analytical results reported by the University of Miami. Tritium results provided by the University of Miami are more consistent for all of the springs sampled as part of this investigation.

Water samples collected during this investigation were submitted to the University of Miami for analysis and underwent QA/QC analysis. The tritium analytical results reported by the University of Miami are of high quality, and they are consistent over time for each background sampling station. These factors help make the University of Miami data technically defensible. Reasonable decisions regarding groundwater flow paths, residence times, and the presence or absence of tritium can be made using these University of Miami data.

4.3.3 Analytical Comparisons: Uranium Analyses Performed by Paragon Analytics, Inc. and General Engineering Laboratories

An analytical method for aqueous uranium requires a low IDL of less than 1 μg/L because dissolved background concentrations of this analyte typically are lower than this level in groundwater at the Laboratory. Paragon Analytics, Inc. performed uranium analyses on groundwater samples using LIKPA, which has an IDL of 0.1 μg/L. GEL analyzes uranium by using the ICPMS method, which provides a similar IDL. The LIKPA method was available before the use of ICPMS during this investigation. LIKPA is a viable analytical method, provided that the ionic strength of the solution is less than 0.7 molal and that dissolved concentrations of chloride are less than 1000 mg/L. However, elevated concentrations of chloride, especially in solid samples, produce interference that biases the results. Groundwater samples collected during this investigation and analyzed for uranium using the LIKPA method have chloride concentrations of less than 20 mg/L.

Figure 4.3-9 shows distributions of dissolved uranium within background spring and well samples analyzed by both LIKPA and ICPMS for the late 1999 and early 2000 sampling round. The correlation is excellent with an r^2 value equal to 1.0, suggesting that for the Laboratory background water samples both methods produce high-precision and accurate analytical results. Concentrations of dissolved uranium analyzed by ICPMS at most background-sampling stations are less than 1 μg/L. This result is consistent with the other sampling rounds conducted in 1997 and 1998. In summary, both LIKPA and ICPMS provided consistent analytical results for uranium, and results for all analyses are suitable for use to determine statistical distributions of this analyte. Based on these comparisons, it was determined that both GEL and Paragon Analytics, Inc. provided acceptable results; these data have been incorporated into the data set.

4.3.4 EES-6 Screening Analyses for Inorganic Analytes

This section and Appendix F present a summary of the procedures, methods, and equipment used by EES-6 for analyzing groundwater samples collected as part of this investigation. Analyses of major cations and anions and trace elements were performed by EES-6. A summary of interlaboratory comparisons of chemical data for inorganic analytes performed by EES-6, Paragon Analytics, Inc., and other contract laboratories for the NMED Oversight Bureau (OB) is also presented. The EES-6 aqueous chemistry laboratory provided analytical results for groundwater and surface water samples, which are used for screening purposes to make decisions in the field. These screening data are supported by validated laboratory analytical results external to the Laboratory.

The EES-6 analytical laboratory uses methods developed from EPA, SW 846 (EPA 1987, 31732) for analyzing inorganic chemicals in aqueous solutions. Laboratory standards, blanks, duplicates, blind samples, and National Institute of Standards and Testing (NIST) reference waters are run as part of the QA and QC programs. Analytical results from EES-6 compare very well with those provided by Paragon Analytics, Inc. ENV-ERS Program has approved the EES-6 laboratory for providing high-precision data for anions and metals and fully validated QA/QC stable isotopes.

4.3.4.1 Analytical Comparisons

Splits of groundwater samples were collected by the NMED-OB during this investigation and analyzed at external laboratories. Shortly after sampling, Laboratory personnel delivered groundwater samples to EES-6 for chemical analyses and also shipped samples to Paragon Analytics, Inc. and other ENV-ERS Program laboratories. Paragon Analytics, Inc. performed chemical and radiochemical analyses on the groundwater samples collected as part of this investigation. Paragon Analytics, Inc. uses the ICPAES method for metal and trace-element analyses, including aluminum, antimony, arsenic, barium, beryllium, boron, calcium, cadmium, cobalt, chromium, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silicon, silver, sodium, strontium, thallium, vanadium, and zinc. The EES-6 laboratory used AA methods for specific trace analytes, including arsenic, antimony, cadmium, cesium, chromium, cobalt, copper, lead, molybdenum, nickel, potassium, rubidium, selenium, silver, sodium, thallium, and tin. The ICPAES method was also used by EES-6 to analyze for aluminum, barium, beryllium, boron, calcium, iron, magnesium, manganese, potassium, sodium, silicon, strontium, titanium, vanadium, and zinc. Both laboratories used the CVAA method for mercury analysis. AA provides lower detection limits than ICPAES for many trace analytes and better precision for low-level sodium and potassium. The ICPMS method provides even better sensitivity for most analytes, including important analytes not normally included, such as uranium and thorium. GEL analyzed the groundwater samples collected in late 1999 and in 2000 for antimony, beryllium, cadmium, lead, thallium, and uranium, using the ICPMS method.

Appendix F provides a comparison of analytical results reported by EES-6 and Paragon Analytics, Inc. for several selected springs and alluvial well LAO-B. Apache Spring, La Mesita Spring, and Doe Spring are representative of groundwater within perched-intermediate zones (Tschicoma Formation and Cerros del Rio basalt) and the regional aquifer (Santa Fe Group sediments).

4.3.4.2 Summary for Inorganic Analytes

Analytical results provided by EES-6 compare very favorably with Paragon Analytics, Inc. for major ions and most trace elements. The EES-6 screening analytical methods include ICPAES, AA, IC, and ISE. The AA method, however, provides lower IDLs for many trace elements in aqueous solution than does the ICPAES method used by Paragon Analytics, Inc. Instrument detection limits associated with ICPAES vary between laboratories, depending on the specific instrument and the configuration being used (axial vs radial view). Analytical results provided by NMED-OB and Paragon Analytics, Inc. showed some inconsistencies in IDLs inherent from the ICPAES method. Because of the favorable comparison, EES-6 data have been combined with the rest of the data since they are suitable and representative of the background geochemistry.

4.3.5 Summary for Stable Isotopes and Tritium

Stable isotope data reported from Geochron, U.S. Geological Survey, and the University of Miami are most representative of the Pajarito Plateau and surrounding areas. These data, in conjunction with Laboratory site data, are used to evaluate the source and elevation of recharge water. Tritium results provided by the University of Miami are the most accurate for the background stations sampled during this investigation. These analytical results can be compared with Laboratory site data to quantitatively place a general age on water. Deep groundwaters with an activity of tritium of <1 pCi/L are greater than 60 years old. Analytical results provided by EES-6, Paragon Analytics, Inc., and GEL compare very well, and these data have been combined for alluvial groundwater, perched-intermediate groundwater, and the regional aquifer.

4.4 Chemical Effects of the Cerro Grande Fire on Laboratory Background Sampling Stations

The Cerro Grande fire significantly impacted several major watersheds that drain into and north of the Laboratory (Gallaher and Koch 2004, 88747). These include Pueblo Canyon, Los Alamos Canyon, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon, Guaje Canyon, Rendija Canyon, and Garcia Canyon. Analytical results collected in June 2000 show that concentrations of major ions and trace elements have returned to prefire values.

A summary of a geochemical conceptual model of the impact of the Cerro Grande fire on surface water and groundwater chemistry developed by Longmire et al. (2001, 71362) is presented in this section. Ash and charcoal produced from the Cerro Grande fire consisted of complex mixtures of inorganic and organic compounds. Calcium, magnesium, silica, potassium, sodium, carbonate, manganese, iron, and other trace elements were concentrated in the ash and charcoal (Longmire et al. 2001, 71362). Long-chain aliphatic, paraffin, aromatic, and polycyclic aromatic compounds were hypothesized to be concentrated in the ash and charcoal contributing to the hydrophobic nature of residual soil. Precipitation of $CaCO_3$ (calcite) resulted from the combustion of organic carbon, that oxidized to form bicarbonate and carbonate during the fire (Longmire et al. 2001, 71362). Calcite has been observed within ash samples of ponderosa pine, aspen, and scrub oak collected on the south rim of upper Los Alamos Canyon (Longmire et al. 2001, 71362). This precipitation process resulted in higher concentrations of dissolved calcium and bicarbonate in storm runoff and base flow.

During storm events, ash and charcoal were washed into canyons, carried downstream, and redeposited. After the fire, TOC and DOC concentrations in surface water were elevated because of the redistribution of ash, charcoal, soot, and other forms of organic carbon concentrated in surface water (Longmire et al. 2001, 71362). Storm runoff, consisting of a mixture of rainwater, ash, charcoal, and sediment, was characterized by a calcium-potassium-bicarbonate solution having a TDS content greater than 100 mg/L

(Longmire et al. 2001, 71362); Gallaher and Koch 2004, 88747). The TDS content of the ash-rich water was higher than prefire storm runoff and base flow. By 2002, the TDS content of base flow had returned to concentrations observed during prefire conditions in several major watersheds (Gallaher and Koch 2004, 88747). The Laboratory has conducted sampling and analyses of surface water and groundwater to assess this impact within the Pueblo Canyon, Los Alamos Canyon, Mortandad Canyon, Pajarito Canyon, Cañon de Valle, and Water Canyon watersheds (Gallaher and Koch 2004, 88747).

4.4.1 Analytical Results for Selected Springs and Well LAO-B

Results of analyses for Apache Spring, Water Canyon Gallery, Pine Spring, and upper Cañon de Valle Spring are provided in Table 4.4-1. Apache Spring, Water Canyon Gallery, and upper Cañon de Valle Spring do not appear to have been impacted by the Cerro Grande fire, based on similarities in water chemistry (major ion and trace element) before and after the fire. Pine Spring, however, may have been impacted by ash-rich runoff, resulting in elevated concentrations of major ions, most notably calcium, sulfate, carbonate alkalinity, and TDS (Figure 4.4-1), and selected trace elements, including manganese (Figure 4.4-2).

Concentrations of manganese increased at Pine Spring immediately after the fire in response to increasing DOC. Organic carbon is a strong reducing agent (electron donor), that has the capacity to reduce many solutes, including manganese, iron, nitrate, sulfate, and uranium (Langmuir 1997, 56037). This change in redox chemistry resulting from the fire increased the solubility of manganese oxides and (oxy)hydroxides. Under oxidizing conditions, manganese(III, IV) is stable as MnOOH and manganese oxide, but under reducing conditions, these solids dissolve to form soluble Mn^{2+}. The aqueous chemistry observed at Pine Spring during June 2000 is expected to return to prefire conditions, depending on the residual amount of ash, charcoal, and other organic material derived from the Cerro Grande fire. Elevated concentrations of dissolved manganese in surface water (base flow) have been observed elsewhere upstream of the Laboratory (in Los Alamos Canyon and Pajarito Canyon) since the fire (Gallaher and Koch 2004, 88747). Sampling of Water Canyon Gallery by the Laboratory since the fire, however, has shown that this sampling station has returned to pre-Cerro Grande fire conditions with respect to major ions and trace elements.

The June 2000 analytical results for Apache Spring, Water Canyon Gallery, upper Cañon de Valle Spring, and Pine Spring were not included in the statistical analysis for the background data set because impacts from the Cerro Grande fire were observed. Continued sampling of these springs is necessary to evaluate their long-term trends in water chemistry.

Well LAO-B was not directly affected by the Cerro Grande fire. However, upper Los Alamos Canyon west of the well was severely impacted. Ash present in runoff recharged alluvial groundwater in the canyon that resulted in iron and manganese reduction, elevated concentrations of major cations and anions and trace elements in several water sheds (Gallaher and Koch 2004, 88747). Prefire conditions have been restored at the well, however, based on the analytical results for major ions (excluding calcium and magnesium), trace anions (fluoride), excluding trace elements largely collected from June 2000 through May 2002 (LANL 2004, 87390).

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary

A hydrogeochemical investigation of background subsurface waters has been conducted for the Laboratory. This data set provides the most robust and integrated chemical and statistical analyses of background subsurface water chemistry conducted for the Laboratory. This included a comprehensive field, chemical, radiochemical, isotopic, and statistical investigation of 15 sampling stations within the Pajarito Plateau/Jemez Mountains region from 1997 to 2000. Groundwaters from alluvium, Bandelier Tuff (Otowi Member and Guaje Pumice Bed), Tschicoma Formation, Cerros del Rio basalt, hydromagmatic deposits, Totavi gravels, and Santa Fe Group sediments were sampled, analyzed, and evaluated as part of this investigation. The sampling sites for this investigation were chosen to provide background data for groundwater occurring in shallow alluvium (well LAO-B and Pine Spring), perched-intermediate aquifers within volcanic rocks (Seven Springs, Apache Spring, Water Canyon Gallery, upper Cañon de Valle Spring, and well LAOI(A)-1.1), and the regional aquifer (Doe Spring, Spring 9B, Pajarito Spring, Spring 1, La Mesita Spring, Sacred Spring, and wells Otowi-4 and Guaje-5). Pajarito Spring (Spring 4A) and La Mesita Spring are separated from the other 13 sampling sites for statistical analyses because Pajarito Spring contains nitrate (as nitrogen) (1 mg/L) and perchlorate (0.5 μg/L), and La Mesita Spring is part of a different hydrogeochemical system representative of the Rio Grande Valley. Representative background samples were collected, analyzed, and statistically evaluated from the remaining 13 stations.

The overall objectives of this study were fulfilled and included

- reviewing available background hydrogeochemical data collected at the Laboratory and surrounding areas before 1997;
- collecting additional groundwater samples from background stations (springs and wells) for alluvial and perched-intermediate groundwater and the regional aquifer; and
- providing validated analytical results and statistical distributions for the different analytes (pre-1997 and post-1997) occurring within alluvial, perched-intermediate groundwater, and the regional aquifer.

Results of statistical analyses, including minimum, mean, median, maximum, one standard deviation, and coefficient of variation, are provided for the alluvium (Tables 4.2-2a through 4.2-2g), perched-intermediate zones (Tables 4.2-3a through 4.2.3g), the regional aquifer (Tables 4.2-4 a through 4.2-4g), La Mesita Spring (Tables 4.2-5a through 4.2-5g), and Pajarito Spring (Tables 4.2-6a through 4.2-6g). The tables containing results of statistical analyses are grouped by filtered and nonfiltered samples for each aquifer type. Other parameters, including the number of samples and number of detects and nondetects, are also provided in the tables. The pre-1997 and post-1997 chemical data are both reported separately and combined for statistical analyses. The post-1997 data are more representative of background water chemistry for the three aquifer types because analytical instruments used during analyses have lower IDLs compared to those used for the pre-1997 analyses. IDLs for antimony, beryllium, cadmium, lead, thallium, and uranium were higher for the pre-1997 samples than those for the post-1997 samples. Analytical methods consisting of GFAA, HAA, and ICPMS provide lower IDLs compared to ICPAES for these trace elements. The IDLs for the post-1997 samples are recommended when comparisons are conducted between background and site data. Table 4.2-2e (alluvial groundwater), Table 4.2-3e (perched-intermediate volcanic rock), and Table 4.2-4e (regional aquifer) are recommended for evaluating the statistical properties of background concentrations of solutes within the three aquifer types.

5.2 Geochemical Variations within Groundwater Types

Important physical, geochemical, and statistical attributes of alluvial and perched-intermediate groundwater and the regional aquifer are summarized in this subsection.

- Groundwater temperature increases with depth from the alluvium to the regional aquifer in response to ambient and Jemez Mountains geothermal gradients. Temperature measurements of groundwater are very useful in differentiating perched-intermediate systems from the regional aquifer.
- The three aquifer types are characterized by a pH range from 6.0 to 9.2, with the greatest variation within perched-intermediate groundwaters. The most basic pH measurements were associated with the perched-intermediate groundwaters.
- Concentrations of calcium, magnesium, sodium, and potassium are the lowest within the alluvial groundwater and highest in the regional aquifer. The range of major cation concentrations is the lowest for the alluvial system and the highest in the regional aquifer. The same compositional and statistical trends are observed for the major anions chloride, sulfate, and bicarbonate within the three aquifer types.
- Concentrations of nitrate (as nitrogen) and fluoride are the lowest within the alluvial system, increase in the perched-intermediate system, and are the highest within the regional aquifer. Concentrations of nitrate (as nitrogen) are <0.6 mg/L in groundwater beneath the Pajarito Plateau and are greater than 1 mg/L at Spring 1 in White Rock Canyon near the confluence with lower Los Alamos Canyon.
- Perched-intermediate groundwater contains the greatest range of fluoride concentrations.
- Background concentrations of arsenic, barium, boron, bromide, strontium, and uranium were the lowest within alluvial groundwater and the highest within the regional aquifer. The highest concentrations of dissolved arsenic (3.7 to 4.4 µg/L) were measured at Spring 1. Concentrations of these trace elements within the perched-intermediate system were between the low and high ends.
- Background concentrations of uranium are remarkably uniform (<0.6 µg/L) in the regional aquifer beneath the Pajarito Plateau and substantially increase at Spring 1 and La Mesita Spring.
- Background/fallout activities of tritium are the highest for the Sierra de los Valles springs and alluvial groundwater (well LAO-B and Pine Spring) and the lowest within the regional aquifer (less than 3 pCi/L). This finding indicates the age of groundwater is increasing from shallow to deep systems.

5.3 Uncertainties

A comprehensive investigation of groundwater chemistry, hydrostratigraphy of sampling sites, and detailed statistical analyses has been conducted. A high degree of confidence lies within the background water chemistry data as a result of this investigation. However, several uncertainties should be taken into consideration in light of the conclusions of this study.

1. The detailed lithology, the criteria for stratigraphic divisions, and the nomenclature of sedimentary units beneath the Pajarito Plateau retain many uncertainties (i.e., compare the highly contrasting stratigraphy of Purtymun 1995, 45344, to that of Goff et al. 2002, 88776). Because units such as the Puye Formation, Totavi Lentil, and various subunits within the Santa Fe Group host or partially host the regional aquifer, an improved geologic framework is needed to reduce uncertainty in the hydrostratigraphy of the Santa Fe Group.

2. As the geochemical and geohydrologic conceptual models continue to evolve, uncertainty is likely to decrease in groundwater flow paths, solute and groundwater residence times, age(s) of deep groundwater, and hydrogeochemical processes that control groundwater composition.

3. Uncertainties exist about the complete representative nature of groundwater chemistry within the alluvium with currently only two background sampling stations.

4. The data collected from wells and springs during this investigation generally reflect background, excluding Pajarito Spring (Spring 4A). However, the long-term (50 yr and more) chemical composition of background sampling sites within and downgradient of the Laboratory is likely to evolve over many decades.

5.4 Conclusions

Hydrogeochemical data and hydrogeologic information collected during the background investigation satisfy the Consent Order requirement, Section IV.A.3.d, which stipulates that the Respondents shall determine the background concentrations for naturally occurring metals and general chemistry parameters in alluvial, intermediate, and regional groundwater. This background investigation report states the background concentration for each metal and the general chemistry parameters, and states the bases for selecting each such concentration. Background distributions of solutes presented in this report are applicable to Laboratory site evaluation. Results of this investigation, including hydrostratigraphic descriptions, multiple chemical analyses, and statistical evaluations provide a technically defensible background database for 13 of the 15 subsurface waters for the Pajarito Plateau and Sierra de los Valles. Table 4.2-2e (alluvial groundwater), Table 4.2-3e (perched-intermediate volcanic rock), and Table 4.2-4e (regional aquifer) are recommended for evaluating the statistical properties of background concentrations of solutes within the three aquifer types.

The hydrogeologic framework and its relationship to the 15 sampling sites have been established and provide a much improved, but incomplete, understanding of hydrostratigraphy for the Pajarito Plateau and surrounding areas west of the Rio Grande. Detailed descriptions of the location, physical characteristics, and hydrogeology of the 15 sampling sites have expanded an understanding of the spatial variability of the three aquifer types.

Quantifying the relationship between groundwater chemistries and aquifer materials (alluvium, perched-intermediate volcanics, and the regional aquifer) has advanced the conceptual Laboratory-specific hydrogeochemical model. For example, increasing solute concentrations, in addition to TDS and specific conductance, occurs from alluvial groundwater, to perched-intermediate groundwater, to the regional aquifer. Increasing groundwater residence times enhance water-rock interactions, including precipitation/dissolution and adsorption/desorption reactions, which produce increasing concentrations of major ions and trace elements within the regional aquifer.

Comprehensive statistical analyses of the groundwater samples have advanced the understanding of solute distributions within the three aquifer types. Many of the major ions are log-normally distributed, which is a direct function of mineralogy of aquifer material, groundwater chemistry, microbial populations, and solute and groundwater residence times.

Statistical parameters describing distributions of trace elements, including antimony, beryllium, cadmium, lead, and thallium, are complex because of the high percentage of nondetects. These metals generally are not leachable from silicate and oxide minerals under circumneutral pH conditions.

The short-term effects of the Cerro Grande fire on several of the background sampling sites within the Sierra de los Valles (Apache Spring, Water Canyon Gallery, upper Cañon de Valle Spring, and Pine Spring) and upper Los Alamos Canyon (well LAO-B) have been assessed. Groundwater chemistry has returned to prefire conditions at the two most impacted background sampling stations (well LAO-B and Pine Spring).

6.0 REFERENCES

Abeele, M., M. Wheeler, and B. Barton, 1981. "Geohydrology of Bandelier Tuff, Los Alamos," Los Alamos National Laboratory report LA-8962-MS, Los Alamos, New Mexico. (Abeele et al. 1981, 06273)

Adams, A.I., F. Goff, and D. Counce, 1995. "Chemical and Isotopic Variations in Precipitation in the Los Alamos Region, New Mexico," Los Alamos National Laboratory report LA-12895-MS, Los Alamos, New Mexico. (Adams et al. 1995, 47192)

Aldrich, M.J., 1986. "Tectonics of the Jemez Lineament in the Jemez Mountains and Rio Grande Rift," *Journal of Geophysical Research*, Vol. 91, pp. 1753–1762. (Aldrich 1986, 21497)

Aldrich, M.J., and D. Dethier, 1990. "Stratigraphic and Tectonic Evolution of the Northern Espanola Basin, Rio Grande Rift, New Mexico," *Geological Society of America Bulletin*, Vol. 102, p. 1695–1705. (Aldrich and Dethier 1990, 49681)

Allison, J.D., D.S. Brown, and K.J. Novo-Gradac., March 1991. "MINTEQA2/PRODEFA2, A Geochemical Assessment Model for Environmental Systems: Version 3.0 User's Manual." (Allison et al. 1991, 49930)

American Public Health Association, 1985. "Standard Methods for the Examination of Water and Wastewater," *American Public Health Association*, 16th ed., Washington, D.C. (American Public Health Association 1985, 88769)

ASTM (American Society for Testing and Materials), 1988. Vol. 11.01, "Annual Book of ASTM Standards, Volume 0.408, Soil and Rock, Building Stones; Geotextiles," Philadelphia, Pennsylvania. (ASTM 1988, 68413)

Aubele, J., 1978. "Geology of the Cerros del Rio Volcanic Field, New Mexico," M. S. Thesis, University of New Mexico, Albuquerque, New Mexico, 136 pp. (Aubele 1978, 86539)

Bachman, G., and H. Mehnert, 1978. "New K-Ar Dates and the Late Pliocene to Holocene Geomorphic History of the Central Rio Grande Region, New Mexico," *Geological Society of America Bulletin,* Vol. 89, pp. 283-292. (Bachman and Mehnert 1978, 88741)

Bailey, R.A., R.L. Smith, and C.S. Ross, 1969. "Stratigraphic Nomenclature of Volcanic Rocks in the Jemez Mountains, New Mexico," *U.S. Geological Survey, Bulletin* 1274-P. (Bailey et al. 1969, 08406)

Baldridge, W., K. Olsen, and J.E. Gallegos, 1984. "Rio Grande Rift: Problems and Perspectives," *New Mexico Geological Society*, 35th Annual Field Conference, October 11–13, 1984. (Baldridge et al. 1984, 88745)

Ball, T., M. Everett, P. Longmire, D. Vaniman, W. Stone, D. Larssen, K. Greene, N. Clayton, and S. McLin, 2002. "Characterization Well R-22 Completion Report," Los Alamos National Laboratory report LA-13893-MS, Los Alamos, New Mexico. (Ball et al. 2002, 71471)

Baltz, E.H., J.H. Abrahams, Jr., and W.D. Purtymun, 1963. "Preliminary Report on the Geology and Hydrology of Mortandad Canyon near Los Alamos, New Mexico, with Reference to Disposal of Liquid, Low-Level Radioactive Waste," *U.S. Geological Survey*, Open-File Report 63-6. (Baltz et al. 1963, 08402)

Birdsell, K.H., W.E. Soll, N.D. Rosenberg, and B.A. Robinson, 1995. “Numerical Modeling of Unsaturated Groundwater Flow and Radionuclide Transport at MDA-G,” Los Alamos National Laboratory document LA-UR-95-2735, Los Alamos, New Mexico. (Birdsell et al. 1995, 70012)

Blake, W.D., F. Goff, A. Adams, and D. Counce, 1995. “Environmental Geochemistry for Surface and Subsurface Waters in the Pajarito Plateau and Outlying Areas, New Mexico,” Los Alamos National Laboratory report LA-12912-MS, Los Alamos, New Mexico. (Blake et al. 1995, 49931)

Broxton, D., and P. Eller, 1995. “Earth Science Investigations for Environmental Restoration, Los Alamos National Laboratory Technical Area 21,” Los Alamos National Laboratory report LA-12934-MS, Los Alamos, New Mexico. (Broxton and Eller 1995, 58207)

Broxton, D., and D.T. Vaniman, 2005. “Geologic Framework of a Groundwater System on the Margin of a Rift Basin, Pajarito Plateau, North-Central New Mexico,” *Vadose Zone Journal* (in press). (Broxton and Vaniman 2005, 88707)

Broxton, D., D. Vaniman, W. Stone, S. McLin, M. Everett, and A. Crowder, 2001. “Characterization Well R-91 Completion Report,” Los Alamos National Laboratory report LA-13821-MS, Los Alamos, New Mexico. (Broxton et al. 2001, 71251)

Broxton, D., R. Gilkeson, P. Longmire, J. Marin, R. Warren, D. Vaniman, A. Crowder, B. Newman, B. Lowry, D. Rogers, W. Stone, S. McLin, G. WoldeGabriel, D. Daymon, and D. Wycoff, 2001. “Characterization Well R-9 Completion Report,” Los Alamos National Laboratory report LA-13742-MS, Los Alamos, New Mexico. (Broxton et al. 2001, 71250)

Broxton, D., R. Warren, A. Crowder, M. Everett, R. Gilkeson, P. Longmire, and J. Marin, 2001. “Characterization Well R-12 Completion Report,” Los Alamos National Laboratory report LA-13822-MS, Los Alamos, New Mexico. (Broxton et al. 2001, 71252)

Broxton. D., D. Vaniman, W. Stone, S. McLin, J. Marin, R. Koch, R. Warren, P. Longmire, D. Rogers, and N. Tapia, 2001. “Characterization Well R-19 Completion Report,” Los Alamos National Laboratory report LA-13823-MS, Los Alamos, New Mexico. (Broxton et al. 2001, 71254)

Broxton D., D. Vaniman, P. Longmire, B. Newman, W. Stone, A. Crowder, P. Schuh, R. Lawrence, E. Tow, M. Everett, R. Warren, N. Clayton, D. Counce, E. Kluk, and D. Bergfeld, 2002. “Characterization Well MCOBT-4.4 and Borehole MCOBT-8.5 Completion Report,” Los Alamos National Laboratory report LA-13993-MS 80, Los Alamos, New Mexico. (Broxton et al. 2002, 76006)

Chapin, C., 1979. “Evolution of the Rio Grande Rift: A Summary,” in *Rio Grande Rift: Tectonics and Magmatism,* American Geophysical Union, Washington, D.C., pp. 1–5. (Chapin 1979, 00597)

Clark, I.D., and P. Fritz, 1997. *Environmental Isotopes in Hydrogeology,* Lewis Publishers, New York, New York. (Clark and Fritz 1997, 59168).

Craig, H., 1961. “Isotopic Variations in Meteoric Waters,” *Science*, Vol. 133, pp. 1702–1703. (Craig 1961, 88748)

Cushman, R.L., 1965. “An Evaluation of Aquifer and Well Characteristics of Municipal Well Fields in Los Alamos and Guaje Canyons, near Los Alamos, New Mexico,” U.S. Geological Survey Water-Supply Paper 1809-D. (Cushman 1965, 08584)

Dale, M., May 23, 2005. “E-mail to S. Yanicak regarding LANL background investigation,” Santa Fe, New Mexico. (Dale 2005, 88774)

Dale, M., S.M. Yanicak, and S.P. Anderson, December 1996. “Ground-Water Oversight at Los Alamos National Laboratory,” NMED-HRMB-96/1, Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. (Dale et al. 1996, 57014)

Dander, D.C., October 1998. “Unsaturated Groundwater Flow beneath Upper Mortandad Canyon, Los Alamos, New Mexico,” Los Alamos National Laboratory document LA-UR-98-4759, Los Alamos, New Mexico. (Dander 1998, 88743)

Denny, C.S., 1940. “Santa Fe Formation in the Española Valley, New Mexico,” *Geological Society of America Bulletin*, Vol. 51, pp. 677–694. (Denny 1940, 88738)

Dethier, D., 1997. “Geology of White Rock Quadrangle, Los Alamos and Santa Fe Counties New Mexico,” New Mexico Bureau of Mines and Mineral Resources Map 73, 1 sheet. (Dethier 1997, 49843)

Dethier, D., and K. Manley, 1985. “Geologic Map of the Chile Quadrangle, Santa Fe and Los Alamos Counties, New Mexico,” New Mexico Bureau of Mines and Mineral Resources Map, 1 sheet. (Dethier and Manley 1985, 21506)

Devaurs, M., and W.D. Purtymun, 1985. “Hydrologic Characteristics of the Alluvial Aquifers in Mortandad, Cañada del Buey and Pajarito Canyons,” Los Alamos National Laboratory document LA-UR-85-4002, Los Alamos, New Mexico. (Devaurs and Purtymun 1985, 07415)

Dransfield, B., and J.N. Gardner, 1985. “Subsurface Geology of the Pajarito Plateau, Española Basin, New Mexico,” Los Alamos National Laboratory report LA-10455-MS, Los Alamos, New Mexico. (Dransfield and Gardner 1985, 06612)

Dunker, K., J. Wolff, R. Harmon, P. Leat, A. Dicken, and R. Thompson, 1991. “Diverse Mantle and Crustal Components in Lavas of the NW Cerros del Rio Volcanic Field, Rio Grande Rift, New Mexico,” *Contributions to Mineralogy and Petrology*, Vol. 108, pp. 331–345. (Dunker et al. 1991, 88739)

EPA (U.S. Environmental Protection Agency), 1987. “Test Methods for Evaluating Solid Waste, Laboratory Manual, Physical/Chemical Methods,” SW-846, 3rd Ed., Update III, Washington, D.C. (EPA 1987, 31732)

EPA (U.S. Environmental protection Agency), 1987. Data Quality Objectives for Remedial Response Activities, Development Process: EPA/540-G-87-003 OSWER Directive No. 9355.0-7B, prepared by CDM Federal Programs Corporation, Washington, D.C. (EPA 1987, 57589)

EPA (U.S. Environmental Protection Agency), 1992. “Guidance for Data Usability in Risk Assessment (Part A),” Publication 9285.7-09A, Office of Emergency Remedial Response, Washington, D.C. (EPA 1992, 54947)

EPA (U.S. Environmental Protection Agency), 1994. “Guidance for the Data Quality Objectives Process (G-4).EPA/600/R-96/055,” Washington, D.C. (EPA 1994, 48639)

EPA (U.S. Environmental Protection Agency), 1994. “U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentrations (LMO 1.0) and Low Concentration Water (OLCO 1.0),” Washington, D.C. (EPA 1994, 48640)

ESP (Environmental Surveillance Program), 2000. “Environmental Surveillance at Los Alamos during 1999,” Los Alamos National Laboratory report LA-13775-ENV, Los Alamos, New Mexico. (ESP 2000, 68661)

ESP (Environmental Surveillance Program), 2001. “Environmental Surveillance at Los Alamos during 2000,” Los Alamos National Laboratory report LA-13861-ENV, Los Alamos, New Mexico. (ESP 2001, 71301)

Fisher, R.V., and Schminke, H.-U., 1984. *Pyroclastic Rocks,* Springer-Verlag, Berlin, Germany. (Fisher and Schminke 1984, 88744)

Freeze, R.A., and J.A. Cherry 1979. *Groundwater*, Prentice Hall, Inc., Englewood Cliffs, New Jersey. (Freeze and Cherry 1979, 88742)

Frenzel, P.F., 1995. “Geohydrology and Simulation of Ground-Water Flow near Los Alamos, North-Central New Mexico,” U.S. Geological Survey, Water-Resources Investigations report 95-4091. (Frenzel 1995, 56028)

Gallaher, B., 1995. “Groundwater velocities in Los Alamos Canyon,” Los Alamos National Laboratory, Memorandum ESH-18/WQ&H-95-409 to ESH-18 Reading File. (Gallaher 1995, 49679)

Gallaher, B.M., and R.J. Koch, 2004, “Cerro Grande Fire Impacts to Water Quality and Stream Flow near Los Alamos National Laboratory: Results of Four Years of Monitoring” (Gallaher and Koch 2004, 88747)

Galusha, T., and J. Blick, 1971. “Stratigraphy of the Santa Fe Group, New Mexico,” *American Museum of Natural History*, Bulletin 144. (Galusha and Blick 1971, 21526)

Gardner, J.N., and F. Goff, 1984. “Potassium-Argon Dates from the Jemez Volcanic Field: Implications of Tectonic Activity in the North-Central Rio Grande Rift,” *Rio Grande Rift: Northern New Mexico,* New Mexico Geological Society, 35th Annual Field Conference, October 11–13, 1984, pp. 75–81. (Gardner and Goff 1984, 44021)

Gardner, J.N., and L. House, 1987. “Seismic Hazards Investigations at Los Alamos National Laboratory, 1984 to 1985,” Los Alamos National Laboratory report LA-11072-MS, Los Alamos, New Mexico. (Gardner and House 1987, 06682)

Gardner, J.N., F. Goff, S. Garcia, and R. Hagan, 1986. “Stratigraphic Relations and Lithologic Variations in the Jemez Volcanic Field, New Mexico,” *Journal of Geophysical Research*, Vol. 91, pp. 1763–1778. (Gardner et al. 1986, 21527)

Gardner, J.N., T. Kolbe, and S. Chang, 1993. “Geology, Drilling and Some Hydrologic Aspects of Seismic Hazards Program Core Holes, Los Alamos National Laboratory,” Los Alamos National Laboratory report LA-12460-MS, Los Alamos, New Mexico. (Gardner et al. 1993, 12582)

Gardner, J.N., A. Lavine, D. Vaniman, and G. WoldeGabriel, 1998. “High-Precision Geologic Mapping to Evaluate the Potential for Seismic Surface Rupture at TA-55, Los Alamos National Laboratory,” Los Alamos National Laboratory report LA-13456-MS, Los Alamos, New Mexico. (Gardner et al. 1998, 63496)

Geddis, A.M., 1992. “Preliminary Modeling of Moisture Movement in the Tuff beneath Mortandad Canyon, Los Alamos National Laboratory,” Los Alamos National Laboratory document LA-UR-92-2577, Los Alamos, New Mexico. (Geddis 1992, 31592)

Geologic, Inc., 1989. “Pathways Analysis at Material Disposal Area T, Los Alamos National Laboratory (LANL), Los Alamos, New Mexico,” prepared for Los Alamos National Laboratory by Geologic, Inc., Herdon, Virginia. (Geologic, Inc. 1989, 31492)

Goff, F., 1995. “Geologic Map of Technical Area 21,” in *Earth Science Investigations for Environmental Restoration, Los Alamos National Laboratory Technical Area 21,* Los Alamos National Laboratory report LA-12934-MS,pp. 7–18. (Goff 1995, 49682)

Goff, F., and S. Sayer, 1980. “A Geothermal Investigation of Spring and Well Waters of the Los Alamos Region, New Mexico,” Los Alamos National Laboratory report LA-8326-MS, Los Alamos, New Mexico. (Goff and Sayer 1980, 54783)

Goff, F., J.N. Gardner, W. Baldridge, J. Hulen, D. Nielson, D. Vaniman, G. Heiken, M. Dungan, and D. Broxton, 1989. “Excursion 17B: Volcanic and Hydrothermal Evolution of the Valles Caldera and Jemez Volcanic Field,” New Mexico Bureau of Mines and Mineral Resources, Memoir 46, pp. 381–434. (Goff et al. 1989, 54783)

Goff, F., J.N. Gardner, and G. Valentine, 1990. "Geologic Map of the St. Peter's Dome Area, Jemez Mountains, New Mexico," New Mexico Bureau of Mines and Mineral Resources, Map 69, 2 sheets. (Goff et al. 1990, 21574)

Goff, F., B. Kues, M. Rogers, L. McFadden, and J.N. Gardner, 1996. "The Jemez Mountains Region," New Mexico Geological Society, 47th Annual Field Conference, September 25–28, 1996, 484 pp. (Goff et al. 1996, 56025)

Goff, F., J.N. Gardner, and S. Reneau, 2002. "Preliminary Geologic Map of the Frijoles, 7.5-Minute Quadrangle," *New Mexico Bureau of Geology*, Map NMBGMR OF-GM 42, available at (http://geoinfo.nmt.edu). (Goff et al. 2002, 88776)

Goff, F., D. Bergfeld, C.J. Janik, D. Counce, and M. Murrell, 2002. "Geochemical Data on Waters, Gases, Scales, and Rocks, from the Dixie Valley Region, Nevada (1996–1999)," Los Alamos National Laboratory report LA-13972-MS, Los Alamos, New Mexico. (Goff et al. 2002, 88766)

Gray, R.N., 1997. "Hydrologic Budget Analysis and Numerical Simulations of Groundwater Flow in Los Alamos Canyon near Los Alamos, New Mexico," M.S. Thesis, University of New Mexico, Albuquerque, New Mexico, 202 pp. (Gray, 1997, 58208)

Griggs, R.L., 1964. "Geology and Ground-Water Resources of the Los Alamos Area, New Mexico," U.S. Geological Survey, Water-Supply Paper 1753, 107 pp. (Griggs 1964, 08795)

Hakam, O.K., A. Choukri, J.L. Reyss, and M. Lferde, 2000. "Activities and Activity Ratios of U and Ra Radioisotopes in Drinking Wells, Springs and Tap Water Samples in Morocco," *Radiochimica Acta*, Vol. 88, pp. 55–60. (Hakam et al. 2000, 70168)

Hearne, G.A., 1985. "Mathematical Model of the Tesuque Aquifer System near Pojoaque, New Mexico," U.S. Geological Survey, Water-Supply Paper 2205, 75 pp. (Hearne 1985, 88749)

Heiken, G., K. Wohletz, R. Fisher, and D. Dethier, 1996. "Field Guide to the Maar Volcanoes of White Rock Canyon, Part II: Field Excursions to the Jemez Mountains, New Mexico," in New Mexico Bureau of Mines and Mineral Resources Bulletin 134, pp. 56–72. (Heiken et al. 1996, 54425)

Katzman D., 2000, "Post-Cerro Grande Fire Environmental Sampling Data: Pajarito Canyon Alluvial Groundwater Samples Collected in June 2000," Los Alamos National Laboratory document LA-UR-00-5491, Los Alamos, New Mexico. (Katzman 2000, 69055)

Keating, E., E. Kwicklis, M. Witkowski, and T. Ballantine, 1999. "A Regional Flow Model for the Regional Aquifer beneath the Pajarito Plateau," Los Alamos National Laboratory document LA-UR-00-1029, Los Alamos, New Mexico. (Keating et al. 1999, 88746)

Keller, G., 1986. "Introduction to Special Section on the Rio Grande Rift," *Journal of Geophysical Research*, Vol. 91, p. 6142. (Keller 1986, 88740)

Kelley, V., 1978. "Geology of the Española Basin, New Mexico," New *Mexico Bureau of Mines and Mineral Resources*, Map 48, 1 sheet. (Kelley, 1978, 11659)

Kempter, K.A., and S. Kelley, 2002. "Geology of the Guaje Mountain, 7.5-min. Quadrangle, Los Alamos and Sandoval Counties, New Mexico," *New Mexico Bureau of Geology and Mineral Resources*, Open-File Geologic Map OF-GM 55, (http://geoinfo.nmt.edu). (Kempter and Kelley 2002, 88777)

Koenig, E.D., and S.G. McLin, 1992. "Application of a Lumped-Parameter Model toward Understanding the Behavior of the Mortandad Canyon Perched Alluvial Aquifer System, Los Alamos, New Mexico," Los Alamos National Laboratory report, Los Alamos, New Mexico (Koenig and McLin 1992, 56029)

Langmuir, D., 1997. *Aqueous Environmental Geochemistry*, Prentice Hall, Inc., Upper Saddle River, New Jersey. (Langmuir 1997, 56037)

LANL (Los Alamos National Laboratory), July 1995. “Statement of Work—Analytical Support, Revision 2,” Los Alamos National Laboratory document, Los Alamos, New Mexico. (LANL 1995, 49738)

LANL (Los Alamos National Laboratory), January 1996. “Groundwater Protection Management Program Plan,” Rev. 2.0, Los Alamos, New Mexico. (LANL 1996, 70215)

LANL (Los Alamos National Laboratory), 1997. “Workplan for Mortandad Canyon,” Los Alamos National Laboratory document LA-UR-97-3291, Los Alamos, New Mexico. (LANL 1997, 56835)

LANL (Los Alamos National Laboratory), 1998. “Hydrogeologic Workplan, Los Alamos National Laboratory,” Los Alamos National Laboratory document, Los Alamos, New Mexico. (LANL 1998, 59599)

LANL (Los Alamos National Laboratory), April 2004. “Los Alamos and Pueblo Canyons Investigation Report,” Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 87390)

Lindsay, W.L., 1979. *Chemical Equilibria in Soils*, John Wiley and Sons, New York, New York. (Lindsay 1979, 00883)

Longmire, P., March 2002. “Characterization Well R-15 Geochemistry Report,” Los Alamos National Laboratory report LA-13896-MS, Los Alamos, New Mexico. (Longmire 2002, 73676)

Longmire, P., April 2002. “Characterization Wells R-9 and R-9i Geochemistry Report,” Los Alamos National Laboratory report LA-13927-MS, Los Alamos, New Mexico. (Longmire 2002, 73282)

Longmire, P., May 2005. “Characterization Well R-25 Geochemistry Report,” Los Alamos National Laboratory report LA-14198-MS, Los Alamos, New Mexico. (Longmire 2005, 88510)

Longmire, P., June 2002. “Characterization Well R-19 Geochemistry Report,” Los Alamos National Laboratory report LA-13964-MS, Los Alamos, New Mexico. (Longmire 2002, 72713).

Longmire, P., June 2002. “Characterization Well R-12 Geochemistry Report,” Los Alamos National Laboratory report LA-13952-MS, Los Alamos, New Mexico. (Longmire 2002, 72800)

Longmire, P., September 2002. “Characterization Well R-22 Geochemistry Report,” Los Alamos National Laboratory report LA-13986-MS, Los Alamos, New Mexico.(Longmire 2002, 72614)

Longmire, P., and F. Goff, 2002. “Characterization Well R-7 Geochemistry Report,” Los Alamos National Laboratory report LA-14004-MS, Los Alamos, New Mexico. (Longmire and Goff, 2002, 75905)

Longmire, P., D. Counce, M. Dale, S. Chipera, and M. Snow, 2001. “Conceptual Model for Mineralogical and Hydrogeochemical Impacts of the Cerro Grande Fire, Los Alamos, New Mexico,” Abstract, Geological Society of America, Rocky Mountain and South-Central Sections, GSA Joint Annual Meeting, April 29-May 2, 2001, Albuquerque, New Mexico. (Longmire et al. 2001, 71362)

Longmire, P.A., S. Kung, J.M. Boak, A.I. Adams, F. Caporuscio, and R.N. Gray, 1996. “Aqueous Geochemistry of Upper Los Alamos Canyon, Los Alamos, New Mexico,” *The Jemez Mountains Region,* New Mexico Geological Society Guidebook, 47th Field Conference, New Mexico, pp. 473-480. (Longmire et al. 1996, 54168)

Longmire, P., C.R. Cotter, I.R. Triay, J.J. Kitten, C. Hall, J. Bentley, D.J. Hollis, and Andrew I. Adams. 1996. “Batch Sorption Results for Americium, Neptunium, Plutonium, Technetium, and Uranium Transport Through the Bandelier Tuff, Los Alamos, New Mexico,” Los Alamos National Laboratory report LA-UR-96-4716, Los Alamos, New Mexico, (Longmire et al. 1996, 56030)

Longmire, P., D. Broxton, W. Stone, R. Gilkeson, J. Marin, D. Rogers, R. Hull, S. McLin, B. Newman, and R. Warren, 2001. “Characterization Well R-15 Completion Report,” Los Alamos National Laboratory report LA-13749-MS, Los Alamos, New Mexico. (Longmire et al. 2001, 70103)

Manley, K., 1979. "Stratigraphy and Structure of the Española Basin, Rio Grande Rift, New Mexico," in *Rio Grande Rift: Tectonics and Magmatism,* American Geophysical Union, Washington, D.C., pp. 71–86. (Manley 1979, 11714)

Mayo, E., 1958. "Lineament Tectonics and Some Ore Districts of the Southwest," *Mining Engineering*, Vol. 10, pp. 1169–175. (Mayo 1958, 21573)

McAda, D.P., and M. Wasiolek, 1988. "Simulation of the Regional Geohydrology of the Tesuque Aquifer system near Santa Fe, New Mexico," U.S. Geological Survey Water-Resources Investigation report 87-4056, (McAda and Wasiolek 1988, 88737)

Meeker, K., F. Goff, J.N. Gardner, L. Trujillo, and D. Counce, 1990. "Environmental Sampling and Mud Sampling Program of CSP Core Hole VC-2B Valles Caldera, New Mexico," (Meeker et al. 1990, 54783.34)

NMED, 2004, "Table 1—Background Perchlorate Concentrations in Pajarito Plateau Groundwaters, Los Alamos, New Mexico." (NMED 2004, 88768)

Penrose, W.R., W.L.. Polzer, E. Hessington, D.M. Nelson, and K.A. Orlandini, 1990. "Mobility of Plutonium and Americium through a Shallow Aquifer in a Semi-Arid Region," *Environmental Science and Technology*, Vol. 24, No. 2, pp. 228–234. (Penrose et al. 1990, 11770)

Purtymun, W.D., 1975. "Geohydrology of the Pajarito Plateau with Reference to Quality of Water, 1949–1972," Los Alamos National Laboratory report LA-5744, Los Alamos, New Mexico. (Purtymun 1975, 11787)

Purtymun, W.D., 1984. "Hydrologic Characteristics of the Main Aquifer in the Los Alamos Area–Development of Ground Water Supplies," Los Alamos National Laboratory report LA-9957-MS, Los Alamos, New Mexico. (Purtymun 1984, 06513)

Purtymun, W.D., 1995. "Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area," Los Alamos National Laboratory report LA-12883-MS, Los Alamos, New Mexico. (Purtymun 1995, 45344)

Purtymun, W.D., and J.B. Cooper, 1969. "Development of Ground-Water Supplies on the Pajarito Plateau, Los Alamos County, New Mexico," U.S. Geological Survey Professional Paper 650-B, pp. 49–153. (Purtymun and Cooper 1969, 11831)

Purtymun, W.D., and S. Johansen, 1974. "General Geohydrology of the Pajarito Plateau," in *Ghost Ranch, Central-Northern New Mexico.* New Mexico Geological Society, 25th Field Conference, October 10–12, 1974, pp. 347–349. (Purtymun and Johansen 1974, 11835)

Purtymun, W.D., G. L. Johnson, and E.C. John, 1966. "Distribution of Radioactivity in Alluvium of a Disposal Area at Los Alamos, New Mexico," U.S. Geological Survey Professional Paper 550-D, (Purtymun et al. 1966, 09653)

Purtymun, W.D., R.J. Peters, and J.W. Owens, 1980. "Geohydrology of White Rock Canyon of the Rio Grande from Otowi to Frijoles Canyon," Los Alamos National Laboratory report LA-8635-MS, Los Alamos, New Mexico. (Purtymun et al. 1980, 00208).

Purtymun, W., S. McLin, A. Stoker, M. Maes, and B. Hammock, 1993, "Water Supply at Los Alamos during 1990," Los Alamos National Laboratory report LA-12471-PR, Los Alamos, New Mexico. (Purtymun et al., 1993, 15371)

Riecker, R., Ed., 1979. "Rio Grande Rift: Tectonics and Magmatism," American Geophysical Union, Washington.,D.C., 438 pp. (Riecker 1979, 21502)

Robinson, B.A., July 2005. "Hydrogeologic Synthesis Report," Los Alamos National Laboratory document LA-UR-05-2814, Los Alamos, New Mexico (Robinson et al. 2005, 88767)

Rogers, M., 1995. "Geologic Map of Los Alamos National Laboratory Reservation," New Mexico Environment Department, Santa Fe, New Mexico. (Rogers 1995, 54419)

Rogers, D.B., and B.M. Gallaher, 1995. "The Unsaturated Hydraulic Characteristics of the Bandelier Tuff," Los Alamos National Laboratory report LA-12968-MS, Los Alamos, New Mexico. (Rogers and Gallaher 1995, 48845)

Self, S., F. Goff, J.N. Gardner, J. Wright, and W. Kite, 1986. "Explosive Rhyolitic Volcanism in the Jemez Mountains: Vent Locations, Caldera Development, and Relation to Regional Structure," *Journal of Geophysical Research*, Vol. 91, pp. 1779–1798. (Self et al. 1986, 21579)

Shevenell, L., and F. Goff, 1995. "The Use of Tritium in Groundwater to Determine Fluid Mean Residence Times of Valles Caldera Hydrothermal Fluids, New Mexico," *Journal of Volcanology and Geothermal Research,* Vol. 67, pp. 187-205. (Shevenell and Goff 1995, 73689)

Shevenell, L., F. Goff, F.-D. Vuataz, P. Trujillo, D. Counce, B. Evans, and C. Janik, 1987. "Hydrogeochemical Data for Thermal and Nonthermal Waters and Gases of the Valles Caldera-Southern Jemez Mountains Region, New Mexico," Los Alamos National Laboratory report LA-10923-OBES, Los Alamos, New Mexico. (Shevenell et al. 1987, 06673)

Smith, R.L., and R.A. Bailey, 1966. "The Bandelier Tuff: A Study of Ash-Flow Eruption Cycles from Zoned Magma Chambers," *Bulletin of Volcanology*, Vol. 29, pp. 83–104. (Smith and Bailey 1966, 21584)

Smith, R.L., R.A. Bailey, and C.S. Ross, 1970. "Geologic Map of the Jemez Mountains, New Mexico," U.S. Geological Survey Map I-571, 1 sheet. (Smith et al. 1970, 09752)

Stoker, A.K., W.D. Purtymun, S.G. McLin, and M.M. Maes, 1991. "Extent of Saturation in Mortandad Canyon," Los Alamos National Laboratory document LA-UR-91-1660, Los Alamos, New Mexico. (Stoker et al. 1991, 07530)

Stoker, A., S. McLin, W. Purtymun, M. Maes, and B. Hammock, 1992. "Water Supply at Los Alamos during 1989," Los Alamos National Laboratory report LA-12276-PR, Los Alamos, New Mexico. (Stoker et al. 1992, 12017)

Stone, W.J., 1995. "Preliminary Results of Modeling the Shallow Aquifer, Mortandad Canyon, Los Alamos National Laboratory, New Mexico," New Mexico Environmental Department report NMED/DOE/AIP-95-1, 32 pp. (Stone 1995, 56043)

Stone, W.J., 1996. "Some Fundamental Hydrologic Issues Pertinent to Environmental Activities at Los Alamos National Laboratory, New Mexico," *New Mexico Geological Society Guidebook*, 47th Field Conference, pp. 449–453. (Stone 1996, 63989)

Theis, C.V., and C.S. Conover, 1962. "Pumping Tests in the Los Alamos Canyon Well Field near Los Alamos, New Mexico," U.S. Geological Survey, Water-Supply Paper 1809-D, 50 pp. (Theis and Conover 1962, 11878)

Turbeville, B., D. Waresback, and S. Self, 1989. "Lava-Dome Growth and Explosive Volcanism in the Jemez Mountains, New Mexico: Evidence from the Plio-Pleistocene Puye Alluvial Fans," *Journal of Volcanology and Geothermal Research*, Vol. 36, pp. 267–291. (Turbeville et al. 1989, 21587)

Umari, A.M.J., and T.L. Szeliga, 1989. "Conversion and Comparison of the Mathematical Three-Dimensional, Finite-Difference, Ground-Water Flow Model to the Modular, Three-Dimensional, Finite-Difference, Ground-Water Flow Model for the Tesuque Aquifer System in Northern New Mexico," U.S. Geological Survey Open-File report 89-26, 39 pp. (Umari and Szeliga 1989, 88735)

USGS (U.S. Geological Survey), 1989. "Techniques of Water-Resources Investigation of the United States Geological Survey," *Methods for Determination of Inorganic Substances in Water and Fluvial Sediments*, 3rd ed., United States Government Printing Office, Washington, D.C., (USGS 1989, 88749)

Vaniman, D., J. Marin, W. Stone, B. Newman, P. Longmire, N. Clayton, R. Lewis, R. Koch, S. McLin, G. WoldeGabriel, D. Counce, D. Rogers, R. Warren, E. Kluk, S. Chipera, D. Larssen, and W. Kopp, 2002. "Characterization Well R-31 Completion Report," Los Alamos National Laboratory report LA-13910-MS, Los Alamos, New Mexico. (Vaniman et al. 2002, 72615)

Vuataz, F.D., and F. Goff, 1986. "Isotope Geochemistry of Thermal and Nonthermal Waters in the Valles Caldera, Jemez Mountains, Northern New Mexico," *Journal of Geophysical Research*, Vol. 91, No. B2, pp. 1835–1853. (Vuataz and Goff 1986, 73687)

WoldeGabriel, G., A. W. Laughlin, D. P. Dethier, and M. Heizler, 1996. "Temporal and Geochemical Trends of Lavas in White Rock Canyon and the Pajarito Plateau, Jemez Volcanic Field, New Mexico, USA," *New Mexico Geological Society Guidebook*, 47th Field Conference, pp. 251–261. (WoldeGabriel et al. 1997, 54427)

Yanicak, S., 1998. "Release of Ground and Surface Water Data Related to Split Sampling and Independent Sampling at Los Alamos National Laboratory and Surrounding Areas during 1996 and 1997," Letter to M. Johansen, DOE LAAO (Yanicak 1998, 57583)

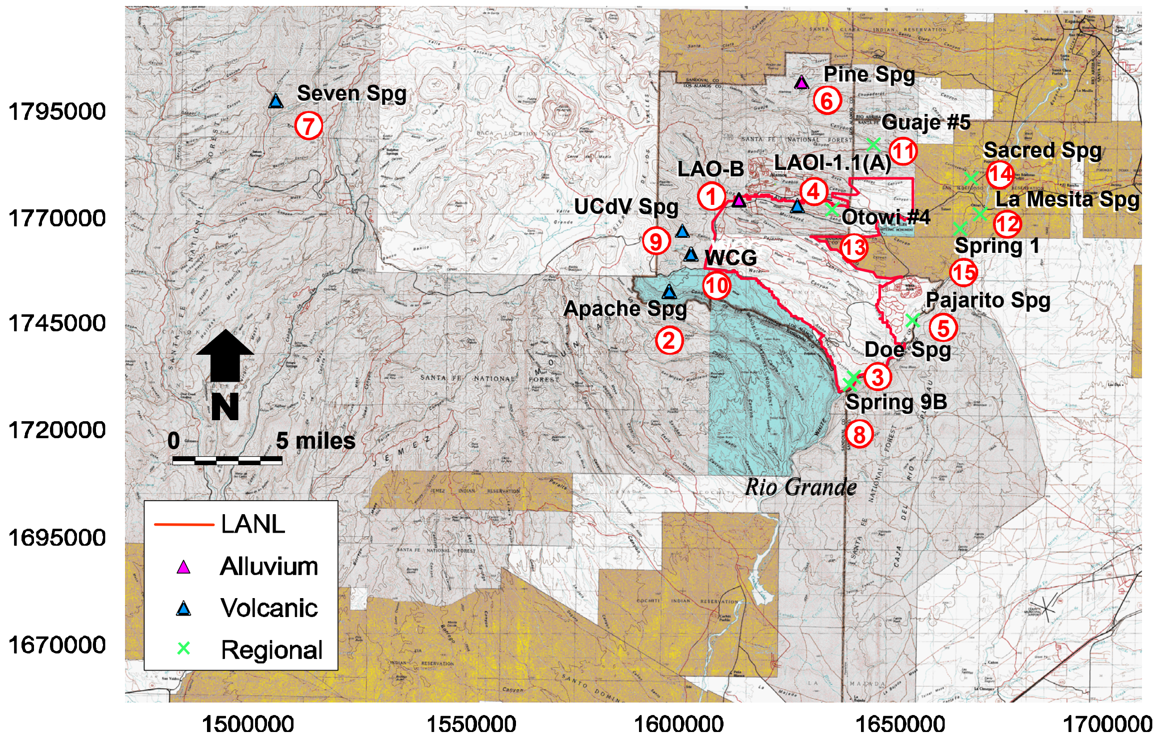


Figure 1.2-1. Location of fifteen sampling sites in the Jemez Mountains and near Los Alamos National Laboratory, New Mexico

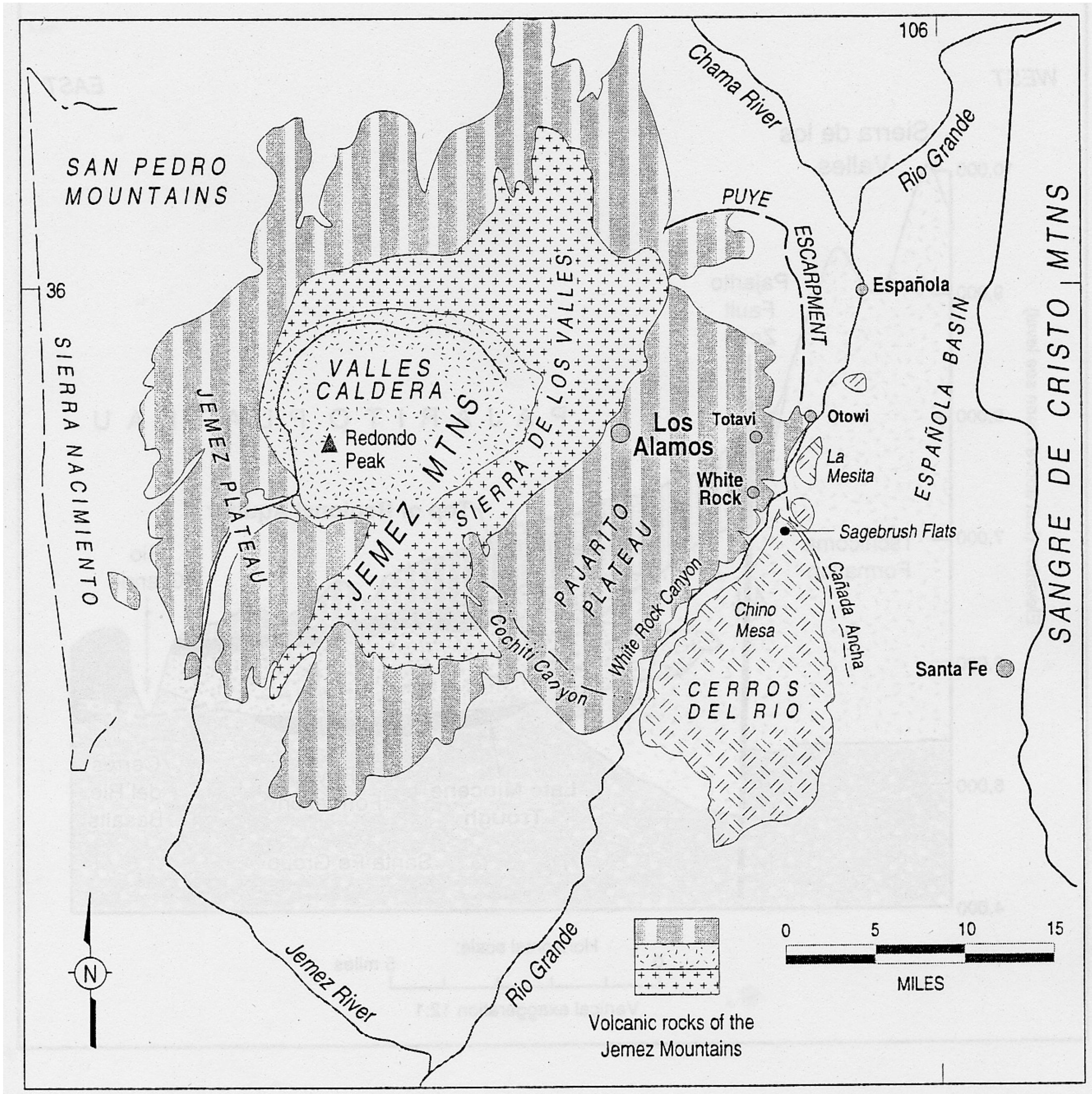


Figure 2.1-1. Regional and tectonic setting of the Jemez Mountains, Valles Caldera, and Pajarito Plateau in relation to the Rio Grande Rift, Española Basin, Colorado Plateau, and the Sangre de Cristo Mountains, New Mexico

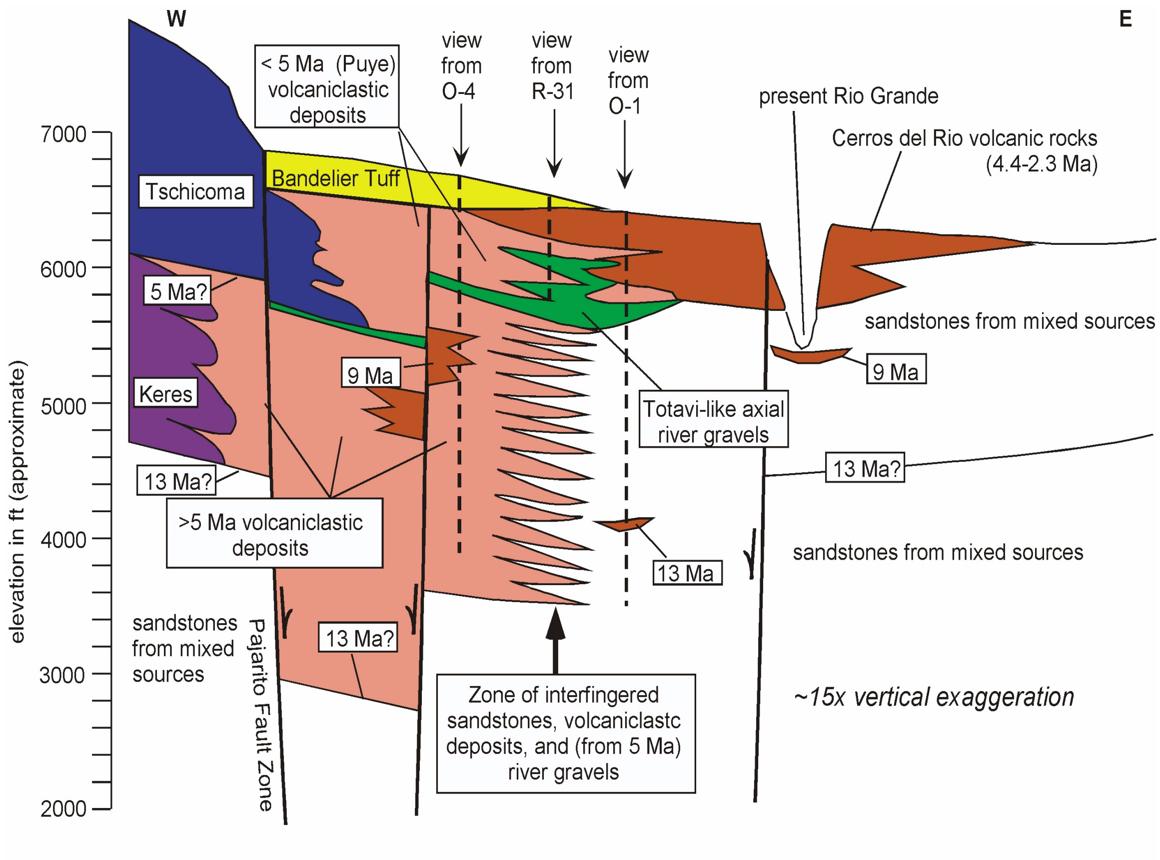


Figure 2.1-2. Diagram showing generalized geologic relations beneath the Pajarito Plateau. O-1 is well Otowi-1, O-4 is well Otowi-4, and R-31 refers to well R-31. Ma refers to millions of years before the present.

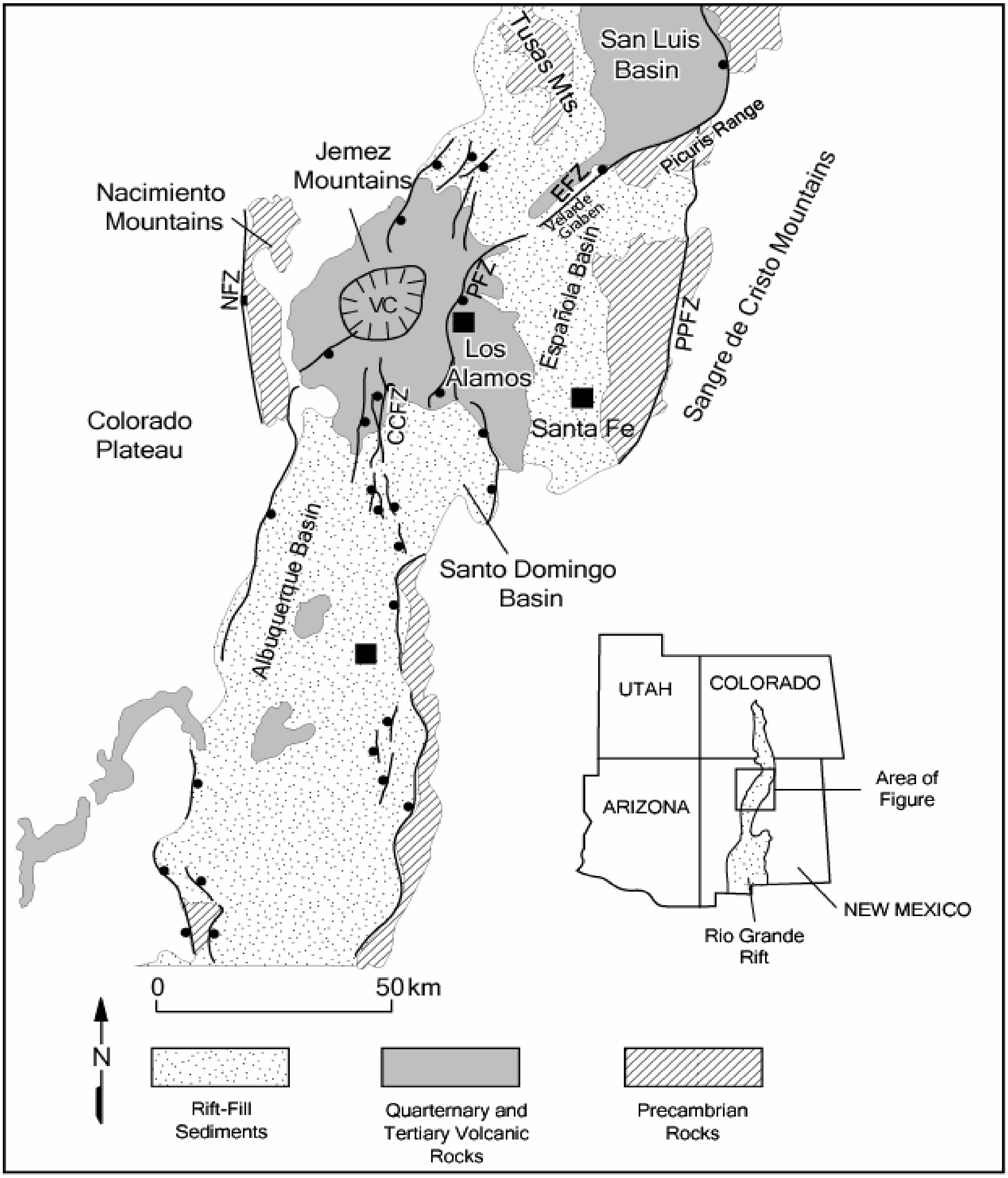


Figure 2.1-3. Regional geologic map (Broxton and Vaniman 2005, 88707)

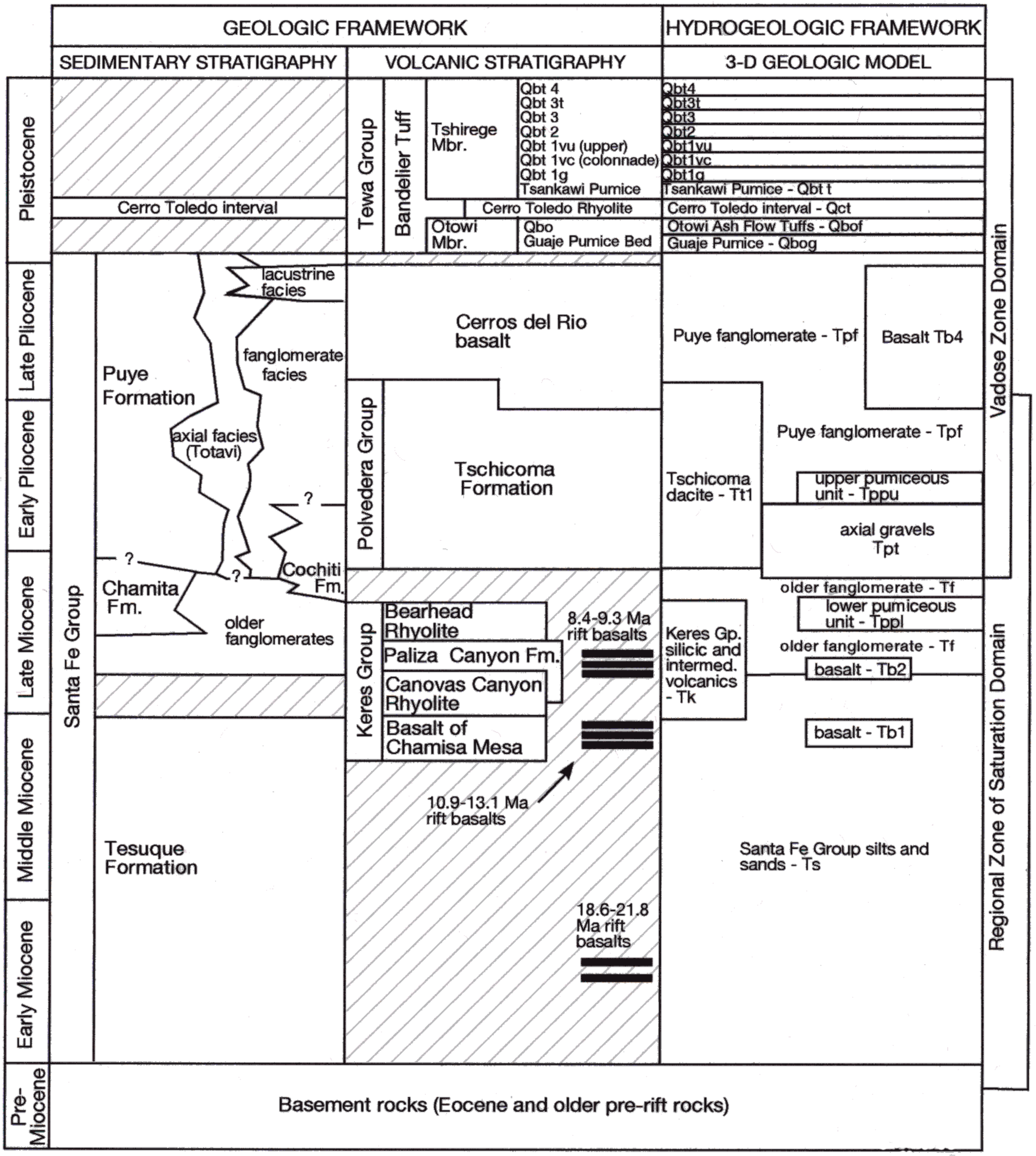


Figure 2.1-4. Revised stratigraphy of the Pajarito Plateau (Broxton and Vaniman 2005, 88707)

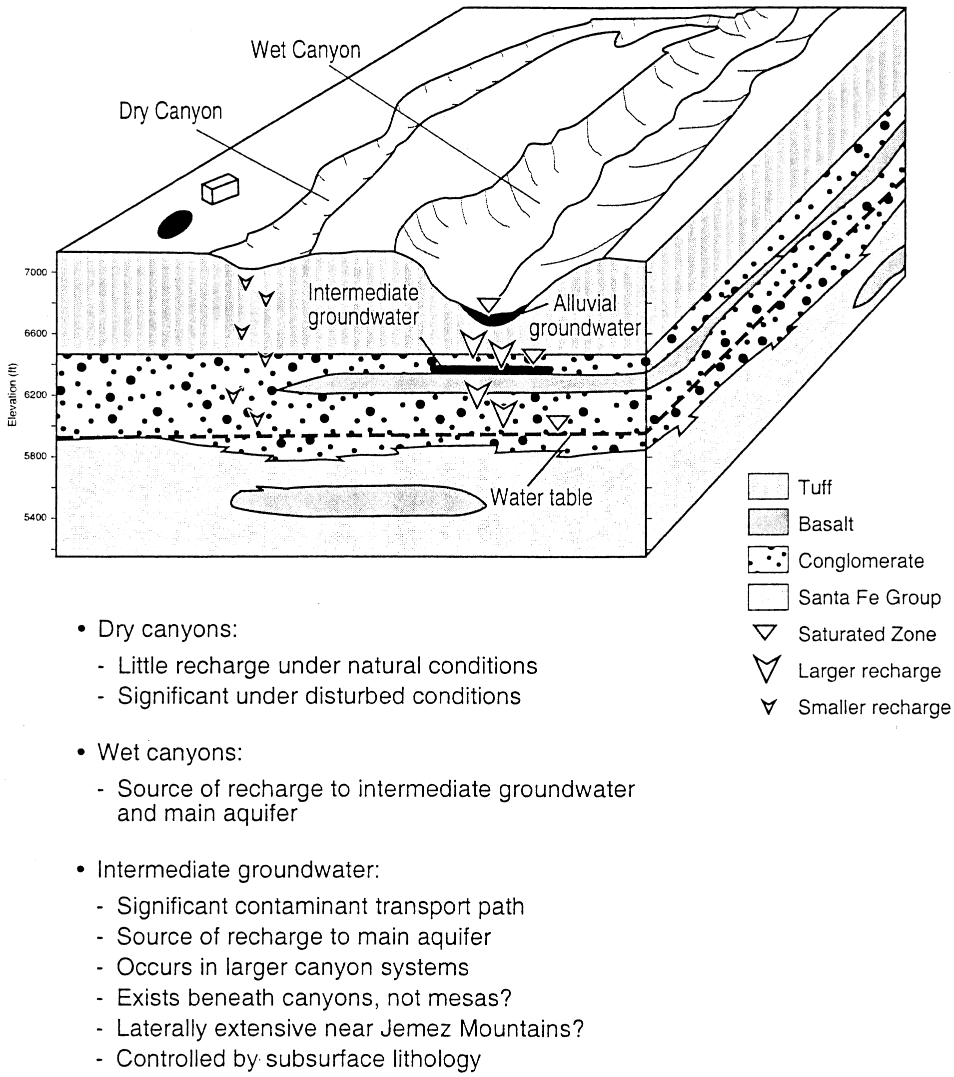


Figure 2.1-5. Hydrologic conceptual model for the canyons of the Pajarito Plateau (LANL 1998, 59599)

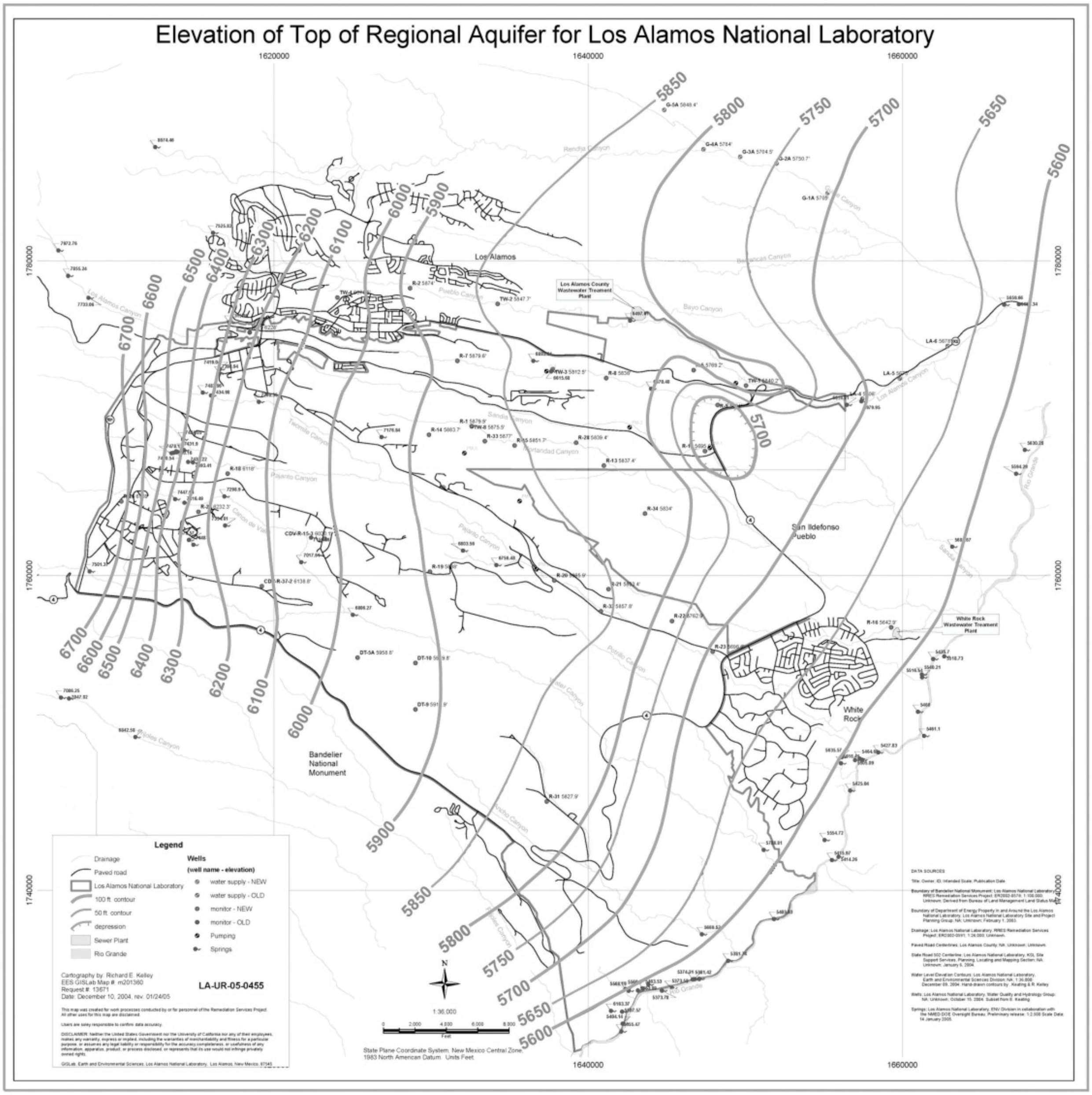


Figure 2.1-6. Regional water-level map in the vicinity of the Pajarito Plateau (Robinson et al., 2005, 88767)

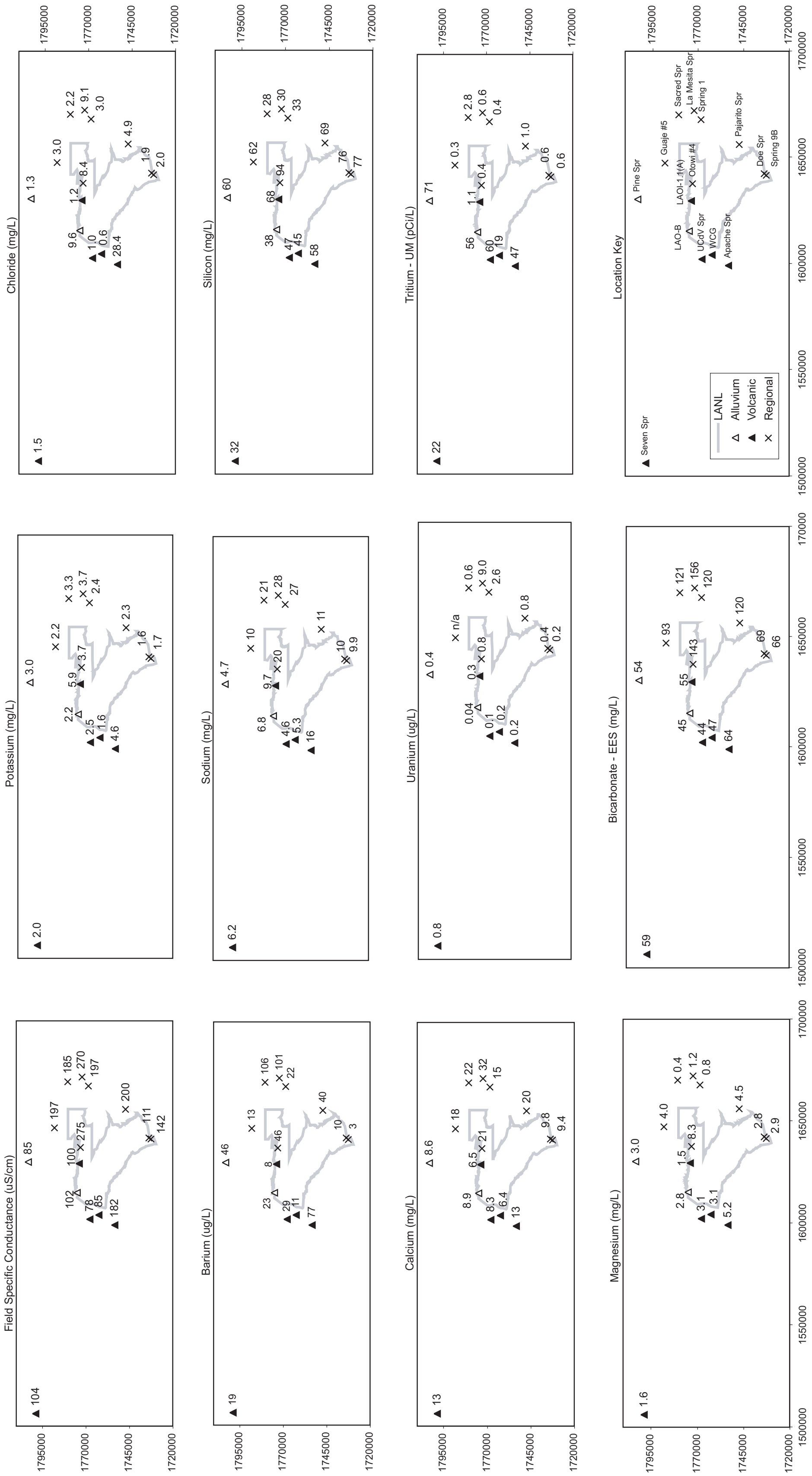


Figure 2.2-1. Average spatial distributions (n = 6) for key analytes at Laboratory background wells and springs

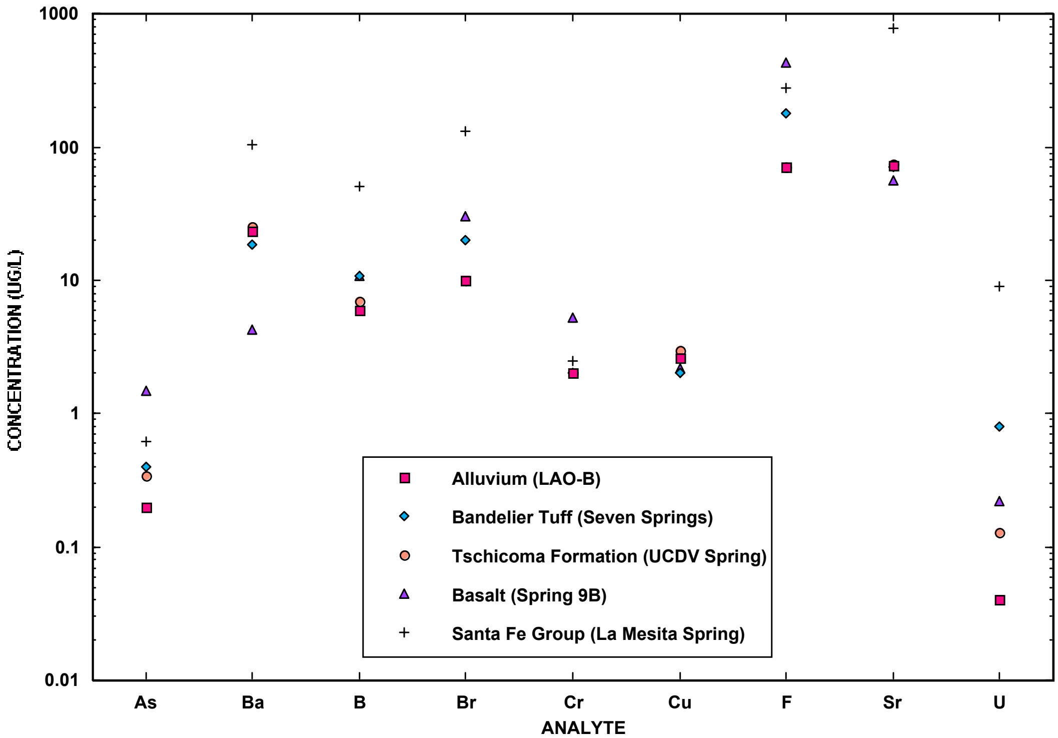


Figure 2.2-2. Average concentrations of selected trace elements within alluvial and perched-intermediate groundwater and the regional aquifer

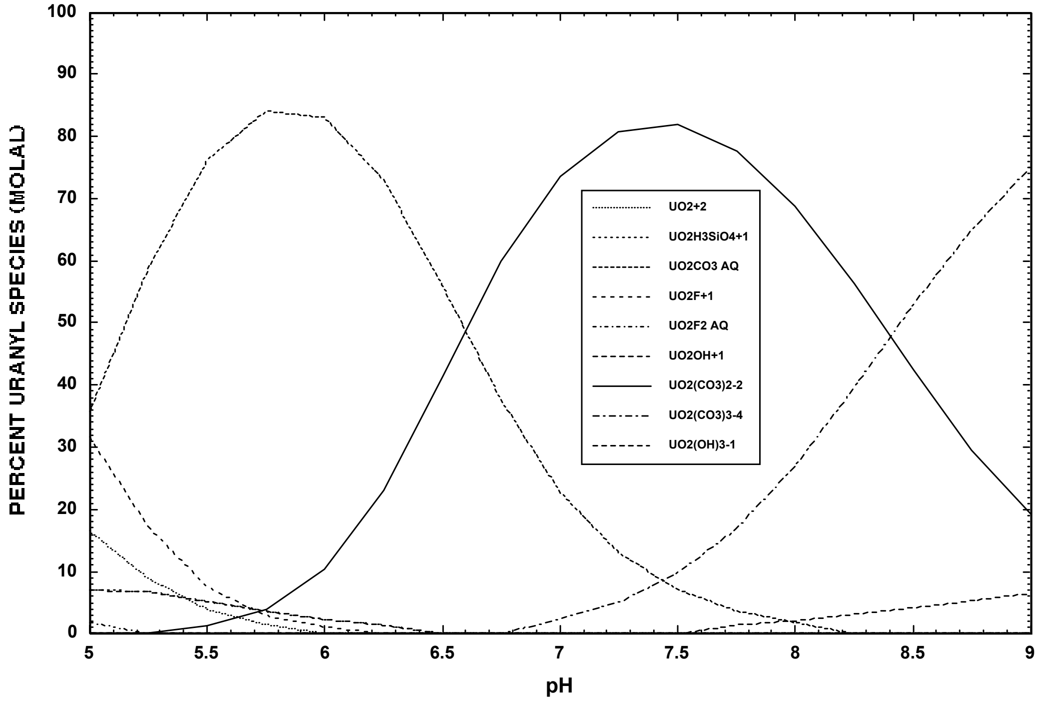


Figure 2.2-3. Results of uranium(VI) speciation calculations for Spring 9B using the computer program MINTEQA2, White Rock Canyon. Log U(VI) = -9.26 molal (m), log F = -4.69 m, log H_4SiO_4 = -2.92 m, and log CO_3^{2-} = -3.07 m at 20.5°C.

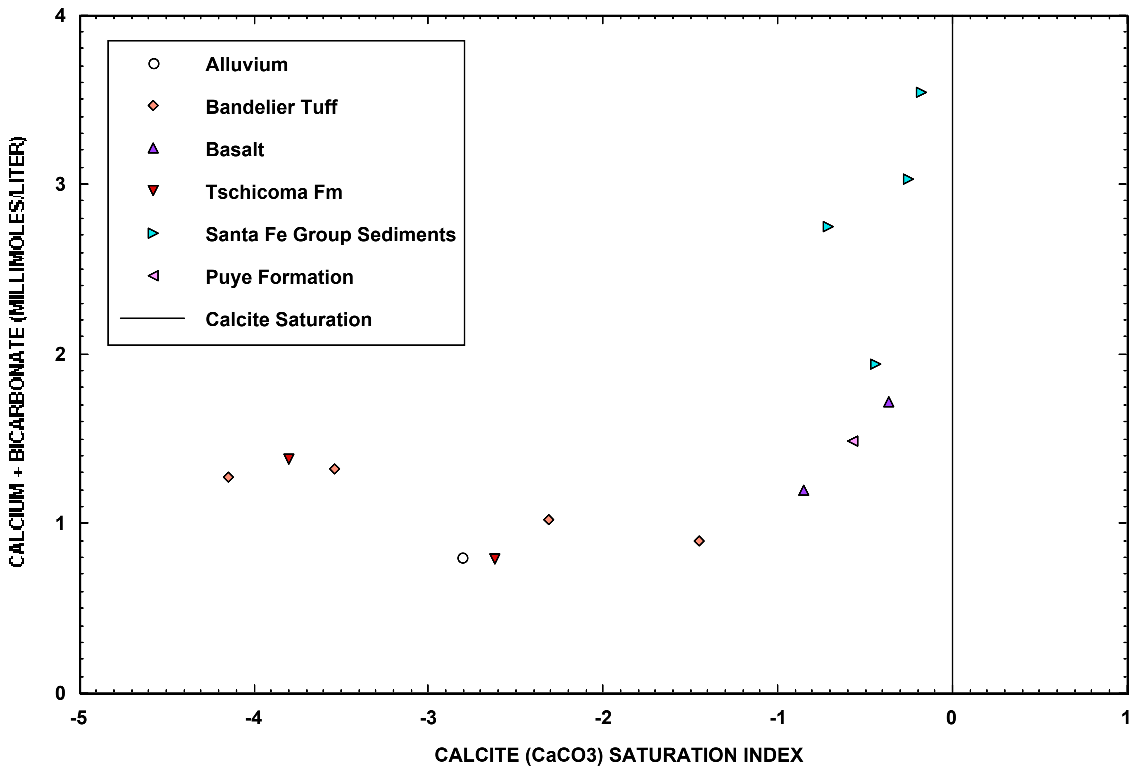


Figure 2.2-4. Saturation indices for calcite versus calcium and bicarbonate concentrations in Laboratory background springs and wells

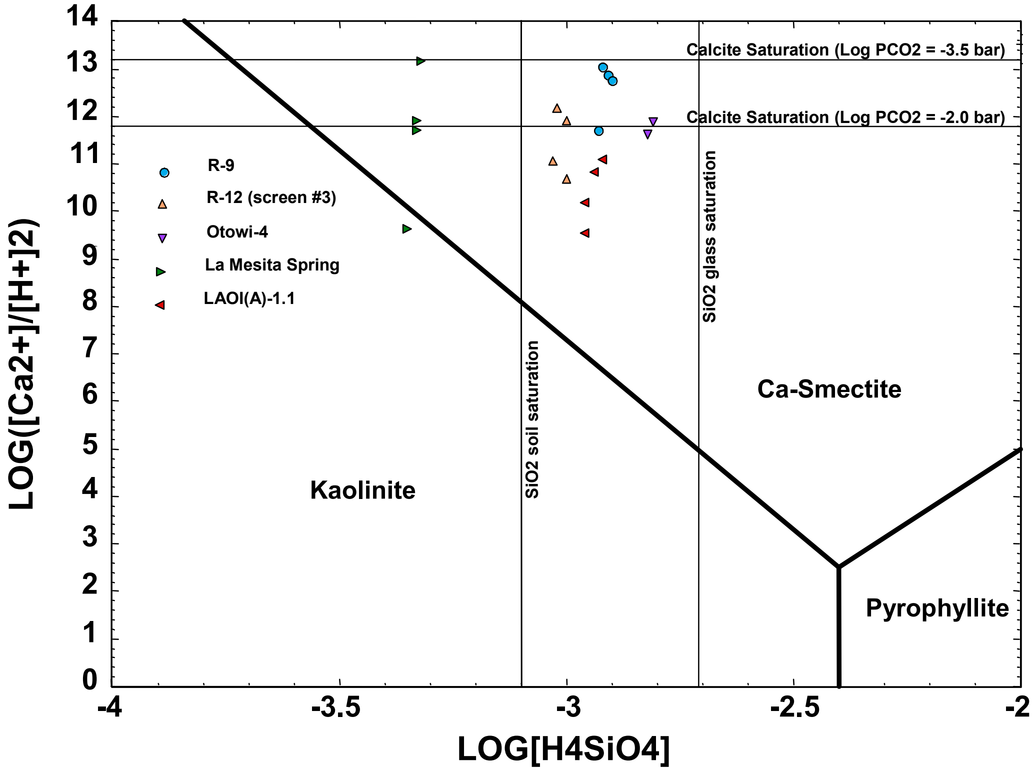
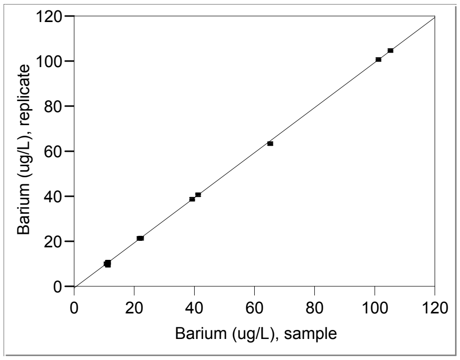
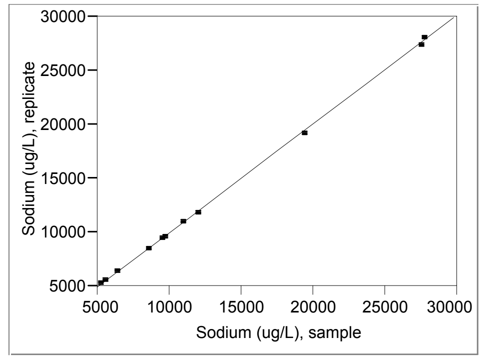


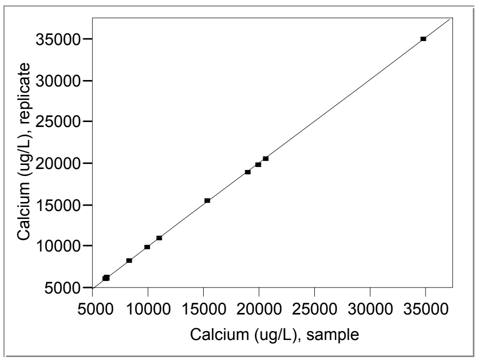
Figure 2.2-5. Activity diagram of log[H_4SiO_4] versus log activity (Ca^2+/[H+]^2) at 25°C for wells Otowi-4, R-9, R-12 (screen #3), LAOI(A)-1.1, and La Mesita Spring



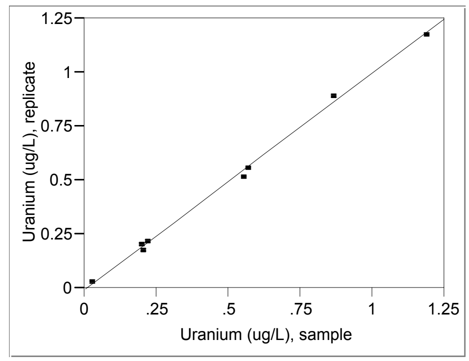
Ba [dup.] = -0.3 + 1.00*Ba, $r^2 > 0.99$, n = 11



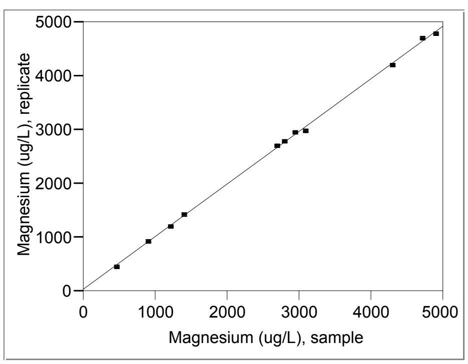
Na [dup.] = -89 + 1.01*Na, $r^2 > 0.99$, n = 11



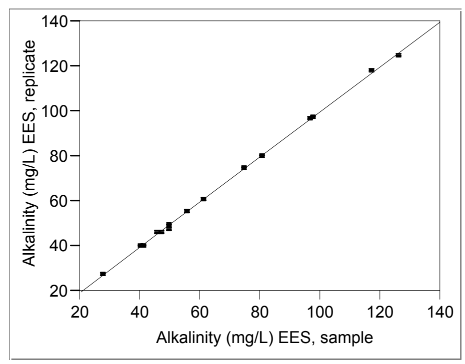
Ca [dup.] = -65 + 1.01*Ca, $r^2 > 0.99$, n = 11



U [dup.] = -0.01 + 1.00*U, $r^2 > 0.99$, n = 8

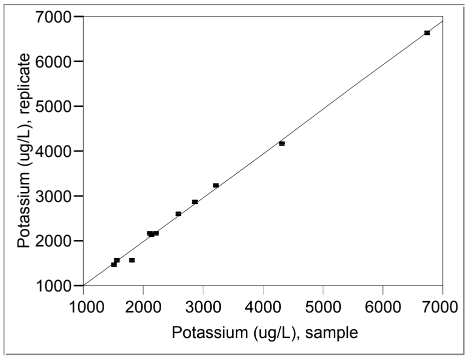


Mg [dup.] = 29 + 0.98*Mg, $r^2 > 0.99$, n = 11

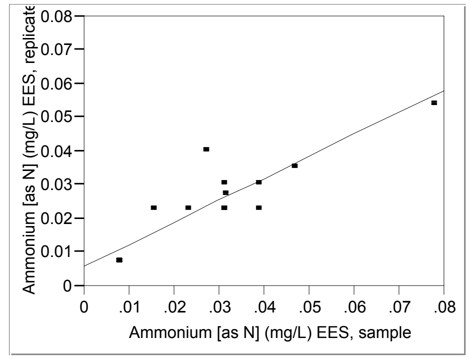


Alk. [dup.] = -0.6 + 1.00*Alk., $r^2 > 0.99$, n = 15

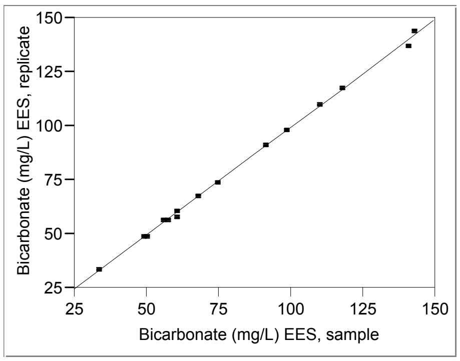
Figure 4.2-1. Comparison of field replicate (dup.)samples ("plus" symbols are nonfiltered samples, and squares are filtered samples)



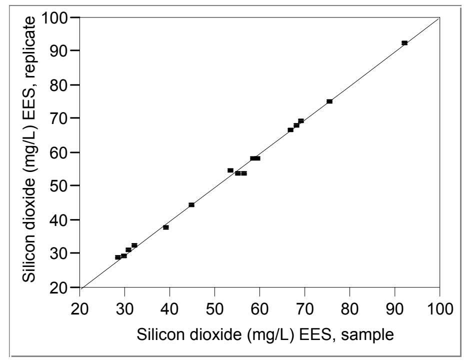
K [dup.] = 33 + 0.98*K, $r^2 > 0.99$, n = 11



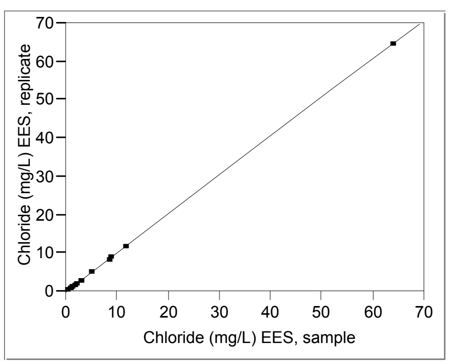
NH_4^+ [dup.] = 0.006 + 0.65*NH_4^+, $r^2 >= 0.81$, n = 16



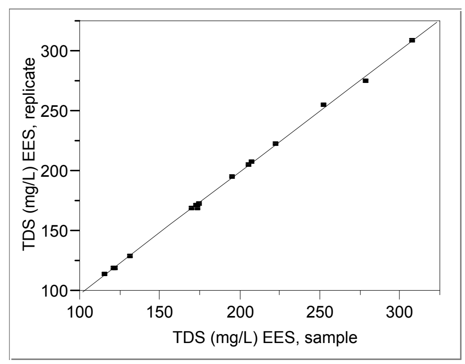
HCO_3^- [dup.] = -0.2 + 1.00*HCO_3^-, $r^2 > 0.99$, n = 15



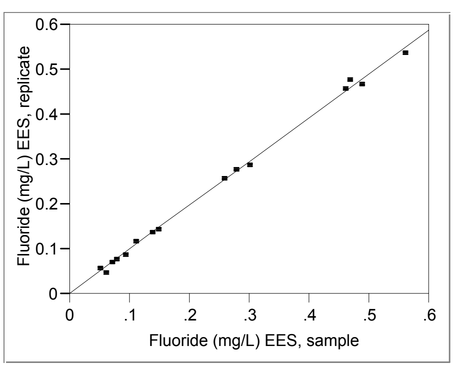
SiO_2 [dup.] = -0.5 + 1.00*SiO_2, $r^2 > 0.99$, n = 16



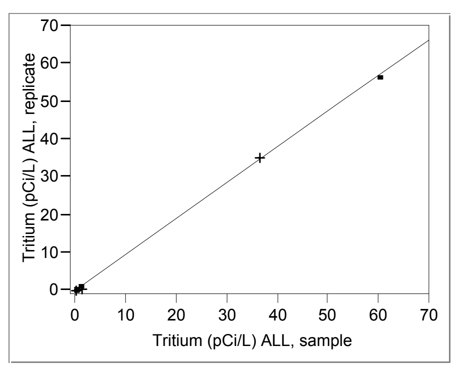
Cl^- [dup.] = -0.1 + 1.01*Cl^-, $r^2 > 0.99$, n = 15



TDS [dup.] = -4 + 1.01*TDS, $r^2 > 0.99$, n = 15

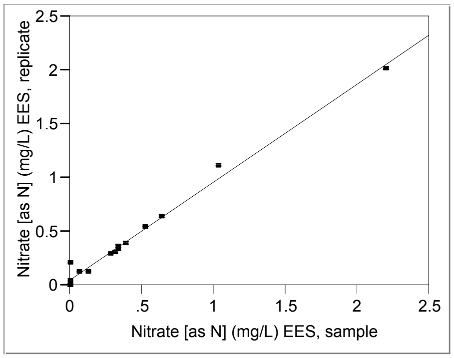


F^- [dup.] = 0.002 + 0.98*F^-, $r^2 > 0.99$, n = 15



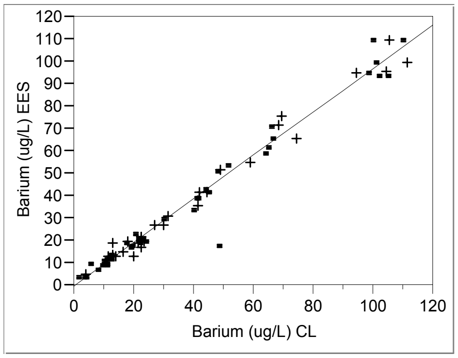
H-3 [dup.] = -0.08 + 0.95*H-3, $r^2 > 0.99$, n = 7

Figure 4.2-1 (continued) Comparison of field replicate (dup.)samples ("plus" symbols are nonfiltered samples, and squares are filtered samples)

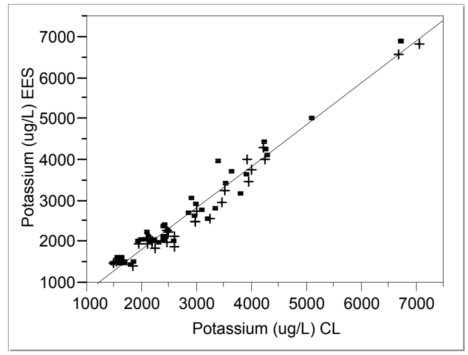


NO_3^- [dup.] = 0.06 + 0.91*NO_3^-, r^2 = 0.99, n = 15

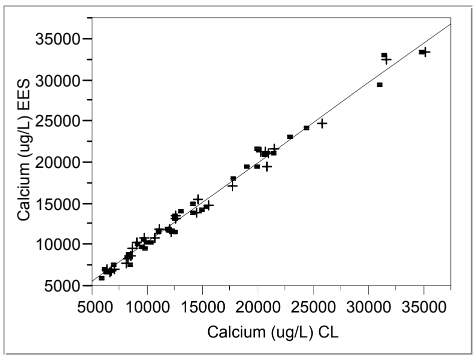
Figure 4.2-1. (continued) Comparison of field replicate (dup.)samples ("plus" symbols are nonfiltered samples, and squares are filtered samples)



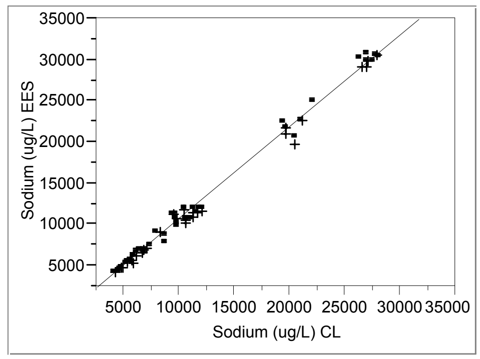
Ba EES = -0.2 + 0.97*Ba, r^2 = 0.97, n = 70



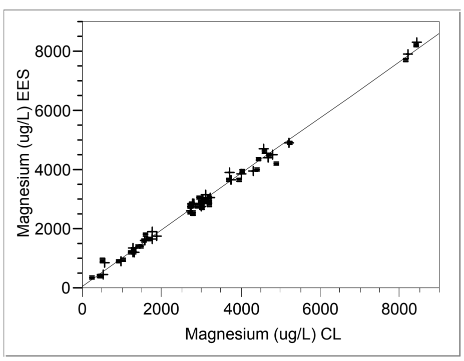
K EES = -210 + 1.01*K, r^2 = 0.97, n = 70



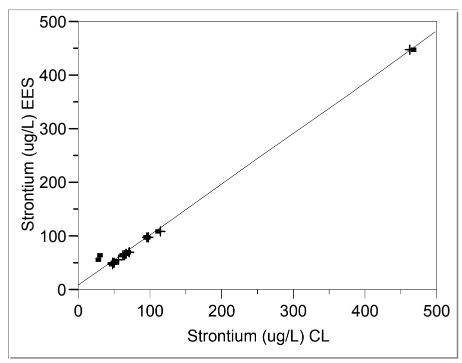
Ca EES = 730 + 0.97*Ca, r^2 = 0.97, n = 70



Na EES = -530 + 1.12*Na, r^2 = 0.99, n = 70

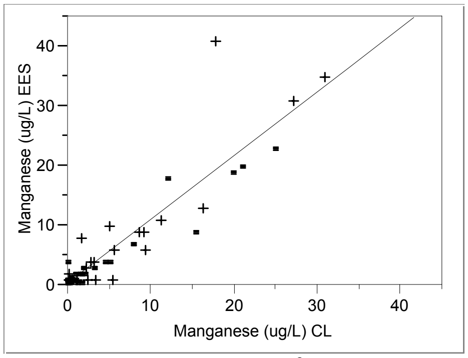


Mg EES = 99 + 0.95 Mg (μg/L), r^2 = 0.99, n = 70

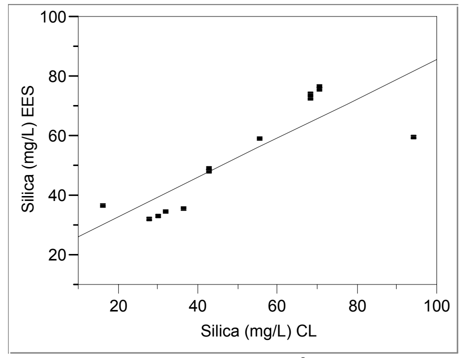


Sr EES = 8.8 + 0.94*Sr, r^2 = 0.99, n = 24

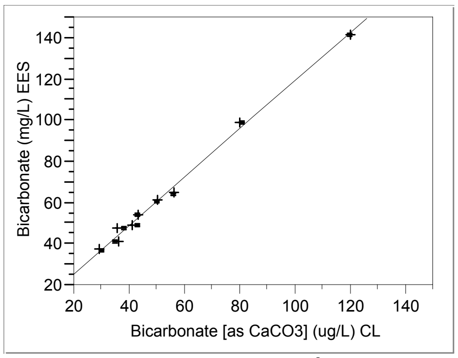
Figure 4.2-2. Comparison of water chemistry results for analytical laboratories and methods (“plus” symbols are nonfiltered samples, and squares are filtered samples)



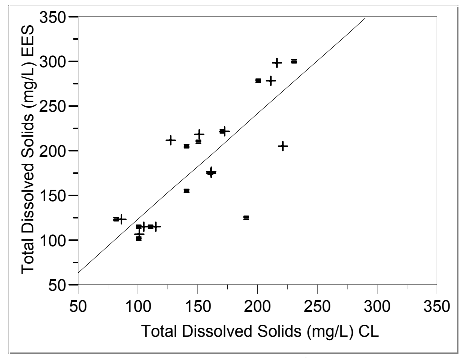
Mn EES = 0.41 + 1.07 Mn, $r^2 = 0.83$, n = 62



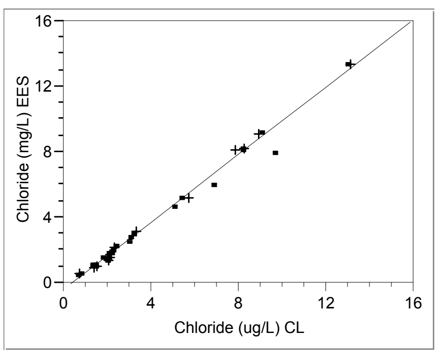
SiO_2 EES = 20 + 0.66 SiO_2, $r^2 = 0.72$, n = 13



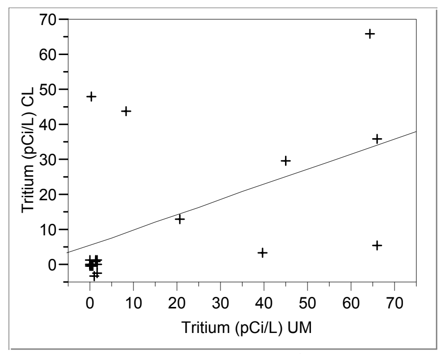
HCO_3^- EES = 2.2 + 1.17 HCO_3^-, $r^2 > 0.99$, n = 18



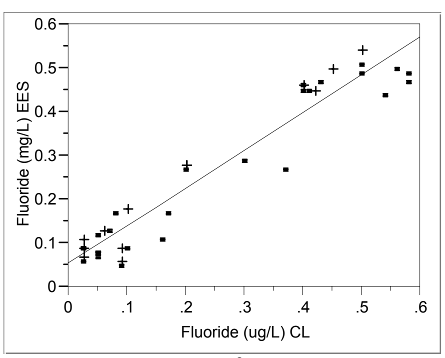
TDS EES = 5.7 + 1.18 TDS, $r^2 = 0.69$, n = 24



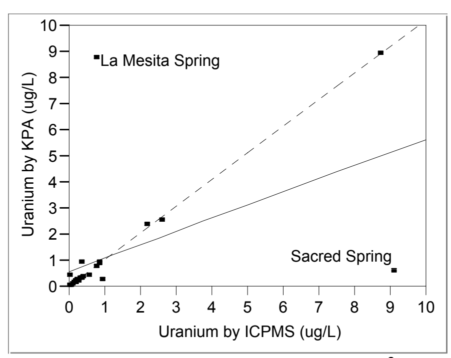
Cl^- EES = -0.4 + 1.03*Cl^-, $r^2 = 0.99$, n = 39



H-3 CL = 5.7 + 0.43*H-3 UM, $r^2 = 0.27$, n = 19

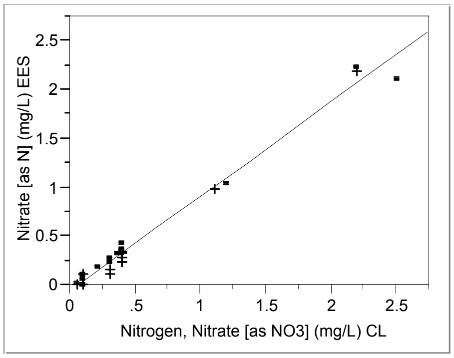


F^- EES = 0.05 + 0.86 F^-, $r^2 = 0.92$, n = 39



U by LIKPA = 0.61 + 0.51*U by ICPMS, $r^2 = 0.26$,n = 27
U by LIKPA = 0.04 + 1.02*U by ICPMS, $r^2 = 0.99$, 25*
* without two outliers

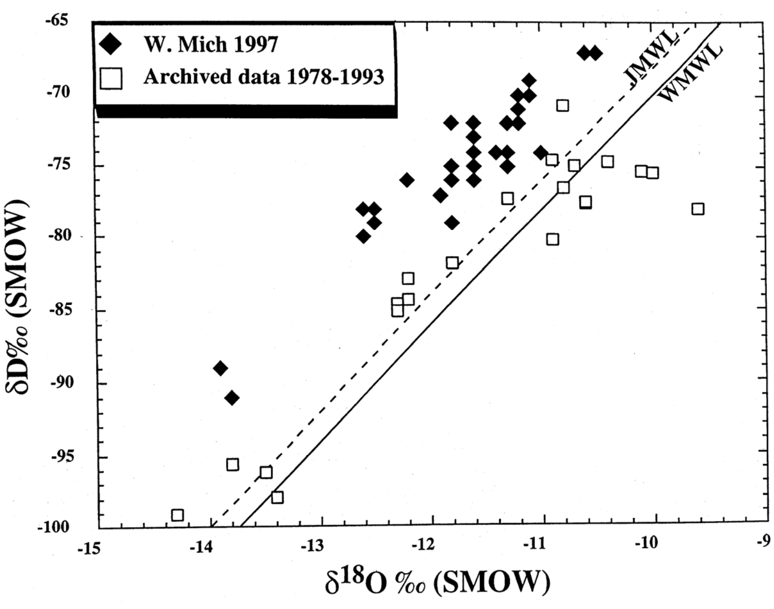
Figure 4.2-2. (continued) Comparison of water chemistry results for analytical laboratories and methods (“plus” symbols are nonfiltered samples, and squares are filtered samples)



NO_3^- EES = -0.06 + 0.96*NO_3^-, r^2 = 0.98, n = 31

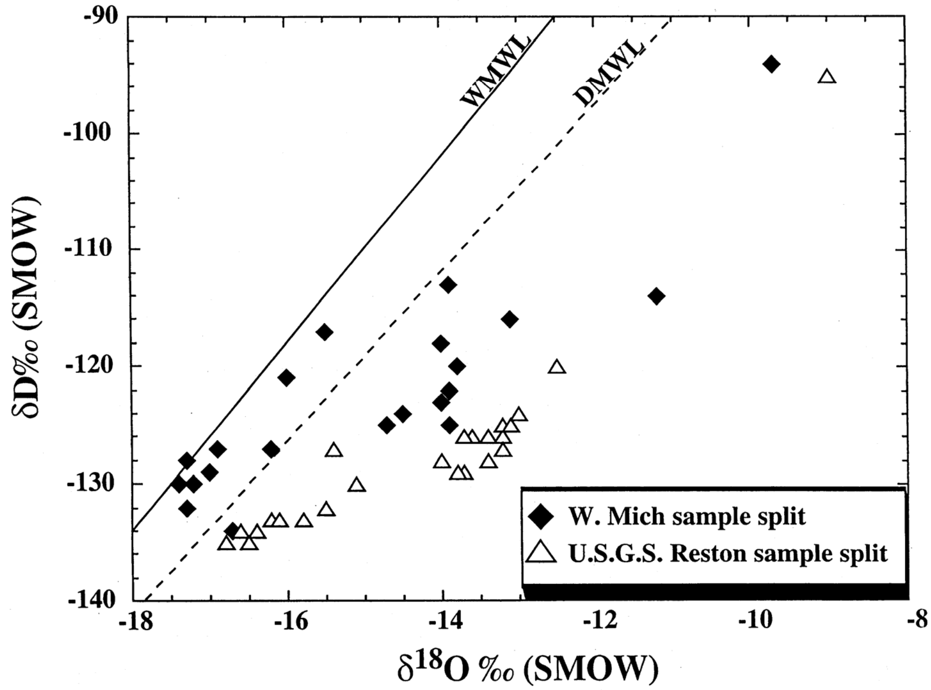
EES = Earth and Environmental Sciences
CL = contract laboratory
LIKPA= laser-induced kinetic phosphorometric analysis
ICPMS = inductively coupled plasma mass spectrometry
UM = University of Miami

Figure 4.2-2. (continued) Comparison of water chemistry results for analytical laboratories and methods ("plus" symbols are nonfiltered samples, and squares are filtered samples)



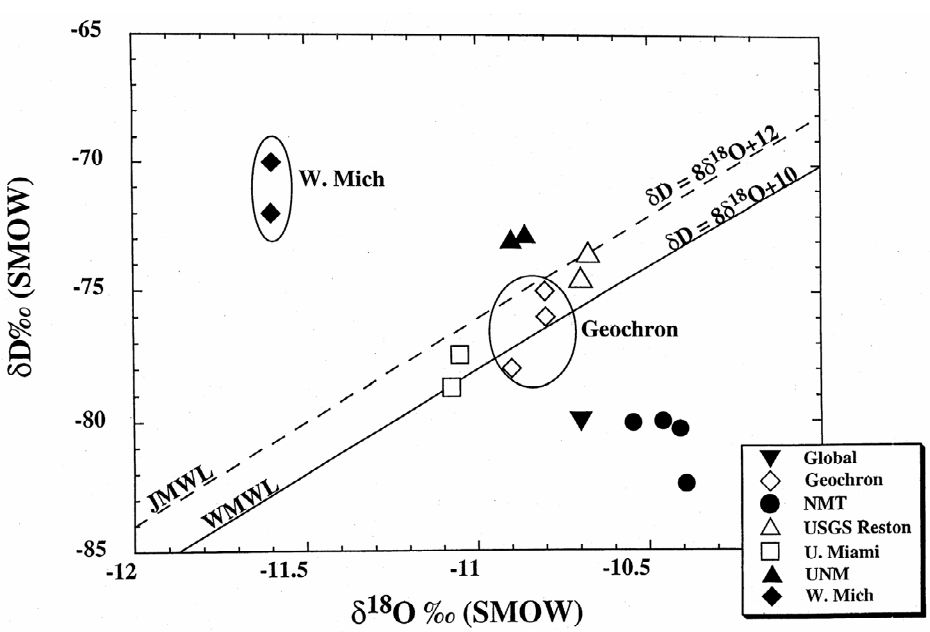
WMWL = worldwide meteoric water line
JMWL = Jemez meteoric water line

Figure 4.3-1. Comparison of archived stable isotope data with University of Western Michigan 1997 data



WMWL = worldwide meteoric water line
DMWL = Dixie Valley meteoric water line

Figure 4.3-2. Laboratory comparison of sample splits from Dixie Valley, Nevada (Goff et al. 2002, 88776)



WMWL = worldwide meteoric water line
JMWL = Jemez meteoric water line

Figure 4.3-3. Comparative stable isotope results from Los Alamos National Laboratory internal standard

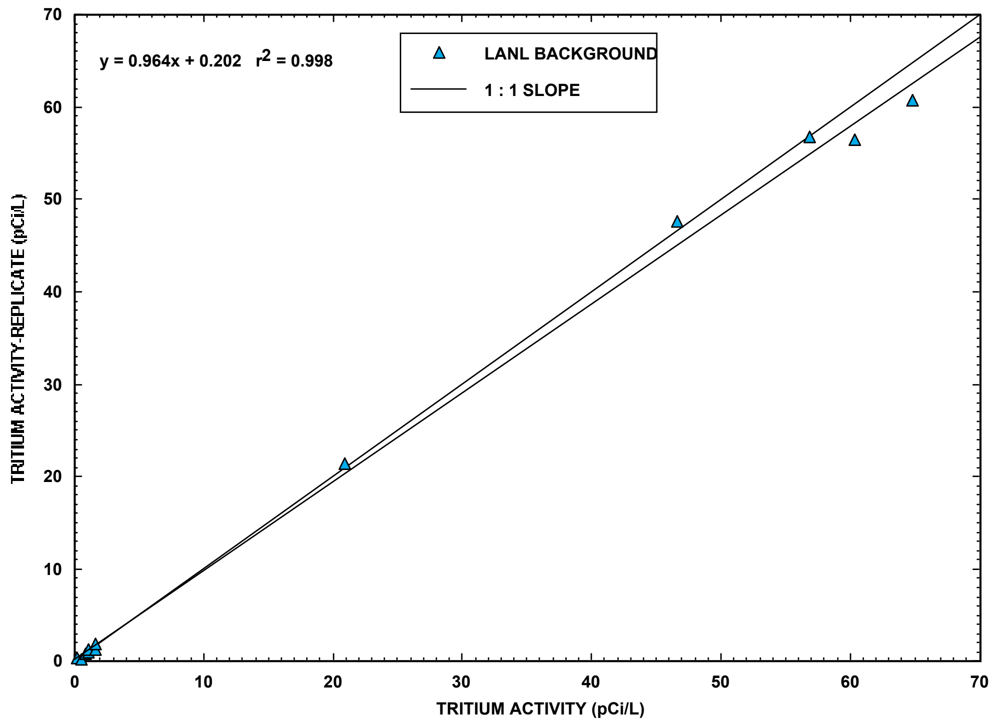


Figure 4.3-4. Comparison of primary and duplicate water samples analyzed for tritium by the University of Miami, Los Alamos National Laboratory background sites, 1997–1998

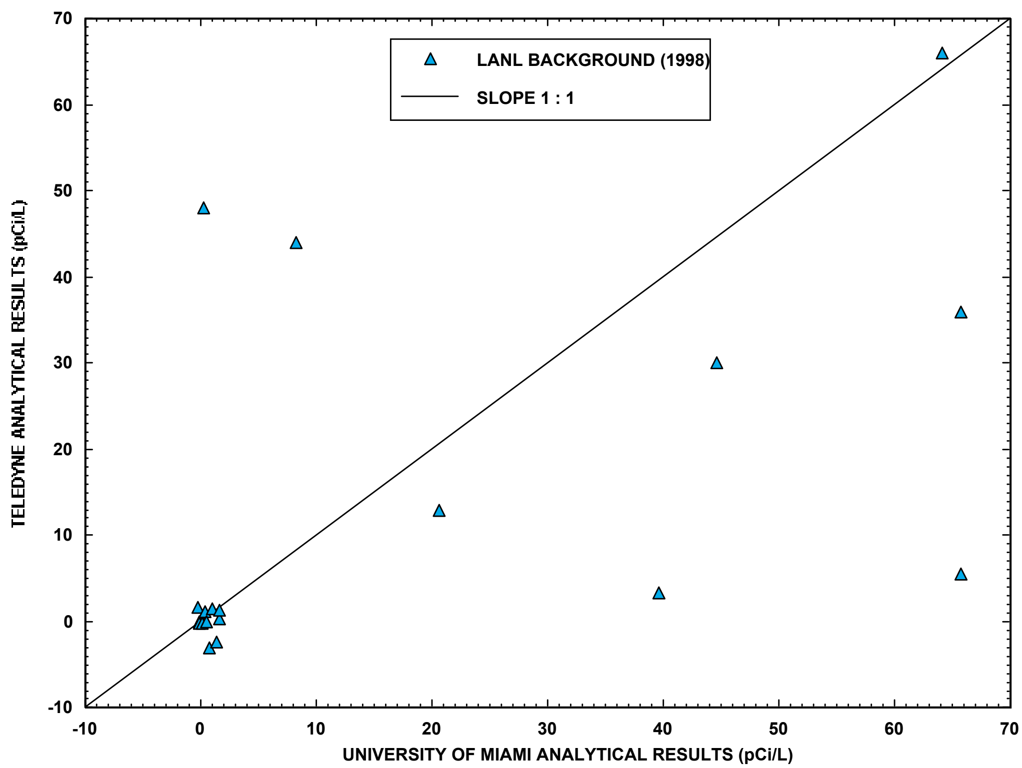


Figure 4.3-5. Comparison of tritium results reported by the University of Miami and Teledyne for Los Alamos National Laboratory background groundwater samples collected from April through October, 1998

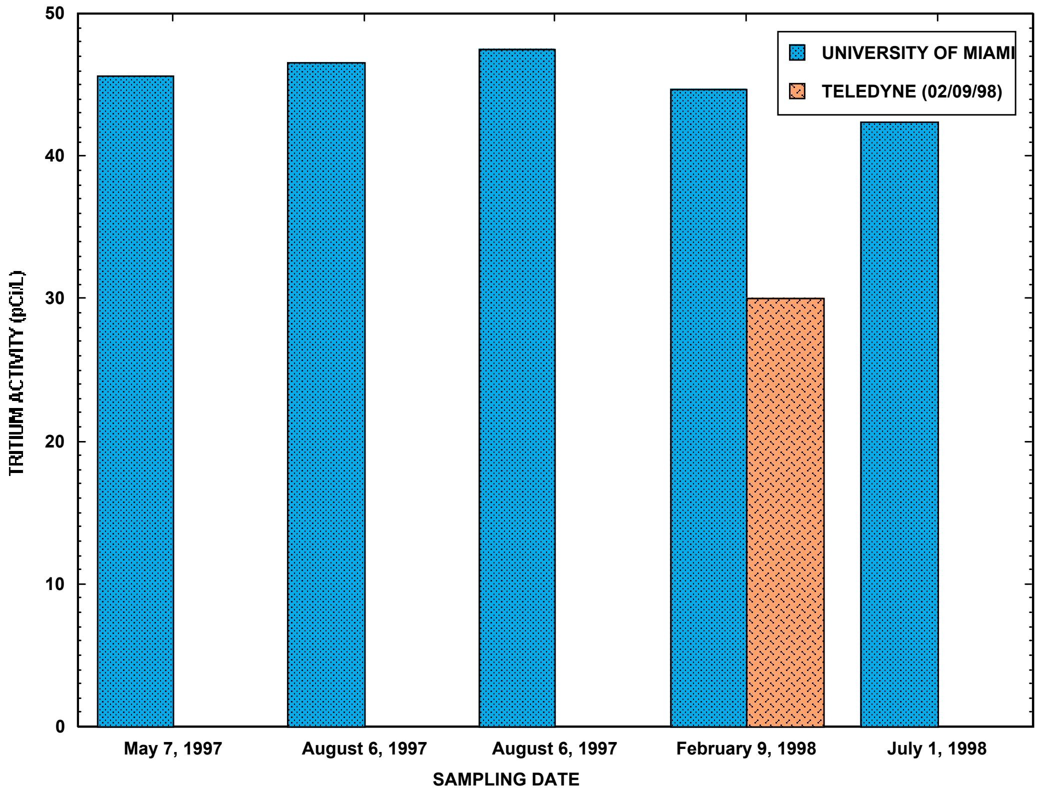


Figure 4.3-6. Comparison of tritium results reported by the University of Miami and Teledyne for Apache Spring; (left to right) groundwater samples were collected during May 7, 1997, August 6, 1997, August 6, 1997 (dup.), February 9, 1998, and July 1, 1998

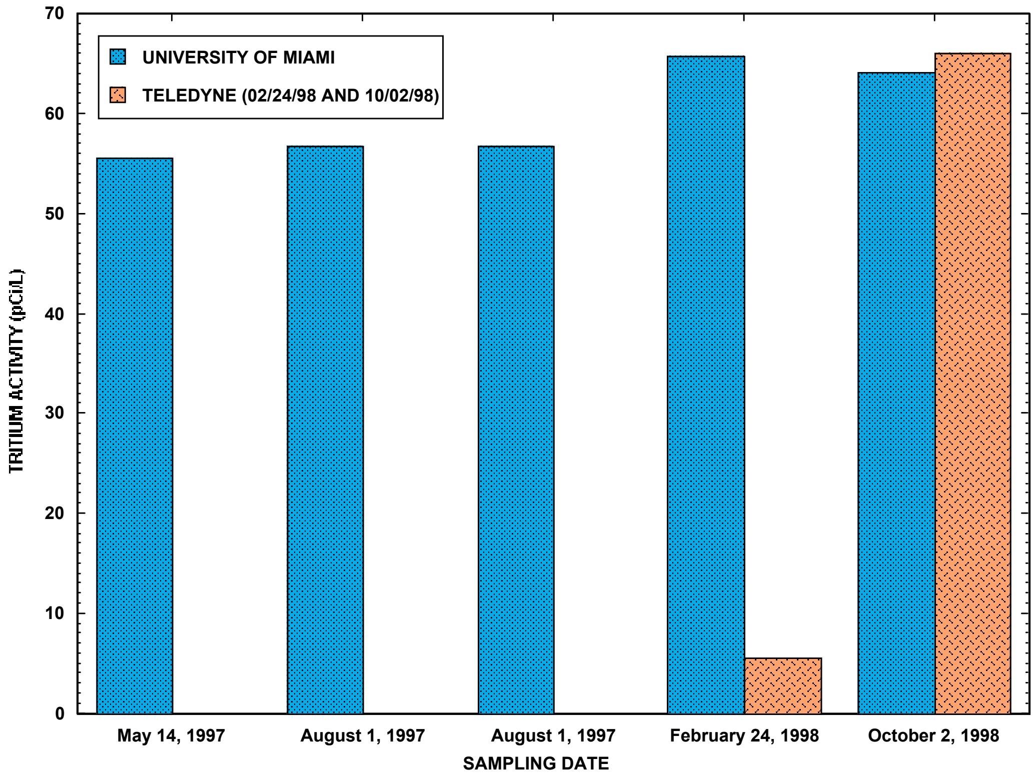


Figure 4.3-7. **Comparison of tritium results reported by the University of Miami and Teledyne for LAO-B well; (left to right) groundwater samples collected during May 14, 1997, August 1, 1997, August 1, 1997 (dup.), February 24, 1998, and October 2, 1998**

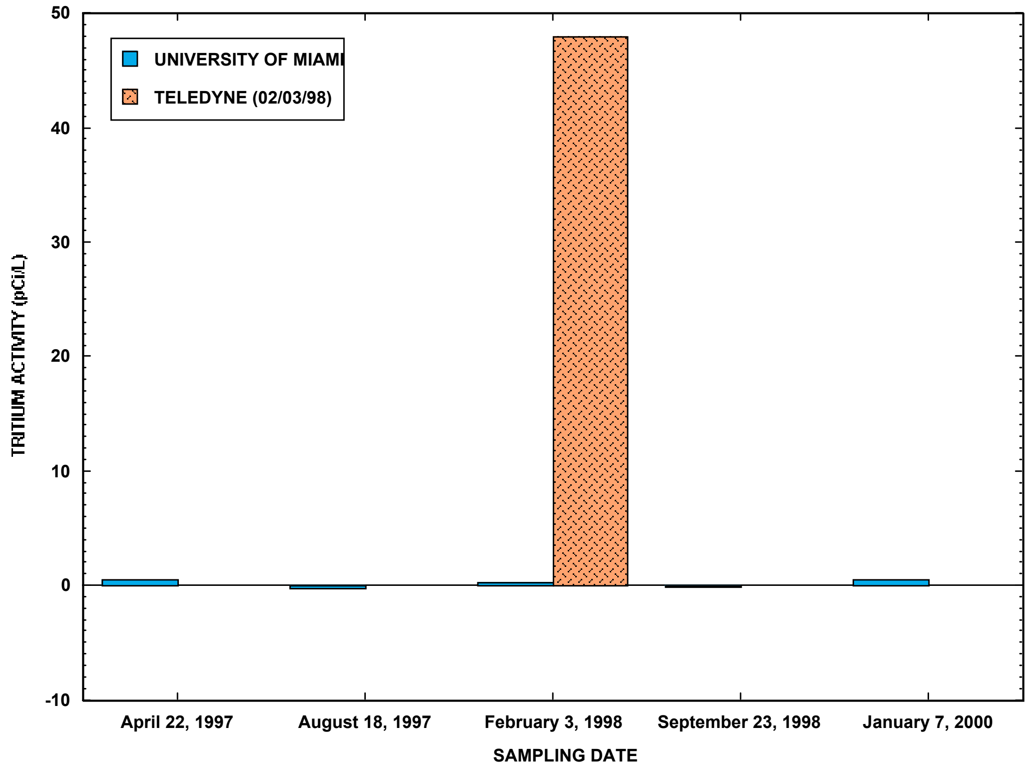


Figure 4.3-8. Comparison of tritium results reported by the University of Miami and Teledyne for Spring 9B; (left to right) groundwater samples collected during April 22, 1997, August 18, 1997, February 3, 1998, and September 23, 1998, and January 7, 2000

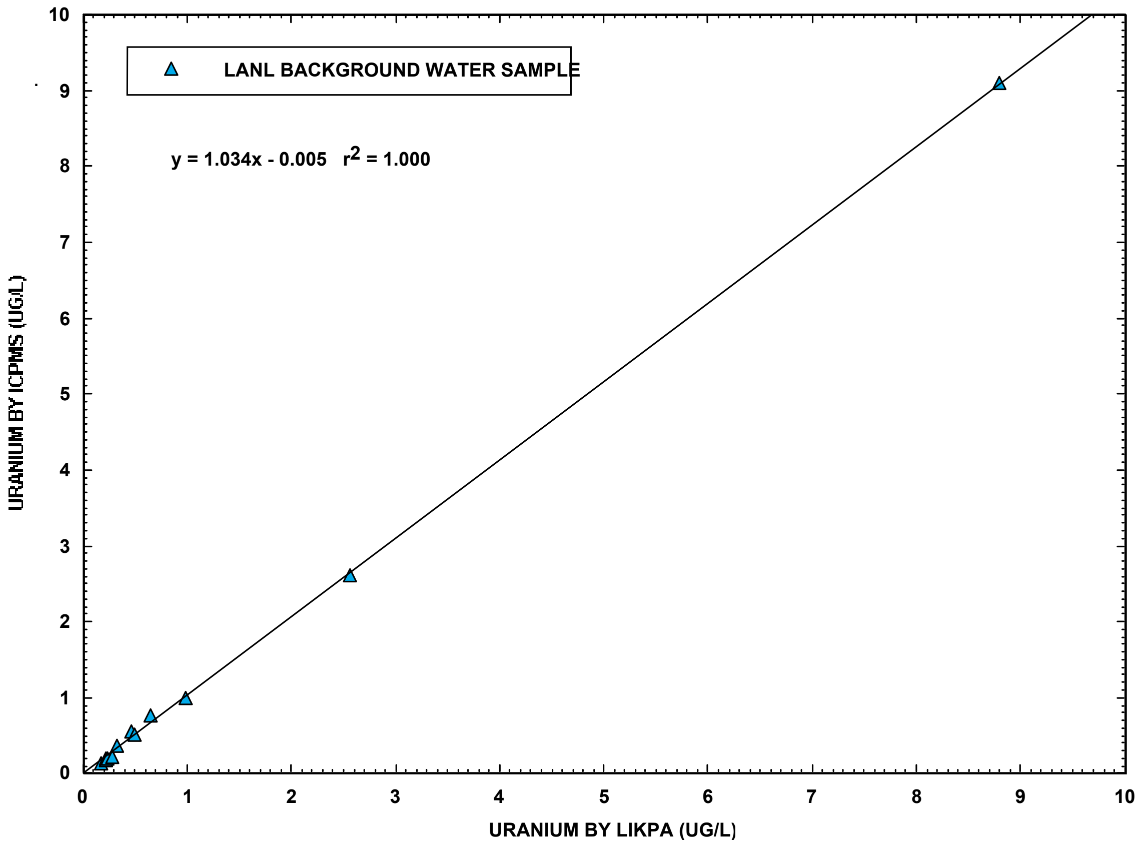


Figure 4.3-9. Comparison of dissolved uranium analyzed by laser-induced kinetic phosphorimetric analysis and inductively coupled plasma mass spectrometry for LANL background sampling stations, December 1999 and January 2000

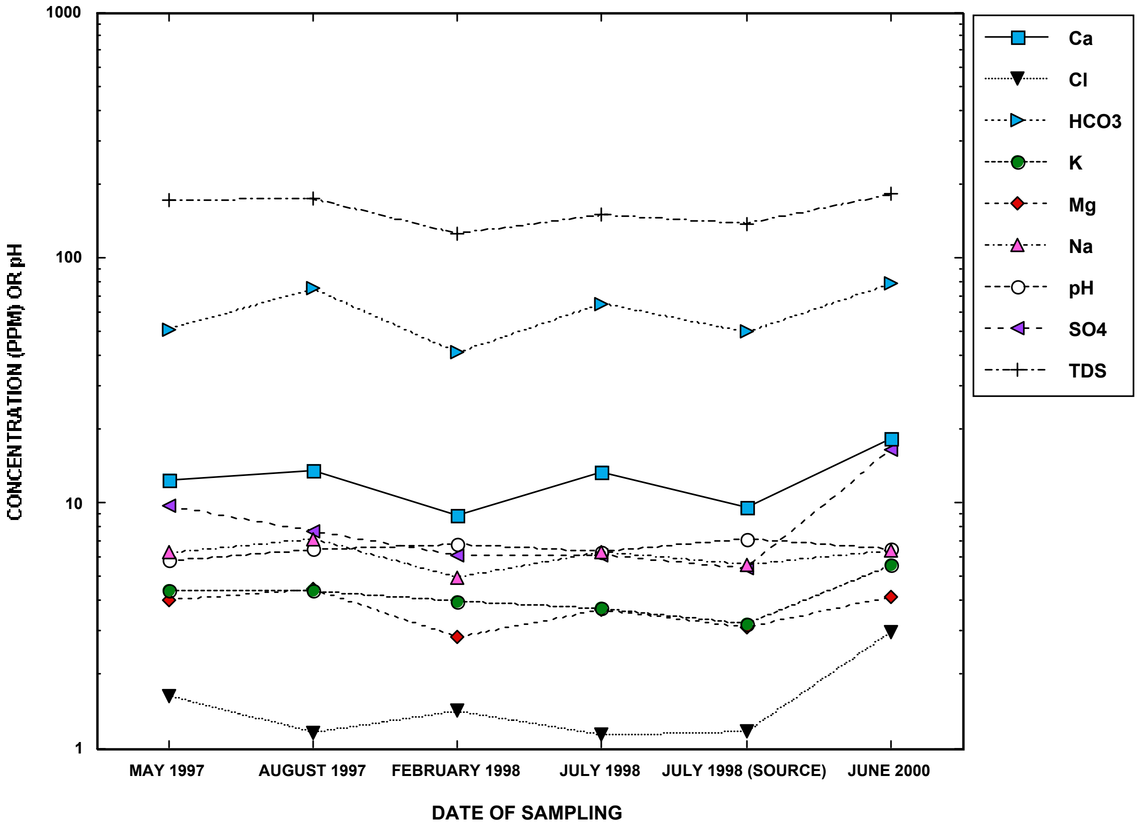


Figure 4.4-1. Concentrations of total dissolved solids and major ions at Pine Spring, Garcia Canyon (alluvium, Puye Formation, and lavas of the Polvadera Group)

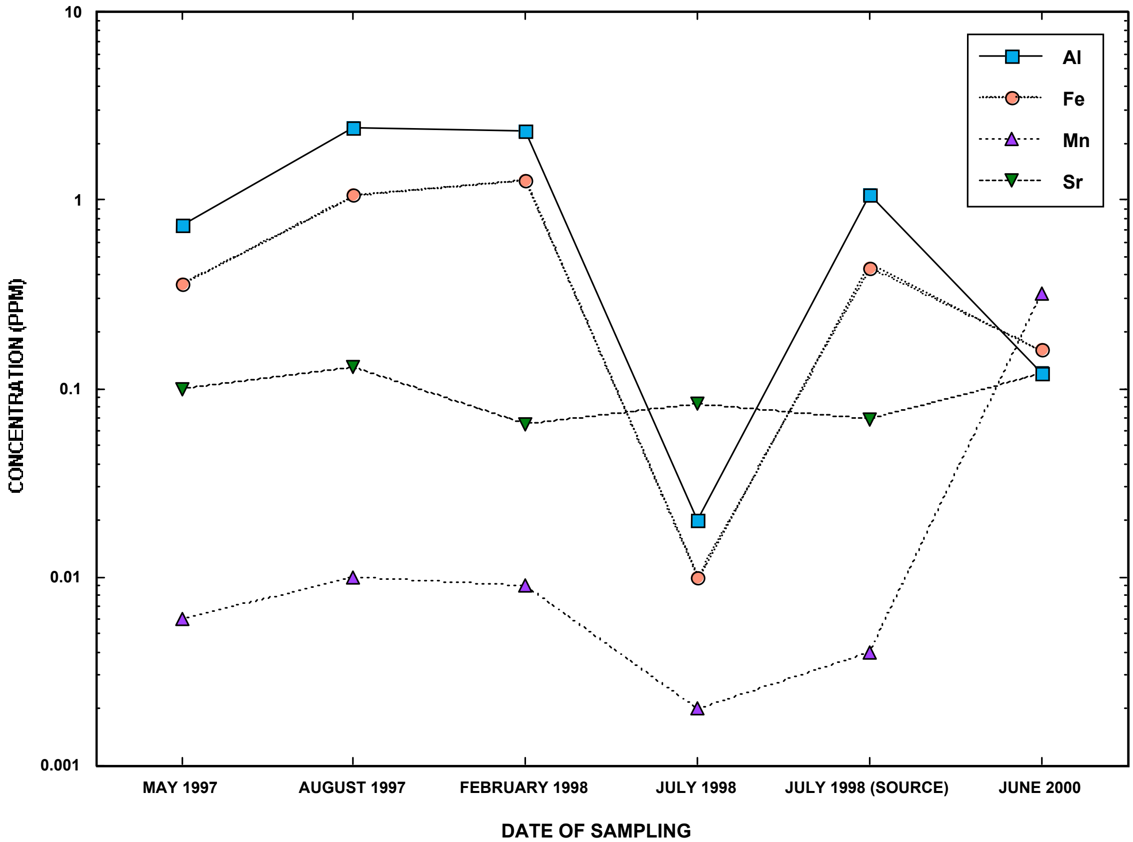


Figure 4.4-2. Concentrations of dissolved aluminum, iron, manganese, and strontium at Pine Spring, Garcia Canyon (Puye Formation and lavas of the Polvadera Group)

Table 2.1-1
Summary of Important Lithologic Units in the Pajarito Plateau Region, New Mexico

Unit	Age	Thickness (m)	Major Lithologic Types
Galisteo Formation	Eocene	200	Indurated sandstone, siltstone, mudstone, conglomerate
Santa Fe Group	Middle to Late Miocene	>2000	Nonindurated mudstone, siltstone, sandstone, gravel, conglomerate
Mafic flows in Santa Fe Group	Miocene	3 to 10	Lava flows, minor scoria, and pillow-palagonite tuff; basalt to basanite
Keres Group	Miocene	≤ 150 per unit	Flows, domes, tuffs, and volcaniclastic sediments; basalt to rhyolite
Volcaniclastic deposits, Keres Group	Miocene	≤ 450	Lahars, block and ash flows, and debris flows (Cochiti Formation)
Polvadera Group	Miocene to Pliocene	≥ 200 per unit	Flows, domes, tuffs and volcaniclastic sediments; basalt to rhyolite
Tschicoma Formation, Polvadera Group	Miocene to Pliocene	≥ 200 per unit	Mostly flows, domes, and minor tuffs; dacite to rhyodacite
Puye Formation, Polvadera Group	Late Miocene to Pliocene	≤ 660	Volcanic gravel, debris flows, sandstone, siltstone, interbedded tephra
Totavi Lentil, Puye Formation	Pliocene	≤ 100	Pebble-to-cobble gravel rich in Precambrian lithologies
Cerros del Rio volcanic field	Pliocene	≤ 70 per unit	Flows, plugs, scoria, pillows, hydromagmatic deposits; basalt to dacite
Lower Bandelier Tuff, Tewa Group	Quaternary	≤ 75	Ash-flow tuff (ignimbrite); minor surge and fall deposits; high-silica rhyolite
Cerro Toledo interval	Quaternary	≤ 30	Fall deposits (rhyolite) interbedded with volcanic sand and gravel
Upper Bandelier Tuff, Tewa Group	Quaternary	≤ 260	Ash-flow tuff (ignimbrite); minor surge and fall deposits; high-silica rhyolite
El Cajete Pumice, Valles Rhyolite, Tewa Group	Late Quaternary	≤ 10	Fall deposits of rhyolitic pumice
Other post-Bandelier deposits	Mostly Late Quaternary	≤ 50	Alluvium, colluvium, fanglomerate, landslides, and terrace deposits

Source: Goff et al. 2002, 88776.

Table 3.1-1
Data Input Requirements for Laboratory Background Hydrogeochemistry Investigation

Type of Data	Available Data (Pre-1997)	Data Required (1997-2000)
Water-quality data	Analyses of groundwater samples are available from Laboratory surveillance and geothermal programs, ER Project, DOE-OB studies, NURE* Project, consultant reports, and the U.S. Geological Survey.	Analyses of additional groundwater samples representing each mode of groundwater occurrence.
Sample handling (filtered/ nonfiltered)	Available data from filtered samples are adequate for use. However, nonfiltered samples that have been collected by some previous programs have greater errors for the cation-anion charge balance than ± 10%; therefore, they are not of adequate quality.	Analyses of filtered and nonfiltered samples (low turbidity), except for total suspended solids, which require a nonfiltered sample.
Analytes	Assessment of the pre-1997 data set (of 55 filtered samples) shows good agreement between cation sum and anion sum. Ten samples had laboratory duplicates and the laboratory variation is less than 20% relative standard deviation. Therefore, these data can be used in the establishing background. However, most of the major cations and anions are frequently detected, but many of the trace elements have low detection rates. The number of analytes has varied annually at each spring or well.	Major cations (Ca, Mg, Na, and K); major anions (HCO_3, Cl, and SO_4); trace elements (Ag, Al, As, B, Ba, Be, Br, Cd, ClO_3, Co, Cr, Cs, Cu, F, Fe, Hg, I, Li, Mn, Mo, NH_4, Ni, NO_2, NO_3, Pb, PO_4, Rb, Sb, Se, S_2O_3, Sn, Sr, Ti, Tl, U, V, and Zn); SiO_2; total dissolved solids, fallout radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239,240}Pu, ^{90}Sr, ^{3}H, ^{234}U, ^{235}U, and ^{238}U); dissolved organic carbon, and stable isotopes (δ^{18}O, δ^{15}N, and δD).
Analytical methods	Samples analyzed by EPA SW 846 and other analytical methods are acceptable for use in determining background water chemistry. These include ICPOES, ICPMS, IC, alkalinity titration, alpha spectrometry, gamma spectroscopy, direct counting, electrolytic enrichment, and IRMS.	SW 846 and other EPA methods for inorganic analytes by ICPAES, ICPMS, CVAA, AA, IC, and colorimetry. Analysis of fallout radionuclides by alpha spectrometry, gamma spectrometry, liquid scintillation, gases proportional counting, electrolytic enrichment/gas proportional counting. Field parameters include temperature, pH, specific conductance, turbidity, and carbonate alkalinity.

*NURE – National uranium resource evaluation.

Table 3.1-2 Names and General Locations of Background Sample Stations

Station Name	Location	Latitude and Longitude	Groundwater Category
Well LAO-B	Upper Los Alamos Canyon	N35°52’43.8"; W106°20'7.1"	Alluvial
Apache Spring	Sierra de los Valles, west of LANL	N35˚49'28.3"; W106˚23'23.38"	Perched Intermediate
Seven Springs	West Jemez Mountains	N35˚48'14.05"; W106˚42'14.0"	Perched Intermediate
Water Canyon Gallery	West of Laboratory	N35˚50'39"; W106˚22'19"	Perched Intermediate
Upper Cañon de Valle Spring	West of Laboratory	N35˚51'32.38"; W106˚22'47.09"	Perched Intermediate
Pine Spring	Pajarito Plateau, north of Laboratory	N35˚57'21.95"; W106˚17'04.52"	Perched Intermediate
Well LAOI-1.1	Upper Los Alamos Canyon	N35°52'31.6"; W106°17'13.5"	Perched Intermediate
Doe Spring	White Rock Canyon	N35˚45'53.51"; W106˚14'34.55"	Perched Intermediate
Spring 9B	White Rock Canyon	N35˚45'40.46"; W106˚14'36.88"	Perched Intermediate
Pajarito Spring (Spring 4A)	White Rock Canyon	N35˚56'34.4"; W106˚11'47.38"	Perched Intermediate
Spring 1	White Rock Canyon, San Ildefonso Pueblo	N35˚51'32.55"; W106˚08'34.08"	Regional Aquifer
Sacred Spring	Near lower Los Alamos Canyon, San Ildefonso Pueblo	N35˚53'33.05"; W106˚08'59.13"	Regional Aquifer
La Mesita Spring	White Rock Canyon, San Ildefonso Pueblo	N35˚52'13.74"; W106˚08'34.23"	Regional Aquifer
Water Supply Well O-4	Middle Los Alamos Canyon	N35˚52'22"; W106˚15'35"	Regional Aquifer
Water Supply Well G-5	Guaje Canyon, north of Laboratory	N35˚54'51"; W106˚13'37"	Regional Aquifer

Table 3.2-1
Summary of Field Parameters Measured at LANL Background Sampling Stations, 1997–2000

Sample Station	Date MM/DD/YY	Temperature (°C)	Specific Conductance (µS/cm)	pH[a]	Turbidity[b] (NTU)
Doe Spring, filtered	04/22/97	17.5	125L[c]	8.19	—[d]
Doe Spring, nonfiltered	04/22/97	17.5	124L	8.19	—
Spring 9B, filtered	04/22/97	20.1	122L	7.82	—
Spring 9B, nonfiltered	04/22/97	20.1	122L	7.82	—
Pajarito Spring, filtered	04/27/97	21.3	207	7.30	5
Pajarito Spring, nonfiltered	04/27/97	21.3	207	7.30	5
Seven Springs, filtered	04/27/97	12.4	83	7.49	0
Seven Springs, nonfiltered	04/27/97	12.4	83	7.49	0
Pine Spring, filtered	05/07/97	6.8	100	5.81	0
Pine Spring, nonfiltered	05/07/97	6.8	100	5.81	0
Apache Spring, filtered	05/07/97	8.3	199	7.27	0
Apache Spring, nonfiltered	05/07/97	8.3	199	7.27	0
Water Canyon Gallery, filtered	05/07/97	11.3	104	7.42	0
Water Canyon Gallery, nonfiltered	05/07/97	11.3	104	7.42	0
LAOI(A)-1.1, filtered	05/09/97	9.7	114	6.82	0
LAOI(A)-1.1, nonfiltered	05/09/97	9.7	114	6.82	0
LAOI(A)-1.1, filtered, duplicate	05/09/97	9.7	114	6.82	0
Upper Cañon de Valle, filtered, duplicate	05/13/97	8.9	70	7.33	0
Upper Cañon de Valle, filtered	05/13/97	8.9	70	7.33	0
Upper Cañon de Valle, nonfiltered	05/13/97	8.9	70	7.33	0
LAO-B, filtered	05/14/97	4.8	105	6.64	0
LAO-B, nonfiltered	05/14/97	4.8	105	6.64	0
Spring 1, filtered	05/21/97	16.8	218	7.43	0
Spring 1, nonfiltered	05/21/97	16.8	218	7.43	0
La Mesita, filtered	05/21/97	15.2	285	7.17	0
La Mesita, nonfiltered	05/21/97	15.2	285	7.17	—
Otowi 4, filtered	05/29/97	27.9	306	6.92	—
Otowi 4, nonfiltered	05/29/97	27.9	306	6.92	—
Otowi 4, filtered, duplicate	05/29/97	27.9	306	6.92	—
Guaje 5, filtered	05/29/97	26.8	186	7.86	—
Guaje 5, nonfiltered	05/29/97	26.8	186	7.86	—
Guaje 5, filtered, duplicate	05/29/97	26.8	186	7.86	—
Sacred Spring, filtered	05/29/97	14.3	225	7.53	0
Sacred Spring, nonfiltered	05/29/97	14.3	225	7.53	0
LAO-B, filtered	08/01/97	9.6	98	6.79	1
LAO-B nonfiltered	08/01/97	9.6	98	6.79	1

Table 3.2-1 (continued)

Sample Station	Date MM/DD/YY	Temperature (°C)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)
LAO-B, filtered, duplicate	08/01/97	9.6	98	6.79	1
Upper Cañon de Valle, filtered	08/04/97	8.2	94	7.30	0
Upper Cañon de Valle, nonfiltered	08/04/97	8.2	94	7.30	0
Pine Spring, filtered	08/04/97	12.5	146	6.46	0
Pine Spring, nonfiltered	08/04/97	12.5	146	6.46	0
Pine Spring, filtered, duplicate	08/04/97	12.5	146	6.46	0
Spring 1, filtered	08/05/97	17.3	231L	6.5	—
Spring 1, nonfiltered	08/05/97	17.3	234L	6.5	—
La Mesita Spring, filtered	08/05/97	16.6	392L	6.5	—
La Mesita Spring, nonfiltered	08/05/97	16.6	394L	6.5	—
Water Canyon Gallery, filtered	08/06/97	11.2	78.7L	7.21	—
Water Canyon Gallery, nonfiltered	08/06/97	11.2	79.3L	7.21	—
Apache Spring, filtered	08/06/97	8.6	330L	7.26	—
Apache Spring, nonfiltered	08/06/97	8.6	334L	7.26	—
Apache Spring, filtered, duplicate	08/06/97	8.6	337L	7.26	—
Pajarito Spring, filtered	08/07/97	21.6	187L	7.96	—
Pajarito Spring, nonfiltered	08/07/97	21.6	187L	7.96	—
Seven Springs, filtered	08/07/97	11.7	112L	7.33	—
Seven Springs, nonfiltered	08/07/97	11.7	113L	7.33	—
Seven Springs, filtered, duplicate	08/07/97	11.7	114L	7.33	—
Sacred Spring, filtered	08/08/97	17.0	196L	7.16	—
Sacred Spring, nonfiltered	08/08/97	17.0	193L	7.16	—
Spring 9B, filtered	08/18/97	20.5	225	7.85	—
Spring 9B, nonfiltered	08/18/97	20.5	225	7.85	0
Doe Spring, filtered	08/18/97	20.2	51	8.27	0
Doe Spring, nonfiltered	08/18/97	20.2	51	8.27	0
Guaje 5, filtered	08/19/97	26.4	216	6.81	0
Guaje 5, nonfiltered	08/19/97	26.4	216	6.81	0
Otowi 4, filtered	08/19/97	27.9	219	7.40	0
Otowi 4, nonfiltered	08/19/97	27.9	219	7.40	0
LAOI-1.1, filtered	09/05/97	10.3	109	7.01	4
LAOI-1.1, nonfiltered	09/05/97	10.3	109	7.01	4
Doe Spring, filtered	02/03/98	13.8	120	8.12	15.3
Doe Spring, nonfiltered	02/03/98	13.8	120	8.12	15.3
Spring 9B, filtered	02/03/98	19.4	130	7.73	0.5
Spring 9B, nonfiltered	02/03/98	19.4	130	7.73	0.5
Water Canyon Gallery, filtered	02/09/98	11.1	90	7.74	1.8
Water Canyon Gallery, nonfiltered	02/09/98	11.1	90	7.74	1.8
Water Canyon Gallery, filtered, duplicate	02/09/98	11.1	90	7.74	1.8
Apache Spring, filtered	02/09/98	6.5	165	7.96	5.0

Table 3.2-1 (continued)

Sample Station	Date MM/DD/YY	Temperature (°C)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Apache Spring, nonfiltered	02/09/98	6.5	165	7.96	5.0
Pine Spring, filtered	02/10/98	3.6	70	6.78	41.7
Pine Spring, nonfiltered	02/10/98	3.6	70	6.78	41.7
Seven Springs, filtered	02/10/98	10.5	120	7.50	2.2
Seven Springs, nonfiltered	02/10/98	10.5	120	7.50	2.2
Pajarito Spring, filtered	02/18/98	18.8	200	7.83	1.6
Pajarito Spring, nonfiltered	02/18/98	18.8	200	7.83	1.6
Pajarito Spring, duplicate	02/18/98	18.8	200	7.83	1.6
Upper Cañon de Valle, filtered	02/23/98	6.7	80	8.04	1.4
Upper Cañon de Valle, nonfiltered	02/23/98	6.7	80	8.04	1.4
LAO-B, filtered	02/24/98	4.4	90	6.91	4.1
LAO-B, nonfiltered	02/24/98	4.4	90	6.91	4.1
LAOI(A)-1.1, filtered	02/25/98	8.7	100	6.68	27.2
LAOI(A)-1.1, nonfiltered	02/25/98	8.7	100	6.68	27.2
Guaje 5, filtered (not sampled)	—	—	—	—	—
Guaje 5, nonfiltered (not sampled)	—	—	—	—	—
Otowi 4, filtered	02/26/98	26.1	290	7.58	1.4
Otowi 4, nonfiltered	02/26/98	26.1	290	7.58	1.4
Spring 1, filtered	04/07/98	15.6	215	7.99	5.4
Spring 1, nonfiltered	04/07/98	15.6	215	7.99	5.4
La Mesita Spring, filtered	04/07/98	12.5	320	7.40	7.6
La Mesita Spring, nonfiltered	04/07/98	12.5	320	7.40	7.6
NMED Sacred Spring Source, filtered	04/14/98	11.6	250	7.24	3.2
NMED Sacred Spring Source, nonfiltered	04/14/98	11.6	250	7.24	3.2
Sacred Spring, nonfiltered	04/14/98	9.3	180	7.36	2.2
Sacred Spring, filtered, duplicate	04/14/98	9.3	180	7.36	2.2
Upper Cañon de Valle, filtered	07/01/98	7.3	65	7.76	4.6
Upper Cañon de Valle, nonfiltered	07/01/98	7.3	65	7.76	4.6
Apache Spring, filtered	07/01/98	9.1	130	7.32	23.8
Apache Spring, nonfiltered	07/01/98	9.1	130	7.32	23.8
Pajarito Spring, filtered	07/06/98	20.6	160	7.97	0.4
Pajarito Spring, nonfiltered	07/06/98	20.6	160	7.97	0.4
Seven Springs, filtered	07/06/98	10.7	100	7.51	2.7
Seven Springs, nonfiltered	07/06/98	10.7	100	7.51	2.7
Spring 1, filtered	07/07/98	17.6	190	7.81	2.6
Spring 1, nonfiltered	07/07/98	17.6	190	7.81	2.6
Spring 1, filtered, duplicate	07/07/98	17.6	190	7.81	2.6
La Mesita Spring, filtered	07/07/98	15.0	230	7.48	9.3
La Mesita Spring, nonfiltered	07/07/98	15.0	230	7.48	9.3
La Mesita Spring, filtered, duplicate	07/07/98	15.0	230	7.48	9.3

Table 3.2-1 (continued)

Sample Station	Date MM/DD/YY	Temperature (°C)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Sacred Spring, filtered	07/07/98	22.8	190	7.94	5.3
Sacred Spring, nonfiltered	07/07/98	22.8	190	7.94	5.3
Water Canyon Gallery, filtered	07/08/98	10.8	65	7.23	1.7
Water Canyon Gallery, nonfiltered	07/08/98	10.8	65	7.23	1.7
Pine Spring, filtered	07/14/98	12.7	80	6.34	17.8
Pine Spring, nonfiltered	07/14/98	12.7	80	6.34	17.8
Pine Spring at source, filtered	07/14/98	9.8	—	7.14	—
Doe Spring, filtered	09/23/98	21.0	167	7.71	—
Doe Spring, nonfiltered	09/23/98	21.0	167	7.71	—
Spring 9B, filtered	09/23/98	20.5	111	7.26	—
Spring 9B, nonfiltered	09/23/98	20.5	111	7.26	—
Otowi 4, filtered	09/28/98	27.5	285	7.45	0.6
Otowi 4, nonfiltered	09/28/98	27.5	285	7.45	0.6
Guaje 5, filtered	09/28/98	24.2	190	8.11	1.1
Guaje 5, nonfiltered	09/28/98	24.2	190	8.11	1.1
LAO-B, filtered	10/02/98	9.8	140	6.83	0.6
LAO-B, nonfiltered	10/02/98	9.8	140	6.83	0.6
LAOI(A)-1.1 , filtered	10/14/98	12.8	95	7.3	>30
LAOI(A)-1.1, nonfiltered	10/14/98	12.8	95	7.3	>30
LAOI(A)-1-1, filtered, duplicate	10/14/98	12.8	95	7.3	>30
Spring 1, filtered	12/16/99	15.2	220	8.23	4.6
La Mesita Spring, filtered	12/16/99	12.5	330	8.13	10.4
Sacred Spring, filtered	12/16/99	0.6	185	8.33	10.6
Seven Springs, filtered	12/20/99	11.1	105	8.39	1.4
Apache Spring, filtered	01/05/00	6.0	135	9.15	3.1
Apache Spring, filtered, duplicate	01/05/00	6.0	135	9.15	3.1
Water Canyon Gallery, filtered	01/05/00	11.7	90	8.53	1.9
Upper Cañon de Valle, filtered	01/05/00	6.8	90	8.74	2.2
Pajarito Spring, filtered	01/06/00	20.7	225	8.32	0.4
Pine Spring, filtered	01/06/00	4.8	60	8.44	43.2
Doe Spring, filtered	01/07/00	12.2	135	8.54	3.5
Doe Spring, filtered, duplicate	01/07/00	12.2	135	8.54	3.5
Spring 9B, filtered	01/07/00	18.5	145	8.54	1.6
LAO-B, filtered	01/10/00	5.7	105	7.59	4.8
LAO-B, filtered, duplicate	01/10/00	5.7	105	7.59	4.8
LAOI(A)-1.1, filtered	01/20/00	9.0	120	7.40	19.6
Doe Spring, nonfiltered	04/06/00	15.7	80	6.89	7.4
Doe Spring, filtered	04/06/00	15.7	80	6.89	7.4
Guaje 5, filtered (not sampled)	—	—	—	—	—
Guaje 5, nonfiltered (not sampled)	—	—	—	—	—

Table 3.2-1 (continued)

Sample Station	Date MM/DD/YY	Temperature (°C)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Otowi 4, filtered (not sampled)	—	—	—	—	—
Otowi 4, nonfiltered (not sampled)	—	—	—	—	—
LAOI(A)-1.1, filtered	04/13/00	11.9	70	6.85	12.8
LAOI(A)-1.1, nonfiltered	04/13/00	11.9	70	6.85	12.8
Spring 9B, filtered	04/06/00	20.0	100	6.44	0.7
Spring 9B, nonfiltered	04/06/00	20.0	100	6.44	0.7
Water Canyon Gallery, filtered	03/30/00	11.3	70	7.4	1.2
Water Canyon Gallery, nonfiltered	03/30/00	11.3	70	7.4	1.2
Water Canyon Gallery, duplicate	03/30/00	11.3	70	7.4	1.2
Water Canyon Gallery, nonfiltered	03/30/00	11.3	70	7.4	1.2
Apache Spring, filtered	03/29/00	7.6	270, 290[e]	7.33	7.3
Apache Spring, nonfiltered	03/29/00	7.6	270, 290[e]	7.33	7.3
Pine Spring, filtered	03/30/00	6.8	70, 70[e]	6.69	44.9
Pine Spring, nonfiltered	03/30/00	6.8	70, 70[e]	6.69	44.9
Pine Spring, filtered	03/30/00	6.8	70, 70[e]	6.69	44.9
Pine Spring, nonfiltered	03/30/00	6.8	70, 70[e]	6.69	44.9
Seven Springs, filtered	03/29/00	10.8	110, 110[e]	7.22	3
Seven Springs, nonfiltered	03/29/00	10.8	110, 110[e]	7.22	3
Pajarito Spring, filtered	03/31/00	20.6	200, 220[e]	7.99	3
Pajarito Spring, nonfiltered	03/31/00	20.6	200 , 220[e]	7.99	3
Pajarito Spring, filtered, duplicate	03/31/00	20.6	200 , 220[e]	7.99	3
Pajarito Spring, nonfiltered, duplicate	03/31/00	20.6	200 , 220[e]	7.99	3
Upper Cañon de Valle, filtered	04/05/00	7.2	70	6.41	4.8
Upper Cañon de Valle, nonfiltered	04/05/00	7.2	70	6.41	4.8
LAO-B, filtered	03/24/00	3.5	78, 80[e]	6.93	3
LAO-B, nonfiltered	03/24/00	3.5	78, 80[e]	6.93	3
Spring 1, filtered	04/04/00	18.5	150, 150[e]	7.26	10.3
Spring 1, nonfiltered	04/04/00	18.5	150, 150[e]	7.26	10.3
La Mesita Spring, filtered	04/10/00	15	220	6.37	4.3
La Mesita Spring, nonfiltered	04/10/00	15	220	6.37	4.3
Sacred Spring, filtered	04/10/00	16	150	6.56	2.5
Sacred Spring, nonfiltered	04/10/00	16	150	6.56	2.5

a pH is in standard units.
b NTU = nephelometric turbidity unit.
c L denotes that specific conductance was measured in the EES-6 analytical laboratory.
d — = Not analyzed.
e Specific conductance measurements were recorded with two instruments.

Table 3.2-2
Field Parameters and Analytes for LANL Background Hydrogeochemistry Investigation

Field Parameters
Temperature, turbidity, specific conductance, and pH
Major Cations and Anions and Neutral Species
Ca, Mg, Na, K, HCO_3, carbonate alkalinity, Cl, SO_4, SiO_2, and TDS
Trace Elements and DOC Fractionation
Ag, Al, As, B, Ba, Be, Br, Cd, ClO_4,Co, Cr, Cs, Cu, F, Fe, Hg, I, K, Li, Mn, Mo, NH_4, Ni, NO_2, NO_3, Pb, PO_4, Rb, Sb, Se, Sn, Sr, Ti, Tl, U, V, Zn, and DOC fractionation analysis
Radionuclides and Stable Isotopes
Low-detection limit tritium, $\delta^{18}O$, $\delta^{15}N$, δD, ^{90}Sr, ^{234}U, ^{235}U, ^{238}U, ^{137}Cs, ^{241}Am, ^{238}Pu, $^{239,240}Pu$, gross alpha, gross beta, and gross gamma

Note:
TDS = total dissolved solids
DOC = dissolved organic carbon

Table 4.1-1
Analytical Methods Used by Contract Laboratories

Analytical Method	Analyte Suite	Analytical Laboratory
ICPAES (USEPA 6010) and CVAA (USEPA 7470)	Trace metals	Paragon Analytics, Inc.
Ion chromatography (USEPA 300.0)	Anions	Paragon Analytics, Inc.
Titrimetric (USEPA 310.1)	Bicarbonate	Paragon Analytics, Inc.
Colorimetric (USEPA 370.1)	Dissolved silica	Huffman
Laser-induced kinetic phosphorimetry	Total uranium	Paragon Analytics, Inc.
Oxidation/Combustion (SW-415.1)	Dissolved organic carbon	Huffman
(USGS/WRI 79-4)	Dissolved organic carbon fractionation	Huffman
Alpha spectrometry	^{241}Am	Paragon Analytics, Inc.
Alpha spectrometry	^{238}Pu, $^{239,240}Pu$	Paragon Analytics, Inc.
Alpha spectrometry	^{234}U, ^{235}U, ^{238}U	Paragon Analytics, Inc.
Gamma spectrometry	Gamma spectrometry analytes	Paragon Analytics, Inc.
Electrolytic enrichment/Direct counting	Tritium (low-level)	University of Miami
Gas proportional counting	^{90}Sr	Paragon Analytics, Inc.

Note:
ICPAES = inductively coupled plasma atomic emission spectrometry
CVAA = cold vapor atomic adsorption

Table 4.1-2
EES-6 Analytical Instrumentation and Instrument -Detection Limits

Analyte	Instrument	EPA Method Number	Instrument Detection Limit (ppm)
Ag	GFAA	200.9	0.0005
	ICPAES	6010	0.002
Al	GFAA	200.9	0.002
	ICPAES	6010	0.01
As	Hydride-AA	7062	0.0002
	GFAA	200.9	0.002
	ICPAES	6010	0.05
B	ICPAES	6010	0.002
Ba	ICPAES	6010	0.002
Be	ICPAES	6010	0.002
Br	IC	300	0.005
Ca	ICPAES	6010	0.002
Cd	GFAA	200.9	0.0002
	ICPAES	6010	0.005
Cl	IC	300	0.01
ClO_3	IC	300	0.02
Co	GFAA	200.9	0.002
	ICPAES	6010	0.01
$CO_3/HCO_3/OH$	Titration	310.0	0.5
Conductivity	Electrode	—	0.5
Cr	GFAA	200.9	0.002
	ICPAES	6010	0.01
Cs	GFAA	200.9	0.002
	AA	—	0.02
Cu	GFAA	200.9	0.002
	ICPAES	6010	0.01
F	IC	300	0.01
	Electrode	—	0.01
Fe	ICPAES	6010	0.01
Hg	Cold Vapor AA	7470A	0.00002
I	IC	—	0.01
K	AA	7610	0.01
	ICPAES	6010	0.2
Li	ICPAES	6010	0.005
Mg	ICPAES	6010	0.002
Mn	ICPAES	6010	0.002
Mo	GFAA	200.9	0.002
	ICPAES	6010	0.02
Na	AA	7770	0.01
	ICPAES	6010	0.05
NH_4	Electrode	—	0.02
Ni	GFAA	200.9	0.002
	ICPAES	6010	0.01

Table 4.1-2 (continued)

Analyte	Instrument	EPA Method Number	Instrument Detection Limit (ppm)
NO_2	IC	300	0.01
NO_3	IC	300	0.01
Oxalate	IC	300	0.02
Pb	GFAA	200.9	0.002
pH	Electrode	—	0.01
PO_4	IC	300	0.02
Rb	GFAA	200.9	0.002
	AA	—	0.01
Sb	Hydride AA	7062	0.0002
	GFAA	200.9	0.002
	ICPAES	6010	0.05
Se	Hydride AA	7742	0.0002
	GFAA	200.9	0.002
	ICPAES	6010	0.1
Si	ICPAES	6010	0.02
Sn	GFAA	200.9	0.005
SO_3	IC	300	0.01
SO_4	IC	300	0.02
S_2O_3	IC	—	0.01
Sr	ICPAES	6010	0.005
Ti	ICPAES	6010	0.002
Tl	GFAA	200.9	0.002
V	ICPAES	6010	0.002
Zn	ICPAES	6010	0.005

AA - atomic absorption spectrometry
GFAA - graphite furnace atomic absorption
IC - ion chromatography
ICPAES - inductively coupled plasma atomic emission spectrometry

Table 4.1-3
Inorganic Target Analytes and Instrument Detection Limits Provided by Paragon Analytics, Inc.

Analyte	Water (μg/L)	Analyte	Water (μg/L)	Analyte	Water (μg/L)
Ag	0.9	Cu	0.6	Sb	3.4
Al	10.2	Fe	15.9	Se	3.1
As	2.5	Hg	0.02	Sn	14.1
B	7.9	K	46.9	Sr	0.5
Ba	0.1	Mg	7.7	Ti	1.3
Be	0.2	Mn	0.2	Tl	3.8
Ca	1.8	Mo	2.9	Total U	0.1
Cd	0.3	Na	2.1	V	0.8
Co	0.8	Ni	0.7	Zn	0.8
Cr	0.9	Pb	1.4		

Table 4.2-1
Sample Location Information

Location	Abbreviated Location	Location Code	Aquifer Type	Location Type	Easting (ft)	Northing (ft)	Source[a]	Elevation (ft)[b]	Location Notes
Apache Spring	Apache Spring	2	Volcanic rocks	Spring	1598966	1753454	GPS	8274	Lava of Tschicoma Formation
Doe Spring	Doe Spring	3	Regional aquifer	Spring	1642350	1733760	GPS	5541	Cerros del Rio hydromagmatic tuffs
Guaje #5	Guaje #5	11	Regional aquifer	Well	1647260	1788038	Blake	6319	Santa Fe Group sediments
La Mesita Spring	La Mesita Spring	12	Regional aquifer	Spring	1672180	1772148	Trimble_GPS	5581	Santa Fe Group sediments
LAO-B	LAO-B	1	Alluvium	Well	1615149	1775170	FIMAD	7326	Volcanic-rich alluvium
LAOI(A)-1.1	LAOI(A)-1.1	4	Volcanic rocks	Well	1629427	1773925	FIMAD	6837	Bandelier Tuff
Otowi #4	Otowi #4	13	Regional aquifer	Well	1637546	1772968	Blake	6627	Santa Fe Group sediments
Pajarito Spring	Pajarito Spring	5	Regional aquifer	Spring	1656224	1747274	Blake	5587	Landslide blocks in Cerros del Rio basalt and Totavi Lentil
Pine Spring	Pine Spring	6	Alluvium	Spring	1630151	1803290	Blake	7238	Puye Formation, lavas of Keres Group, and alluvium
Sacred Spring	Sacred Spring	14	Regional aquifer	Spring	1670060	1780451	GPS	5650	Santa Fe Group sediments
Seven Springs	Seven Springs	7	Volcanic rocks	Spring	1505978	1798869	Blake	8143	Bandelier Tuff
Spring 1	Spring 1	15	Regional aquifer	Spring	1667883	1768364	GPS	5584	Landslide blocks in Cerros del Rio basalt, Santa Fe Group sediments, and Totavi Lentil
Spring 9B	Spring 9B	8	Regional aquifer	Spring	1641613	1732525	GPS	5492	Cerros del Rio basalt and hydromagmatic deposits
Upper Cañon de Valle Spring	UCdV Spring	9	Volcanic rocks	Spring	1601989	1767970	Trimble_GPS	8494	Upper Bandelier Tuff
Water Canyon Gallery	WCG	10	Volcanic rocks	Spring	1604088	1762656	GPS	8002	Upper Bandelier Tuff
Rio Grande	RG	n/a[c]	River	River	na[d]	na	na	na	None

[a] Location sources were FIMAD, Blake et al. (1995, 49931), and global positioning system (GPS) instruments.
[b] Elevation from GPS instruments.
[c] n/a = not applicable.
[d] na = not available.

Table 4.2-2a
Alluvial Groundwater Shows Filtered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median[a]	Maximum	Mean	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	52	4	391.5	8760	1046	1853	1.7713	1	7
Metals	Antimony	µg/L	51	0.09	1	100	3.417	13.87	4.0594	0	39
Metals	Arsenic	µg/L	51	0.1	2	50	3.105	7.024	2.262	0	28
Metals	Barium	µg/L	52	19	34.65	110	42.68	23.65	0.5541	0	4
Metals	Beryllium	µg/L	49	0.01	1	10	1.54	1.769	1.149	0	33
Metals	Boron	µg/L	40	3	10	100	15.83	20.05	1.2669	0	15
Metals	Cadmium	µg/L	52	0.07	1	5	1.368	1.451	1.0603	0	40
Metals	Calcium	µg/L	54	6800	11000	28000	12410	5100	0.411	0	0
Metals	Cesium	µg/L	19	0	2	8	2.053	1.985	0.9672	0	12
Metals	Chromium	µg/L	53	0.21	2	66	4.717	9.48	2.0097	0	33
Metals	Cobalt	µg/L	53	0.02	2	59	3.573	8.17	2.2866	0	35
Metals	Copper	µg/L	53	0.27	3	37	4.633	6.625	1.4301	0	22
Metals	Iron	µg/L	53	8.3	160	4600	586.1	1016	1.7338	0	8
Metals	Lead	µg/L	50	0.01	2	460	37.17	115.3	3.103	0	23
Metals	Lithium	µg/L	27	4	10	10	8.778	2.225	0.2534	0	21
Metals	Magnesium	µg/L	54	664	3308	7300	3721	1421	0.3818	0	2
Metals	Manganese	µg/L	53	0.044	9	740	28.44	108.9	3.8304	1	22
Metals	Mercury	µg/L	53	0.0092	0.2	200	28.38	63.14	2.2246	1	35
Metals	Molybdenum	µg/L	39	0.735	2	25	4.991	4.786	0.959	0	31
Metals	Nickel	µg/L	48	0.3	2	20	4.719	5.406	1.1454	0	27
Metals	Potassium	µg/L	53	1800	2990	9000	3262	1225	0.3755	0	2
Metals	Rubidium	µg/L	23	0.2	6	60	13.27	17.84	1.3442	0	6
Metals	Selenium	µg/L	47	0.02	2	10	2.207	2.305	1.0443	0	36
Metals	Silver	µg/L	52	0.45	1	14	3.28	4.128	1.2585	0	39
Metals	Sodium	µg/L	53	4300	6900	58000	8070	7200	0.8922	0	0
Metals	Strontium	µg/L	32	50	70	3500	285.7	817.6	2.8618	0	2
Metals	Thallium	µg/L	43	0.026	2	100	3.998	15.04	3.7617	0	31
Metals	Thorium	µg/L	2	1	1	1	1	0	0	0	2
Metals	Tin	µg/L	17	0	5	14.1	5.659	3.963	0.7003	0	15
Metals	Titanium	µg/L	18	1.621	9.5	100	16.88	25.5	1.5111	0	7
Metals	Uranium	µg/L	26	0	0.2505	1200	48.2	234.9	4.8747	0	11
Metals	Uranium by NATU[c]	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS[c]	µg/L	6	0.025	0.051	0.957	0.2272	0.3678	1.6191	0	0
Metals	Uranium by TULIKPA[c]	µg/L	6	0.07	0.29	1	0.455	0.4334	0.9525	0	0
Metals	Vanadium	µg/L	51	0.33	2.578	70	6.718	12.23	1.8201	0	21

Table 4.2-2a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Zinc	µg/L	48	0.31	10	500	21.89	71.51	3.2662	1	24
Other	Ammonia	µg/L	16	10	50	500	110	147.8	1.3435	0	12
Other	Alkalinity Total	µg/L	9	4.70E+04	8.28E+04	9.18E+04	7.79E+04	1.56E+04	0.2007	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	2	3.00E+04	3.25E+04	3.50E+04	3.25E+04	3536	0.1088	0	0
Other	Bromide	µg/L	34	0.05	20	1000	112.8	236.1	2.0924	0	24
Other	Chloride	µg/L	47	1104	6030	1.19E+04	5598	3372	0.6024	0	2
Other-iso	Delta deuterium vs. Std. Mean Ocean Water	n/a	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	46	10	100	500	118.1	79.88	0.6762	0	12
Other	Nitrogen Ammonia (as N)	µg/L	10	100	500	500	360	183.8	0.5105	0	7
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	11	50	130	6.60E+04	6121	1.99E+04	3.2443	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	5	100	200	200	160	54.77	0.3423	2	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	5	100	100	100	100	0	0	2	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	6	100	215	460	270	153.1	0.567	0	1
Other	Oxalate	µg/L	7	20	20	1000	300	478.2	1.594	0	7
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	8	50	115	200	117.5	64.53	0.5492	0	5
Other	Silica	µg/L	36	1.40E+04	3.70E+04	9.80E+04	4.22E+04	1.98E+04	0.4686	0	2
Other	Sulfate	µg/L	57	10	5000	6.60E+04	7913	1.09E+04	1.3745	0	12
Other	Total Dissolved Solids	µg/L	24	1.00E+05	1.31E+05	1.90E+05	1.36E+05	2.69E+04	0.1979	0	0
Other	Carbon Dissolved Organic	µg/L	22	1700	3090	1.20E+04	4011	2566	0.6396	0	0
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	19	13	116	141	111.7	31.49	0.282	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	9	600	1000	2600	1167	593.7	0.5089	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	7	0	100	300	100	100	1	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	8	0	100	2200	337.5	755.8	2.2394	0	0
Other	Humic Substances Hydrophilic Total	µg/L	10	800	1050	2800	1380	656.3	0.4755	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	10	400	950	2400	1090	622.6	0.5712	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	10	0	450	2300	650	645.1	0.9924	0	0
Other	Humic Substances Hydrophobic Total	µg/L	10	800	1250	3800	1780	1046	0.5879	0	0
Other	pH	SU	14	6.3	6.97	7.56	6.996	0.3775	0.054	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	5	-76	-74	-69	-72.8	2.775	-0.0381	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.6	-11.4	-11.1	-11.38	0.228	-0.02	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	17	863.8	1185	1434	1140	194.8	0.1709	0	0
Other	Cation Sum	µg/L	17	946	1265	1594	1255	215.6	0.1718	0	0
Other	Balance	µg/L	17	-40.85	77.08	275.7	96.03	89.06	0.9274	0	0

Table 4.2-2a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Alkalinity(Lab) $CaCO_3$	µg/L	13	2.73E+04	4.07E+04	6.12E+04	4.21E+04	1.11E+04	0.2634	0	0
Other	Ammonium	µg/L	24	0	27.4	180	37.39	36.24	0.9692	0	9
Other	Ammonium [as N]	µg/L	13	15.56	23.33	50.63	24.67	10.65	0.4316	0	4
Other	Bicarbonate	µg/L	25	3.33E+04	4.97E+04	1.00E+05	5.29E+04	1.64E+04	0.3102	0	0
Other	Carbonate	µg/L	23	0	0	1000	173.9	387.6	2.2284	0	4
Other	Chlorate (ClO_3)	µg/L	20	0	20	1500	112	344.4	3.0751	0	14
Other	Conductivity (Field)	µS/cm	8	70	98	146	108.5	30.85	0.2843	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	0	0	0	0
Other	Hardness	µg/L	11	3.00E+04	4.13E+04	5.30E+04	4.20E+04	7916	0.1884	0	0
Other	Iodide	µg/L	19	0	10	10	6.842	4.776	0.698	0	13
Other	Nitrate	µg/L	28	0	21.45	960	108.5	216.3	1.9926	0	11
Other	Nitrate [as N]	µg/L	13	2.258	5.171	216.8	32.24	63.78	1.9785	0	5
Other	Nitrite	µg/L	25	10	20	120	22.4	22.41	1.0006	0	22
Other	Nitrite [as N]	µg/L	13	1.795	1.795	3.59	2.209	0.7871	0.3563	0	12
Other	pH (Field)	SU	11	5.81	6.78	7.14	6.632	0.3559	0.0537	0	0
Other	Phosphate	µg/L	25	5	48.9	240	56.39	52.53	0.9315	0	12
Other	Silicon	µg/L	16	1.40E+04	1.80E+04	3.76E+04	2.07E+04	6229	0.3008	0	0
Other	Sulfite	µg/L	13	10	10	10	10	0	0	0	13
Other	Total Suspended Solids	µg/L	4	500	7379	3.32E+04	1.21E+04	1.55E+04	1.2762	0	0
Other	Turbidity (Field)	NTU	8	0	1	41.7	8.275	14.77	1.7849	0	0
Other-ratio	Br/Cl by wt	ratio	11	0	0.001066	0.01756	0.004441	0.006021	1.356	0	0
Other-ratio	B/Cl by wt	ratio	11	5.13E-04	0.006098	0.01308	0.0055	0.005128	0.9324	0	0
Other-ratio	Cs/Cl by wt	ratio	11	0	0	0.001829	1.66E-04	5.52E-04	3.3166	0	0
Other-ratio	F/Cl by wt	ratio	11	0.005903	0.06098	0.1026	0.0469	0.04077	0.8692	0	0
Other-ratio	HCO_3/CL by wt	ratio	11	3.667	28.87	67.24	28.45	26.04	0.9152	0	0
Other-ratio	K/Cl by wt	ratio	11	0.2231	2.695	3.815	1.846	1.582	0.8568	0	0
Other-ratio	Li/Cl by wt	ratio	11	0	0	0	0	0	0	0	0
Other-ratio	Na/Cl by wt	ratio	11	0.7106	3.507	6.398	3.094	2.402	0.7763	0	0
Other-ratio	SO_4/Cl by wt	ratio	11	0.2726	4.31	6.617	3.214	2.799	0.8709	0	0
Rad-iso	Americium-241	pCi/L	14	-0.00235	0.0175	0.037	0.01577	0.0114	0.7231	0	12
Rad-iso	Plutonium-238	pCi/L	16	-0.0249	0.002075	0.0342	0.004358	0.0142	3.2581	0	16
Rad-iso	Plutonium-239	pCi/L	16	-0.0324	0.006545	0.125	0.01161	0.03318	2.857	0	14
Rad-iso	Strontium-90	pCi/L	19	-0.5	0.14	0.34	0.1062	0.1776	1.6724	0	19
Rad-iso	Tritium	pCi/L	5	5.522	56.82	70.86	49.88	25.51	0.5115	0	0
Rad-iso	Tritium	TU[f]	5	1.73	17.8	22.2	15.63	7.993	0.5115	0	0
Rad-iso	Uranium-234	pCi/L	14	0.001	0.0435	0.078	0.04536	0.02449	0.5399	0	6
Rad-iso	Uranium-235	pCi/L	14	-0.00122	0.0069	0.015	0.007506	0.004216	0.5617	0	13

Table 4.2-2a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Uranium-238	pCi/L	14	-0.005	0.01555	0.124	0.02846	0.03312	1.1639	0	10
Rad-gross	Gross Alpha Radiation	pCi/L	4	-0.78	0.505	1.22	0.3625	0.8693	2.3982	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	1.3	3.1	3.84	2.835	1.109	0.391	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	124	241	290	224	72.61	0.3241	0	1
Rad-gscan[g]	Cesium-137	pCi/L	13	-1.5	-0.278	0.893	-0.266	0.7341	-2.7598	0	13

[a] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = coefficient of variation = std. dev./mean.
NATU = natural uranium.
TUICPMS = total uranium inductively coupled plasma mass spectrometry.
TULIKPA = total uranium kinetic phosphorimetric analysis.

[d] — = No summary information, no samples analyzed.

[e] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[f] Rad-gscan = gamma spectroscopy.

Table 4.2-2b
Alluvial Groundwater Shows Filtered Samples at Half-Detection Limit for All Years, R-Qualifiers Omitted

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	51	2	400	8760	1055	1871	1.7732	0	7
Metals	Antimony	µg/L	51	0.045	0.5	50	1.709	6.935	4.0569	0	39
Metals	Arsenic	µg/L	51	0.05	1.1	25	1.666	3.507	2.1044	0	28
Metals	Barium	µg/L	52	13	34.15	110	40.19	21.2	0.5276	0	4
Metals	Beryllium	µg/L	49	0.005	0.5	5	0.7778	0.8795	1.1309	0	33
Metals	Boron	µg/L	40	3	8.5	50	11.25	10.05	0.8925	0	15
Metals	Cadmium	µg/L	52	0.042	0.5	2.5	0.7022	0.7406	1.0548	0	40
Metals	Calcium	µg/L	54	6800	11000	28000	12410	5100	0.411	0	0
Metals	Cesium	µg/L	19	0	1	8	1.474	2.085	1.4147	0	12
Metals	Chromium	µg/L	53	0.105	1	66	3.266	9.059	2.7738	0	33
Metals	Cobalt	µg/L	53	0.02	1	59	2.394	8.023	3.3513	0	35
Metals	Copper	µg/L	53	0.135	2	37	3.681	6.612	1.7961	0	22
Metals	Iron	µg/L	53	4.15	160	4600	578.4	1020	1.7642	0	8
Metals	Lead	µg/L	50	0.005	1	460	36.59	115.5	3.1571	0	23
Metals	Lithium	µg/L	27	2	5	10	5.074	1.385	0.2729	0	21
Metals	Magnesium	µg/L	54	664	3308	7300	3666	1477	0.403	0	2
Metals	Manganese	µg/L	52	0.022	5	740	26.9	110.3	4.0991	0	22
Metals	Mercury	µg/L	52	0.0046	0.1	200	18.31	45.39	2.4784	0	35
Metals	Molybdenum	µg/L	39	0.5	1	12.5	2.54	2.366	0.9315	0	31
Metals	Nickel	µg/L	48	0.15	1	12	2.767	3.016	1.0899	0	27
Metals	Potassium	µg/L	53	1100	2990	9000	3217	1278	0.3972	0	2
Metals	Rubidium	µg/L	23	0.1	6	30	8.7	8.071	0.9277	0	6
Metals	Selenium	µg/L	47	0.01	1	5	1.113	1.147	1.0301	0	36
Metals	Silver	µg/L	52	0.225	0.5	14	1.799	2.578	1.4331	0	39
Metals	Sodium	µg/L	53	4300	6900	58000	8070	7200	0.8922	0	0
Metals	Strontium	µg/L	32	27.2	70	3500	283.9	818.2	2.8821	0	2
Metals	Thallium	µg/L	43	0.013	1	50	2.013	7.516	3.7328	0	31
Metals	Thorium	µg/L	2	0.5	0.5	0.5	0.5	0	0	0	2
Metals	Tin	µg/L	17	0	2.5	11	3.153	2.746	0.871	0	15
Metals	Titanium	µg/L	18	1	6.5	100	15.6	26	1.6669	0	7
Metals	Uranium	µg/L	26	0	0.2505	600	24.14	117.5	4.866	0	11
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	6	0.025	0.051	0.957	0.2272	0.3678	1.6191	0	0
Metals	Uranium by TULIKPA	µg/L	6	0.07	0.29	0.5	0.2883	0.191	0.6626	0	0

Table 4.2-2b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[1]	Std. Dev.[2]	CV[3]	Rejected	Nondetects
Metals	Vanadium	µg/L	51	0.165	2	70	4.831	10.29	2.1306	0	21
Metals	Zinc	µg/L	47	0.155	5	250	12.53	36.03	2.8765	0	24
Other	Ammonia	µg/L	16	5	25	420	77.19	118.7	1.5382	0	12
Other	Alkalinity Total	µg/L	9	4.70E+04	8.28E+04	9.18E+04	7.79E+04	1.56E+04	0.2007	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	2	3.00E+04	3.25E+04	3.50E+04	3.25E+04	3536	0.1088	0	0
Other	Bromide	µg/L	34	0.025	13.65	500	58.43	117.2	2.0067	0	24
Other	Chloride	µg/L	47	1000	6030	1.19E+04	5523	3427	0.6205	0	2
Other-iso	Delta deuterium vs. Std. Mean Ocean Water	n/a	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	46	5	100	300	100.5	58.27	0.5798	0	12
Other	Nitrogen Ammonia (as N)	µg/L	10	50	250	250	205	72.46	0.3534	0	7
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	11	25	130	6.60E+04	6117	1.99E+04	3.247	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	100	100	100	100	0	0	0	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	6	50	215	460	261.7	165.1	0.6309	0	1
Other	Oxalate	µg/L	7	10	10	500	150	239.1	1.594	0	7
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	8	25	100	160	83.13	51.68	0.6217	0	5
Other	Silica	µg/L	36	1.40E+04	3.70E+04	9.80E+04	4.13E+04	2.06E+04	0.4981	0	2
Other	Sulfate	µg/L	57	5	5000	6.60E+04	7150	9317	1.3031	0	12
Other	Total Dissolved Solids	µg/L	24	1.00E+05	1.31E+05	1.90E+05	1.36E+05	2.69E+04	0.1979	0	0
Other	Carbon Dissolved Organic	µg/L	22	1700	3090	1.20E+04	4011	2566	0.6396	0	0
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	19	13	116	141	111.7	31.49	0.282	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	9	600	1000	2600	1167	593.7	0.5089	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	7	0	100	300	100	100	1	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	8	0	100	2200	337.5	755.8	2.2394	0	0
Other	Humic Substances Hydrophilic Total	µg/L	10	800	1050	2800	1380	656.3	0.4755	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	10	400	950	2400	1090	622.6	0.5712	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	10	0	450	2300	650	645.1	0.9924	0	0
Other	Humic Substances Hydrophobic Total	µg/L	10	800	1250	3800	1780	1046	0.5879	0	0
Other	pH	SU	14	6.3	6.97	7.56	6.996	0.3775	0.054	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	5	-76	-74	-69	-72.8	2.775	-0.0381	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.6	-11.4	-11.1	-11.38	0.228	-0.02	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[1]	Std. Dev.[2]	CV[3]	Rejected	Nondetects
Other	Anion Sum	µg/L	17	863.8	1185	1434	1140	194.8	0.1709	0	0
Other	Cation Sum	µg/L	17	946	1265	1594	1255	215.6	0.1718	0	0
Other	Balance	µg/L	17	-40.85	77.08	275.7	96.03	89.06	0.9274	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	13	2.73E+04	4.07E+04	6.12E+04	4.21E+04	1.11E+04	0.2634	0	0
Other	Ammonium	µg/L	24	0	24.9	180	33.53	38.39	1.1448	0	9
Other	Ammonium [as N]	µg/L	13	7.778	23.33	50.63	22.27	13.21	0.5931	0	4
Other	Bicarbonate	µg/L	25	3.33E+04	4.97E+04	1.00E+05	5.29E+04	1.64E+04	0.3102	0	0
Other	Carbonate	µg/L	23	0	0	500	86.96	193.8	2.2284	0	4
Other	Chlorate (ClO_3)	µg/L	20	0	10	1500	93.5	335.5	3.5884	0	14
Other	Conductivity (Field)	µS/cm	8	70	98	146	108.5	30.85	0.2843	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	0	0	0	0
Other	Hardness	µg/L	11	3.00E+04	4.13E+04	5.30E+04	4.20E+04	7916	0.1884	0	0
Other	Iodide	µg/L	19	0	5	5	3.421	2.388	0.698	0	13
Other	Nitrate	µg/L	28	0	18.51	960	100.9	217.1	2.1524	0	11
Other	Nitrate [as N]	µg/L	13	1.129	5.171	216.8	31.72	64.05	2.0193	0	5
Other	Nitrite	µg/L	25	5	10	120	14.8	23.25	1.571	0	22
Other	Nitrite [as N]	µg/L	13	0.8974	0.8974	3.59	1.243	0.7805	0.6281	0	12
Other	pH (Field)	SU	11	5.81	6.78	7.14	6.632	0.3559	0.0537	0	0
Other	Phosphate	µg/L	25	3.26	25	240	47.86	54.63	1.1414	0	12
Other	Silicon	µg/L	16	1.40E+04	1.80E+04	3.76E+04	2.07E+04	6229	0.3008	0	0
Other	Sulfite	µg/L	13	5	5	5	5	0	0	0	13
Other	Total Suspended Solids	µg/L	4	500	7379	3.32E+04	1.21E+04	1.55E+04	1.2762	0	0
Other	Turbidity (Field)	NTU	8	0	1	41.7	8.275	14.77	1.7849	0	0
Other-ratio	Br/Cl by wt	ratio	11	0	0.001066	0.01756	0.004441	0.006021	1.356	0	0
Other-ratio	B/Cl by wt	ratio	11	5.13E-04	0.006098	0.01308	0.0055	0.005128	0.9324	0	0
Other-ratio	Cs/Cl by wt	ratio	11	0	0	0.001829	1.66E-04	5.52E-04	3.3166	0	0
Other-ratio	F/Cl by wt	ratio	11	0.005903	0.06098	0.1026	0.0469	0.04077	0.8692	0	0
Other-ratio	HCO_3/CL by wt	ratio	11	3.667	28.87	67.24	28.45	26.04	0.9152	0	0
Other-ratio	K/Cl by wt	ratio	11	0.2231	2.695	3.815	1.846	1.582	0.8568	0	0
Other-ratio	Li/Cl by wt	ratio	11	0	0	0	0	0	0	0	0
Other-ratio	Na/Cl by wt	ratio	11	0.7106	3.507	6.398	3.094	2.402	0.7763	0	0
Other-ratio	SO_4/Cl by wt	ratio	11	0.2726	4.31	6.617	3.214	2.799	0.8709	0	0
Rad-iso	Americium-241	pCi/L	14	-0.001175	0.00875	0.0312	0.009927	0.009406	0.9475	0	12
Rad-iso	Plutonium-238	pCi/L	16	-0.01245	0.001038	0.0171	0.002179	0.007099	3.2581	0	16
Rad-iso	Plutonium-239	pCi/L	16	-0.0162	0.003273	0.125	0.01046	0.03169	3.0291	0	14
Rad-iso	Strontium-90	pCi/L	19	-0.25	0.07	0.17	0.05311	0.08881	1.6724	0	19

Table 4.2-2b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[1]	Std. Dev.[2]	CV[3]	Rejected	Nondetects
Rad-iso	Tritium	pCi/L	5	5.522	56.82	70.86	49.88	25.51	0.5115	0	0
Rad-iso	Tritium	TU[e]	5	1.73	17.8	22.2	15.63	7.993	0.5115	0	0
Rad-iso	Uranium-234	pCi/L	14	5.00E-04	0.04345	0.078	0.04042	0.02835	0.7015	0	6
Rad-iso	Uranium-235	pCi/L	14	-6.10E-04	0.00345	0.0134	0.004232	0.003269	0.7725	0	13
Rad-iso	Uranium-238	pCi/L	14	-0.0025	0.007775	0.124	0.02415	0.03478	1.4398	0	10
Rad-gross	Gross Alpha Radiation	pCi/L	4	-0.78	0.3025	1.22	0.2612	0.8222	3.147	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	0.65	3.1	3.84	2.672	1.414	0.5291	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	110	193	290	196.5	92.68	0.4717	0	1
Rad-gscan[f]	Cesium-137	pCi/L	13	-0.75	-0.139	0.4465	-0.133	0.367	-2.7598	0	13

[a] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] — = No summary information, no samples analyzed.

[e] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[f] Rad-gscan = gamma spectroscopy.

Table 4.2-2c
Alluvial Groundwater Shows Nonfiltered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	22	4	200	17400	2692	4989	1.8532	0	0
Metals	Antimony	µg/L	22	0.06	0.5915	3.4	1.333	1.287	0.9651	0	13
Metals	Arsenic	µg/L	22	0.1	1.5	5	1.573	1.359	0.8641	0	6
Metals	Barium	µg/L	22	20	40.25	76	42.79	17.73	0.4143	0	0
Metals	Beryllium	µg/L	22	0.01	0.765	2	0.9598	0.8667	0.903	0	13
Metals	Boron	µg/L	11	5	8	20.07	11.3	5.933	0.525	0	1
Metals	Cadmium	µg/L	22	0.07	0.65	1	0.5897	0.423	0.7173	0	13
Metals	Calcium	µg/L	22	8180	12350	23000	13780	5122	0.3718	0	0
Metals	Cesium	µg/L	9	1	2	3	2.111	0.6009	0.2846	0	7
Metals	Chromium	µg/L	22	0.21	2	12	2.574	2.806	1.0901	0	6
Metals	Cobalt	µg/L	22	0.02	1.15	5	1.348	1.101	0.8165	0	12
Metals	Copper	µg/L	22	0.27	2	11	3.429	3.539	1.032	0	4
Metals	Iron	µg/L	22	11	91.21	7650	1199	2218	1.8495	0	1
Metals	Lead	µg/L	22	0.01	1.6	6	2.001	1.589	0.7944	0	10
Metals	Lithium	µg/L	9	4	10	10	9.333	2	0.2143	0	7
Metals	Magnesium	µg/L	22	2440	4040	7200	4385	1494	0.3407	0	0
Metals	Manganese	µg/L	22	0.09	2.65	31	8.318	9.537	1.1465	0	2
Metals	Mercury	µg/L	22	0.0092	0.02	0.2	0.05874	0.07021	1.1954	1	6
Metals	Molybdenum	µg/L	15	0.722	2	10	2.698	2.233	0.8277	0	9
Metals	Nickel	µg/L	22	0.3	2	6.2	2.222	1.7	0.7652	0	9
Metals	Potassium	µg/L	22	1955	3200	4520	3192	803.2	0.2517	0	0
Metals	Rubidium	µg/L	9	4	7	22	8.778	5.239	0.5968	0	0
Metals	Selenium	µg/L	22	0.1	1.35	5	1.688	1.554	0.9204	0	10
Metals	Silver	µg/L	22	0.05	0.95	5	0.9909	0.9322	0.9407	0	13
Metals	Sodium	µg/L	22	4700	7135	10000	7550	1555	0.206	0	0
Metals	Strontium	µg/L	11	54	69	128.9	79.68	23.99	0.3012	0	0
Metals	Thallium	µg/L	22	0.057	2	9.9	2.413	2.007	0.8316	0	13
Metals	Thorium	µg/L	1	1	1	1	1	n/a[d]	n/a	0	1
Metals	Tin	µg/L	11	1	5	14.1	6.291	4.041	0.6423	0	11
Metals	Titanium	µg/L	10	2	19	270	69.47	96.85	1.394	0	0
Metals	Uranium	µg/L	8	0	0.03501	0.41	0.0996	0.1451	1.4563	0	1
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	22	0.33	1.75	12	3.17	3.635	1.1465	0	5
Metals	Zinc	µg/L	21	0.31	5	20	7.037	6.451	0.9168	1	7
Other	Ammonia	µg/L	1	130	130	130	130	—	—	0	0
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	2.90E+04	3.25E+04	3.60E+04	3.25E+04	4950	0.1523	0	0
Other	Bromide	µg/L	11	10	10	100	28.2	35.66	1.2643	0	5
Other	Chloride	µg/L	11	1130	6010	1.19E+04	5786	4414	0.7629	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a	6	-79	-76.5	-12	-66.17	26.62	-0.4023	0	0
Other	Fluoride	µg/L	11	50	70	120	79.27	23.67	0.2986	0	2
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	1	50	50	50	50			0	1
Other	Nitrogen Nitrate (as NO_3)	µg/L	2	100	100	100	100	0	0	2	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	2	100	100	100	100	0	0	2	0
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	3	20	20	20	20	0	0	0	3
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	2	200	200	200	200	0	0	0	2
Other	Silica	µg/L	9	3.45E+04	4.84E+04	1.08E+05	5.75E+04	2.59E+04	0.4511	0	0
Other	Sulfate	µg/L	11	3250	4700	9670	5406	1979	0.366	0	0
Other	Total Dissolved Solids	µg/L	11	1.00E+05	1.62E+05	2.20E+05	1.54E+05	4.37E+04	0.2844	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	8	3	2105	4000	2094	1475	0.7044	0	0
Other	Conductivity	µS/cm	11	90.2	111	141	116.3	16.31	0.1402	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	8	6.63	6.915	7.52	6.964	0.2838	0.0408	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	2	0.1	1.3	2.5	1.3	1.697	1.3054	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	6	-74	-69.5	-63	-69.5	3.937	-0.0566	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	12	-11.6	-10.95	-10	-10.81	0.5017	-0.0464	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	μg/L	8	862.9	1161	1414	1139	209.3	0.1837	0	0
Other	Cation Sum	μg/L	8	1016	1408	2737	1518	525.9	0.3465	0	0
Other	Balance	μg/L	8	-8.28	138.9	858.8	250.6	306.4	1.2228	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	9	2.87E+04	4.13E+04	6.09E+04	4.18E+04	1.08E+04	0.2576	0	0
Other	Ammonium	μg/L	9	18.9	30	50.71	30.81	10.64	0.3453	0	2
Other	Ammonium [as N]	μg/L	9	14.7	23.33	39.44	23.96	8.274	0.3453	0	2
Other	Bicarbonate	μg/L	9	3.50E+04	5.04E+04	7.43E+04	5.10E+04	1.31E+04	0.2576	0	0
Other	Carbonate	μg/L	9	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	μg/L	9	10	20	20	17.78	4.41	0.248	0	9
Other	Conductivity (Field)	μS/cm	6	70	94	146	104	31.7	0.3048	0	0
Other	Dissolved Oxygen (Field)	μg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	—	—	0	0
Other	Hardness	μg/L	8	3.05E+04	4.25E+04	5.29E+04	4.23E+04	7972	0.1885	0	0
Other	Iodide	μg/L	9	10	10	10	10	0	0	0	9
Other	Nitrate	μg/L	9	10	10	50	18.89	13.64	0.7222	0	7
Other	Nitrate [as N]	μg/L	9	2.258	2.258	11.29	4.265	3.081	0.7222	0	7
Other	Nitrite	μg/L	9	10	10	20	11.11	3.333	0.3	0	8
Other	Nitrite [as N]	μg/L	9	1.795	1.795	3.59	1.994	0.5983	0.3	0	8
Other	pH (Field)	SU	8	5.81	6.71	6.91	6.57	0.3632	0.0553	0	0
Other	Phosphate	μg/L	9	16.3	57.03	220	72.1	60.96	0.8455	0	3
Other	Silicon	μg/L	8	1.61E+04	2.59E+04	5.06E+04	2.81E+04	1.23E+04	0.439	0	0
Other	Sulfite	μg/L	9	10	10	10	10	0	0	0	9
Other	Total Suspended Solids	μg/L	6	500	1.06E+04	2.79E+04	1.13E+04	1.07E+04	0.9493	0	0
Other	Turbidity (Field)	NTU	6	0	2.55	41.7	10.87	16.53	1.5207	0	0
Other-ratio	Br/Cl by wt	ratio	8	0	9.84E-04	0.01455	0.003107	0.005204	1.6748	0	0
Other-ratio	B/Cl by wt	ratio	8	5.22E-04	0.005692	0.01756	0.007563	0.007526	0.9951	0	0
Other-ratio	Cs/Cl by wt	ratio	8	0	0	0.002158	5.01E-04	9.32E-04	1.8588	0	0
Other-ratio	F/Cl by wt	ratio	8	0.006087	0.03471	0.1062	0.04456	0.04216	0.9461	0	0
Other-ratio	HCO_3/CL by wt	ratio	8	3.898	17.53	65	25.13	25.1	0.9986	0	0
Other-ratio	K/Cl by wt	ratio	8	0.2146	1.5	3.954	1.731	1.641	0.9481	0	0
Other-ratio	Li/Cl by wt	ratio	8	0	0	0.001098	1.37E-04	3.88E-04	2.8284	0	0
Other-ratio	Na/Cl by wt	ratio	8	0.7172	2.09	6.22	2.719	2.289	0.8416	0	0
Other-ratio	SO_4/Cl by wt	ratio	8	0.2826	2.449	6.562	2.994	2.846	0.9505	0	0
Rad-iso	Americium-241	pCi/L	11	-0.003	0.0165	0.04	0.01691	0.01395	0.8253	0	11
Rad-iso	Plutonium-238	pCi/L	12	-0.013	0.001025	0.038	0.007199	0.01508	2.0951	0	12
Rad-iso	Plutonium-239	pCi/L	12	-0.00828	0.00387	0.021	0.004063	0.007654	1.8841	0	12
Rad-iso	Strontium-90	pCi/L	15	-0.5	0.02	0.4	0.02623	0.2444	9.3171	0	15
Rad-iso	Tritium	pCi/L	20	-50	56.99	109	46.64	35.43	0.7597	0	4
Rad-iso	Tritium	TU[e]	8	15.8	20.45	21.3	19.65	1.871	0.0952	0	0

Table 4.2-2c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Uranium-234	pCi/L	11	0.02	0.033	0.16	0.05517	0.04106	0.7442	0	6
Rad-iso	Uranium-235	pCi/L	11	-0.0074	0.0071	0.03	0.008773	0.01011	1.1519	0	10
Rad-iso	Uranium-238	pCi/L	11	0.01	0.026	0.102	0.03277	0.02534	0.7732	0	8
Rad-gross	Gross Alpha Radiation	pCi/L	4	0.3	0.795	1.8	0.9225	0.744	0.8065	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	1.9	4.03	5.5	3.865	1.887	0.4881	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	161	246	354	251.8	86.52	0.3437	0	1
Rad-gscan[f]	Cesium-137	pCi/L	11	-2.66	0.00686	1.92	-0.1227	1.485	-12.0958	0	11

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] — = No summary information, no samples analyzed.

[e] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[f] Rad-gscan = gamma spectroscopy.

Table 4.2-2d
Alluvial Groundwater Shows Nonfiltered Samples at Half-Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	22	2	200	17400	2685	4993	1.8592	0	0
Metals	Antimony	µg/L	22	0.03	0.2958	1.7	0.6667	0.6434	0.9651	0	13
Metals	Arsenic	µg/L	22	0.05	0.75	2.7	0.9602	0.76	0.7915	0	6
Metals	Barium	µg/L	22	20	40.25	76	42.79	17.73	0.4143	0	0
Metals	Beryllium	µg/L	22	0.01	0.3825	1	0.4829	0.4303	0.8912	0	13
Metals	Boron	µg/L	11	3.95	8	20.07	10.94	6.27	0.5729	0	1
Metals	Cadmium	µg/L	22	0.042	0.325	0.5	0.2965	0.2096	0.707	0	13
Metals	Calcium	µg/L	22	8180	12350	23000	13780	5122	0.3718	0	0
Metals	Cesium	µg/L	9	0.5	1	3	1.389	0.928	0.6681	0	7
Metals	Chromium	µg/L	22	0.105	1	12	2.01	2.734	1.3604	0	6
Metals	Cobalt	µg/L	22	0.02	0.75	2.5	0.7427	0.6039	0.813	0	12
Metals	Copper	µg/L	22	0.135	1.55	11	2.905	3.596	1.2376	0	4
Metals	Iron	µg/L	22	5.5	91.21	7650	1192	2222	1.8639	0	1
Metals	Lead	µg/L	22	0.005	0.8	6	1.274	1.407	1.1039	0	10
Metals	Lithium	µg/L	9	4	5	10	5.444	1.74	0.3196	0	7
Metals	Magnesium	µg/L	22	2440	4040	7200	4385	1494	0.3407	0	0
Metals	Manganese	µg/L	22	0.09	2.65	31	7.008	8.881	1.2672	0	2
Metals	Mercury	µg/L	21	0.0046	0.02	0.1	0.03624	0.03674	1.0137	0	6
Metals	Molybdenum	µg/L	15	0.5	1	5	1.44	1.104	0.7665	0	9
Metals	Nickel	µg/L	22	0.15	1	6.2	1.46	1.433	0.9818	0	9
Metals	Potassium	µg/L	22	1955	3200	4520	3192	803.2	0.2517	0	0
Metals	Rubidium	µg/L	9	4	7	22	8.778	5.239	0.5968	0	0
Metals	Selenium	µg/L	22	0.05	0.9	2.5	0.8791	0.7622	0.867	0	10
Metals	Silver	µg/L	22	0.05	0.5	2.5	0.5148	0.4688	0.9106	0	13
Metals	Sodium	µg/L	22	4700	7135	10000	7550	1555	0.206	0	0
Metals	Strontium	µg/L	11	54	69	128.9	79.68	23.99	0.3012	0	0
Metals	Thallium	µg/L	22	0.057	1	4.95	1.217	0.9926	0.8153	0	13
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	n/a[d]	n/a	0	1
Metals	Tin	µg/L	11	0.5	2.5	7.05	3.145	2.02	0.6423	0	11
Metals	Titanium	µg/L	10	2	19	270	69.47	96.85	1.394	0	0
Metals	Uranium	µg/L	8	0	0.03501	0.41	0.0871	0.1394	1.6	0	1
Metals	Uranium by NATU	µg/L	0	—[e]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	22	0.165	1	12	2.836	3.716	1.3102	0	5
Metals	Zinc	µg/L	20	0.155	4.2	20	5.401	6.139	1.1367	0	7
Other	Ammonia	µg/L	1	130	130	130	130	—	—	0	0
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	2.90E+04	3.25E+04	3.60E+04	3.25E+04	4950	0.1523	0	0
Other	Bromide	µg/L	11	5	10	50	17.29	16.5	0.9541	0	5
Other	Chloride	µg/L	11	1130	6010	1.19E+04	5786	4414	0.7629	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a	6	-79	-76.5	-12	-66.17	26.62	-0.4023	0	0
Other	Fluoride	µg/L	11	25	70	120	74.73	30.9	0.4136	0	2
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	1	25	25	25	25	—	—	0	1
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	3	10	10	10	10	0	0	0	3
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	2	100	100	100	100	0	0	0	2
Other	Silica	µg/L	9	3.45E+04	4.84E+04	1.08E+05	5.75E+04	2.59E+04	0.4511	0	0
Other	Sulfate	µg/L	11	3250	4700	9670	5406	1979	0.366	0	0
Other	Total Dissolved Solids	µg/L	11	1.00E+05	1.62E+05	2.20E+05	1.54E+05	4.37E+04	0.2844	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	8	3	2105	4000	2094	1475	0.7044	0	0
Other	Conductivity	µS/cm	11	90.2	111	141	116.3	16.31	0.1402	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	8	6.63	6.915	7.52	6.964	0.2838	0.0408	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	2	0.1	1.3	2.5	1.3	1.697	1.3054	0	0

Table 4.2-2d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Deuterium Hydrogen Ratio	ratio	6	-74	-69.5	-63	-69.5	3.937	-0.0566	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	12	-11.6	-10.95	-10	-10.81	0.5017	-0.0464	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	8	862.9	1161	1414	1139	209.3	0.1837	0	0
Other	Cation Sum	µg/L	8	1016	1408	2737	1518	525.9	0.3465	0	0
Other	Balance	µg/L	8	-8.28	138.9	858.8	250.6	306.4	1.2228	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	9	2.87E+04	4.13E+04	6.09E+04	4.18E+04	1.08E+04	0.2576	0	0
Other	Ammonium	µg/L	9	10	30	50.71	28.59	13.66	0.4779	0	2
Other	Ammonium [as N]	µg/L	9	7.778	23.33	39.44	22.24	10.63	0.4779	0	2
Other	Bicarbonate	µg/L	9	3.50E+04	5.04E+04	7.43E+04	5.10E+04	1.31E+04	0.2576	0	0
Other	Carbonate	µg/L	9	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	9	5	10	10	8.889	2.205	0.248	0	9
Other	Conductivity (Field)	µS/cm	6	70	94	146	104	31.7	0.3048	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	—	—	0	0
Other	Hardness	µg/L	8	3.05E+04	4.25E+04	5.29E+04	4.23E+04	7972	0.1885	0	0
Other	Iodide	µg/L	9	5	5	5	5	0	0	0	9
Other	Nitrate	µg/L	9	5	5	50	13.89	15.77	1.1353	0	7
Other	Nitrate [as N]	µg/L	9	1.129	1.129	11.29	3.136	3.56	1.1353	0	7
Other	Nitrite	µg/L	9	5	5	10	6.111	2.205	0.3608	0	8
Other	Nitrite [as N]	µg/L	9	0.8974	0.8974	1.795	1.097	0.3957	0.3608	0	8
Other	pH (Field)	SU	8	5.81	6.71	6.91	6.57	0.3632	0.0553	0	0
Other	Phosphate	µg/L	9	10	57.03	220	65.43	65.13	0.9953	0	3
Other	Silicon	µg/L	8	1.61E+04	2.59E+04	5.06E+04	2.81E+04	1.23E+04	0.439	0	0
Other	Sulfite	µg/L	9	5	5	5	5	0	0	0	9
Other	Total Suspended Solids	µg/L	6	500	1.06E+04	2.79E+04	1.13E+04	1.07E+04	0.9493	0	0
Other	Turbidity (Field)	NTU	6	0	2.55	41.7	10.87	16.53	1.5207	0	0
Other-ratio	Br/Cl by wt	ratio	8	0	9.84E-04	0.01455	0.003107	0.005204	1.6748	0	0
Other-ratio	B/Cl by wt	ratio	8	5.22E-04	0.005692	0.01756	0.007563	0.007526	0.9951	0	0
Other-ratio	Cs/Cl by wt	ratio	8	0	0	0.002158	5.01E-04	9.32E-04	1.8588	0	0
Other-ratio	F/Cl by wt	ratio	8	0.006087	0.03471	0.1062	0.04456	0.04216	0.9461	0	0
Other-ratio	HCO_3/CL by wt	ratio	8	3.898	17.53	65	25.13	25.1	0.9986	0	0
Other-ratio	K/Cl by wt	ratio	8	0.2146	1.5	3.954	1.731	1.641	0.9481	0	0
Other-ratio	Li/Cl by wt	ratio	8	0	0	0.001098	1.37E-04	3.88E-04	2.8284	0	0
Other-ratio	Na/Cl by wt	ratio	8	0.7172	2.09	6.22	2.719	2.289	0.8416	0	0
Other-ratio	SO_4/Cl by wt	ratio	8	0.2826	2.449	6.562	2.994	2.846	0.9505	0	0
Rad-iso	Americium-241	pCi/L	11	-0.0015	0.00825	0.02	0.008455	0.006977	0.8253	0	11

Table 4.2-2d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-238	pCi/L	12	-0.0065	5.13E-04	0.019	0.0036	0.007542	2.0951	0	12
Rad-iso	Plutonium-239	pCi/L	12	-0.00414	0.001935	0.0105	0.002031	0.003827	1.8841	0	12
Rad-iso	Strontium-90	pCi/L	15	-0.25	0.01	0.2	0.01312	0.1222	9.3171	0	15
Rad-iso	Tritium	pCi/L	20	-25	56.03	67.99	45.31	27.83	0.6142	0	4
Rad-iso	Tritium	TU[f]	8	15.8	20.45	21.3	19.65	1.871	0.0952	0	0
Rad-iso	Uranium-234	pCi/L	11	0.01	0.0165	0.16	0.04745	0.04677	0.9857	0	6
Rad-iso	Uranium-235	pCi/L	11	-0.0037	0.00415	0.015	0.004664	0.005056	1.0841	0	10
Rad-iso	Uranium-238	pCi/L	11	0.005	0.013	0.102	0.02449	0.02819	1.1512	0	8
Rad-gross	Gross Alpha Radiation	pCi/L	4	0.3	0.475	1.8	0.7625	0.7095	0.9305	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	0.95	4.03	5.5	3.628	2.243	0.6182	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	80.5	246	354	231.6	118.2	0.5104	0	1
Rad-gscan[g]	Cesium-137	pCi/L	11	-1.33	0.00343	0.96	-0.06137	0.7423	-12.0958	0	11

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-2e
Alluvial Groundwater Shows Filtered Samples at Half-Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	33	2	210	8760	1164	2258	1.9395	0	14
Metals	Antimony	µg/L	34	0.045	0.3415	1.7	0.5553	0.569	1.0247	0	33
Metals	Arsenic	µg/L	34	0.05	1	4.03	1.017	0.8297	0.8158	0	21
Metals	Barium	µg/L	34	19	41.65	64	38.69	14.07	0.3638	0	0
Metals	Beryllium	µg/L	34	0.005	0.348	1	0.4459	0.4209	0.9439	0	27
Metals	Boron	µg/L	22	3.95	8.5	15.03	9.123	3.306	0.3624	0	6
Metals	Cadmium	µg/L	34	0.042	0.325	0.5	0.2915	0.2126	0.7293	0	33
Metals	Calcium	µg/L	34	6800	11470	23000	12740	5306	0.4164	0	0
Metals	Cesium	µg/L	13	0.5	1	3	1.077	0.6071	0.5638	0	12
Metals	Chromium	µg/L	34	0.105	1	5	1.297	1.303	1.0049	0	28
Metals	Cobalt	µg/L	34	0.02	0.595	2.5	0.7438	0.5766	0.7752	0	26
Metals	Copper	µg/L	34	0.135	1.3	8	1.985	2.146	1.0811	0	21
Metals	Iron	µg/L	34	4.15	76.2	4600	548	1080	1.9716	0	14
Metals	Lead	µg/L	34	0.005	0.8	4	1.028	0.9721	0.9452	0	24
Metals	Lithium	µg/L	13	4	5	5	4.846	0.3755	0.0775	0	11
Metals	Magnesium	µg/L	34	2200	3502	7300	4002	1586	0.3962	0	0
Metals	Manganese	µg/L	33	0.022	3	21	5.511	5.921	1.0745	0	16
Metals	Mercury	µg/L	33	0.0046	0.025	0.11	0.04158	0.04024	0.9679	0	29
Metals	Molybdenum	µg/L	21	0.5	1	5	1.479	1.253	0.847	0	18
Metals	Nickel	µg/L	34	0.15	1	5.6	1.553	1.375	0.8852	0	24
Metals	Potassium	µg/L	34	1800	2955	4420	3060	745.2	0.2435	0	0
Metals	Rubidium	µg/L	13	4	5	7	5.385	1.121	0.2082	0	0
Metals	Selenium	µg/L	34	0.05	1.1	2.5	1.021	0.8968	0.8784	0	32
Metals	Silver	µg/L	34	0.225	0.5	2.5	0.6044	0.5676	0.939	0	32
Metals	Sodium	µg/L	34	4300	7030	9900	7141	1699	0.2379	0	0
Metals	Strontium	µg/L	15	27.2	69	126.7	76.87	30.16	0.3924	0	2
Metals	Thallium	µg/L	34	0.013	1	2.75	0.8699	0.6614	0.7604	0	31
Metals	Thorium	µg/L	2	0.5	0.5	0.5	0.5	0	0	0	2
Metals	Tin	µg/L	15	0.5	2.5	7.05	2.84	1.845	0.6497	0	15
Metals	Titanium	µg/L	14	1	8.05	100	18.63	28.98	1.5556	0	3
Metals	Uranium	µg/L	15	0	0.068	0.957	0.1427	0.2417	1.6941	0	2
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	6	0.025	0.051	0.957	0.2272	0.3678	1.6191	0	0
Metals	Uranium by TULIKPA	µg/L	6	0.07	0.29	0.5	0.2883	0.191	0.6626	0	0

Table 4.2-2e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	34	0.165	1	9.4	2.187	2.439	1.115	0	12
Metals	Zinc	µg/L	31	0.155	2.5	21	4.636	4.83	1.0418	0	19
Other	Ammonia	µg/L	8	25	25	250	59.38	77.85	1.3111	0	8
Other	Alkalinity Total	µg/L	9	4.70E+04	8.28E+04	9.18E+04	7.79E+04	1.56E+04	0.2007	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	2	3.00E+04	3.25E+04	3.50E+04	3.25E+04	3536	0.1088	0	0
Other	Bromide	µg/L	26	0.025	17.34	100	35.06	38.26	1.0912	0	16
Other	Chloride	µg/L	32	1104	6010	1.19E+04	5510	3465	0.629	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	29	25	93.96	213	97.36	47	0.4828	0	6
Other	Nitrogen Ammonia (as N)	µg/L	6	250	250	250	250	0	0	0	6
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	10	25	115	260	128.5	83.1	0.6467	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	100	100	100	100	0	0	0	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	6	50	215	460	261.7	165.1	0.6309	0	1
Other	Oxalate	µg/L	7	10	10	500	150	239.1	1.594	0	7
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	8	25	100	160	83.13	51.68	0.6217	0	5
Other	Silica	µg/L	19	1.61E+04	4.71E+04	9.42E+04	4.71E+04	1.92E+04	0.4078	0	2
Other	Sulfate	µg/L	32	3190	6260	1.77E+04	7287	3881	0.5325	0	0
Other	Total Dissolved Solids	µg/L	15	1.00E+05	1.32E+05	1.90E+05	1.39E+05	2.86E+04	0.2054	0	0
Other	Carbon Dissolved Organic	µg/L	20	1700	3300	1.20E+04	4167	2644	0.6346	0	0
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	19	13	116	141	111.7	31.49	0.282	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	9	600	1000	2600	1167	593.7	0.5089	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	7	0	100	300	100	100	1	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	8	0	100	2200	337.5	755.8	2.2394	0	0
Other	Humic Substances Hydrophilic Total	µg/L	10	800	1050	2800	1380	656.3	0.4755	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	10	400	950	2400	1090	622.6	0.5712	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	10	0	450	2300	650	645.1	0.9924	0	0
Other	Humic Substances Hydrophobic Total	µg/L	10	800	1250	3800	1780	1046	0.5879	0	0
Other	pH	SU	14	6.3	6.97	7.56	6.996	0.3775	0.054	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	5	-76	-74	-69	-72.8	2.775	-0.0381	0	0

Table 4.2-2e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.6	-11.4	-11.1	-11.38	0.228	-0.02	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	11	863.8	1224	1434	1162	211.7	0.1823	0	0
Other	Cation Sum	µg/L	11	1017	1273	1531	1270	190.5	0.15	0	0
Other	Balance	µg/L	11	-40.85	77.08	270.7	94.3	89.18	0.9458	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	13	2.73E+04	4.07E+04	6.12E+04	4.21E+04	1.11E+04	0.2634	0	0
Other	Ammonium	µg/L	13	10	30	65.1	28.64	16.99	0.5931	0	4
Other	Ammonium [as N]	µg/L	13	7.778	23.33	50.63	22.27	13.21	0.5931	0	4
Other	Bicarbonate	µg/L	15	3.33E+04	4.97E+04	1.00E+05	5.40E+04	1.80E+04	0.3339	0	0
Other	Carbonate	µg/L	13	0	0	0	0	0	n/a[e]	0	0
Other	Chlorate (ClO_3)	µg/L	13	5	10	10	9.231	1.878	0.2034	0	13
Other	Conductivity (Field)	µS/cm	8	70	98	146	108.5	30.85	0.2843	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	—	—	0	0
Other	Hardness	µg/L	11	3.00E+04	4.13E+04	5.30E+04	4.20E+04	7916	0.1884	0	0
Other	Iodide	µg/L	13	5	5	5	5	0	0	0	13
Other	Nitrate	µg/L	13	5	22.9	960	140.5	283.6	2.0193	0	5
Other	Nitrate [as N]	µg/L	13	1.129	5.171	216.8	31.72	64.05	2.0193	0	5
Other	Nitrite	µg/L	13	5	5	20	6.923	4.349	0.6281	0	12
Other	Nitrite [as N]	µg/L	13	0.8974	0.8974	3.59	1.243	0.7805	0.6281	0	12
Other	pH (Field)	SU	11	5.81	6.78	7.14	6.632	0.3559	0.0537	0	0
Other	Phosphate	µg/L	13	3.26	48.9	240	69.19	66.96	0.9677	0	4
Other	Silicon	µg/L	11	1.46E+04	2.32E+04	3.76E+04	2.29E+04	6324	0.2756	0	0
Other	Sulfite	µg/L	13	5	5	5	5	0	0	0	13
Other	Total Suspended Solids	µg/L	4	500	7379	3.32E+04	1.21E+04	1.55E+04	1.2762	0	0
Other	Turbidity (Field)	NTU	8	0	1	41.7	8.275	14.77	1.7849	0	0
Other-ratio	Br/Cl by wt	ratio	11	0	0.001066	0.01756	0.004441	0.006021	1.356	0	0
Other-ratio	B/Cl by wt	ratio	11	5.13E-04	0.006098	0.01308	0.0055	0.005128	0.9324	0	0
Other-ratio	Cs/Cl by wt	ratio	11	0	0	0.001829	1.66E-04	5.52E-04	3.3166	0	0
Other-ratio	F/Cl by wt	ratio	11	0.005903	0.06098	0.1026	0.0469	0.04077	0.8692	0	0
Other-ratio	HCO_3/CL by wt	ratio	11	3.667	28.87	67.24	28.45	26.04	0.9152	0	0
Other-ratio	K/Cl by wt	ratio	11	0.2231	2.695	3.815	1.846	1.582	0.8568	0	0
Other-ratio	Li/Cl by wt	ratio	11	0	0	0	0	0	—	0	0
Other-ratio	Na/Cl by wt	ratio	11	0.7106	3.507	6.398	3.094	2.402	0.7763	0	0
Other-ratio	SO_4/Cl by wt	ratio	11	0.2726	4.31	6.617	3.214	2.799	0.8709	0	0
Rad-iso	Americium-241	pCi/L	14	-0.00118	0.00875	0.0312	0.009927	0.009406	0.9475	0	12
Rad-iso	Plutonium-238	pCi/L	16	-0.01245	0.001038	0.0171	0.002179	0.007099	3.2581	0	16

Table 4.2-2e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	16	-0.0162	0.003273	0.125	0.01046	0.03169	3.0291	0	14
Rad-iso	Strontium-90	pCi/L	19	-0.25	0.07	0.17	0.05311	0.08881	1.6724	0	19
Rad-iso	Tritium	pCi/L	5	5.522	56.82	70.86	49.88	25.51	0.5115	0	0
Rad-iso	Tritium	TU[f]	5	1.73	17.8	22.2	15.63	7.993	0.5115	0	0
Rad-iso	Uranium-234	pCi/L	14	5.00E-04	0.04345	0.078	0.04042	0.02835	0.7015	0	6
Rad-iso	Uranium-235	pCi/L	14	-6.10E-04	0.00345	0.0134	0.004232	0.003269	0.7725	0	13
Rad-iso	Uranium-238	pCi/L	14	-0.0025	0.007775	0.124	0.02415	0.03478	1.4398	0	10
Rad-gross	Gross Alpha Radiation	pCi/L	4	-0.78	0.3025	1.22	0.2612	0.8222	3.147	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	0.65	3.1	3.84	2.672	1.414	0.5291	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	110	193	290	196.5	92.68	0.4717	0	1
Rad-gscan[g]	Cesium-137	pCi/L	13	-0.75	-0.139	0.4465	-0.133	0.367	-2.7598	0	13

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] — = No summary information, no samples analyzed.

[e] n/a = Not applicable.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-2f
Alluvial Groundwater Shows Nonfiltered Samples at Half-Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	22	2	200	17400	2685	4993	1.8592	0	7
Metals	Antimony	µg/L	22	0.03	0.2958	1.7	0.6667	0.6434	0.9651	0	22
Metals	Arsenic	µg/L	22	0.05	0.75	2.7	0.9602	0.76	0.7915	0	13
Metals	Barium	µg/L	22	20	40.25	76	42.79	17.73	0.4143	0	0
Metals	Beryllium	µg/L	22	0.01	0.3825	1	0.4829	0.4303	0.8912	0	19
Metals	Boron	µg/L	11	3.95	8	20.07	10.94	6.27	0.5729	0	1
Metals	Cadmium	µg/L	22	0.042	0.325	0.5	0.2965	0.2096	0.707	0	21
Metals	Calcium	µg/L	22	8180	12350	23000	13780	5122	0.3718	0	0
Metals	Cesium	µg/L	9	0.5	1	3	1.389	0.928	0.6681	0	7
Metals	Chromium	µg/L	22	0.105	1	12	2.01	2.734	1.3604	0	15
Metals	Cobalt	µg/L	22	0.02	0.75	2.5	0.7427	0.6039	0.813	0	19
Metals	Copper	µg/L	22	0.135	1.55	11	2.905	3.596	1.2376	0	13
Metals	Iron	µg/L	22	5.5	91.21	7650	1192	2222	1.8639	0	7
Metals	Lead	µg/L	22	0.005	0.8	6	1.274	1.407	1.1039	0	18
Metals	Lithium	µg/L	9	4	5	10	5.444	1.74	0.3196	0	7
Metals	Magnesium	µg/L	22	2440	4040	7200	4385	1494	0.3407	0	0
Metals	Manganese	µg/L	22	0.09	2.65	31	7.008	8.881	1.2672	0	6
Metals	Mercury	µg/L	21	0.0046	0.02	0.1	0.03624	0.03674	1.0137	0	15
Metals	Molybdenum	µg/L	15	0.5	1	5	1.44	1.104	0.7665	0	13
Metals	Nickel	µg/L	22	0.15	1	6.2	1.46	1.433	0.9818	0	17
Metals	Potassium	µg/L	22	1955	3200	4520	3192	803.2	0.2517	0	0
Metals	Rubidium	µg/L	9	4	7	22	8.778	5.239	0.5968	0	0
Metals	Selenium	µg/L	22	0.05	0.9	2.5	0.8791	0.7622	0.867	0	18
Metals	Silver	µg/L	22	0.05	0.5	2.5	0.5148	0.4688	0.9106	0	20
Metals	Sodium	µg/L	22	4700	7135	10000	7550	1555	0.206	0	0
Metals	Strontium	µg/L	11	54	69	128.9	79.68	23.99	0.3012	0	0
Metals	Thallium	µg/L	22	0.057	1	4.95	1.217	0.9926	0.8153	0	20
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	11	0.5	2.5	7.05	3.145	2.02	0.6423	0	11
Metals	Titanium	µg/L	10	2	19	270	69.47	96.85	1.394	0	0
Metals	Uranium	µg/L	8	0	0.03501	0.41	0.0871	0.1394	1.6	0	4
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	22	0.165	1	12	2.836	3.716	1.3102	0	8
Metals	Zinc	µg/L	20	0.155	4.2	20	5.401	6.139	1.1367	0	14
Other	Ammonia	µg/L	1	130	130	130	130	—	—	0	0
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	2.90E+04	3.25E+04	3.60E+04	3.25E+04	4950	0.1523	0	0
Other	Bromide	µg/L	11	5	10	50	17.29	16.5	0.9541	0	5
Other	Chloride	µg/L	11	1130	6010	1.19E+04	5786	4414	0.7629	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	6	-79	-76.5	-12	-66.17	26.62	-0.4023	0	0
Other	Fluoride	µg/L	11	25	70	120	74.73	30.9	0.4136	0	2
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	1	25	25	25	25	—	—	0	1
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	3	10	10	10	10	0	0	0	3
Other	Phosphorus Orthophosphate (as PO4)	µg/L	2	100	100	100	100	0	0	0	2
Other	Silica	µg/L	9	3.45E+04	4.84E+04	1.08E+05	5.75E+04	2.59E+04	0.4511	0	0
Other	Sulfate	µg/L	11	3250	4700	9670	5406	1979	0.366	0	0
Other	Total Dissolved Solids	µg/L	11	1.00E+05	1.62E+05	2.20E+05	1.54E+05	4.37E+04	0.2844	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	8	3	2105	4000	2094	1475	0.7044	0	0
Other	Conductivity	µS/cm	11	90.2	111	141	116.3	16.31	0.1402	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0								
Other	pH	SU	8	6.63	6.915	7.52	6.964	0.2838	0.0408	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	2	0.1	1.3	2.5	1.3	1.697	1.3054	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	6	-74	-69.5	-63	-69.5	3.937	-0.0566	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	12	-11.6	-10.95	-10	-10.81	0.5017	-0.0464	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	μg/L	8	862.9	1161	1414	1139	209.3	0.1837	0	0
Other	Cation Sum	μg/L	8	1016	1408	2737	1518	525.9	0.3465	0	0
Other	Balance	μg/L	8	-8.28	138.9	858.8	250.6	306.4	1.2228	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	9	2.87E+04	4.13E+04	6.09E+04	4.18E+04	1.08E+04	0.2576	0	0
Other	Ammonium	μg/L	9	10	30	50.71	28.59	13.66	0.4779	0	2
Other	Ammonium [as N]	μg/L	9	7.778	23.33	39.44	22.24	10.63	0.4779	0	2
Other	Bicarbonate	μg/L	9	3.50E+04	5.04E+04	7.43E+04	5.10E+04	1.31E+04	0.2576	0	0
Other	Carbonate	μg/L	9	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	μg/L	9	5	10	10	8.889	2.205	0.248	0	9
Other	Conductivity (Field)	μS/cm	6	70	94	146	104	31.7	0.3048	0	0
Other	Dissolved Oxygen (Field)	μg/L	1	1.09E+04	1.09E+04	1.09E+04	1.09E+04	—	—	0	0
Other	Hardness	μg/L	8	3.05E+04	4.25E+04	5.29E+04	4.23E+04	7972	0.1885	0	0
Other	Iodide	μg/L	9	5	5	5	5	0	0	0	9
Other	Nitrate	μg/L	9	5	5	50	13.89	15.77	1.1353	0	7
Other	Nitrate [as N]	μg/L	9	1.129	1.129	11.29	3.136	3.56	1.1353	0	7
Other	Nitrite	μg/L	9	5	5	10	6.111	2.205	0.3608	0	8
Other	Nitrite [as N]	μg/L	9	0.8974	0.8974	1.795	1.097	0.3957	0.3608	0	8
Other	pH (Field)	SU	8	5.81	6.71	6.91	6.57	0.3632	0.0553	0	0
Other	Phosphate	μg/L	9	10	57.03	220	65.43	65.13	0.9953	0	3
Other	Silicon	μg/L	8	1.61E+04	2.59E+04	5.06E+04	2.81E+04	1.23E+04	0.439	0	0
Other	Sulfite	μg/L	9	5	5	5	5	0	0	0	9
Other	Total Suspended Solids	μg/L	6	500	1.06E+04	2.79E+04	1.13E+04	1.07E+04	0.9493	0	0
Other	Turbidity (Field)	NTU	6	0	2.55	41.7	10.87	16.53	1.5207	0	0
Other-ratio	Br/Cl by wt	ratio	8	0	9.84E-04	0.01455	0.003107	0.005204	1.6748	0	0
Other-ratio	B/Cl by wt	ratio	8	5.22E-04	0.005692	0.01756	0.007563	0.007526	0.9951	0	0
Other-ratio	Cs/Cl by wt	ratio	8	0	0	0.002158	5.01E-04	9.32E-04	1.8588	0	0
Other-ratio	F/Cl by wt	ratio	8	0.006087	0.03471	0.1062	0.04456	0.04216	0.9461	0	0
Other-ratio	HCO_3/CL by wt	ratio	8	3.898	17.53	65	25.13	25.1	0.9986	0	0
Other-ratio	K/Cl by wt	ratio	8	0.2146	1.5	3.954	1.731	1.641	0.9481	0	0
Other-ratio	Li/Cl by wt	ratio	8	0	0	0.001098	1.37E-04	3.88E-04	2.8284	0	0
Other-ratio	Na/Cl by wt	ratio	8	0.7172	2.09	6.22	2.719	2.289	0.8416	0	0
Other-ratio	SO_4/Cl by wt	ratio	8	0.2826	2.449	6.562	2.994	2.846	0.9505	0	0
Rad-iso	Americium-241	pCi/L	11	-0.0015	0.00825	0.02	0.008455	0.006977	0.8253	0	11
Rad-iso	Plutonium-238	pCi/L	12	-0.0065	5.13E-04	0.019	0.0036	0.007542	2.0951	0	12
Rad-iso	Plutonium-239	pCi/L	12	-0.00414	0.001935	0.0105	0.002031	0.003827	1.8841	0	12
Rad-iso	Strontium-90	pCi/L	15	-0.25	0.01	0.2	0.01312	0.1222	9.3171	0	15
Rad-iso	Tritium	pCi/L	20	-25	56.03	67.99	45.31	27.83	0.6142	0	4

Table 4.2-2f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	8	15.8	20.45	21.3	19.65	1.871	0.0952	0	0
Rad-iso	Uranium-234	pCi/L	11	0.01	0.0165	0.16	0.04745	0.04677	0.9857	0	6
Rad-iso	Uranium-235	pCi/L	11	-0.0037	0.00415	0.015	0.004664	0.005056	1.0841	0	10
Rad-iso	Uranium-238	pCi/L	11	0.005	0.013	0.102	0.02449	0.02819	1.1512	0	8
Rad-gross	Gross Alpha Radiation	pCi/L	4	0.3	0.475	1.8	0.7625	0.7095	0.9305	0	1
Rad-gross	Gross Beta Radiation	pCi/L	4	0.95	4.03	5.5	3.628	2.243	0.6182	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	4	80.5	246	354	231.6	118.2	0.5104	0	1
Rad-gscan[g]	Cesium-137	pCi/L	11	-1.33	0.00343	0.96	-0.06137	0.7423	-12.0958	0	11

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-2g
Alluvial Groundwater Shows Both Filtered and Nonfiltered Samples at Half-Detection Limit, Post-1997, R-Qualifiers Not Include

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	55	2	210	17400	1773	3644	2.0558	0	21
Metals	Antimony	µg/L	56	0.03	0.3415	1.7	0.5991	0.5961	0.9951	0	55
Metals	Arsenic	µg/L	56	0.05	0.8	4.03	0.9947	0.7965	0.8007	0	34
Metals	Barium	µg/L	56	19	41.65	76	40.3	15.59	0.3868	0	0
Metals	Beryllium	µg/L	56	0.005	0.3655	1	0.4604	0.4211	0.9146	0	46
Metals	Boron	µg/L	33	3.95	8.5	20.07	9.729	4.496	0.4621	0	7
Metals	Cadmium	µg/L	56	0.042	0.325	0.5	0.2935	0.2095	0.714	0	54
Metals	Calcium	µg/L	56	6800	11950	23000	13150	5212	0.3964	0	0
Metals	Cesium	µg/L	22	0.5	1	3	1.205	0.7505	0.6231	0	19
Metals	Chromium	µg/L	56	0.105	1	12	1.577	1.999	1.2677	0	43
Metals	Cobalt	µg/L	56	0.02	0.595	2.5	0.7434	0.582	0.7829	0	45
Metals	Copper	µg/L	56	0.135	1.35	11	2.347	2.812	1.1982	0	34
Metals	Iron	µg/L	56	4.15	91.21	7650	801.1	1639	2.0461	0	21
Metals	Lead	µg/L	56	0.005	0.8	6	1.125	1.156	1.0279	0	42
Metals	Lithium	µg/L	22	4	5	10	5.091	1.151	0.2261	0	18
Metals	Magnesium	µg/L	56	2200	3725	7300	4153	1548	0.3728	0	0
Metals	Manganese	µg/L	55	0.022	3	31	6.11	7.211	1.1802	0	22
Metals	Mercury	µg/L	54	0.0046	0.0225	0.11	0.0395	0.03865	0.9785	0	44
Metals	Molybdenum	µg/L	36	0.5	1	5	1.463	1.177	0.8044	0	31
Metals	Nickel	µg/L	56	0.15	1	6.2	1.517	1.386	0.9139	0	41
Metals	Potassium	µg/L	56	1800	2990	4520	3112	764	0.2455	0	0
Metals	Rubidium	µg/L	22	4	6	22	6.773	3.753	0.5542	0	0
Metals	Selenium	µg/L	56	0.05	0.95	2.5	0.9652	0.8421	0.8725	0	50
Metals	Silver	µg/L	56	0.05	0.5	2.5	0.5692	0.5283	0.9282	0	52
Metals	Sodium	µg/L	56	4300	7105	10000	7302	1642	0.2249	0	0
Metals	Strontium	µg/L	26	27.2	69	128.9	78.06	27.24	0.3489	0	2
Metals	Thallium	µg/L	56	0.013	1	4.95	1.006	0.8174	0.8121	0	51
Metals	Thorium	µg/L	3	0.5	0.5	0.5	0.5	0	0	0	3
Metals	Tin	µg/L	26	0.5	2.5	7.05	2.969	1.888	0.6358	0	26
Metals	Titanium	µg/L	24	1	9.8	270	39.81	69.29	1.7402	0	3
Metals	Uranium	µg/L	23	0	0.068	0.957	0.1234	0.21	1.7024	0	6
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	6	0.025	0.051	0.957	0.2272	0.3678	1.6191	0	0
Metals	Uranium by TULIKPA	µg/L	6	0.07	0.29	0.5	0.2883	0.191	0.6626	0	0

Table 4.2-2g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	56	0.165	1	12	2.442	2.99	1.2245	0	20
Metals	Zinc	µg/L	51	0.155	3.4	21	4.936	5.335	1.0808	0	33
Other	Ammonia	µg/L	9	25	25	250	67.22	76.53	1.1385	0	8
Other	Alkalinity Total	µg/L	9	4.70E+04	8.28E+04	9.18E+04	7.79E+04	1.56E+04	0.2007	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	4	2.90E+04	3.25E+04	3.60E+04	3.25E+04	3512	0.1081	0	0
Other	Bromide	µg/L	37	0.025	12.61	100	29.78	34.05	1.1437	0	21
Other	Chloride	µg/L	43	1104	6010	1.19E+04	5580	3677	0.6589	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	6	-79	-76.5	-12	-66.17	26.62	-0.4023	0	0
Other	Fluoride	µg/L	40	25	88.86	213	91.14	44	0.4828	0	8
Other	Nitrogen Ammonia (as N)	µg/L	6	250	250	250	250	0	0	0	6
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	11	25	100	260	119.1	84.79	0.712	0	3
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	100	100	100	100	0	0	0	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	6	50	215	460	261.7	165.1	0.6309	0	1
Other	Oxalate	µg/L	10	10	10	500	108	206.6	1.913	0	10
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	10	25	100	160	86.5	46.13	0.5333	0	7
Other	Silica	µg/L	28	1.61E+04	4.77E+04	1.08E+05	5.05E+04	2.17E+04	0.4296	0	2
Other	Sulfate	µg/L	43	3190	6130	1.77E+04	6806	3569	0.5244	0	0
Other	Total Dissolved Solids	µg/L	26	1.00E+05	1.35E+05	2.20E+05	1.45E+05	3.57E+04	0.2455	0	0
Other	Carbon Dissolved Organic	µg/L	20	1700	3300	1.20E+04	4167	2644	0.6346	0	0
Other	Carbon Total Organic	µg/L	8	3	2105	4000	2094	1475	0.7044	0	0
Other	Conductivity	µS/cm	30	13	115.5	141	113.4	26.69	0.2354	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	9	600	1000	2600	1167	593.7	0.5089	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	7	0	100	300	100	100	1	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	8	0	100	2200	337.5	755.8	2.2394	0	0
Other	Humic Substances Hydrophilic Total	µg/L	10	800	1050	2800	1380	656.3	0.4755	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	10	400	950	2400	1090	622.6	0.5712	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	10	0	450	2300	650	645.1	0.9924	0	0
Other	Humic Substances Hydrophobic Total	µg/L	10	800	1250	3800	1780	1046	0.5879	0	0
Other	pH	SU	22	6.3	6.945	7.56	6.985	0.3396	0.0486	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	2	0.1	1.3	2.5	1.3	1.697	1.3054	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	11	-76	-71	-63	-71	3.715	-0.0523	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	17	-11.6	-11	-10	-10.98	0.5081	-0.0463	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-2g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	µg/L	19	862.9	1224	1434	1152	205.1	0.178	0	0
Other	Cation Sum	µg/L	19	1016	1338	2737	1375	378.8	0.2756	0	0
Other	Balance	µg/L	19	-40.85	79.89	858.8	160.1	217.3	1.3573	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	22	2.73E+04	4.09E+04	6.12E+04	4.20E+04	1.07E+04	0.2549	0	0
Other	Ammonium	µg/L	22	10	30	65.1	28.62	15.36	0.5368	0	6
Other	Ammonium [as N]	µg/L	22	7.778	23.33	50.63	22.26	11.95	0.5368	0	6
Other	Bicarbonate	µg/L	24	3.33E+04	4.99E+04	1.00E+05	5.29E+04	1.61E+04	0.305	0	0
Other	Carbonate	µg/L	22	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	22	5	10	10	9.091	1.974	0.2171	0	22
Other	Conductivity (Field)	µS/cm	14	70	98	146	106.6	30.07	0.2822	0	0
Other	Dissolved Oxygen (Field)	µg/L	2	1.09E+04	1.09E+04	1.09E+04	1.09E+04	0	0	0	0
Other	Hardness	µg/L	19	3.00E+04	4.13E+04	5.30E+04	4.21E+04	7716	0.1832	0	0
Other	Iodide	µg/L	22	5	5	5	5	0	0	0	22
Other	Nitrate	µg/L	22	5	10	960	88.68	223.9	2.5245	0	12
Other	Nitrate [as N]	µg/L	22	1.129	2.258	216.8	20.02	50.55	2.5245	0	12
Other	Nitrite	µg/L	22	5	5	20	6.591	3.581	0.5433	0	20
Other	Nitrite [as N]	µg/L	22	0.8974	0.8974	3.59	1.183	0.6428	0.5433	0	20
Other	pH (Field)	SU	19	5.81	6.78	7.14	6.606	0.3502	0.053	0	0
Other	Phosphate	µg/L	22	3.26	52.96	240	67.65	64.66	0.9558	0	7
Other	Silicon	µg/L	19	1.46E+04	2.32E+04	5.06E+04	2.51E+04	9397	0.3741	0	0
Other	Sulfite	µg/L	22	5	5	5	5	0	0	0	22
Other	Total Suspended Solids	µg/L	10	500	1.05E+04	3.32E+04	1.16E+04	1.20E+04	1.0314	0	0
Other	Turbidity (Field)	NTU	14	0	1	41.7	9.386	14.98	1.5956	0	0
Other-ratio	Br/Cl by wt	ratio	19	0	0.001066	0.01756	0.003879	0.00558	1.4383	0	0
Other-ratio	B/Cl by wt	ratio	19	5.13E-04	0.006098	0.01756	0.006369	0.006143	0.9645	0	0
Other-ratio	Cs/Cl by wt	ratio	19	0	0	0.002158	3.07E-04	7.32E-04	2.381	0	0
Other-ratio	F/Cl by wt	ratio	19	0.005903	0.06098	0.1062	0.04592	0.0402	0.8755	0	0
Other-ratio	HCO_3/CL by wt	ratio	19	3.667	28.87	67.24	27.06	24.99	0.9237	0	0
Other-ratio	K/Cl by wt	ratio	19	0.2146	2.695	3.954	1.798	1.563	0.8691	0	0
Other-ratio	Li/Cl by wt	ratio	19	0	0	0.001098	5.78E-05	2.52E-04	4.3589	0	0
Other-ratio	Na/Cl by wt	ratio	19	0.7106	3.396	6.398	2.936	2.297	0.7824	0	0
Other-ratio	SO_4/Cl by wt	ratio	19	0.2726	4.31	6.617	3.121	2.741	0.8782	0	0
Rad-iso	Americium-241	pCi/L	25	-0.0015	0.0085	0.0312	0.009279	0.008293	0.8937	0	23
Rad-iso	Plutonium-238	pCi/L	28	-0.01245	0.001012	0.019	0.002788	0.007189	2.5788	0	28
Rad-iso	Plutonium-239	pCi/L	28	-0.0162	0.00265	0.125	0.006849	0.02413	3.5224	0	26
Rad-iso	Strontium-90	pCi/L	34	-0.25	0.0605	0.2	0.03546	0.1051	2.9634	0	34
Rad-iso	Tritium	pCi/L	25	-25	56.82	70.86	46.22	26.93	0.5826	0	4

Table 4.2-2g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	13	1.73	20.1	22.2	18.1	5.243	0.2896	0	0
Rad-iso	Uranium-234	pCi/L	25	5.00E-04	0.0379	0.16	0.04351	0.03687	0.8474	0	12
Rad-iso	Uranium-235	pCi/L	25	-0.0037	0.00355	0.015	0.004422	0.00406	0.9183	0	23
Rad-iso	Uranium-238	pCi/L	25	-0.0025	0.0095	0.124	0.0243	0.03141	1.2923	0	18
Rad-gross	Gross Alpha Radiation	pCi/L	8	-0.78	0.3575	1.8	0.5119	0.7597	1.4842	0	2
Rad-gross	Gross Beta Radiation	pCi/L	8	0.65	3.1	5.5	3.15	1.809	0.5743	0	2
Rad-gross	Gross Gamma Radiation	pCi/L	8	80.5	232.5	354	214.1	100.1	0.4677	0	2
Rad-gscan[g]	Cesium-137	pCi/L	24	-1.33	-0.0145	0.96	-0.1002	0.5578	-5.5689	0	24

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3a
Volcanic Rock Groundwater Shows Filtered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	71	5	120	4580	412.2	827.7	2.0078	1	16
Metals	Antimony	µg/L	68	0.02	0.5	100	3.106	13.39	4.3102	0	65
Metals	Arsenic	µg/L	70	0.2	0.55	50	4.849	12.7	2.6195	0	33
Metals	Barium	µg/L	76	5	19.92	350	40.03	58.72	1.4668	0	4
Metals	Beryllium	µg/L	65	0.01	2	10	1.529	1.725	1.1288	1	56
Metals	Boron	µg/L	68	2	9.457	730	29.64	92.19	3.1107	0	26
Metals	Cadmium	µg/L	76	0	1	30	1.606	4.771	2.9708	0	69
Metals	Calcium	µg/L	77	1630	8500	67000	10970	9719	0.886	0	0
Metals	Cesium	µg/L	44	0	2	10	2.114	2.355	1.1141	0	33
Metals	Chromium	µg/L	75	0	2	30	2.394	4.527	1.8913	0	62
Metals	Cobalt	µg/L	75	0	2	81	5.849	16.73	2.8609	0	67
Metals	Copper	µg/L	75	0	2	60	4.897	11.32	2.3122	4	33
Metals	Iron	µg/L	77	7.3	60	1560	188.4	315.3	1.674	0	25
Metals	Lead	µg/L	69	0	2	150	8.317	22.86	2.7482	0	57
Metals	Lithium	µg/L	52	2	10	60	13.1	11.7	0.8935	0	33
Metals	Magnesium	µg/L	77	370	2940	16000	3143	2485	0.7908	0	0
Metals	Manganese	µg/L	75	0.05	2.2	8800	250.7	1427	5.691	3	30
Metals	Mercury	µg/L	70	0.01	0.05	200	11.51	43.53	3.7812	5	54
Metals	Molybdenum	µg/L	53	0	2	100	5.668	14.23	2.5107	0	37
Metals	Nickel	µg/L	70	0	2	160	7.894	26.81	3.3963	0	57
Metals	Potassium	µg/L	76	1400	2625	21000	4016	3469	0.8638	0	0
Metals	Rubidium	µg/L	45	0.1	8	100	18.56	25.12	1.3533	0	8
Metals	Selenium	µg/L	67	0.1	0.5	100	3.875	12.41	3.2039	0	65
Metals	Silver	µg/L	74	0.2	1	30	2.399	5.998	2.5	0	70
Metals	Sodium	µg/L	76	4110	6905	51300	10510	10100	0.9611	0	0
Metals	Strontium	µg/L	58	20	69	450	85.18	74.1	0.87	0	0
Metals	Thallium	µg/L	61	0.026	2	100	3.536	12.64	3.5749	0	56
Metals	Thorium	µg/L	6	1	1	1	1	0	0	0	6
Metals	Tin	µg/L	42	0	5	15	5.488	3.985	0.7261	0	38
Metals	Uranium	µg/L	27	0.108	0.334	100	5.278	19.1	3.6188	0	5
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	12	0.108	0.2025	0.843	0.3049	0.2433	0.798	0	0
Metals	Uranium by TULIKPA	µg/L	12	0.14	0.215	0.92	0.3333	0.2574	0.7721	0	0
Metals	Titanium	µg/L	41	0	3	96	10.74	20.78	1.9347	0	16
Metals	Vanadium	µg/L	72	0.43	3.55	130	8.116	17.92	2.2076	0	27

Table 4.2-3a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Zinc	µg/L	57	0.51	10	1400	57.2	249.5	4.3621	0	30
Other	Ammonia	µg/L	9	20	60	450	134.4	163.6	1.2172	0	3
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	6	3.80E+04	4.30E+04	5.60E+04	4.53E+04	6501	0.1434	0	0
Other	Bromide	µg/L	65	0.05	20	1000	63.52	135.7	2.1357	0	32
Other	Chloride	µg/L	68	530	1400	7.13E+04	5887	1.39E+04	2.3668	0	1
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	68	30	101.5	980	149.1	156.3	1.0482	0	6
Other	Nitrogen Ammonia (as N)	µg/L	13	320	500	530	489.2	51.55	0.1054	0	12
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	17	200	390	7.60E+04	1.29E+04	2.25E+04	1.7501	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	6	300	350	400	350	54.77	0.1565	6	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	6	100	100	100	100	0	0	6	0
Other	Nitrogen Total Kjeldahl (as N)	µg/L	12	100	155	430	198.3	114.8	0.5788	0	4
Other	Oxalate	µg/L	13	0.6	20	5571	445.5	1540	3.4568	0	12
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	18	50	66.5	200	105.3	69.26	0.6579	0	8
Other	Silica	µg/L	64	2.80E+04	4.49E+04	7.26E+04	4.76E+04	1.29E+04	0.2708	0	0
Other	Sulfate	µg/L	74	0	4105	2.24E+04	4617	3873	0.8388	0	5
Other	Total Dissolved Solids	µg/L	55	8.20E+04	1.24E+05	2.79E+05	1.41E+05	3.89E+04	0.275	0	0
Other	Carbon Dissolved Organic	µg/L	16	600	2500	8700	3506	2666	0.7603	0	0
Other	Carbon Total Organic	µg/L	4	470	515	690	547.5	101.4	0.1853	0	0
Other	Conductivity	µS/cm	42	71	109	337	131.8	71.14	0.5395	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	14	200	850	3100	1200	906.4	0.7553	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	11	100	200	400	200	89.44	0.4472	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	10	100	200	300	230	67.49	0.2935	0	0
Other	Humic Substances Hydrophilic Total	µg/L	14	300	1050	3700	1500	1075	0.7166	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	13	100	1300	4600	1569	1542	0.9826	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	14	100	500	3100	742.9	792	1.0661	0	0
Other	Humic Substances Hydrophobic Total	µg/L	14	500	1450	5000	2043	1643	0.8043	0	0
Other	pH	SU	34	6.6	7.4	7.71	7.402	0.2511	0.0339	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	11	-91	-79	-71	-79	6.197	-0.0784	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	11	-13.9	-12.5	-11.3	-12.45	0.8153	-0.0655	0	0
Other	Cyanide Reactive	µg/L	1	500	500	500	500	0	0	0	1

Table 4.2-3a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Other	Sulfide Reactive	µg/L	1	4.01E+04	4.01E+04	4.01E+04	4.01E+04	0	0	0	1
Other	Anion Sum	µg/L	43	732	1100	3012	1240	541.3	0.4367	0	0
Other	Cation Sum	µg/L	43	855.5	1150	3298	1313	549.2	0.4184	0	0
Other	Balance	µg/L	37	-24.22	38.9	651.3	76.42	147.3	1.9272	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	31	2.77E+04	4.45E+04	5.31E+04	4.40E+04	6975	0.1585	0	0
Other	Ammonium	µg/L	47	0	35.55	170	38.79	35.19	0.9071	0	12
Other	Ammonium [as N]	µg/L	31	15.43	31.11	124.4	33.23	22.57	0.6793	0	8
Other	Bicarbonate	µg/L	49	3.38E+04	5.43E+04	1.30E+05	5.66E+04	1.40E+04	0.247	0	0
Other	Carbonate	µg/L	43	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	38	0	20	500	28.42	78.9	2.7759	0	33
Other	Conductivity (Field)	µS/cm	14	65	94.5	165	98	26.16	0.2669	0	0
Other	Dissolved Oxygen (Field)	µg/L	3	1.07E+04	1.38E+04	1.38E+04	1.28E+04	1824	0.143	0	0
Other	Hardness	µg/L	26	1.93E+04	3.11E+04	6.23E+04	3.49E+04	1.20E+04	0.3446	0	0
Other	Iodide	µg/L	42	0	10	10	7.381	4.45	0.6029	0	31
Other	Nitrate	µg/L	49	0	690	2400	814.4	702.4	0.8624	0	5
Other	Nitrate [as N]	µg/L	31	2.258	268.7	541.9	252.1	137.1	0.5438	0	1
Other	Nitrite	µg/L	45	10	10	1160	158	320.3	2.0271	0	26
Other	Nitrite [as N]	µg/L	31	1.795	1.795	16.15	2.779	2.656	0.9556	0	23
Other	pH (Field)	SU	25	6.68	7.33	8.04	7.37	0.3202	0.0434	0	0
Other	Phosphate	µg/L	45	4	39	200	46.93	42.87	0.9134	0	19
Other	Silicon	µg/L	28	1.41E+04	2.52E+04	3.24E+04	2.41E+04	6176	0.2568	0	0
Other	Sulfite	µg/L	31	10	10	50	12.58	9.989	0.794	0	31
Other	Total Suspended Solids	µg/L	11	100	3679	6.30E+04	2.30E+04	2.65E+04	1.1489	0	1
Other	Turbidity (Field)	NTU	14	0	2.45	30	9.443	12.18	1.2895	0	2
Other-ratio	Br/Cl by wt	ratio	26	0	0.003752	0.03774	0.008489	0.01094	1.2891	0	0
Other-ratio	B/Cl by wt	ratio	26	0	0.006723	0.01381	0.005884	0.003603	0.6124	0	0
Other-ratio	Cs/Cl by wt	ratio	26	0	0	0.001961	1.49E-04	5.25E-04	3.5331	0	0
Other-ratio	F/Cl by wt	ratio	26	0.00121	0.09217	0.1373	0.07945	0.0439	0.5526	0	0
Other-ratio	HCO3/CL by wt	ratio	26	0.9399	40.91	93.02	41.72	25.15	0.6028	0	0
Other-ratio	K/Cl by wt	ratio	26	0.07925	2.438	6.696	2.682	2.012	0.7502	0	0
Other-ratio	Li/Cl by wt	ratio	26	0	0	0.01887	0.001241	0.004031	3.2472	0	0
Other-ratio	Na/Cl by wt	ratio	26	0.5463	4.607	11.09	6.087	3.767	0.6189	0	0
Other-ratio	SO_4/Cl by wt	ratio	26	0.1138	3.238	7.793	3.511	2.27	0.6467	0	0
Rad-iso	Americium-241	pCi/L	19	0	0.022	0.192	0.03122	0.04191	1.3424	0	16
Rad-iso	Plutonium-238	pCi/L	19	-0.008	0.014	0.109	0.02452	0.02986	1.2182	0	16
Rad-iso	Plutonium-239	pCi/L	19	-0.009	0.011	0.041	0.009842	0.01198	1.2172	0	18
Rad-iso	Strontium-90	pCi/L	19	-0.23	0	0.55	0.01421	0.1854	13.0482	0	19

Table 4.2-3a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Rad-iso	Tritium	pCi/L	11	1.053	22.47	60.33	26.84	22.77	0.8484	0	0
Rad-iso	Tritium	TU[f]	11	0.33	7.04	18.9	8.407	7.133	0.8484	0	0
Rad-iso	Uranium-234	pCi/L	19	0.058	0.182	0.601	0.2443	0.182	0.7448	0	2
Rad-iso	Uranium-235	pCi/L	19	-0.0049	0.011	0.046	0.01528	0.01452	0.9504	0	16
Rad-iso	Uranium-238	pCi/L	19	0.016	0.101	0.595	0.1402	0.136	0.9698	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	12	-0.23	0.155	0.97	0.2508	0.4053	1.6159	0	0
Rad-gross	Gross Beta Radiation	pCi/L	12	0.45	2.7	5.9	2.838	1.885	0.6644	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	143	194	311	223.4	66.55	0.2979	0	3
Rad-gscan[g]	Cesium-137	pCi/L	19	-2.27	-0.17	1.1	-0.2464	0.799	-3.2431	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3b
Volcanic Rock Groundwater Shows Filtered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	70	3.95	114.7	4580	410.5	835.4	2.0352	0	16
Metals	Antimony	µg/L	68	0.01	0.25	50	1.566	6.692	4.2724	0	65
Metals	Arsenic	µg/L	70	0.1	0.55	25	2.552	6.318	2.4756	0	33
Metals	Barium	µg/L	76	5	19.92	350	38.45	57.69	1.5005	0	4
Metals	Beryllium	µg/L	64	0.005	1	10	0.9241	1.626	1.76	0	56
Metals	Boron	µg/L	68	1	8.437	730	25.85	92.05	3.5613	0	26
Metals	Cadmium	µg/L	76	0	0.5	15	0.8687	2.412	2.7769	0	69
Metals	Calcium	µg/L	77	1630	8500	67000	10970	9719	0.886	0	0
Metals	Cesium	µg/L	44	0	1	5	1.159	1.315	1.1347	0	33
Metals	Chromium	µg/L	75	0	1	15	1.355	2.483	1.832	0	62
Metals	Cobalt	µg/L	75	0	1	81	4.007	13.86	3.4593	0	67
Metals	Copper	µg/L	71	0	2	60	4.248	10.33	2.4326	0	33
Metals	Iron	µg/L	77	3.65	50	1560	180.8	318.4	1.7611	0	25
Metals	Lead	µg/L	69	0	1	150	5.977	20.42	3.4167	0	57
Metals	Lithium	µg/L	52	2	5	60	9.827	12.66	1.2887	0	33
Metals	Magnesium	µg/L	77	370	2940	16000	3143	2485	0.7908	0	0
Metals	Manganese	µg/L	72	0.05	2.1	8800	259.9	1456	5.6	0	30
Metals	Mercury	µg/L	65	0.005	0.03	100	6.211	22.53	3.628	0	54
Metals	Molybdenum	µg/L	53	0	1	50	3.643	7.954	2.183	0	37
Metals	Nickel	µg/L	70	0	1	160	6.461	26.73	4.1366	0	57
Metals	Potassium	µg/L	76	1400	2625	21000	4016	3469	0.8638	0	0
Metals	Rubidium	µg/L	45	0.05	8	50	14.44	14.46	1.0009	0	8
Metals	Selenium	µg/L	67	0.05	0.25	50	1.94	6.206	3.1986	0	65
Metals	Silver	µg/L	74	0.1	0.5	15	1.225	2.995	2.4452	0	70
Metals	Sodium	µg/L	76	4110	6905	51300	10510	10100	0.9611	0	0
Metals	Strontium	µg/L	58	20	69	450	85.18	74.1	0.87	0	0
Metals	Thallium	µg/L	61	0.013	1	50	1.797	6.316	3.5153	0	56
Metals	Thorium	µg/L	6	0.5	0.5	0.5	0.5	0	0	0	6
Metals	Tin	µg/L	42	0	2.5	15	2.982	2.673	0.8964	0	38
Metals	Titanium	µg/L	41	0	3	96	10.26	20.96	2.0422	0	16

Table 4.2-3b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Uranium	µg/L	27	0.108	0.334	50	3.13	9.586	3.0626	0	5
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	12	0.108	0.2025	0.843	0.3049	0.2433	0.798	0	0
Metals	Uranium by TULIKPA	µg/L	12	0.14	0.215	0.92	0.3333	0.2574	0.7721	0	0
Metals	Vanadium	µg/L	72	0.215	3.259	130	7.369	17.9	2.4284	0	27
Metals	Zinc	µg/L	57	0.255	5	1400	55.33	249.9	4.5161	0	30
Other	Ammonia	µg/L	9	10	60	450	127.8	168	1.3151	0	3
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	6	3.80E+04	4.30E+04	5.60E+04	4.53E+04	6501	0.1434	0	0
Other	Bromide	µg/L	65	0.025	15.66	500	40.29	73.07	1.8139	0	32
Other	Chloride	µg/L	68	500	1400	7.13E+04	5879	1.39E+04	2.3702	0	1
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	68	25	101.5	980	142.1	152.4	1.0722	0	6
Other	Nitrogen Ammonia (as N)	µg/L	13	250	250	320	256.9	19.42	0.0756	0	12
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	17	200	390	7.60E+04	1.29E+04	2.25E+04	1.7501	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	12	50	155	430	181.7	131.8	0.7253	0	4
Other	Oxalate	µg/L	13	0.3	10	5571	437.1	1543	3.5297	0	12
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	18	25	66.5	200	81.67	60.2	0.7372	0	8
Other	Silica	µg/L	64	2.80E+04	4.49E+04	7.26E+04	4.76E+04	1.29E+04	0.2708	0	0
Other	Sulfate	µg/L	74	0	4015	2.24E+04	4583	3881	0.8468	0	5
Other	Total Dissolved Solids	µg/L	55	8.20E+04	1.24E+05	2.79E+05	1.41E+05	3.89E+04	0.275	0	0
Other	Carbon Dissolved Organic	µg/L	16	600	2500	8700	3506	2666	0.7603	0	0
Other	Carbon Total Organic	µg/L	4	470	515	690	547.5	101.4	0.1853	0	0
Other	Conductivity	µS/cm	42	71	109	337	131.8	71.14	0.5395	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	14	200	850	3100	1200	906.4	0.7553	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	11	100	200	400	200	89.44	0.4472	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	10	100	200	300	230	67.49	0.2935	0	0
Other	Humic Substances Hydrophilic Total	µg/L	14	300	1050	3700	1500	1075	0.7166	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	13	100	1300	4600	1569	1542	0.9826	0	0

Table 4.2-3b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Other	Humic Substances Hydrophobic Neutrals	μg/L	14	100	500	3100	742.9	792	1.0661	0	0
Other	Humic Substances Hydrophobic Total	μg/L	14	500	1450	5000	2043	1643	0.8043	0	0
Other	pH	SU	34	6.6	7.4	7.71	7.402	0.2511	0.0339	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	11	-91	-79	-71	-79	6.197	-0.0784	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	11	-13.9	-12.5	-11.3	-12.45	0.8153	-0.0655	0	0
Other	Cyanide Reactive	μg/L	1	250	250	250	250	—	—	0	1
Other	Sulfide Reactive	μg/L	1	2.01E+04	2.01E+04	2.01E+04	2.01E+04	—	—	0	1
Other	Anion Sum	μg/L	43	732	1100	3012	1240	541.3	0.4367	0	0
Other	Cation Sum	μg/L	43	855.5	1150	3298	1313	549.2	0.4184	0	0
Other	Balance	μg/L	37	-24.22	38.9	651.3	76.42	147.3	1.9272	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	31	2.77E+04	4.45E+04	5.31E+04	4.40E+04	6975	0.1585	0	0
Other	Ammonium	μg/L	47	0	30	170	35.55	36.53	1.0276	0	12
Other	Ammonium [as N]	μg/L	31	7.778	31.11	124.4	31.22	24.39	0.7812	0	8
Other	Bicarbonate	μg/L	49	3.38E+04	5.43E+04	1.30E+05	5.66E+04	1.40E+04	0.247	0	0
Other	Carbonate	μg/L	43	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	μg/L	38	0	10	250	14.21	39.45	2.7759	0	33
Other	Conductivity (Field)	μS/cm	14	65	94.5	165	98	26.16	0.2669	0	0
Other	Dissolved Oxygen (Field)	μg/L	3	1.07E+04	1.38E+04	1.38E+04	1.28E+04	1824	0.143	0	0
Other	Hardness	μg/L	26	1.93E+04	3.11E+04	6.23E+04	3.49E+04	1.20E+04	0.3446	0	0
Other	Iodide	μg/L	42	0	5	5	3.69	2.225	0.6029	0	31
Other	Nitrate	μg/L	49	0	690	2400	809.4	707.4	0.874	0	5
Other	Nitrate [as N]	μg/L	31	1.129	268.7	541.9	252.1	137.2	0.5442	0	1
Other	Nitrite	μg/L	45	5	5	1160	154.8	321.8	2.0791	0	26
Other	Nitrite [as N]	μg/L	31	0.8974	0.8974	16.15	2.084	2.907	1.3947	0	23
Other	pH (Field)	SU	25	6.68	7.33	8.04	7.37	0.3202	0.0434	0	0
Other	Phosphate	μg/L	45	3.26	25	142.9	38.19	38.9	1.0187	0	19
Other	Silicon	μg/L	28	1.41E+04	2.52E+04	3.24E+04	2.41E+04	6176	0.2568	0	0
Other	Sulfite	μg/L	31	5	5	25	6.29	4.995	0.794	0	31
Other	Total Suspended Solids	μg/L	11	50	3679	6.30E+04	2.30E+04	2.65E+04	1.1493	0	1
Other	Turbidity (Field)	NTU	14	0	2.45	27.2	7.3	9.114	1.2485	0	2

Table 4.2-3b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Other-ratio	Br/Cl by wt	ratio	26	0	0.003752	0.03774	0.008489	0.01094	1.2891	0	0
Other-ratio	B/Cl by wt	ratio	26	0	0.006723	0.01381	0.005884	0.003603	0.6124	0	0
Other-ratio	Cs/Cl by wt	ratio	26	0	0	0.001961	1.49E-04	5.25E-04	3.5331	0	0
Other-ratio	F/Cl by wt	ratio	26	0.00121	0.09217	0.1373	0.07945	0.0439	0.5526	0	0
Other-ratio	HCO_3/CL by wt	ratio	26	0.9399	40.91	93.02	41.72	25.15	0.6028	0	0
Other-ratio	K/Cl by wt	ratio	26	0.07925	2.438	6.696	2.682	2.012	0.7502	0	0
Other-ratio	Li/Cl by wt	ratio	26	0	0	0.01887	0.001241	0.004031	3.2472	0	0
Other-ratio	Na/Cl by wt	ratio	26	0.5463	4.607	11.09	6.087	3.767	0.6189	0	0
Other-ratio	SO_4/Cl by wt	ratio	26	0.1138	3.238	7.793	3.511	2.27	0.6467	0	0
Rad-iso	Americium-241	pCi/L	19	0	0.011	0.192	0.02306	0.0432	1.8738	0	16
Rad-iso	Plutonium-238	pCi/L	19	-0.004	0.007	0.109	0.01823	0.0292	1.6016	0	16
Rad-iso	Plutonium-239	pCi/L	19	-0.0045	0.0055	0.041	0.006	0.009669	1.6114	0	18
Rad-iso	Strontium-90	pCi/L	19	-0.115	0	0.275	0.007105	0.09271	13.0482	0	19
Rad-iso	Tritium	pCi/L	11	1.053	22.47	60.33	26.84	22.77	0.8484	0	0
Rad-iso	Tritium	TU[f]	11	0.33	7.04	18.9	8.407	7.133	0.8484	0	0
Rad-iso	Uranium-234	pCi/L	19	0.029	0.182	0.601	0.241	0.1856	0.7702	0	2
Rad-iso	Uranium-235	pCi/L	19	-0.00245	0.0055	0.046	0.01051	0.01322	1.2577	0	16
Rad-iso	Uranium-238	pCi/L	19	0.008	0.101	0.595	0.1398	0.1364	0.9757	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	12	-0.23	0.155	0.97	0.2508	0.4053	1.6159	0	0
Rad-gross	Gross Beta Radiation	pCi/L	12	0.45	2.175	5.9	2.604	2.054	0.7886	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	139	163.5	311	179.4	50.8	0.2832	0	3
Rad-gscan[g]	Cesium-137	pCi/L	19	-1.135	-0.085	0.55	-0.1232	0.3995	-3.2431	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3c
Volcanic Rock Groundwater Shows Nonfiltered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	30	79.8	1088	4953	1465	1343	0.9166	0	4
Metals	Antimony	µg/L	30	0.1	0.15	3.4	1.113	1.366	1.2267	0	30
Metals	Arsenic	µg/L	30	0.2	0.65	4.7	1.26	1.194	0.9479	0	9
Metals	Barium	µg/L	30	13	21.7	124.8	33.02	26.68	0.8079	0	0
Metals	Beryllium	µg/L	30	0.2	2	2	1.493	0.7404	0.496	0	30
Metals	Boron	µg/L	24	2	8	12	8.331	2.308	0.277	0	5
Metals	Cadmium	µg/L	30	0.2	1	1	0.75	0.3608	0.4811	0	30
Metals	Calcium	µg/L	30	6240	8175	15150	9548	2998	0.314	0	0
Metals	Cesium	µg/L	20	2	2	2	2	0	0	0	19
Metals	Chromium	µg/L	30	0.3	2	5	1.873	1.165	0.6222	0	20
Metals	Cobalt	µg/L	30	0.5	2	2	1.554	0.6469	0.4163	0	30
Metals	Copper	µg/L	30	0.3	2.9	10	3.727	2.898	0.7776	3	11
Metals	Iron	µg/L	30	66.5	427.3	2052	575.8	527.3	0.9158	0	5
Metals	Lead	µg/L	30	1	2	4	1.88	0.6327	0.3365	1	20
Metals	Lithium	µg/L	20	10	10	10	10	0	0	0	19
Metals	Magnesium	µg/L	30	1540	2950	5906	2914	1253	0.43	0	0
Metals	Manganese	µg/L	30	0.37	4	15.25	5.004	3.591	0.7177	2	6
Metals	Mercury	µg/L	30	0.01	0.02	0.13	0.03367	0.03146	0.9344	5	13
Metals	Molybdenum	µg/L	24	2	2	13	3.063	2.446	0.7986	0	16
Metals	Nickel	µg/L	30	0.83	2	3	1.85	0.43	0.2325	0	26
Metals	Potassium	µg/L	30	1420	2460	7280	3503	1978	0.5647	0	0
Metals	Rubidium	µg/L	20	4	9.5	42	14.1	11.14	0.7904	0	0
Metals	Selenium	µg/L	30	0.1	0.5	3.1	1.19	1.306	1.0977	0	24
Metals	Silver	µg/L	30	0.6	1	4	1.057	0.6055	0.5731	0	27
Metals	Sodium	µg/L	30	4130	6575	34940	8719	6311	0.7238	0	0
Metals	Strontium	µg/L	25	47.6	71	168.6	78.12	25.38	0.3249	0	0
Metals	Thallium	µg/L	30	2	2	9	2.667	1.43	0.5364	0	30
Metals	Thorium	µg/L	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Metals	Tin	µg/L	25	5	5	14.2	7.184	3.967	0.5522	0	24
Metals	Titanium	µg/L	24	2.2	16.73	82.65	24.59	23.06	0.9378	0	0

Table 4.2-3c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium	µg/L	5	0.15	0.25	0.82	0.422	0.3018	0.7151	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—
Metals	Vanadium	µg/L	30	0.5	2.5	6	2.934	1.483	0.5055	0	10
Metals	Zinc	µg/L	30	0.6	10	20	9.268	6.013	0.6488	0	19
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	5	3.56E+04	4.30E+04	5.60E+04	4.51E+04	7973	0.1767	0	0
Other	Bromide	µg/L	25	10	20	100	32.51	34.82	1.071	0	10
Other	Chloride	µg/L	25	540	1370	6.43E+04	5974	1.37E+04	2.2936	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	12	-99	-88	-81	-88.17	4.988	-0.0566	0	0
Other	Fluoride	µg/L	25	50	90	210	103.4	45.14	0.4367	0	1
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	5	300	400	400	360	54.77	0.1521	5	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	5	100	100	100	100	0	0	5	0
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	5	20	20	20	20	0	0	0	5
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	200	200	200	200	0	0	0	3
Other	Silica	µg/L	20	3.19E+04	4.86E+04	8.37E+04	5.37E+04	1.62E+04	0.3015	0	0
Other	Sulfate	µg/L	25	960	4530	1.03E+04	4842	2278	0.4704	0	0
Other	Total Dissolved Solids	µg/L	25	8.60E+04	1.24E+05	2.68E+05	1.45E+05	4.11E+04	0.2845	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	1	3000	3000	3000	3000	0	0	0	0
Other	Conductivity	µS/cm	20	79.3	111.5	334	123.7	60.06	0.4855	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-3c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Humic Substances Hydrophobic Neutrals	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	μg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	20	6.91	7.35	7.58	7.318	0.1534	0.021	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	5	-6	-1.4	0.2	-2.46	2.443	-0.9931	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	15	-95	-76	-67	-78.4	7.385	-0.0942	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	27	-13.8	-12	-10.5	-12.19	0.756	-0.062	0	0
Other	Cyanide Reactive	μg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	μg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	μg/L	20	730.1	1091	2996	1191	527.3	0.4426	0	0
Other	Cation Sum	μg/L	20	875.5	1190	3017	1342	533.2	0.3974	0	0
Other	Balance	μg/L	20	-26.36	67.03	670.4	126.1	175.1	1.3885	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	20	2.77E+04	4.45E+04	5.34E+04	4.39E+04	7168	0.1634	0	0
Other	Ammonium	μg/L	20	15.35	33.2	48.58	32.07	9.207	0.2871	0	2
Other	Ammonium [as N]	μg/L	20	11.94	25.82	37.78	24.94	7.161	0.2871	0	2
Other	Bicarbonate	μg/L	20	3.38E+04	5.43E+04	6.52E+04	5.35E+04	8745	0.1634	0	0
Other	Carbonate	μg/L	20	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	μg/L	20	10	20	20	17.5	4.443	0.2539	0	20
Other	Conductivity (Field)	μS/cm	12	65	94.5	165	98.92	28.3	0.2861	0	0
Other	Dissolved Oxygen (Field)	μg/L	2	1.07E+04	1.22E+04	1.38E+04	1.22E+04	2234	0.1827	0	0
Other	Hardness	μg/L	20	2.28E+04	3.34E+04	6.22E+04	3.62E+04	1.07E+04	0.2956	0	0
Other	Iodide	μg/L	20	10	10	10	10	0	0	0	20
Other	Nitrate	μg/L	20	20	835.4	1940	900.3	465.3	0.5168	0	1
Other	Nitrate [as N]	μg/L	20	4.516	188.6	438.1	203.3	105.1	0.5168	0	1
Other	Nitrite	μg/L	20	10	10	30	14	5.982	0.4273	0	17
Other	Nitrite [as N]	μg/L	20	1.795	1.795	5.385	2.513	1.074	0.4273	0	17
Other	pH (Field)	SU	19	6.68	7.33	8.04	7.393	0.3325	0.045	0	0
Other	Phosphate	μg/L	20	20	50	120	53.55	30.14	0.5628	0	12
Other	Silicon	μg/L	20	1.49E+04	2.27E+04	3.91E+04	2.51E+04	7563	0.3015	0	0
Other	Sulfite	μg/L	20	10	10	10	10	0	0	0	20
Other	Total Suspended Solids	μg/L	16	100	5538	7.55E+04	1.95E+04	2.54E+04	1.3015	0	1
Other	Turbidity (Field)	NTU	12	0	2.45	30	8.367	11.41	1.364	0	1

Table 4.2-3c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-ratio	Br/Cl by wt	ratio	20	0	0.004023	0.02142	0.007288	0.008059	1.1057	0	0
Other-ratio	B/Cl by wt	ratio	20	0	0.007168	0.01462	0.006245	0.003992	0.6393	0	0
Other-ratio	Cs/Cl by wt	ratio	20	0	0	0.001961	9.80E-05	4.38E-04	4.4721	0	0
Other-ratio	F/Cl by wt	ratio	20	0.001259	0.09209	0.1373	0.08337	0.0446	0.5349	0	0
Other-ratio	HCO_3/CL by wt	ratio	20	0.9518	42.05	91.85	42.84	25.15	0.5871	0	0
Other-ratio	K/Cl by wt	ratio	20	0.08305	2.3	6.781	2.628	2.095	0.797	0	0
Other-ratio	Li/Cl by wt	ratio	20	0	0	0.01686	8.43E-04	0.003771	4.4721	0	0
Other-ratio	Na/Cl by wt	ratio	20	0.5434	4.67	12.09	5.9	3.834	0.6498	0	0
Other-ratio	SO_4/Cl by wt	ratio	20	0.114	3.331	8.127	3.517	2.314	0.6581	0	0
Rad-iso	Americium-241	pCi/L	15	0	0.026	0.136	0.03351	0.03158	0.9426	0	11
Rad-iso	Plutonium-238	pCi/L	15	-0.013	0.009	0.057	0.0142	0.02239	1.577	0	13
Rad-iso	Plutonium-239	pCi/L	15	-0.011	0.0095	0.041	0.01039	0.01305	1.2552	0	14
Rad-iso	Strontium-90	pCi/L	15	-0.76	0.01	0.36	-0.05533	0.2571	-4.6468	0	15
Rad-iso	Tritium	pCi/L	33	-3	20.59	50.43	20.67	17.17	0.831	0	0
Rad-iso	Tritium	TU[f]	16	0.24	6.75	15.8	7.393	5.891	0.7969	0	0
Rad-iso	Uranium-234	pCi/L	15	0.098	0.209	0.655	0.3026	0.2014	0.6656	0	2
Rad-iso	Uranium-235	pCi/L	15	-9.00E-04	0.015	0.039	0.01695	0.01014	0.5981	0	12
Rad-iso	Uranium-238	pCi/L	15	0.038	0.099	0.465	0.1659	0.129	0.778	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.1	0.61	1.3	0.543	0.3782	0.6966	0	4
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.02	2.55	7.5	3.114	2.78	0.8926	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	9	103	196	329	205.6	81.59	0.3969	0	2
Rad-gscan[g]	Cesium-137	pCi/L	15	-2.7	0.314	1.4	0.05267	1.258	23.8814	0	15

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3d
Volcanic Rock Groundwater Shows Nonfiltered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	30	49.35	1088	4953	1439	1361	0.946	0	4
Metals	Antimony	µg/L	30	0.05	0.075	1.7	0.5567	0.6829	1.2267	0	30
Metals	Arsenic	µg/L	30	0.1	0.65	4.7	0.92	0.9307	1.0116	0	9
Metals	Barium	µg/L	30	13	21.7	124.8	33.02	26.68	0.8079	0	0
Metals	Beryllium	µg/L	30	0.1	1	1	0.7463	0.3702	0.496	0	30
Metals	Boron	µg/L	24	1	8	12	7.631	2.952	0.3869	0	5
Metals	Cadmium	µg/L	30	0.1	0.5	0.5	0.375	0.1804	0.4811	0	30
Metals	Calcium	µg/L	30	6240	8175	15150	9548	2998	0.314	0	0
Metals	Cesium	µg/L	20	1	1	2	1.05	0.2236	0.213	0	19
Metals	Chromium	µg/L	30	0.15	1	5	1.436	1.303	0.9072	0	20
Metals	Cobalt	µg/L	30	0.25	1	1	0.777	0.3235	0.4163	0	30
Metals	Copper	µg/L	27	0.15	3	10	3.778	3.113	0.824	0	11
Metals	Iron	µg/L	30	33.25	427.3	2052	565.1	536.9	0.9502	0	5
Metals	Lead	µg/L	29	0.5	1	4	1.328	0.8724	0.6571	0	20
Metals	Lithium	µg/L	20	5	5	10	5.25	1.118	0.213	0	19
Metals	Magnesium	µg/L	30	1540	2950	5906	2914	1253	0.43	0	0
Metals	Manganese	µg/L	28	0.44	4.7	15.25	5.116	3.728	0.7288	0	6
Metals	Mercury	µg/L	25	0.005	0.01	0.13	0.032	0.03657	1.1429	0	13
Metals	Molybdenum	µg/L	24	1	1	13	2.34	2.746	1.1735	0	16
Metals	Nickel	µg/L	30	0.55	1	3	1.03	0.4085	0.3967	0	26
Metals	Potassium	µg/L	30	1420	2460	7280	3503	1978	0.5647	0	0
Metals	Rubidium	µg/L	20	4	9.5	42	14.1	11.14	0.7904	0	0
Metals	Selenium	µg/L	30	0.05	0.25	1.55	0.64	0.6553	1.0239	0	24
Metals	Silver	µg/L	30	0.3	0.5	4	0.645	0.7023	1.0888	0	27
Metals	Sodium	µg/L	30	4130	6575	34940	8719	6311	0.7238	0	0
Metals	Strontium	µg/L	25	47.6	71	168.6	78.12	25.38	0.3249	0	0
Metals	Thallium	µg/L	30	1	1	4.5	1.333	0.7151	0.5364	0	30
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	25	2.5	2.5	14	3.872	2.807	0.7251	0	24
Metals	Titanium	µg/L	24	2.2	16.73	82.65	24.59	23.06	0.9378	0	0

Table 4.2-3d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium	µg/L	5	0.15	0.25	0.82	0.422	0.3018	0.7151	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—
Metals	Vanadium	µg/L	30	0.25	2.5	6	2.646	1.736	0.6561	0	10
Metals	Zinc	µg/L	30	0.3	5	20	6.831	6.341	0.9282	0	19
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	5	3.56E+04	4.30E+04	5.60E+04	4.51E+04	7973	0.1767	0	0
Other	Bromide	µg/L	25	5	10.63	100	24.11	26.49	1.0985	0	10
Other	Chloride	µg/L	25	540	1370	6.43E+04	5974	1.37E+04	2.2936	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	12	-99	-88	-81	-88.17	4.988	-0.0566	0	0
Other	Fluoride	µg/L	25	25	90	210	102.4	46.62	0.4555	0	1
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	5	10	10	10	10	0	0	0	5
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	100	100	200	140	54.77	0.3912	0	3
Other	Silica	µg/L	20	3.19E+04	4.86E+04	8.37E+04	5.37E+04	1.62E+04	0.3015	0	0
Other	Sulfate	µg/L	25	960	4530	1.03E+04	4842	2278	0.4704	0	0
Other	Total Dissolved Solids	µg/L	25	8.60E+04	1.24E+05	2.68E+05	1.45E+05	4.11E+04	0.2845	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	1	3000	3000	3000	3000	0	0	0	0
Other	Conductivity	µS/cm	20	79.3	111.5	334	123.7	60.06	0.4855	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-3d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	20	6.91	7.35	7.58	7.318	0.1534	0.021	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	5	-6	-1.4	0.2	-2.46	2.443	-0.9931	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	15	-95	-76	-67	-78.4	7.385	-0.0942	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	27	-13.8	-12	-10.5	-12.19	0.756	-0.062	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	20	730.1	1091	2996	1191	527.3	0.4426	0	0
Other	Cation Sum	µg/L	20	875.5	1190	3017	1342	533.2	0.3974	0	0
Other	Balance	µg/L	20	-26.36	67.03	670.4	126.1	175.1	1.3885	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	20	2.77E+04	4.45E+04	5.34E+04	4.39E+04	7168	0.1634	0	0
Other	Ammonium	µg/L	20	10	33.2	48.58	31.07	10.94	0.3521	0	2
Other	Ammonium [as N]	µg/L	20	7.778	25.82	37.78	24.16	8.507	0.3521	0	2
Other	Bicarbonate	µg/L	20	3.38E+04	5.43E+04	6.52E+04	5.35E+04	8745	0.1634	0	0
Other	Carbonate	µg/L	20	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	20	5	10	10	8.75	2.221	0.2539	0	20
Other	Conductivity (Field)	µS/cm	12	65	94.5	165	98.92	28.3	0.2861	0	0
Other	Dissolved Oxygen (Field)	µg/L	2	1.07E+04	1.22E+04	1.38E+04	1.22E+04	2234	0.1827	0	0
Other	Hardness	µg/L	20	2.28E+04	3.34E+04	6.22E+04	3.62E+04	1.07E+04	0.2956	0	0
Other	Iodide	µg/L	20	5	5	5	5	0	0	0	20
Other	Nitrate	µg/L	20	10	835.4	1940	899.8	466.3	0.5182	0	1
Other	Nitrate [as N]	µg/L	20	2.258	188.6	438.1	203.2	105.3	0.5182	0	1
Other	Nitrite	µg/L	20	5	5	30	8.75	6.859	0.7838	0	17
Other	Nitrite [as N]	µg/L	20	0.8974	0.8974	5.385	1.571	1.231	0.7838	0	17
Other	pH (Field)	SU	19	6.68	7.33	8.04	7.393	0.3325	0.045	0	0
Other	Phosphate	µg/L	20	10	25	120	43.05	35.9	0.8341	0	12
Other	Silicon	µg/L	20	1.49E+04	2.27E+04	3.91E+04	2.51E+04	7563	0.3015	0	0
Other	Sulfite	µg/L	20	5	5	5	5	0	0	0	20
Other	Total Suspended Solids	µg/L	16	50	5538	7.55E+04	1.95E+04	2.54E+04	1.3018	0	1
Other	Turbidity (Field)	NTU	12	0	2.45	27.2	7.117	9.486	1.333	0	1

Table 4.2-3d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-ratio	Br/Cl by wt	ratio	20	0	0.004023	0.02142	0.007288	0.008059	1.1057	0	0
Other-ratio	B/Cl by wt	ratio	20	0	0.007168	0.01462	0.006245	0.003992	0.6393	0	0
Other-ratio	Cs/Cl by wt	ratio	20	0	0	0.001961	9.80E-05	4.38E-04	4.4721	0	0
Other-ratio	F/Cl by wt	ratio	20	0.001259	0.09209	0.1373	0.08337	0.0446	0.5349	0	0
Other-ratio	HCO_3/CL by wt	ratio	20	0.9518	42.05	91.85	42.84	25.15	0.5871	0	0
Other-ratio	K/Cl by wt	ratio	20	0.08305	2.3	6.781	2.628	2.095	0.797	0	0
Other-ratio	Li/Cl by wt	ratio	20	0	0	0.01686	8.43E-04	0.003771	4.4721	0	0
Other-ratio	Na/Cl by wt	ratio	20	0.5434	4.67	12.09	5.9	3.834	0.6498	0	0
Other-ratio	SO_4/Cl by wt	ratio	20	0.114	3.331	8.127	3.517	2.314	0.6581	0	0
Rad-iso	Americium-241	pCi/L	15	0	0.016	0.136	0.02467	0.03321	1.3458	0	11
Rad-iso	Plutonium-238	pCi/L	15	-0.0065	0.0045	0.057	0.009867	0.01689	1.712	0	13
Rad-iso	Plutonium-239	pCi/L	15	-0.0055	0.00475	0.041	0.006563	0.01074	1.6366	0	14
Rad-iso	Strontium-90	pCi/L	15	-0.38	0.005	0.18	-0.02767	0.1286	-4.6468	0	15
Rad-iso	Tritium	pCi/L	33	-3	20.59	50.43	20.67	17.17	0.831	0	0
Rad-iso	Tritium	TU[f]	16	0.24	6.75	15.8	7.393	5.891	0.7969	0	0
Rad-iso	Uranium-234	pCi/L	15	0.049	0.209	0.655	0.2947	0.2099	0.7125	0	2
Rad-iso	Uranium-235	pCi/L	15	-4.50E-04	0.0075	0.039	0.01138	0.01045	0.918	0	12
Rad-iso	Uranium-238	pCi/L	15	0.019	0.099	0.465	0.1646	0.1305	0.7926	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.1	0.3475	0.7	0.375	0.2359	0.629	0	4
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.02	2.4	7.5	3.019	2.841	0.9412	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	9	103	164.5	313	172.6	62.97	0.3649	0	2
Rad-gscan[g]	Cesium-137	pCi/L	15	-1.35	0.157	0.7	0.02633	0.6289	23.8814	0	15

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3e
Volcanic Rock Groundwater Shows Filtered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	55	3.95	85	4580	446.8	935.3	2.0935	0	15
Metals	Antimony	µg/L	56	0.05	0.25	1.7	0.4639	0.5868	1.2651	0	54
Metals	Arsenic	µg/L	56	0.1	0.5	3.9	0.7929	0.6203	0.7824	0	24
Metals	Barium	µg/L	56	5	19	110	29.38	27.19	0.9256	0	1
Metals	Beryllium	µg/L	55	0.005	0.5	1	0.5754	0.4273	0.7427	0	49
Metals	Boron	µg/L	49	1	8	13	7.39	2.511	0.3398	0	17
Metals	Cadmium	µg/L	56	0.065	0.5	1.99	0.37	0.3101	0.8381	0	54
Metals	Calcium	µg/L	56	5800	8085	16000	9357	3135	0.335	0	0
Metals	Cesium	µg/L	32	0.5	1	2	0.9688	0.3345	0.3453	0	30
Metals	Chromium	µg/L	56	0.15	0.995	2	0.735	0.4177	0.5683	0	48
Metals	Cobalt	µg/L	56	0.19	0.645	1	0.6616	0.3354	0.5069	0	52
Metals	Copper	µg/L	52	0.14	1	6	1.628	1.476	0.907	0	25
Metals	Iron	µg/L	56	3.65	41.75	1560	170	336.1	1.9766	0	22
Metals	Lead	µg/L	56	0.005	0.7	2.81	0.7577	0.5545	0.7318	0	49
Metals	Lithium	µg/L	32	2	5	10	5.406	1.794	0.3318	0	23
Metals	Magnesium	µg/L	56	1180	2945	6100	2847	1334	0.4684	0	0
Metals	Manganese	µg/L	53	0.05	2	9	2.439	2.306	0.9454	0	18
Metals	Mercury	µg/L	51	0.005	0.025	0.17	0.03721	0.03848	1.0341	0	41
Metals	Molybdenum	µg/L	36	0.5	1	4	1.433	0.9241	0.6447	0	27
Metals	Nickel	µg/L	56	0.255	1	2.6	0.8795	0.3939	0.4478	0	47
Metals	Potassium	µg/L	56	1500	2485	7470	3518	1916	0.5446	0	0
Metals	Rubidium	µg/L	32	3	8.5	40	13.72	11.53	0.8408	0	0
Metals	Selenium	µg/L	56	0.05	0.25	1.9	0.7652	0.7922	1.0353	0	54
Metals	Silver	µg/L	56	0.12	0.5	1.1	0.4791	0.1549	0.3234	0	52
Metals	Sodium	µg/L	56	4110	6575	36000	9153	7202	0.7869	0	0
Metals	Strontium	µg/L	38	42	69	163.5	75.93	27.6	0.3635	0	0
Metals	Thallium	µg/L	56	0.013	1	4.9	0.9928	0.7507	0.7562	0	52
Metals	Thorium	µg/L	6	0.5	0.5	0.5	0.5	0	0	0	6
Metals	Tin	µg/L	38	0.5	2.5	15	3.112	2.699	0.8673	0	37
Metals	Titanium	µg/L	37	0.65	3	96	10.86	21.93	2.019	0	15

Table 4.2-3e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium	μg/L	18	0.108	0.2075	0.843	0.3061	0.2393	0.7819	0	0
Metals	Uranium by NATU	μg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	μg/L	12	0.108	0.2025	0.843	0.3049	0.2433	0.798	0	0
Metals	Uranium by TULIKPA	μg/L	12	0.14	0.215	0.92	0.3333	0.2574	0.7721	0	0
Metals	Vanadium	μg/L	56	0.215	3	6	2.493	1.58	0.6339	0	20
Metals	Zinc	μg/L	50	0.255	5	33	5.28	6.066	1.1489	0	28
Other	Ammonia	μg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	μg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	μg/L	6	3.80E+04	4.30E+04	5.60E+04	4.53E+04	6501	0.1434	0	0
Other	Bromide	μg/L	49	0.025	12.38	100	29.77	35.49	1.1924	0	24
Other	Chloride	μg/L	49	530	1397	7.13E+04	6932	1.63E+04	2.3455	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	μg/L	49	25	90	210	103.5	46.08	0.4451	0	5
Other	Nitrogen Ammonia (as N)	μg/L	12	250	250	265	251.7	4.438	0.0176	0	12
Other	Nitrogen Nitrate + Nitrite (as N)	μg/L	11	200	320	400	314.5	71.74	0.2281	0	0
Other	Nitrogen Nitrate (as NO_3)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	μg/L	12	50	155	430	181.7	131.8	0.7253	0	4
Other	Oxalate	μg/L	13	0.3	10	5571	437.1	1543	3.5297	0	12
Other	Phosphorus Orthophosphate (as PO_4)	μg/L	18	25	66.5	200	81.67	60.2	0.7372	0	8
Other	Silica	μg/L	44	3.00E+04	4.88E+04	7.26E+04	5.02E+04	1.28E+04	0.254	0	0
Other	Sulfate	μg/L	49	950	4200	1.13E+04	4437	2372	0.5346	0	0
Other	Total Dissolved Solids	μg/L	37	8.20E+04	1.23E+05	2.56E+05	1.41E+05	3.90E+04	0.2767	0	0
Other	Carbon Dissolved Organic	μg/L	15	600	2500	8700	3353	2686	0.801	0	0
Other	Carbon Total Organic	μg/L	4	470	515	690	547.5	101.4	0.1853	0	0
Other	Conductivity	μS/cm	42	71	109	337	131.8	71.14	0.5395	0	0
Other	Humic Substances Hydrophilic Acids	μg/L	14	200	850	3100	1200	906.4	0.7553	0	0
Other	Humic Substances Hydrophilic Bases	μg/L	11	100	200	400	200	89.44	0.4472	0	0
Other	Humic Substances Hydrophilic Neutrals	μg/L	10	100	200	300	230	67.49	0.2935	0	0
Other	Humic Substances Hydrophilic Total	μg/L	14	300	1050	3700	1500	1075	0.7166	0	0
Other	Humic Substances Hydrophobic Acids	μg/L	13	100	1300	4600	1569	1542	0.9826	0	0
Other	Humic Substances Hydrophobic Neutrals	μg/L	14	100	500	3100	742.9	792	1.0661	0	0
Other	Humic Substances Hydrophobic Total	μg/L	14	500	1450	5000	2043	1643	0.8043	0	0
Other	pH	SU	34	6.6	7.4	7.71	7.402	0.2511	0.0339	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—

Table 4.2-3e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Deuterium Hydrogen Ratio	ratio	11	-91	-79	-71	-79	6.197	-0.078	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	11	-13.9	-12.5	-11.3	-12.45	0.8153	-0.066	0	0
Other	Cyanide Reactive	µg/L	1	250	250	250	250	0	0	0	1
Other	Sulfide Reactive	µg/L	1	2.01E+04	2.01E+04	2.01E+04	2.01E+04	0	0	0	1
Other	Anion Sum	µg/L	26	732	1087	3012	1226	595.2	0.4856	0	0
Other	Cation Sum	µg/L	26	855.5	1150	2973	1322	555	0.4199	0	0
Other	Balance	µg/L	26	-24.22	41.41	651.3	91.27	172.9	1.8941	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	31	2.77E+04	4.45E+04	5.31E+04	4.40E+04	6975	0.1585	0	0
Other	Ammonium	µg/L	31	10	40	160	40.14	31.35	0.7812	0	8
Other	Ammonium [as N]	µg/L	31	7.778	31.11	124.4	31.22	24.39	0.7812	0	8
Other	Bicarbonate	µg/L	31	3.38E+04	5.43E+04	6.48E+04	5.37E+04	8509	0.1585	0	0
Other	Carbonate	µg/L	31	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	32	5	10	10	9.063	1.983	0.2188	0	32
Other	Conductivity (Field)	µS/cm	14	65	94.5	165	98	26.16	0.2669	0	0
Other	Dissolved Oxygen (Field)	µg/L	3	1.07E+04	1.38E+04	1.38E+04	1.28E+04	1824	0.143	0	0
Other	Hardness	µg/L	26	1.93E+04	3.11E+04	6.23E+04	3.49E+04	1.20E+04	0.3446	0	0
Other	Iodide	µg/L	31	5	5	5	5	0	0	0	31
Other	Nitrate	µg/L	31	5	1190	2400	1116	607.5	0.5442	0	1
Other	Nitrate [as N]	µg/L	31	1.129	268.7	541.9	252.1	137.2	0.5442	0	1
Other	Nitrite	µg/L	31	5	5	90	11.61	16.2	1.3947	0	23
Other	Nitrite [as N]	µg/L	31	0.8974	0.8974	16.15	2.084	2.907	1.3947	0	23
Other	pH (Field)	SU	25	6.68	7.33	8.04	7.37	0.3202	0.0434	0	0
Other	Phosphate	µg/L	31	3.26	25	142.9	37.18	37.92	1.0199	0	17
Other	Silicon	µg/L	26	1.41E+04	2.33E+04	3.24E+04	2.35E+04	6086	0.2588	0	0
Other	Sulfite	µg/L	31	5	5	25	6.29	4.995	0.794	0	31
Other	Total Suspended Solids	µg/L	11	50	3679	6.30E+04	2.30E+04	2.65E+04	1.1493	0	1
Other	Turbidity (Field)	NTU	14	0	2.45	27.2	7.3	9.114	1.2485	0	2
Other-ratio	Br/Cl by wt	ratio	26	0	0.003752	0.03774	0.008489	0.01094	1.2891	0	0
Other-ratio	B/Cl by wt	ratio	26	0	0.006723	0.01381	0.005884	0.003603	0.6124	0	0
Other-ratio	Cs/Cl by wt	ratio	26	0	0	0.001961	1.49E-04	5.25E-04	3.5331	0	0
Other-ratio	F/Cl by wt	ratio	26	0.00121	0.09217	0.1373	0.07945	0.0439	0.5526	0	0
Other-ratio	HCO_3/CL by wt	ratio	26	0.9399	40.91	93.02	41.72	25.15	0.6028	0	0
Other-ratio	K/Cl by wt	ratio	26	0.07925	2.438	6.696	2.682	2.012	0.7502	0	0
Other-ratio	Li/Cl by wt	ratio	26	0	0	0.01887	0.001241	0.004031	3.2472	0	0
Other-ratio	Na/Cl by wt	ratio	26	0.5463	4.607	11.09	6.087	3.767	0.6189	0	0
Other-ratio	SO_4/Cl by wt	ratio	26	0.1138	3.238	7.793	3.511	2.27	0.6467	0	0
Rad-iso	Americium-241	pCi/L	19	0	0.011	0.192	0.02306	0.0432	1.8738	0	16

Table 4.2-3e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-238	pCi/L	19	-0.004	0.007	0.109	0.01823	0.0292	1.6016	0	16
Rad-iso	Plutonium-239	pCi/L	19	-0.0045	0.0055	0.041	0.006	0.009669	1.6114	0	18
Rad-iso	Strontium-90	pCi/L	19	-0.115	0	0.275	0.007105	0.09271	13.048	0	19
Rad-iso	Tritium	pCi/L	11	1.053	22.47	60.33	26.84	22.77	0.8484	0	0
Rad-iso	Tritium	TU[f]	11	0.33	7.04	18.9	8.407	7.133	0.8484	0	0
Rad-iso	Uranium-234	pCi/L	19	0.029	0.182	0.601	0.241	0.1856	0.7702	0	2
Rad-iso	Uranium-235	pCi/L	19	-0.00245	0.0055	0.046	0.01051	0.01322	1.2577	0	16
Rad-iso	Uranium-238	pCi/L	19	0.008	0.101	0.595	0.1398	0.1364	0.9757	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	12	-0.23	0.155	0.97	0.2508	0.4053	1.6159	0	0
Rad-gross	Gross Beta Radiation	pCi/L	12	0.45	2.175	5.9	2.604	2.054	0.7886	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	139	163.5	311	179.4	50.8	0.2832	0	3
Rad-gscan[g]	Cesium-137	pCi/L	19	-1.135	-0.085	0.55	-0.1232	0.3995	-3.243	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3f
Volcanic Rock Groundwater Shows Nonfiltered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	30	49.35	1088	4953	1439	1361	0.946	0	4
Metals	Antimony	µg/L	30	0.05	0.075	1.7	0.5567	0.6829	1.2267	0	30
Metals	Arsenic	µg/L	30	0.1	0.65	4.7	0.92	0.9307	1.0116	0	9
Metals	Barium	µg/L	30	13	21.7	124.8	33.02	26.68	0.8079	0	0
Metals	Beryllium	µg/L	30	0.1	1	1	0.7463	0.3702	0.496	0	30
Metals	Boron	µg/L	24	1	8	12	7.631	2.952	0.3869	0	5
Metals	Cadmium	µg/L	30	0.1	0.5	0.5	0.375	0.1804	0.4811	0	30
Metals	Calcium	µg/L	30	6240	8175	15150	9548	2998	0.314	0	0
Metals	Cesium	µg/L	20	1	1	2	1.05	0.2236	0.213	0	19
Metals	Chromium	µg/L	30	0.15	1	5	1.436	1.303	0.9072	0	20
Metals	Cobalt	µg/L	30	0.25	1	1	0.777	0.3235	0.4163	0	30
Metals	Copper	µg/L	27	0.15	3	10	3.778	3.113	0.824	0	11
Metals	Iron	µg/L	30	33.25	427.3	2052	565.1	536.9	0.9502	0	5
Metals	Lead	µg/L	29	0.5	1	4	1.328	0.8724	0.6571	0	20
Metals	Lithium	µg/L	20	5	5	10	5.25	1.118	0.213	0	19
Metals	Magnesium	µg/L	30	1540	2950	5906	2914	1253	0.43	0	0
Metals	Manganese	µg/L	28	0.44	4.7	15.25	5.116	3.728	0.7288	0	6
Metals	Mercury	µg/L	25	0.005	0.01	0.13	0.032	0.03657	1.1429	0	13
Metals	Molybdenum	µg/L	24	1	1	13	2.34	2.746	1.1735	0	16
Metals	Nickel	µg/L	30	0.55	1	3	1.03	0.4085	0.3967	0	26
Metals	Potassium	µg/L	30	1420	2460	7280	3503	1978	0.5647	0	0
Metals	Rubidium	µg/L	20	4	9.5	42	14.1	11.14	0.7904	0	0
Metals	Selenium	µg/L	30	0.05	0.25	1.55	0.64	0.6553	1.0239	0	24
Metals	Silver	µg/L	30	0.3	0.5	4	0.645	0.7023	1.0888	0	27
Metals	Sodium	µg/L	30	4130	6575	34940	8719	6311	0.7238	0	0
Metals	Strontium	µg/L	25	47.6	71	168.6	78.12	25.38	0.3249	0	0
Metals	Thallium	µg/L	30	1	1	4.5	1.333	0.7151	0.5364	0	30
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	25	2.5	2.5	14	3.872	2.807	0.7251	0	24
Metals	Titanium	µg/L	24	2.2	16.73	82.65	24.59	23.06	0.9378	0	0
Metals	Uranium	µg/L	5	0.15	0.25	0.82	0.422	0.3018	0.7151	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-3f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	30	0.25	2.5	6	2.646	1.736	0.6561	0	10
Metals	Zinc	µg/L	30	0.3	5	20	6.831	6.341	0.9282	0	19
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	5	3.56E+04	4.30E+04	5.60E+04	4.51E+04	7973	0.1767	0	0
Other	Bromide	µg/L	25	5	10.63	100	24.11	26.49	1.0985	0	10
Other	Chloride	µg/L	25	540	1370	6.43E+04	5974	1.37E+04	2.2936	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	12	-99	-88	-81	-88.17	4.988	-0.057	0	0
Other	Fluoride	µg/L	25	25	90	210	102.4	46.62	0.4555	0	1
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	5	10	10	10	10	0	0	0	5
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	100	100	200	140	54.77	0.3912	0	3
Other	Silica	µg/L	20	3.19E+04	4.86E+04	8.37E+04	5.37E+04	1.62E+04	0.3015	0	0
Other	Sulfate	µg/L	25	960	4530	1.03E+04	4842	2278	0.4704	0	0
Other	Total Dissolved Solids	µg/L	25	8.60E+04	1.24E+05	2.68E+05	1.45E+05	4.11E+04	0.2845	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	1	3000	3000	3000	3000	0	0	0	0
Other	Conductivity	µS/cm	20	79.3	111.5	334	123.7	60.06	0.4855	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	20	6.91	7.35	7.58	7.318	0.1534	0.021	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	5	-6	-1.4	0.2	-2.46	2.443	-0.993	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	15	-95	-76	-67	-78.4	7.385	-0.094	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	27	-13.8	-12	-10.5	-12.19	0.756	-0.062	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-3f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	µg/L	20	730.1	1091	2996	1191	527.3	0.4426	0	0
Other	Cation Sum	µg/L	20	875.5	1190	3017	1342	533.2	0.3974	0	0
Other	Balance	µg/L	20	-26.36	67.03	670.4	126.1	175.1	1.3885	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	20	2.77E+04	4.45E+04	5.34E+04	4.39E+04	7168	0.1634	0	0
Other	Ammonium	µg/L	20	10	33.2	48.58	31.07	10.94	0.3521	0	2
Other	Ammonium [as N]	µg/L	20	7.778	25.82	37.78	24.16	8.507	0.3521	0	2
Other	Bicarbonate	µg/L	20	3.38E+04	5.43E+04	6.52E+04	5.35E+04	8745	0.1634	0	0
Other	Carbonate	µg/L	20	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	20	5	10	10	8.75	2.221	0.2539	0	20
Other	Conductivity (Field)	µS/cm	12	65	94.5	165	98.92	28.3	0.2861	0	0
Other	Dissolved Oxygen (Field)	µg/L	2	1.07E+04	1.22E+04	1.38E+04	1.22E+04	2234	0.1827	0	0
Other	Hardness	µg/L	20	2.28E+04	3.34E+04	6.22E+04	3.62E+04	1.07E+04	0.2956	0	0
Other	Iodide	µg/L	20	5	5	5	5	0	0	0	20
Other	Nitrate	µg/L	20	10	835.4	1940	899.8	466.3	0.5182	0	1
Other	Nitrate [as N]	µg/L	20	2.258	188.6	438.1	203.2	105.3	0.5182	0	1
Other	Nitrite	µg/L	20	5	5	30	8.75	6.859	0.7838	0	17
Other	Nitrite [as N]	µg/L	20	0.8974	0.8974	5.385	1.571	1.231	0.7838	0	17
Other	pH (Field)	SU	19	6.68	7.33	8.04	7.393	0.3325	0.045	0	0
Other	Phosphate	µg/L	20	10	25	120	43.05	35.9	0.8341	0	12
Other	Silicon	µg/L	20	1.49E+04	2.27E+04	3.91E+04	2.51E+04	7563	0.3015	0	0
Other	Sulfite	µg/L	20	5	5	5	5	0	0	0	20
Other	Total Suspended Solids	µg/L	16	50	5538	7.55E+04	1.95E+04	2.54E+04	1.3018	0	1
Other	Turbidity (Field)	NTU	12	0	2.45	27.2	7.117	9.486	1.333	0	1
Other-ratio	Br/Cl by wt	ratio	20	0	0.004023	0.02142	0.007288	0.008059	1.1057	0	0
Other-ratio	B/Cl by wt	ratio	20	0	0.007168	0.01462	0.006245	0.003992	0.6393	0	0
Other-ratio	Cs/Cl by wt	ratio	20	0	0	0.001961	9.80E-05	4.38E-04	4.4721	0	0
Other-ratio	F/Cl by wt	ratio	20	0.001259	0.09209	0.1373	0.08337	0.0446	0.5349	0	0
Other-ratio	HCO_3/CL by wt	ratio	20	0.9518	42.05	91.85	42.84	25.15	0.5871	0	0
Other-ratio	K/Cl by wt	ratio	20	0.08305	2.3	6.781	2.628	2.095	0.797	0	0
Other-ratio	Li/Cl by wt	ratio	20	0	0	0.01686	8.43E-04	0.003771	4.4721	0	0
Other-ratio	Na/Cl by wt	ratio	20	0.5434	4.67	12.09	5.9	3.834	0.6498	0	0
Other-ratio	SO_4/Cl by wt	ratio	20	0.114	3.331	8.127	3.517	2.314	0.6581	0	0
Rad-iso	Americium-241	pCi/L	15	0	0.016	0.136	0.02467	0.03321	1.3458	0	11
Rad-iso	Plutonium-238	pCi/L	15	-0.0065	0.0045	0.057	0.009867	0.01689	1.712	0	13
Rad-iso	Plutonium-239	pCi/L	15	-0.0055	0.00475	0.041	0.006563	0.01074	1.6366	0	14
Rad-iso	Strontium-90	pCi/L	15	-0.38	0.005	0.18	-0.02767	0.1286	-4.647	0	15
Rad-iso	Tritium	pCi/L	33	-3	20.59	50.43	20.67	17.17	0.831	0	0

Table 4.2-3f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	16	0.24	6.75	15.8	7.393	5.891	0.7969	0	0
Rad-iso	Uranium-234	pCi/L	15	0.049	0.209	0.655	0.2947	0.2099	0.7125	0	2
Rad-iso	Uranium-235	pCi/L	15	-4.50E-04	0.0075	0.039	0.01138	0.01045	0.918	0	12
Rad-iso	Uranium-238	pCi/L	15	0.019	0.099	0.465	0.1646	0.1305	0.7926	0	1
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.1	0.3475	0.7	0.375	0.2359	0.629	0	4
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.02	2.4	7.5	3.019	2.841	0.9412	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	9	103	164.5	313	172.6	62.97	0.3649	0	2
Rad-gscan[g]	Cesium-137	pCi/L	15	-1.35	0.157	0.7	0.02633	0.6289	23.881	0	15

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-3g
Volcanic Rock Groundwater Shows Both Filtered and Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	85	3.95	180	4953	797	1196	1.5003	0	19
Metals	Antimony	µg/L	86	0.05	0.25	1.7	0.4962	0.6196	1.2486	0	84
Metals	Arsenic	µg/L	86	0.1	0.55	4.7	0.8372	0.7404	0.8844	0	33
Metals	Barium	µg/L	86	5	19.82	124.8	30.65	26.91	0.8781	0	1
Metals	Beryllium	µg/L	85	0.005	1	1	0.6357	0.4141	0.6514	0	79
Metals	Boron	µg/L	73	1	8	13	7.47	2.646	0.3542	0	22
Metals	Cadmium	µg/L	86	0.065	0.5	1.99	0.3717	0.2708	0.7284	0	84
Metals	Calcium	µg/L	86	5800	8175	16000	9423	3071	0.3259	0	0
Metals	Cesium	µg/L	52	0.5	1	2	1	0.297	0.297	0	49
Metals	Chromium	µg/L	86	0.15	1	5	0.9797	0.8974	0.916	0	68
Metals	Cobalt	µg/L	86	0.19	1	1	0.7019	0.334	0.4758	0	82
Metals	Copper	µg/L	79	0.14	1.4	10	2.363	2.389	1.0113	0	36
Metals	Iron	µg/L	86	3.65	74	2052	307.8	455.3	1.4791	0	27
Metals	Lead	µg/L	85	0.005	1	4	0.9521	0.7272	0.7638	0	69
Metals	Lithium	µg/L	52	2	5	10	5.346	1.558	0.2914	0	42
Metals	Magnesium	µg/L	86	1180	2945	6100	2870	1299	0.4526	0	0
Metals	Manganese	µg/L	81	0.05	2	15.25	3.364	3.129	0.9299	0	24
Metals	Mercury	µg/L	76	0.005	0.025	0.17	0.0355	0.0377	1.0621	0	54
Metals	Molybdenum	µg/L	60	0.5	1	13	1.796	1.909	1.0632	0	43
Metals	Nickel	µg/L	86	0.255	1	3	0.9319	0.4031	0.4326	0	73
Metals	Potassium	µg/L	86	1420	2470	7470	3513	1926	0.5484	0	0
Metals	Rubidium	µg/L	52	3	9	42	13.87	11.28	0.8133	0	0
Metals	Selenium	µg/L	86	0.05	0.25	1.9	0.7215	0.7458	1.0336	0	78
Metals	Silver	µg/L	86	0.12	0.5	4	0.537	0.436	0.812	0	79
Metals	Sodium	µg/L	86	4110	6575	36000	9002	6870	0.7632	0	0
Metals	Strontium	µg/L	63	42	69.4	168.6	76.8	26.56	0.3458	0	0
Metals	Thallium	µg/L	86	0.013	1	4.9	1.112	0.7522	0.6767	0	82
Metals	Thorium	µg/L	6	0.5	0.5	0.5	0.5	0	0	0	6
Metals	Tin	µg/L	63	0.5	2.5	15	3.413	2.746	0.8044	0	61
Metals	Titanium	µg/L	61	0.65	7.754	96	16.26	23.19	1.4264	0	15
Metals	Uranium	µg/L	23	0.108	0.22	0.843	0.3313	0.2514	0.7589	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	12	0.108	0.2025	0.843	0.3049	0.2433	0.798	0	0

Table 4.2-3g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium by TULIKPA	µg/L	12	0.14	0.215	0.92	0.3333	0.2574	0.7721	0	0
Metals	Vanadium	µg/L	86	0.215	3	6	2.546	1.628	0.6393	0	30
Metals	Zinc	µg/L	80	0.255	5	33	5.862	6.177	1.0537	0	47
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	11	3.56E+04	4.30E+04	5.60E+04	4.52E+04	6825	0.1509	0	0
Other	Bromide	µg/L	74	0.025	11.38	100	27.86	32.65	1.1722	0	34
Other	Chloride	µg/L	74	530	1375	7.13E+04	6608	1.54E+04	2.3235	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	12	-99	-88	-81	-88.17	4.988	-0.057	0	0
Other	Fluoride	µg/L	74	25	90	210	103.1	45.95	0.4455	0	6
Other	Nitrogen Ammonia (as N)	µg/L	12	250	250	265	251.7	4.438	0.0176	0	12
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	11	200	320	400	314.5	71.74	0.2281	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	12	50	155	430	181.7	131.8	0.7253	0	4
Other	Oxalate	µg/L	18	0.3	10	5571	318.4	1311	4.117	0	17
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	23	25	70	200	94.35	62.86	0.6663	0	11
Other	Silica	µg/L	64	3.00E+04	4.88E+04	8.37E+04	5.13E+04	1.39E+04	0.2707	0	0
Other	Sulfate	µg/L	74	950	4405	1.13E+04	4574	2333	0.51	0	0
Other	Total Dissolved Solids	µg/L	62	8.20E+04	1.23E+05	2.68E+05	1.42E+05	3.96E+04	0.278	0	0
Other	Carbon Dissolved Organic	µg/L	15	600	2500	8700	3353	2686	0.801	0	0
Other	Carbon Total Organic	µg/L	5	470	550	3000	1038	1100	1.06	0	0
Other	Conductivity	µS/cm	62	71	110.5	337	129.2	67.38	0.5214	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	14	200	850	3100	1200	906.4	0.7553	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	11	100	200	400	200	89.44	0.4472	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	10	100	200	300	230	67.49	0.2935	0	0
Other	Humic Substances Hydrophilic Total	µg/L	14	300	1050	3700	1500	1075	0.7166	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	13	100	1300	4600	1569	1542	0.9826	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	14	100	500	3100	742.9	792	1.0661	0	0
Other	Humic Substances Hydrophobic Total	µg/L	14	500	1450	5000	2043	1643	0.8043	0	0
Other	pH	SU	54	6.6	7.39	7.71	7.371	0.2222	0.0301	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	5	-6	-1.4	0.2	-2.46	2.443	-0.993	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	26	-95	-78	-67	-78.65	6.782	-0.086	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	38	-13.9	-12.1	-10.5	-12.27	0.7712	-0.063	0	0
Other	Cyanide Reactive	µg/L	1	250	250	250	250	0	0	0	1

Table 4.2-3g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Sulfide Reactive	µg/L	1	2.01E+04	2.01E+04	2.01E+04	2.01E+04	0	0	0	1
Other	Anion Sum	µg/L	46	730.1	1087	3012	1211	560.8	0.4632	0	0
Other	Cation Sum	µg/L	46	855.5	1171	3017	1330	539.7	0.4057	0	0
Other	Balance	µg/L	46	-26.36	44.83	670.4	106.4	172.8	1.6236	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	51	2.77E+04	4.45E+04	5.34E+04	4.40E+04	6980	0.1588	0	0
Other	Ammonium	µg/L	51	10	37.25	160	36.58	25.6	0.6998	0	10
Other	Ammonium [as N]	µg/L	51	7.778	28.97	124.4	28.45	19.91	0.6998	0	10
Other	Bicarbonate	µg/L	51	3.38E+04	5.43E+04	6.52E+04	5.36E+04	8515	0.1588	0	0
Other	Carbonate	µg/L	51	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	52	5	10	10	8.942	2.062	0.2306	0	52
Other	Conductivity (Field)	µS/cm	26	65	94.5	165	98.42	26.62	0.2704	0	0
Other	Dissolved Oxygen (Field)	µg/L	5	1.07E+04	1.38E+04	1.38E+04	1.26E+04	1731	0.138	0	0
Other	Hardness	µg/L	46	1.93E+04	3.24E+04	6.23E+04	3.55E+04	1.14E+04	0.3204	0	0
Other	Iodide	µg/L	51	5	5	5	5	0	0	0	51
Other	Nitrate	µg/L	51	5	1010	2400	1031	561.7	0.5445	0	2
Other	Nitrate [as N]	µg/L	51	1.129	228.1	541.9	232.9	126.8	0.5445	0	2
Other	Nitrite	µg/L	51	5	5	90	10.49	13.31	1.2692	0	40
Other	Nitrite [as N]	µg/L	51	0.8974	0.8974	16.15	1.883	2.39	1.2692	0	40
Other	pH (Field)	SU	44	6.68	7.33	8.04	7.38	0.3219	0.0436	0	0
Other	Phosphate	µg/L	51	3.26	25	142.9	39.48	36.89	0.9344	0	29
Other	Silicon	µg/L	46	1.41E+04	2.27E+04	3.91E+04	2.42E+04	6734	0.2783	0	0
Other	Sulfite	µg/L	51	5	5	25	5.784	3.921	0.6778	0	51
Other	Total Suspended Solids	µg/L	27	50	5176	7.55E+04	2.09E+04	2.54E+04	1.2123	0	2
Other	Turbidity (Field)	NTU	26	0	2.45	27.2	7.215	9.099	1.2611	0	3
Other-ratio	Br/Cl by wt	ratio	46	0	0.003752	0.03774	0.007967	0.009711	1.219	0	0
Other-ratio	B/Cl by wt	ratio	46	0	0.006829	0.01462	0.006041	0.003738	0.6188	0	0
Other-ratio	Cs/Cl by wt	ratio	46	0	0	0.001961	1.27E-04	4.85E-04	3.8282	0	0
Other-ratio	F/Cl by wt	ratio	46	0.00121	0.09217	0.1373	0.08115	0.04375	0.5392	0	0
Other-ratio	HCO_3/CL by wt	ratio	46	0.9399	41.38	93.02	42.21	24.87	0.5894	0	0
Other-ratio	K/Cl by wt	ratio	46	0.07925	2.401	6.781	2.658	2.025	0.7618	0	0
Other-ratio	Li/Cl by wt	ratio	46	0	0	0.01887	0.001068	0.003882	3.6341	0	0
Other-ratio	Na/Cl by wt	ratio	46	0.5434	4.643	12.09	6.005	3.755	0.6252	0	0
Other-ratio	SO_4/Cl by wt	ratio	46	0.1138	3.28	8.127	3.513	2.264	0.6444	0	0
Rad-iso	Americium-241	pCi/L	34	0	0.01375	0.192	0.02377	0.03855	1.622	0	27
Rad-iso	Plutonium-238	pCi/L	34	-0.0065	0.006	0.109	0.01454	0.02457	1.69	0	29
Rad-iso	Plutonium-239	pCi/L	34	-0.0055	0.0049	0.041	0.006249	0.01	1.6006	0	32
Rad-iso	Strontium-90	pCi/L	34	-0.38	0.0025	0.275	-0.008235	0.1096	-13.31	0	34

Table 4.2-3g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	pCi/L	44	-3	21.13	60.33	22.21	18.64	0.8392	0	0
Rad-iso	Tritium	TU[f]	27	0.24	6.95	18.9	7.806	6.312	0.8087	0	0
Rad-iso	Uranium-234	pCi/L	34	0.029	0.1855	0.655	0.2647	0.1955	0.7387	0	4
Rad-iso	Uranium-235	pCi/L	34	-0.00245	0.00675	0.046	0.01089	0.01191	1.093	0	28
Rad-iso	Uranium-238	pCi/L	34	0.008	0.1	0.595	0.1507	0.1324	0.8782	0	2
Rad-gross	Gross Alpha Radiation	pCi/L	22	-0.23	0.3375	0.97	0.3073	0.3375	1.0984	0	4
Rad-gross	Gross Beta Radiation	pCi/L	22	-0.02	2.4	7.5	2.793	2.39	0.8559	0	4
Rad-gross	Gross Gamma Radiation	pCi/L	19	103	164.5	313	176.2	55.36	0.3143	0	5
Rad-gscan[g]	Cesium-137	pCi/L	34	-1.35	-0.01925	0.7	-0.05722	0.5104	-8.92	0	34

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4a
Regional Aquifer Shows Filtered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	73	3	26.2	900	55.1	109.2	1.9819	1	40
Metals	Antimony	µg/L	73	0.03	0.2	100	6.972	22.75	3.2623	0	67
Metals	Arsenic	µg/L	76	1	2.45	100	7.858	16.8	2.1381	0	22
Metals	Barium	µg/L	77	3.5	21	300	42.58	48.11	1.1301	0	11
Metals	Beryllium	µg/L	64	0.01	2	100	4.501	17.33	3.8495	0	61
Metals	Boron	µg/L	70	8	25	110	28.76	21.49	0.7472	0	18
Metals	Cadmium	µg/L	77	0.13	1	30	1.303	3.468	2.6616	0	73
Metals	Calcium	µg/L	77	9000	15000	38100	15680	5517	0.3518	0	0
Metals	Cesium	µg/L	48	0	2	10	1.521	1.53	1.0058	0	34
Metals	Chromium	µg/L	77	0.3	4	44.7	4.904	5.938	1.2108	0	21
Metals	Cobalt	µg/L	77	0.38	2	60	3.95	10.25	2.5957	0	75
Metals	Copper	µg/L	77	0.28	2	40	3.436	5.048	1.4694	0	41
Metals	Iron	µg/L	77	7.3	25.1	2400	70.68	271.7	3.8437	0	53
Metals	Lead	µg/L	72	0.01	2	430	12.83	55.05	4.2909	0	62
Metals	Lithium	µg/L	53	10	30	60	29.79	11.31	0.3795	0	2
Metals	Magnesium	µg/L	77	290	2770	8430	2725	2246	0.8242	0	5
Metals	Manganese	µg/L	77	0.05	2	57.43	8.054	11.18	1.3887	0	53
Metals	Mercury	µg/L	72	0.01	0.05	100	2.87	16.53	5.7606	4	60
Metals	Molybdenum	µg/L	56	1	2	100	4.563	13.16	2.8849	0	40
Metals	Nickel	µg/L	72	0.5	2	100	5.154	12.64	2.4514	0	59
Metals	Potassium	µg/L	77	1370	2080	5070	2291	767.9	0.3352	0	0
Metals	Rubidium	µg/L	51	0.2	3	100	9.737	21.31	2.1881	0	11
Metals	Selenium	µg/L	68	0.02	0.2	100	3.493	12.19	3.4893	0	66
Metals	Silver	µg/L	77	0.24	1	100	4.679	17.16	3.667	0	76
Metals	Sodium	µg/L	77	9000	19000	32300	18070	7605	0.4209	0	0
Metals	Strontium	µg/L	60	42	114.7	510	183.1	154	0.8412	0	1
Metals	Thallium	µg/L	59	0.026	2	100	3.891	12.83	3.298	0	53
Metals	Thorium	µg/L	5	1	1	1	1	0	0	0	5
Metals	Tin	µg/L	41	1	5	100	8.498	15.29	1.7996	0	40
Metals	Titanium	µg/L	43	0	2	10	2.708	2.298	0.8485	0	36
Metals	Uranium	µg/L	20	0.195	0.67	100	13.66	30.86	2.2585	0	2
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	9	0.195	0.519	2.61	0.8646	0.8971	1.0377	0	0
Metals	Uranium by TULIKPA	µg/L	9	0.23	0.47	2.56	0.8778	0.9284	1.0576	0	0

Table 4.2-4a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	70	1.6	11.1	250	19.71	35.63	1.8079	0	11
Metals	Zinc	µg/L	62	0.51	10	80	16.74	21.5	1.2844	0	45
Other	Ammonia	µg/L	7	20	80	380	160	147.6	0.9228	0	0
Other	Alkalinity Total	µg/L	3	9.40E+04	9.50E+04	9.90E+04	9.60E+04	2646	0.0276	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	63	0.05	30.51	200	58.65	63.9	1.0895	0	22
Other	Chloride	µg/L	70	1740	2345	9140	3283	1990	0.6061	0	6
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	70	200	465	600	439.3	102.7	0.2338	0	2
Other	Nitrogen Ammonia (as N)	µg/L	11	190	500	1100	510	222.5	0.4363	0	8
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	13	50	380	5.80E+04	1.10E+04	2.01E+04	1.8282	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	7	200	210	400	281.4	99.4	0.3532	1	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	7	100	100	100	100	0	0	1	6
Other	Nitrogen Total Kjeldahl (as N)	µg/L	9	100	190	350	206.7	91.52	0.4428	0	2
Other	Oxalate	µg/L	17	0.6	20	20	18.86	4.705	0.2495	0	17
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	15	50	50	250	126	85.34	0.6773	0	13
Other	Silica	µg/L	64	1.40E+04	6.92E+04	1.05E+05	5.84E+04	2.43E+04	0.4162	0	0
Other	Sulfate	µg/L	81	10	4050	1.72E+04	4234	3160	0.7463	0	9
Other	Total Dissolved Solids	µg/L	59	1.20E+05	1.96E+05	3.22E+05	2.01E+05	4.87E+04	0.2421	0	0
Other	Carbon Dissolved Organic	µg/L	8	290	1300	8100	2278	2554	1.1214	0	0
Other	Carbon Total Organic	µg/L	5	270	370	600	416	155.3	0.3734	0	0
Other	Conductivity	µS/cm	37	100	196	292	185.9	53.18	0.2861	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	6	300	900	4300	1400	1501	1.0719	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	5	100	100	400	180	130.4	0.7244	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	4	200	200	500	275	150	0.5455	0	0
Other	Humic Substances Hydrophilic Total	µg/L	6	400	1200	5200	1717	1787	1.041	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	6	100	350	1500	516.7	511.5	0.9901	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	6	300	600	1300	666.7	403.3	0.605	0	0
Other	Humic Substances Hydrophobic Total	µg/L	6	400	1050	2900	1217	879.6	0.7229	0	0
Other	pH	SU	33	6.8	7.85	8.17	7.735	0.3463	0.0448	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	0	0	0	0	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	10	-80	-72	-70	-73.5	3.064	-0.0417	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	10	-11.9	-11.3	-11.2	-11.39	0.2378	-0.0209	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-4a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	44	1198	2071	3220	1943	577.4	0.2971	0	0
Other	Cation Sum	µg/L	44	1235	2064	3101	1962	556.5	0.2837	0	0
Other	Balance	µg/L	43	-55.67	13.06	66.09	14.84	28.09	1.8929	0	3
Other	Alkalinity(Lab) $CaCO_3$	µg/L	33	5.37E+04	9.59E+04	1.28E+05	8.55E+04	2.49E+04	0.2915	0	0
Other	Ammonium	µg/L	53	0	30	100	35.61	25.59	0.7185	0	19
Other	Ammonium [as N]	µg/L	33	15.56	23.33	57.59	25.58	11.85	0.463	0	13
Other	Bicarbonate	µg/L	54	6.00E+04	9.54E+04	1.50E+05	9.95E+04	2.85E+04	0.286	0	0
Other	Carbonate	µg/L	51	0	0	8000	864.7	2108	2.4376	0	2
Other	Chlorate (ClO3)	µg/L	42	0	20	20	15	8.337	0.5558	0	33
Other	Conductivity (Field)	µS/cm	16	51	190	290	196.8	58.62	0.2978	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	28	3.55E+04	5.54E+04	1.04E+05	5.61E+04	1.94E+04	0.3459	0	0
Other	Iodide	µg/L	48	0	10	10	6.875	4.684	0.6813	0	33
Other	Nitrate	µg/L	53	0	840	3250	994.4	948.3	0.9537	0	5
Other	Nitrate [as N]	µg/L	33	2.258	331.9	733.9	293.3	197.7	0.6742	0	2
Other	Nitrite	µg/L	46	10	20	2390	172.8	520.3	3.0108	0	35
Other	Nitrite [as N]	µg/L	33	1.795	1.795	5.385	2.448	0.985	0.4024	0	28
Other	pH (Field)	SU	28	6.5	7.645	8.27	7.571	0.4449	0.0588	0	0
Other	Phosphate	µg/L	45	2	30	80	31.68	20.69	0.6532	0	31
Other	Silicon	µg/L	28	8700	3.01E+04	4.68E+04	2.77E+04	1.20E+04	0.4333	0	0
Other	Sulfite	µg/L	33	10	10	10	10	0	0	0	33
Other	Total Suspended Solids	µg/L	10	100	348	8.26E+04	1.32E+04	2.79E+04	2.1222	0	2
Other	Turbidity (Field)	NTU	13	0	2.2	5.4	2.046	1.821	0.89	0	0
Other-ratio	Br/Cl by wt	ratio	28	0	0.009741	0.02151	0.01066	0.005016	0.4704	0	0
Other-ratio	B/Cl by wt	ratio	28	0.001091	0.005868	0.01844	0.008365	0.004693	0.5611	0	0
Other-ratio	Cs/Cl by wt	ratio	28	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	28	0.02845	0.173	0.2905	0.156	0.07999	0.5128	0	0
Other-ratio	HCO_3/CL by wt	ratio	28	15.75	35.24	69.83	35.98	13.32	0.3702	0	0
Other-ratio	K/Cl by wt	ratio	28	0.406	0.7119	2.355	0.8173	0.4064	0.4973	0	0
Other-ratio	Li/Cl by wt	ratio	28	0.004091	0.01055	0.01786	0.01048	0.004196	0.4004	0	0
Other-ratio	Na/Cl by wt	ratio	28	2.436	5.884	12.79	6.574	3.148	0.4789	0	0
Other-ratio	SO_4/Cl by wt	ratio	28	0.6357	1.183	4.226	1.637	0.9223	0.5635	0	0
Rad-iso	Americium-241	pCi/L	19	-0.0047	0.022	0.24	0.03376	0.05323	1.5767	0	17
Rad-iso	Plutonium-238	pCi/L	19	-0.0406	0.006	0.049	0.008321	0.01959	2.3539	0	18
Rad-iso	Plutonium-239	pCi/L	19	-0.0112	0.0084	0.048	0.01218	0.0155	1.2724	0	17

Table 4.2-4a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Strontium-90	pCi/L	19	-0.3	0.01	0.46	0.05358	0.1941	3.6226	0	19
Rad-iso	Tritium	pCi/L	10	0.1277	0.5107	3.798	0.8906	1.128	1.2666	0	0
Rad-iso	Tritium	TU[f]	10	0.04	0.16	1.19	0.279	0.3534	1.2666	0	0
Rad-iso	Uranium-234	pCi/L	19	0.1	0.475	1.56	0.5773	0.4417	0.765	0	0
Rad-iso	Uranium-235	pCi/L	19	0.0055	0.0197	0.065	0.02049	0.01518	0.741	0	16
Rad-iso	Uranium-238	pCi/L	19	0.055	0.216	0.822	0.2852	0.2348	0.8235	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	13	-0.53	0.17	1.75	0.356	0.7492	2.1048	0	4
Rad-gross	Gross Beta Radiation	pCi/L	13	0.18	1.6	2.5	1.574	0.7492	0.476	0	8
Rad-gross	Gross Gamma Radiation	pCi/L	13	132	226	318	216.5	55.85	0.2579	0	2
Rad-gscan[g]	Cesium-137	pCi/L	19	-2.5	-0.25	2.2	-0.3119	1.231	-3.9451	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4b
Regional Aquifer Shows Filtered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	72	1.6	19.52	900	43.33	106.4	2.4563	0	40
Metals	Antimony	µg/L	73	0.03	0.1	50	3.584	11.41	3.1835	0	67
Metals	Arsenic	µg/L	76	1	1.95	50	4.874	8.239	1.6905	0	22
Metals	Barium	µg/L	77	1.9	21	300	38.85	45.61	1.174	0	11
Metals	Beryllium	µg/L	64	0.005	1	50	2.251	8.663	3.8487	0	61
Metals	Boron	µg/L	70	4.6	19.4	110	24.13	17.44	0.7228	0	18
Metals	Cadmium	µg/L	77	0.065	0.5	30	0.8581	3.404	3.9665	0	73
Metals	Calcium	µg/L	77	9000	15000	38100	15680	5517	0.3518	0	0
Metals	Cesium	µg/L	48	0	1	5	0.7813	0.7849	1.0046	0	34
Metals	Chromium	µg/L	77	0.15	4	44.7	4.228	5.252	1.2421	0	21
Metals	Cobalt	µg/L	77	0.19	1	30	1.997	5.126	2.5668	0	75
Metals	Copper	µg/L	77	0.14	1.2	20	2.539	3.041	1.1975	0	41
Metals	Iron	µg/L	77	3.65	20	2400	57.79	272	4.7062	0	53
Metals	Lead	µg/L	72	0.005	1	430	11.05	54.67	4.9485	0	62
Metals	Lithium	µg/L	53	5	30	60	29.6	11.68	0.3945	0	2
Metals	Magnesium	µg/L	77	230	2770	8430	2703	2268	0.8389	0	5
Metals	Manganese	µg/L	77	0.025	2	57.43	5.807	9.098	1.5667	0	53
Metals	Mercury	µg/L	68	0.005	0.0275	50	1.528	8.501	5.5646	0	60
Metals	Molybdenum	µg/L	56	1	1	50	2.62	6.562	2.5049	0	40
Metals	Nickel	µg/L	72	0.25	1	50	2.895	6.583	2.2741	0	59
Metals	Potassium	µg/L	77	1370	2080	5070	2291	767.9	0.3352	0	0
Metals	Rubidium	µg/L	51	0.1	3	50	6.261	10.35	1.6525	0	11
Metals	Selenium	µg/L	68	0.01	0.1	50	1.774	6.098	3.4365	0	66
Metals	Silver	µg/L	77	0.12	0.5	50	2.346	8.577	3.6563	0	76
Metals	Sodium	µg/L	77	9000	19000	32300	18070	7605	0.4209	0	0
Metals	Strontium	µg/L	60	42	114.7	510	182.2	154.6	0.8483	0	1
Metals	Thallium	µg/L	59	0.013	1	50	1.991	6.409	3.2183	0	53
Metals	Thorium	µg/L	5	0.5	0.5	0.5	0.5	0	0	0	5
Metals	Tin	µg/L	41	0.5	2.5	50	4.493	7.986	1.7776	0	40
Metals	Titanium	µg/L	43	0	1	5.874	1.621	1.592	0.9821	0	36
Metals	Uranium	µg/L	20	0.195	0.67	50	8.662	16.74	1.9322	0	2
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	9	0.195	0.519	2.61	0.8646	0.8971	1.0377	0	0

Table 4.2-4b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium by TULIKPA	µg/L	9	0.23	0.47	2.56	0.8778	0.9284	1.0576	0	0
Metals	Vanadium	µg/L	70	1	11	250	18.34	34.65	1.8894	0	11
Metals	Zinc	µg/L	62	0.255	5	80	13.43	21.6	1.6079	0	45
Other	Ammonia	µg/L	7	20	80	380	160	147.6	0.9228	0	0
Other	Alkalinity Total	µg/L	3	9.40E+04	9.50E+04	9.90E+04	9.60E+04	2646	0.0276	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	63	0.025	30	100	40.63	29.69	0.7307	0	22
Other	Chloride	µg/L	70	1740	2345	9140	3069	1926	0.6277	0	6
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	70	200	457	600	432.1	106.9	0.2474	0	2
Other	Nitrogen Ammonia (as N)	µg/L	11	190	250	1100	327.3	257.5	0.7867	0	8
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	13	25	380	5.80E+04	1.10E+04	2.01E+04	1.8291	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	6	100	155	400	211.7	137.8	0.6508	0	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	6	50	50	50	50	0	0	0	6
Other	Nitrogen Total Kjeldahl (as N)	µg/L	9	50	190	350	195.6	107.4	0.549	0	2
Other	Oxalate	µg/L	17	0.3	10	10	9.429	2.353	0.2495	0	17
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	15	25	25	250	79.33	75.92	0.957	0	13
Other	Silica	µg/L	64	1.40E+04	6.92E+04	1.05E+05	5.84E+04	2.43E+04	0.4162	0	0
Other	Sulfate	µg/L	81	5	3720	1.72E+04	4202	3166	0.7534	0	9
Other	Total Dissolved Solids	µg/L	59	1.20E+05	1.96E+05	3.22E+05	2.01E+05	4.87E+04	0.2421	0	0
Other	Carbon Dissolved Organic	µg/L	8	290	1300	8100	2278	2554	1.1214	0	0
Other	Carbon Total Organic	µg/L	5	270	370	600	416	155.3	0.3734	0	0
Other	Conductivity	µS/cm	37	100	196	292	185.9	53.18	0.2861	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	6	300	900	4300	1400	1501	1.0719	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	5	100	100	400	180	130.4	0.7244	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	4	200	200	500	275	150	0.5455	0	0
Other	Humic Substances Hydrophilic Total	µg/L	6	400	1200	5200	1717	1787	1.041	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	6	100	350	1500	516.7	511.5	0.9901	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	6	300	600	1300	666.7	403.3	0.605	0	0
Other	Humic Substances Hydrophobic Total	µg/L	6	400	1050	2900	1217	879.6	0.7229	0	0
Other	pH	SU	33	6.8	7.85	8.17	7.735	0.3463	0.0448	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	0	0	0	0	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	10	-80	-72	-70	-73.5	3.064	-0.0417	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	10	-11.9	-11.3	-11.2	-11.39	0.2378	-0.0209	0	0

Table 4.2-4b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	44	1198	2071	3220	1943	577.4	0.2971	0	0
Other	Cation Sum	µg/L	44	1235	2064	3101	1962	556.5	0.2837	0	0
Other	Balance	µg/L	43	-55.67	13.06	66.09	14.62	28.15	1.9254	0	3
Other	Alkalinity(Lab) $CaCO_3$	µg/L	33	5.37E+04	9.59E+04	1.28E+05	8.55E+04	2.49E+04	0.2915	0	0
Other	Ammonium	µg/L	53	0	25	100	30.71	26.03	0.8478	0	19
Other	Ammonium [as N]	µg/L	33	7.778	23.33	57.59	22.52	14.78	0.6565	0	13
Other	Bicarbonate	µg/L	54	6.00E+04	9.54E+04	1.50E+05	9.95E+04	2.85E+04	0.286	0	0
Other	Carbonate	µg/L	51	0	0	8000	766.7	1964	2.5613	0	2
Other	Chlorate (ClO_3)	µg/L	42	0	10	10	7.5	4.169	0.5558	0	33
Other	Conductivity (Field)	µS/cm	16	51	190	290	196.8	58.62	0.2978	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	28	3.55E+04	5.54E+04	1.04E+05	5.61E+04	1.94E+04	0.3459	0	0
Other	Iodide	µg/L	48	0	5	5	3.438	2.342	0.6813	0	33
Other	Nitrate	µg/L	53	0	840	3250	992.5	950.1	0.9572	0	5
Other	Nitrate [as N]	µg/L	33	1.129	331.9	733.9	293.2	197.9	0.675	0	2
Other	Nitrite	µg/L	46	5	10	2390	167.5	522	3.1164	0	35
Other	Nitrite [as N]	µg/L	33	0.8974	0.8974	5.385	1.496	1.068	0.7141	0	28
Other	pH (Field)	SU	28	6.5	7.645	8.27	7.571	0.4449	0.0588	0	0
Other	Phosphate	µg/L	45	2	25	80	19.54	15.45	0.791	0	31
Other	Silicon	µg/L	28	8700	3.01E+04	4.68E+04	2.77E+04	1.20E+04	0.4333	0	0
Other	Sulfite	µg/L	33	5	5	5	5	0	0	0	33
Other	Total Suspended Solids	µg/L	10	50	223	8.26E+04	1.31E+04	2.79E+04	2.1282	0	2
Other	Turbidity (Field)	NTU	13	0	2.2	5.4	2.046	1.821	0.89	0	0
Other-ratio	Br/Cl by wt	ratio	28	0	0.009741	0.02151	0.01066	0.005016	0.4704	0	0
Other-ratio	B/Cl by wt	ratio	28	0.001091	0.005868	0.01844	0.008365	0.004693	0.5611	0	0
Other-ratio	Cs/Cl by wt	ratio	28	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	28	0.02845	0.173	0.2905	0.156	0.07999	0.5128	0	0
Other-ratio	HCO_3/CL by wt	ratio	28	15.75	35.24	69.83	35.98	13.32	0.3702	0	0
Other-ratio	K/Cl by wt	ratio	28	0.406	0.7119	2.355	0.8173	0.4064	0.4973	0	0
Other-ratio	Li/Cl by wt	ratio	28	0.004091	0.01055	0.01786	0.01048	0.004196	0.4004	0	0
Other-ratio	Na/Cl by wt	ratio	28	2.436	5.884	12.79	6.574	3.148	0.4789	0	0
Other-ratio	SO_4/Cl by wt	ratio	28	0.6357	1.183	4.226	1.637	0.9223	0.5635	0	0
Rad-iso	Americium-241	pCi/L	19	-0.00235	0.011	0.24	0.0243	0.05347	2.2005	0	17
Rad-iso	Plutonium-238	pCi/L	19	-0.0203	0.003	0.049	0.00545	0.01352	2.4813	0	18

Table 4.2-4b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	19	-0.0056	0.0042	0.048	0.008461	0.0139	1.6429	0	17
Rad-iso	Strontium-90	pCi/L	19	-0.15	0.005	0.23	0.02679	0.09705	3.6226	0	19
Rad-iso	Tritium	pCi/L	10	0.1277	0.5107	3.798	0.8906	1.128	1.2666	0	0
Rad-iso	Tritium	TU[f]	10	0.04	0.16	1.19	0.279	0.3534	1.2666	0	0
Rad-iso	Uranium-234	pCi/L	19	0.1	0.475	1.56	0.5773	0.4417	0.765	0	0
Rad-iso	Uranium-235	pCi/L	19	0.00275	0.01	0.065	0.0138	0.0166	1.2034	0	16
Rad-iso	Uranium-238	pCi/L	19	0.055	0.216	0.822	0.2852	0.2348	0.8235	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	13	-0.53	0.085	1.75	0.2921	0.6996	2.3948	0	4
Rad-gross	Gross Beta Radiation	pCi/L	13	0.18	0.99	2.5	1.079	0.7223	0.6693	0	8
Rad-gross	Gross Gamma Radiation	pCi/L	13	117	177	318	196.9	61	0.3098	0	2
Rad-gscan[g]	Cesium-137	pCi/L	19	-1.25	-0.125	1.1	-0.156	0.6153	-3.9451	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4c
Regional Aquifer Shows Nonfiltered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	μg/L	34	10.2	67.37	3696	369.9	729.9	1.9731	1	11
Metals	Antimony	μg/L	34	0.1	0.2	5.2	1.088	1.58	1.4522	0	30
Metals	Arsenic	μg/L	34	1	2.35	6.7	2.656	1.255	0.4725	0	4
Metals	Barium	μg/L	34	3.6	24.6	112	39.33	36.98	0.9401	0	0
Metals	Beryllium	μg/L	34	0.2	2	2	1.514	0.7693	0.5081	0	34
Metals	Boron	μg/L	29	7	29	52	26.26	15.28	0.5821	0	5
Metals	Cadmium	μg/L	34	0.2	1	1	0.7794	0.348	0.4464	0	34
Metals	Calcium	μg/L	34	9050	17070	37300	16850	6205	0.3683	0	0
Metals	Cesium	μg/L	24	2	2	2	2	0	0	0	24
Metals	Chromium	μg/L	34	0.3	4	16	5.015	3.203	0.6387	0	6
Metals	Cobalt	μg/L	34	0.5	2	2	1.607	0.6214	0.3866	0	32
Metals	Copper	μg/L	34	0.88	2	23	4.028	4.513	1.1204	0	10
Metals	Iron	μg/L	34	9.433	58.3	2024	280.2	450.5	1.608	0	11
Metals	Lead	μg/L	34	1	2	4	1.885	0.6523	0.346	0	31
Metals	Lithium	μg/L	24	10	30	50	28.33	9.168	0.3236	0	0
Metals	Magnesium	μg/L	34	470	2886	8430	3194	2534	0.7933	0	1
Metals	Manganese	μg/L	34	0.2	2.6	142.8	14.61	26.81	1.8349	0	17
Metals	Mercury	μg/L	34	0.01	0.02	0.12	0.02941	0.02309	0.7849	3	20
Metals	Molybdenum	μg/L	28	2	2	8	2.586	1.315	0.5087	0	17
Metals	Nickel	μg/L	34	0.92	2	17	2.248	2.63	1.1703	0	29
Metals	Potassium	μg/L	34	1470	2155	5010	2374	879.9	0.3706	0	0
Metals	Rubidium	μg/L	24	2	3	9	3.875	2.05	0.5289	0	0
Metals	Selenium	μg/L	34	0.1	0.2	3.3	1.035	1.287	1.2433	0	25
Metals	Silver	μg/L	34	0.6	1	1.2	0.9559	0.1353	0.1415	0	33
Metals	Sodium	μg/L	34	9500	19300	30300	17810	6925	0.3889	0	0
Metals	Strontium	μg/L	28	47.8	111.5	500	185	161.1	0.8709	0	0
Metals	Thallium	μg/L	34	2	2	5.2	2.485	0.9215	0.3708	0	33
Metals	Thorium	μg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	μg/L	28	5	5	14.6	6.271	3.182	0.5074	0	27
Metals	Titanium	μg/L	28	1.3	4.216	78.94	11.82	17.92	1.5165	0	11
Metals	Uranium	μg/L	6	0.25	0.63	2.92	0.955	0.9786	1.0247	0	0
Metals	Uranium by NATU	μg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	μg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	μg/L	0	—	—	—	—	—	—	—	—

Table 4.2-4c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	34	2	11	19	10.9	4.477	0.4109	0	1
Metals	Zinc	µg/L	34	0.6	10	70	16.39	18.93	1.1548	0	25
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	2	9.77E+04	9.89E+04	1.00E+05	9.89E+04	1626	0.0165	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	28	18.41	40	200	54.69	53.89	0.9853	0	5
Other	Chloride	µg/L	28	1700	2574	9050	3482	2354	0.6761	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	11	-87	-80	-78	-81.09	2.587	-0.0319	0	0
Other	Fluoride	µg/L	28	200	430	550	395.4	101.2	0.256	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	4	200	300	400	300	115.5	0.3849	1	2
Other	Nitrogen Nitrite (as NO_2)	µg/L	4	100	100	100	100	0	0	1	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	9	20	20	20	20	0	0	0	9
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	4	200	200	200	200	0	0	0	4
Other	Silica	µg/L	24	2.65E+04	6.90E+04	9.97E+04	6.22E+04	2.30E+04	0.3697	0	0
Other	Sulfate	µg/L	28	1700	5559	1.74E+04	4954	3147	0.6353	0	0
Other	Total Dissolved Solids	µg/L	27	1.27E+05	2.01E+05	3.18E+05	2.12E+05	4.92E+04	0.232	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	24	120	201	296	189	56.45	0.2986	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	24	7.17	7.77	8.17	7.703	0.3251	0.0422	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	8	-7.6	-0.55	2.6	-1.337	3.672	-2.7453	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	18	-77	-73	-67	-72.78	2.962	-0.0407	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	29	-11.9	-11.2	-10.1	-11.19	0.4232	-0.0378	0	0

Table 4.2-4c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	24	1227	2077	3085	1960	604.9	0.3086	0	0
Other	Cation Sum	µg/L	24	1238	2144	3015	1978	591.5	0.299	0	0
Other	Balance	µg/L	24	-33.56	4.13	87.33	11.5	32.71	2.8442	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	24	5.40E+04	9.22E+04	1.29E+05	8.59E+04	2.54E+04	0.2954	0	0
Other	Ammonium	µg/L	24	20	30	68.03	33.03	13.56	0.4105	0	6
Other	Ammonium [as N]	µg/L	24	15.56	23.33	52.91	25.69	10.54	0.4105	0	6
Other	Bicarbonate	µg/L	24	6.59E+04	1.13E+05	1.57E+05	1.04E+05	3.12E+04	0.2991	0	0
Other	Carbonate	µg/L	24	0	0	5300	220.8	1082	4.899	0	0
Other	Chlorate (ClO_3)	µg/L	24	10	20	20	18.75	3.378	0.1802	0	24
Other	Conductivity (Field)	µS/cm	14	51	202.5	290	198.5	62.74	0.3161	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	24	3.56E+04	5.31E+04	1.02E+05	5.55E+04	1.96E+04	0.3538	0	0
Other	Iodide	µg/L	24	10	10	10	10	0	0	0	24
Other	Nitrate	µg/L	24	10	1310	3220	1235	906.4	0.7338	0	3
Other	Nitrate [as N]	µg/L	24	2.258	295.8	727.1	278.9	204.7	0.7338	0	3
Other	Nitrite	µg/L	24	10	10	20	12.08	4.149	0.3433	0	24
Other	Nitrite [as N]	µg/L	24	1.795	1.795	3.59	2.169	0.7446	0.3433	0	24
Other	pH (Field)	SU	24	6.5	7.645	8.27	7.585	0.4535	0.0598	0	0
Other	Phosphate	µg/L	24	20	25	80	35.83	17.92	0.5	0	21
Other	Silicon	µg/L	24	1.24E+04	3.23E+04	4.66E+04	2.91E+04	1.07E+04	0.3697	0	0
Other	Sulfite	µg/L	24	10	10	10	10	0	0	0	24
Other	Total Suspended Solids	µg/L	22	100	2140	8.26E+04	1.26E+04	2.08E+04	1.6574	0	4
Other	Turbidity (Field)	NTU	12	0	1.25	5.4	1.817	1.978	1.0885	0	0
Other-ratio	Br/Cl by wt	ratio	24	0	0.009952	0.02311	0.0121	0.006505	0.5376	0	0
Other-ratio	B/Cl by wt	ratio	24	0.001126	0.00652	0.01923	0.008441	0.004621	0.5475	0	0
Other-ratio	Cs/Cl by wt	ratio	24	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	24	0.02873	0.1756	0.2802	0.1606	0.07997	0.4978	0	0
Other-ratio	HCO_3/CL by wt	ratio	24	15.8	36.24	71.43	36.83	13.48	0.3661	0	0
Other-ratio	K/Cl by wt	ratio	24	0.3912	0.7468	2.343	0.8163	0.4245	0.52	0	0
Other-ratio	Li/Cl by wt	ratio	24	0.00351	0.01013	0.01765	0.01019	0.004199	0.4118	0	0
Other-ratio	Na/Cl by wt	ratio	24	2.381	5.7	12.47	6.43	2.998	0.4662	0	0
Other-ratio	SO_4/Cl by wt	ratio	24	0.6276	1.18	4.307	1.64	0.9466	0.5773	0	0
Rad-iso	Americium-241	pCi/L	16	0.001	0.0133	0.193	0.03372	0.04945	1.4664	0	14
Rad-iso	Plutonium-238	pCi/L	16	-0.002	0.012	0.045	0.01331	0.01409	1.0581	0	16

Table 4.2-4c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	16	-0.0044	0.0078	0.048	0.01014	0.01249	1.2321	0	16
Rad-iso	Strontium-90	pCi/L	16	-0.25	-0.015	0.37	-0.01452	0.1618	-11.1463	0	16
Rad-iso	Tritium	pCi/L	37	-2.4	0.4789	48	2.589	8.142	3.1444	0	0
Rad-iso	Tritium	TU[f]	21	-0.08	0.08	4.04	0.4276	0.923	2.1586	0	0
Rad-iso	Uranium-234	pCi/L	16	0.152	0.5	1.64	0.5846	0.4171	0.7136	0	0
Rad-iso	Uranium-235	pCi/L	16	-0.0019	0.0275	0.063	0.02945	0.0182	0.618	0	7
Rad-iso	Uranium-238	pCi/L	16	0.096	0.264	0.814	0.2913	0.1899	0.6519	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.5	0.44	1.6	0.4668	0.7497	1.6058	0	3
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.32	2.08	4	1.97	1.492	0.7575	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	149	209	397	239.5	84.4	0.3524	0	2
Rad-gscan[g]	Cesium-137	pCi/L	16	-2.09	-0.6105	2.1	-0.2559	1.286	-5.023	0	16

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4d
Regional Aquifer Shows Nonfiltered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	33	5.5	60	3696	370.1	742.1	2.0051	0	11
Metals	Antimony	µg/L	34	0.05	0.1	2.6	0.5574	0.7837	1.406	0	30
Metals	Arsenic	µg/L	34	1	2.2	6.7	2.496	1.32	0.5291	0	4
Metals	Barium	µg/L	34	3.6	24.6	112	39.33	36.98	0.9401	0	0
Metals	Beryllium	µg/L	34	0.1	1	1	0.7571	0.3846	0.5081	0	34
Metals	Boron	µg/L	29	5.2	20	52	23.61	14.42	0.611	0	5
Metals	Cadmium	µg/L	34	0.1	0.5	0.5	0.3897	0.174	0.4464	0	34
Metals	Calcium	µg/L	34	9050	17070	37300	16850	6205	0.3683	0	0
Metals	Cesium	µg/L	24	1	1	1	1	0	0	0	24
Metals	Chromium	µg/L	34	0.15	4	16	4.737	3.311	0.6991	0	6
Metals	Cobalt	µg/L	34	0.25	1	1	0.8268	0.2929	0.3542	0	32
Metals	Copper	µg/L	34	0.44	2	23	3.815	4.642	1.2167	0	10
Metals	Iron	µg/L	34	5	41.68	2024	270	454.7	1.6843	0	11
Metals	Lead	µg/L	34	0.5	1	4	1.09	0.7853	0.7206	0	31
Metals	Lithium	µg/L	24	10	30	50	28.33	9.168	0.3236	0	0
Metals	Magnesium	µg/L	34	246	2886	8430	3187	2542	0.7977	0	1
Metals	Manganese	µg/L	34	0.1	2.1	142.8	14.2	27.02	1.9022	0	17
Metals	Mercury	µg/L	31	0.005	0.01	0.12	0.0229	0.02479	1.0825	0	20
Metals	Molybdenum	µg/L	28	1	1.225	8	1.895	1.5	0.7919	0	17
Metals	Nickel	µg/L	34	0.46	1	17	1.453	2.758	1.8978	0	29
Metals	Potassium	µg/L	34	1470	2155	5010	2374	879.9	0.3706	0	0
Metals	Rubidium	µg/L	24	2	3	9	3.875	2.05	0.5289	0	0
Metals	Selenium	µg/L	34	0.05	0.1	3.3	0.6162	0.7797	1.2654	0	25
Metals	Silver	µg/L	34	0.3	0.5	1	0.4926	0.1122	0.2278	0	33
Metals	Sodium	µg/L	34	9500	19300	30300	17810	6925	0.3889	0	0
Metals	Strontium	µg/L	28	47.8	111.5	500	185	161.1	0.8709	0	0
Metals	Thallium	µg/L	34	1	1	4.3	1.306	0.683	0.523	0	33
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	28	2.5	2.5	14.6	3.396	2.586	0.7613	0	27
Metals	Titanium	µg/L	28	0.65	4.216	78.94	11.28	18.15	1.6086	0	11
Metals	Uranium	µg/L	6	0.25	0.63	2.92	0.955	0.9786	1.0247	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-4d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—
Metals	Vanadium	µg/L	34	2	11	19	10.82	4.596	0.4247	0	1
Metals	Zinc	µg/L	34	0.3	5	70	13.47	20.11	1.4938	0	25
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	2	9.77E+04	9.89E+04	1.00E+05	9.89E+04	1626	0.0165	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	28	10	40	100	41.83	23.84	0.5699	0	5
Other	Chloride	µg/L	28	1700	2574	9050	3482	2354	0.6761	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	11	-87	-80	-78	-81.09	2.587	-0.0319	0	0
Other	Fluoride	µg/L	28	200	430	550	395.4	101.2	0.256	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	100	100	400	200	173.2	0.866	0	2
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	9	10	10	10	10	0	0	0	9
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	4	100	100	100	100	0	0	0	4
Other	Silica	µg/L	24	2.65E+04	6.90E+04	9.97E+04	6.22E+04	2.30E+04	0.3697	0	0
Other	Sulfate	µg/L	28	1700	5559	1.74E+04	4954	3147	0.6353	0	0
Other	Total Dissolved Solids	µg/L	27	1.27E+05	2.01E+05	3.18E+05	2.12E+05	4.92E+04	0.232	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	24	120	201	296	189	56.45	0.2986	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	24	7.17	7.77	8.17	7.703	0.3251	0.0422	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	8	-7.6	-0.55	2.6	-1.337	3.672	-2.7453	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	18	-77	-73	-67	-72.78	2.962	-0.0407	0	0

Table 4.2-4d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	29	-11.9	-11.2	-10.1	-11.19	0.4232	-0.0378	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	24	1227	2077	3085	1960	604.9	0.3086	0	0
Other	Cation Sum	µg/L	24	1238	2144	3015	1978	591.5	0.299	0	0
Other	Balance	µg/L	24	-33.56	4.13	87.33	11.5	32.71	2.8442	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	24	5.40E+04	9.22E+04	1.29E+05	8.59E+04	2.54E+04	0.2954	0	0
Other	Ammonium	µg/L	24	10	30	68.03	30.53	16.47	0.5396	0	6
Other	Ammonium [as N]	µg/L	24	7.778	23.33	52.91	23.74	12.81	0.5396	0	6
Other	Bicarbonate	µg/L	24	6.59E+04	1.13E+05	1.57E+05	1.04E+05	3.12E+04	0.2991	0	0
Other	Carbonate	µg/L	24	0	0	5300	220.8	1082	4.899	0	0
Other	Chlorate (ClO_3)	µg/L	24	5	10	10	9.375	1.689	0.1802	0	24
Other	Conductivity (Field)	µS/cm	14	51	202.5	290	198.5	62.74	0.3161	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	24	3.56E+04	5.31E+04	1.02E+05	5.55E+04	1.96E+04	0.3538	0	0
Other	Iodide	µg/L	24	5	5	5	5	0	0	0	24
Other	Nitrate	µg/L	24	5	1310	3220	1234	907.9	0.7356	0	3
Other	Nitrate [as N]	µg/L	24	1.129	295.8	727.1	278.7	205	0.7356	0	3
Other	Nitrite	µg/L	24	5	5	10	6.042	2.074	0.3433	0	24
Other	Nitrite [as N]	µg/L	24	0.8974	0.8974	1.795	1.084	0.3723	0.3433	0	24
Other	pH (Field)	SU	24	6.5	7.645	8.27	7.585	0.4535	0.0598	0	0
Other	Phosphate	µg/L	24	10	17.5	80	21.46	17.03	0.7938	0	21
Other	Silicon	µg/L	24	1.24E+04	3.23E+04	4.66E+04	2.91E+04	1.07E+04	0.3697	0	0
Other	Sulfite	µg/L	24	5	5	5	5	0	0	0	24
Other	Total Suspended Solids	µg/L	22	50	2140	8.26E+04	1.26E+04	2.09E+04	1.6607	0	4
Other	Turbidity (Field)	NTU	12	0	1.25	5.4	1.817	1.978	1.0885	0	0
Other-ratio	Br/Cl by wt	ratio	24	0	0.009952	0.02311	0.0121	0.006505	0.5376	0	0
Other-ratio	B/Cl by wt	ratio	24	0.001126	0.00652	0.01923	0.008441	0.004621	0.5475	0	0
Other-ratio	Cs/Cl by wt	ratio	24	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	24	0.02873	0.1756	0.2802	0.1606	0.07997	0.4978	0	0
Other-ratio	HCO_3/CL by wt	ratio	24	15.8	36.24	71.43	36.83	13.48	0.3661	0	0
Other-ratio	K/Cl by wt	ratio	24	0.3912	0.7468	2.343	0.8163	0.4245	0.52	0	0
Other-ratio	Li/Cl by wt	ratio	24	0.00351	0.01013	0.01765	0.01019	0.004199	0.4118	0	0
Other-ratio	Na/Cl by wt	ratio	24	2.381	5.7	12.47	6.43	2.998	0.4662	0	0
Other-ratio	SO_4/Cl by wt	ratio	24	0.6276	1.18	4.307	1.64	0.9466	0.5773	0	0
Rad-iso	Americium-241	pCi/L	16	5.00E-04	0.00665	0.193	0.02583	0.05007	1.9386	0	14

Table 4.2-4d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-238	pCi/L	16	-0.001	0.006	0.0225	0.006656	0.007043	1.0581	0	16
Rad-iso	Plutonium-239	pCi/L	16	-0.0022	0.0039	0.024	0.005069	0.006245	1.2321	0	16
Rad-iso	Strontium-90	pCi/L	16	-0.125	-0.0075	0.185	-0.00726	0.08091	-11.1463	0	16
Rad-iso	Tritium	pCi/L	37	-2.4	0.4789	48	2.589	8.142	3.1444	0	0
Rad-iso	Tritium	TU[f]	21	-0.08	0.08	4.04	0.4276	0.923	2.1586	0	0
Rad-iso	Uranium-234	pCi/L	16	0.152	0.5	1.64	0.5846	0.4171	0.7136	0	0
Rad-iso	Uranium-235	pCi/L	16	-9.50E-04	0.0244	0.063	0.02616	0.0202	0.7723	0	7
Rad-iso	Uranium-238	pCi/L	16	0.096	0.264	0.814	0.2913	0.1899	0.6519	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.5	0.2671	1.6	0.3709	0.7305	1.9693	0	3
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.16	1.555	4	1.781	1.518	0.8525	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	105	199.3	397	209.8	77.64	0.37	0	2
Rad-gscan[g]	Cesium-137	pCi/L	16	-1.045	-0.3053	1.05	-0.128	0.6428	-5.023	0	16

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4e
Regional Aquifer Shows Filtered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	μg/L	54	1.6	10	115.1	20	20.12	1.0064	0	33
Metals	Antimony	μg/L	55	0.05	0.1	2.6	0.5289	0.7371	1.3938	0	51
Metals	Arsenic	μg/L	55	1	1.7	5.5	2.191	1.128	0.5148	0	13
Metals	Barium	μg/L	55	1.9	20.8	110	36.3	37.03	1.02	0	1
Metals	Beryllium	μg/L	55	0.005	1	1	0.6009	0.4297	0.7151	0	52
Metals	Boron	μg/L	48	4.6	18.2	51	23.16	13.93	0.6015	0	9
Metals	Cadmium	μg/L	55	0.065	0.5	0.5	0.3523	0.1923	0.5458	0	53
Metals	Calcium	μg/L	55	9090	15000	38100	15980	5850	0.366	0	0
Metals	Cesium	μg/L	33	0.5	1	1	0.9242	0.1821	0.197	0	33
Metals	Chromium	μg/L	55	0.15	3	44.7	4.083	5.948	1.457	0	14
Metals	Cobalt	μg/L	55	0.19	1	1	0.6686	0.3489	0.5218	0	54
Metals	Copper	μg/L	55	0.14	1	9	1.537	1.613	1.0492	0	31
Metals	Iron	μg/L	55	3.65	18.7	131.1	27.09	31.15	1.1501	0	39
Metals	Lead	μg/L	55	0.005	1	2	0.7172	0.4018	0.5603	0	52
Metals	Lithium	μg/L	33	20	30	40	29.97	7.808	0.2605	0	0
Metals	Magnesium	μg/L	55	230	2770	8430	2718	2378	0.8749	0	4
Metals	Manganese	μg/L	55	0.025	1	57.43	4.675	9.462	2.024	0	33
Metals	Mercury	μg/L	51	0.005	0.025	0.24	0.03107	0.03751	1.2074	0	44
Metals	Molybdenum	μg/L	38	1	1	3	1.334	0.6773	0.5077	0	30
Metals	Nickel	μg/L	55	0.25	1	19.8	1.426	2.736	1.9189	0	44
Metals	Potassium	μg/L	55	1370	2110	5070	2351	831	0.3534	0	0
Metals	Rubidium	μg/L	33	1	3	8	3.424	1.888	0.5514	0	1
Metals	Selenium	μg/L	55	0.05	0.1	3.6	0.7082	0.8498	1.1999	0	53
Metals	Silver	μg/L	55	0.12	0.5	1	0.4614	0.121	0.2622	0	54
Metals	Sodium	μg/L	55	9400	19300	30900	18080	7393	0.4089	0	0
Metals	Strontium	μg/L	38	42	114.7	510	192.5	165.2	0.8586	0	0
Metals	Thallium	μg/L	55	0.013	1	3.9	1.1	0.6445	0.586	0	49
Metals	Thorium	μg/L	5	0.5	0.5	0.5	0.5	0	0	0	5
Metals	Tin	μg/L	38	0.5	2.5	9.8	2.874	1.944	0.6764	0	38
Metals	Titanium	μg/L	38	0.65	1	5.874	1.439	1.332	0.9254	0	33
Metals	Uranium	μg/L	15	0.195	0.555	2.83	0.8827	0.8869	1.0047	0	0
Metals	Uranium by NATU	μg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	μg/L	9	0.195	0.519	2.61	0.8646	0.8971	1.0377	0	0
Metals	Uranium by TULIKPA	μg/L	9	0.23	0.47	2.56	0.8778	0.9284	1.0576	0	0

Table 4.2-4e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	55	1	11	17.1	10.47	4.681	0.4472	0	4
Metals	Zinc	µg/L	50	0.255	5	80	13.26	22.77	1.7176	0	35
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	3	9.40E+04	9.50E+04	9.90E+04	9.60E+04	2646	0.0276	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	48	0.025	37.21	100	44.27	31.85	0.7196	0	16
Other	Chloride	µg/L	48	1740	2300	9140	3195	2095	0.6559	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	48	200	465	580	432.7	103.8	0.2398	0	0
Other	Nitrogen Ammonia (as N)	µg/L	9	250	250	1100	345.6	282.9	0.8188	0	8
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	9	25	300	910	324.4	259.3	0.7991	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	6	100	155	400	211.7	137.8	0.6508	0	3
Other	Nitrogen Nitrite (as NO_2)	µg/L	6	50	50	50	50	0	0	0	6
Other	Nitrogen Total Kjeldahl (as N)	µg/L	9	50	190	350	195.6	107.4	0.549	0	2
Other	Oxalate	µg/L	17	0.3	10	10	9.429	2.353	0.2495	0	17
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	15	25	25	250	79.33	75.92	0.957	0	13
Other	Silica	µg/L	42	1.86E+04	6.78E+04	1.00E+05	5.81E+04	2.38E+04	0.4095	0	0
Other	Sulfate	µg/L	48	1770	4973	1.72E+04	4659	2781	0.5968	0	0
Other	Total Dissolved Solids	µg/L	37	1.40E+05	2.04E+05	3.22E+05	2.09E+05	4.76E+04	0.2278	0	0
Other	Carbon Dissolved Organic	µg/L	8	290	1300	8100	2278	2554	1.1214	0	0
Other	Carbon Total Organic	µg/L	5	270	370	600	416	155.3	0.3734	0	0
Other	Conductivity	µS/cm	37	100	196	292	185.9	53.18	0.2861	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	6	300	900	4300	1400	1501	1.0719	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	5	100	100	400	180	130.4	0.7244	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	4	200	200	500	275	150	0.5455	0	0
Other	Humic Substances Hydrophilic Total	µg/L	6	400	1200	5200	1717	1787	1.041	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	6	100	350	1500	516.7	511.5	0.9901	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	6	300	600	1300	666.7	403.3	0.605	0	0
Other	Humic Substances Hydrophobic Total	µg/L	6	400	1050	2900	1217	879.6	0.7229	0	0
Other	pH	SU	33	6.8	7.85	8.17	7.735	0.3463	0.0448	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	0	0	0	0	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	10	-80	-72	-70	-73.5	3.064	-0.042	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	10	-11.9	-11.3	-11.2	-11.39	0.2378	-0.021	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	28	1198	2162	3220	2010	602.2	0.2996	0	0

Table 4.2-4e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	μg/L	28	1245	2184	3101	2017	568.3	0.2817	0	0
Other	Balance	μg/L	28	-55.67	11.41	66.09	9.211	30.94	3.3594	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	33	5.37E+04	9.59E+04	1.28E+05	8.55E+04	2.49E+04	0.2915	0	0
Other	Ammonium	μg/L	33	10	30	74.04	28.95	19.01	0.6565	0	13
Other	Ammonium [as N]	μg/L	33	7.778	23.33	57.59	22.52	14.78	0.6565	0	13
Other	Bicarbonate	μg/L	33	6.55E+04	1.10E+05	1.50E+05	1.03E+05	2.93E+04	0.2845	0	0
Other	Carbonate	μg/L	33	0	0	7100	590.9	1688	2.8567	0	0
Other	Chlorate (ClO_3)	μg/L	33	5	10	10	9.545	1.46	0.1529	0	33
Other	Conductivity (Field)	μS/cm	16	51	190	290	196.8	58.62	0.2978	0	0
Other	Dissolved Oxygen (Field)	μg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	μg/L	28	3.55E+04	5.54E+04	1.04E+05	5.61E+04	1.94E+04	0.3459	0	0
Other	Iodide	μg/L	33	5	5	5	5	0	0	0	33
Other	Nitrate	μg/L	33	5	1470	3250	1298	876.3	0.675	0	2
Other	Nitrate [as N]	μg/L	33	1.129	331.9	733.9	293.2	197.9	0.675	0	2
Other	Nitrite	μg/L	33	5	5	30	8.333	5.951	0.7141	0	28
Other	Nitrite [as N]	μg/L	33	0.8974	0.8974	5.385	1.496	1.068	0.7141	0	28
Other	pH (Field)	SU	28	6.5	7.645	8.27	7.571	0.4449	0.0588	0	0
Other	Phosphate	μg/L	33	3.26	25	80	21.79	16.45	0.7547	0	26
Other	Silicon	μg/L	28	8700	3.01E+04	4.68E+04	2.77E+04	1.20E+04	0.4333	0	0
Other	Sulfite	μg/L	33	5	5	5	5	0	0	0	33
Other	Total Suspended Solids	μg/L	10	50	223	8.26E+04	1.31E+04	2.79E+04	2.1282	0	2
Other	Turbidity (Field)	NTU	13	0	2.2	5.4	2.046	1.821	0.89	0	0
Other-ratio	Br/Cl by wt	ratio	28	0	0.009741	0.02151	0.01066	0.005016	0.4704	0	0
Other-ratio	B/Cl by wt	ratio	28	0.001091	0.005868	0.01844	0.008365	0.004693	0.5611	0	0
Other-ratio	Cs/Cl by wt	ratio	28	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	28	0.02845	0.173	0.2905	0.156	0.07999	0.5128	0	0
Other-ratio	HCO_3/CL by wt	ratio	28	15.75	35.24	69.83	35.98	13.32	0.3702	0	0
Other-ratio	K/Cl by wt	ratio	28	0.406	0.7119	2.355	0.8173	0.4064	0.4973	0	0
Other-ratio	Li/Cl by wt	ratio	28	0.004091	0.01055	0.01786	0.01048	0.004196	0.4004	0	0
Other-ratio	Na/Cl by wt	ratio	28	2.436	5.884	12.79	6.574	3.148	0.4789	0	0
Other-ratio	SO_4/Cl by wt	ratio	28	0.6357	1.183	4.226	1.637	0.9223	0.5635	0	0
Rad-iso	Americium-241	pCi/L	19	-0.00235	0.011	0.24	0.0243	0.05347	2.2005	0	17
Rad-iso	Plutonium-238	pCi/L	19	-0.0203	0.003	0.049	0.00545	0.01352	2.4813	0	18
Rad-iso	Plutonium-239	pCi/L	19	-0.0056	0.0042	0.048	0.008461	0.0139	1.6429	0	17
Rad-iso	Strontium-90	pCi/L	19	-0.15	0.005	0.23	0.02679	0.09705	3.6226	0	19
Rad-iso	Tritium	pCi/L	10	0.1277	0.5107	3.798	0.8906	1.128	1.2666	0	0

Table 4.2-4e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	10	0.04	0.16	1.19	0.279	0.3534	1.2666	0	0
Rad-iso	Uranium-234	pCi/L	19	0.1	0.475	1.56	0.5773	0.4417	0.765	0	0
Rad-iso	Uranium-235	pCi/L	19	0.00275	0.01	0.065	0.0138	0.0166	1.2034	0	16
Rad-iso	Uranium-238	pCi/L	19	0.055	0.216	0.822	0.2852	0.2348	0.8235	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	13	-0.53	0.085	1.75	0.2921	0.6996	2.3948	0	4
Rad-gross	Gross Beta Radiation	pCi/L	13	0.18	0.99	2.5	1.079	0.7223	0.6693	0	8
Rad-gross	Gross Gamma Radiation	pCi/L	13	117	177	318	196.9	61	0.3098	0	2
Rad-gscan[g]	Cesium-137	pCi/L	19	-1.25	-0.125	1.1	-0.156	0.6153	-3.945	0	19

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4f
Regional Aquifer Shows Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	33	5.5	60	3696	370.1	742.1	2.0051	0	11
Metals	Antimony	µg/L	34	0.05	0.1	2.6	0.5574	0.7837	1.406	0	30
Metals	Arsenic	µg/L	34	1	2.2	6.7	2.496	1.32	0.5291	0	4
Metals	Barium	µg/L	34	3.6	24.6	112	39.33	36.98	0.9401	0	0
Metals	Beryllium	µg/L	34	0.1	1	1	0.7571	0.3846	0.5081	0	34
Metals	Boron	µg/L	29	5.2	20	52	23.61	14.42	0.611	0	5
Metals	Cadmium	µg/L	34	0.1	0.5	0.5	0.3897	0.174	0.4464	0	34
Metals	Calcium	µg/L	34	9050	17070	37300	16850	6205	0.3683	0	0
Metals	Cesium	µg/L	24	1	1	1	1	0	0	0	24
Metals	Chromium	µg/L	34	0.15	4	16	4.737	3.311	0.6991	0	6
Metals	Cobalt	µg/L	34	0.25	1	1	0.8268	0.2929	0.3542	0	32
Metals	Copper	µg/L	34	0.44	2	23	3.815	4.642	1.2167	0	10
Metals	Iron	µg/L	34	5	41.68	2024	270	454.7	1.6843	0	11
Metals	Lead	µg/L	34	0.5	1	4	1.09	0.7853	0.7206	0	31
Metals	Lithium	µg/L	24	10	30	50	28.33	9.168	0.3236	0	0
Metals	Magnesium	µg/L	34	246	2886	8430	3187	2542	0.7977	0	1
Metals	Manganese	µg/L	34	0.1	2.1	142.8	14.2	27.02	1.9022	0	17
Metals	Mercury	µg/L	31	0.005	0.01	0.12	0.0229	0.02479	1.0825	0	20
Metals	Molybdenum	µg/L	28	1	1.225	8	1.895	1.5	0.7919	0	17
Metals	Nickel	µg/L	34	0.46	1	17	1.453	2.758	1.8978	0	29
Metals	Potassium	µg/L	34	1470	2155	5010	2374	879.9	0.3706	0	0
Metals	Rubidium	µg/L	24	2	3	9	3.875	2.05	0.5289	0	0
Metals	Selenium	µg/L	34	0.05	0.1	3.3	0.6162	0.7797	1.2654	0	25
Metals	Silver	µg/L	34	0.3	0.5	1	0.4926	0.1122	0.2278	0	33
Metals	Sodium	µg/L	34	9500	19300	30300	17810	6925	0.3889	0	0
Metals	Strontium	µg/L	28	47.8	111.5	500	185	161.1	0.8709	0	0
Metals	Thallium	µg/L	34	1	1	4.3	1.306	0.683	0.523	0	33
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	28	2.5	2.5	14.6	3.396	2.586	0.7613	0	27
Metals	Titanium	µg/L	28	0.65	4.216	78.94	11.28	18.15	1.6086	0	11
Metals	Uranium	µg/L	6	0.25	0.63	2.92	0.955	0.9786	1.0247	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-4f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	34	2	11	19	10.82	4.596	0.4247	0	1
Metals	Zinc	µg/L	34	0.3	5	70	13.47	20.11	1.4938	0	25
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	2	9.77E+04	9.89E+04	1.00E+05	9.89E+04	1626	0.0165	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	28	10	40	100	41.83	23.84	0.5699	0	5
Other	Chloride	µg/L	28	1700	2574	9050	3482	2354	0.6761	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	11	-87	-80	-78	-81.09	2.587	-0.0319	0	0
Other	Fluoride	µg/L	28	200	430	550	395.4	101.2	0.256	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	100	100	400	200	173.2	0.866	0	2
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	9	10	10	10	10	0	0	0	9
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	4	100	100	100	100	0	0	0	4
Other	Silica	µg/L	24	2.65E+04	6.90E+04	9.97E+04	6.22E+04	2.30E+04	0.3697	0	0
Other	Sulfate	µg/L	28	1700	5559	1.74E+04	4954	3147	0.6353	0	0
Other	Total Dissolved Solids	µg/L	27	1.27E+05	2.01E+05	3.18E+05	2.12E+05	4.92E+04	0.232	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	24	120	201	296	189	56.45	0.2986	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	24	7.17	7.77	8.17	7.703	0.3251	0.0422	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	8	-7.6	-0.55	2.6	-1.337	3.672	-2.7453	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	18	-77	-73	-67	-72.78	2.962	-0.0407	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	29	-11.9	-11.2	-10.1	-11.19	0.4232	-0.0378	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	24	1227	2077	3085	1960	604.9	0.3086	0	0

Table 4.2-4f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	μg/L	24	1238	2144	3015	1978	591.5	0.299	0	0
Other	Balance	μg/L	24	-33.56	4.13	87.33	11.5	32.71	2.8442	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	24	5.40E+04	9.22E+04	1.29E+05	8.59E+04	2.54E+04	0.2954	0	0
Other	Ammonium	μg/L	24	10	30	68.03	30.53	16.47	0.5396	0	6
Other	Ammonium [as N]	μg/L	24	7.778	23.33	52.91	23.74	12.81	0.5396	0	6
Other	Bicarbonate	μg/L	24	6.59E+04	1.13E+05	1.57E+05	1.04E+05	3.12E+04	0.2991	0	0
Other	Carbonate	μg/L	24	0	0	5300	220.8	1082	4.899	0	0
Other	Chlorate (ClO_3)	μg/L	24	5	10	10	9.375	1.689	0.1802	0	24
Other	Conductivity (Field)	μS/cm	14	51	202.5	290	198.5	62.74	0.3161	0	0
Other	Dissolved Oxygen (Field)	μg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	μg/L	24	3.56E+04	5.31E+04	1.02E+05	5.55E+04	1.96E+04	0.3538	0	0
Other	Iodide	μg/L	24	5	5	5	5	0	0	0	24
Other	Nitrate	μg/L	24	5	1310	3220	1234	907.9	0.7356	0	3
Other	Nitrate [as N]	μg/L	24	1.129	295.8	727.1	278.7	205	0.7356	0	3
Other	Nitrite	μg/L	24	5	5	10	6.042	2.074	0.3433	0	24
Other	Nitrite [as N]	μg/L	24	0.8974	0.8974	1.795	1.084	0.3723	0.3433	0	24
Other	pH (Field)	SU	24	6.5	7.645	8.27	7.585	0.4535	0.0598	0	0
Other	Phosphate	μg/L	24	10	17.5	80	21.46	17.03	0.7938	0	21
Other	Silicon	μg/L	24	1.24E+04	3.23E+04	4.66E+04	2.91E+04	1.07E+04	0.3697	0	0
Other	Sulfite	μg/L	24	5	5	5	5	0	0	0	24
Other	Total Suspended Solids	μg/L	22	50	2140	8.26E+04	1.26E+04	2.09E+04	1.6607	0	4
Other	Turbidity (Field)	NTU	12	0	1.25	5.4	1.817	1.978	1.0885	0	0
Other-ratio	Br/Cl by wt	ratio	24	0	0.009952	0.02311	0.0121	0.006505	0.5376	0	0
Other-ratio	B/Cl by wt	ratio	24	0.001126	0.00652	0.01923	0.008441	0.004621	0.5475	0	0
Other-ratio	Cs/Cl by wt	ratio	24	0	0	0	0	0		0	0
Other-ratio	F/Cl by wt	ratio	24	0.02873	0.1756	0.2802	0.1606	0.07997	0.4978	0	0
Other-ratio	HCO_3/CL by wt	ratio	24	15.8	36.24	71.43	36.83	13.48	0.3661	0	0
Other-ratio	K/Cl by wt	ratio	24	0.3912	0.7468	2.343	0.8163	0.4245	0.52	0	0
Other-ratio	Li/Cl by wt	ratio	24	0.00351	0.01013	0.01765	0.01019	0.004199	0.4118	0	0
Other-ratio	Na/Cl by wt	ratio	24	2.381	5.7	12.47	6.43	2.998	0.4662	0	0
Other-ratio	SO_4/Cl by wt	ratio	24	0.6276	1.18	4.307	1.64	0.9466	0.5773	0	0
Rad-iso	Americium-241	pCi/L	16	5.00E-04	0.00665	0.193	0.02583	0.05007	1.9386	0	14
Rad-iso	Plutonium-238	pCi/L	16	-0.001	0.006	0.0225	0.006656	0.007043	1.0581	0	16
Rad-iso	Plutonium-239	pCi/L	16	-0.0022	0.0039	0.024	0.005069	0.006245	1.2321	0	16
Rad-iso	Strontium-90	pCi/L	16	-0.125	-0.0075	0.185	-0.00726	0.08091	-11.1463	0	16
Rad-iso	Tritium	pCi/L	37	-2.4	0.4789	48	2.589	8.142	3.1444	0	0

Table 4.2-4f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	21	-0.08	0.08	4.04	0.4276	0.923	2.1586	0	0
Rad-iso	Uranium-234	pCi/L	16	0.152	0.5	1.64	0.5846	0.4171	0.7136	0	0
Rad-iso	Uranium-235	pCi/L	16	-9.50E-04	0.0244	0.063	0.02616	0.0202	0.7723	0	7
Rad-iso	Uranium-238	pCi/L	16	0.096	0.264	0.814	0.2913	0.1899	0.6519	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	10	-0.5	0.2671	1.6	0.3709	0.7305	1.9693	0	3
Rad-gross	Gross Beta Radiation	pCi/L	10	-0.16	1.555	4	1.781	1.518	0.8525	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	10	105	199.3	397	209.8	77.64	0.37	0	2
Rad-gscan[g]	Cesium-137	pCi/L	16	-1.045	-0.3053	1.05	-0.128	0.6428	-5.023	0	16

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-4g
Regional Aquifer Shows Both Filtered and Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	87	1.6	20	3696	152.8	484.1	3.1684	0	44
Metals	Antimony	µg/L	89	0.05	0.1	2.6	0.5397	0.7509	1.3913	0	81
Metals	Arsenic	µg/L	89	1	1.9	6.7	2.307	1.207	0.5231	0	17
Metals	Barium	µg/L	89	1.9	21	112	37.46	36.83	0.9831	0	1
Metals	Beryllium	µg/L	89	0.005	1	1	0.6606	0.4179	0.6326	0	86
Metals	Boron	µg/L	77	4.6	19.2	52	23.33	14.03	0.6012	0	14
Metals	Cadmium	µg/L	89	0.065	0.5	0.5	0.3666	0.1854	0.5058	0	87
Metals	Calcium	µg/L	89	9050	15500	38100	16320	5968	0.3658	0	0
Metals	Cesium	µg/L	57	0.5	1	1	0.9561	0.1427	0.1492	0	57
Metals	Chromium	µg/L	89	0.15	3.85	44.7	4.333	5.092	1.1752	0	20
Metals	Cobalt	µg/L	89	0.19	1	1	0.729	0.3359	0.4608	0	86
Metals	Copper	µg/L	89	0.14	1.1	23	2.407	3.304	1.3724	0	41
Metals	Iron	µg/L	89	3.65	22.7	2024	119.9	303.7	2.5333	0	50
Metals	Lead	µg/L	89	0.005	1	4	0.8595	0.6029	0.7014	0	83
Metals	Lithium	µg/L	57	10	30	50	29.28	8.368	0.2858	0	0
Metals	Magnesium	µg/L	89	230	2800	8430	2897	2439	0.8417	0	5
Metals	Manganese	µg/L	89	0.025	1	142.8	8.315	18.72	2.2511	0	50
Metals	Mercury	µg/L	82	0.005	0.0175	0.24	0.02798	0.03335	1.1918	0	64
Metals	Molybdenum	µg/L	66	1	1	8	1.572	1.129	0.7181	0	47
Metals	Nickel	µg/L	89	0.25	1	19.8	1.436	2.729	1.8999	0	73
Metals	Potassium	µg/L	89	1370	2120	5070	2360	845.1	0.3581	0	0
Metals	Rubidium	µg/L	57	1	3	9	3.614	1.953	0.5403	0	1
Metals	Selenium	µg/L	89	0.05	0.1	3.6	0.673	0.8204	1.219	0	78
Metals	Silver	µg/L	89	0.12	0.5	1	0.4733	0.1181	0.2494	0	87
Metals	Sodium	µg/L	89	9400	19300	30900	17980	7180	0.3994	0	0
Metals	Strontium	µg/L	66	42	112	510	189.3	162.3	0.8573	0	0
Metals	Thallium	µg/L	89	0.013	1	4.3	1.178	0.6633	0.5628	0	82
Metals	Thorium	µg/L	5	0.5	0.5	0.5	0.5	0	0	0	5
Metals	Tin	µg/L	66	0.5	2.5	14.6	3.095	2.235	0.7221	0	65
Metals	Titanium	µg/L	66	0.65	1	78.94	5.615	12.72	2.2658	0	44
Metals	Uranium	µg/L	21	0.195	0.555	2.92	0.9034	0.8895	0.9846	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	9	0.195	0.519	2.61	0.8646	0.8971	1.0377	0	0
Metals	Uranium by TULIKPA	µg/L	9	0.23	0.47	2.56	0.8778	0.9284	1.0576	0	0

Table 4.2-4g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	89	1	11	19	10.6	4.626	0.4363	0	5
Metals	Zinc	µg/L	84	0.255	5	80	13.34	21.61	1.6198	0	60
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	5	9.40E+04	9.77E+04	1.00E+05	9.71E+04	2569	0.0264	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	2	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bromide	µg/L	76	0.025	40	100	43.37	29.01	0.669	0	21
Other	Chloride	µg/L	76	1700	2300	9140	3301	2183	0.6614	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	11	-87	-80	-78	-81.09	2.587	-0.0319	0	0
Other	Fluoride	µg/L	76	200	445	580	419	103.8	0.2477	0	0
Other	Nitrogen Ammonia (as N)	µg/L	9	250	250	1100	345.6	282.9	0.8188	0	8
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	9	25	300	910	324.4	259.3	0.7991	0	2
Other	Nitrogen Nitrate (as NO_3)	µg/L	9	100	100	400	207.8	139.3	0.6703	0	5
Other	Nitrogen Nitrite (as NO_2)	µg/L	9	50	50	50	50	0	0	0	9
Other	Nitrogen Total Kjeldahl (as N)	µg/L	9	50	190	350	195.6	107.4	0.549	0	2
Other	Oxalate	µg/L	26	0.3	10	10	9.627	1.902	0.1976	0	26
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	19	25	100	250	83.68	67.51	0.8067	0	17
Other	Silica	µg/L	66	1.86E+04	6.78E+04	1.00E+05	5.96E+04	2.34E+04	0.3928	0	0
Other	Sulfate	µg/L	76	1700	5238	1.74E+04	4768	2904	0.6091	0	0
Other	Total Dissolved Solids	µg/L	64	1.27E+05	2.03E+05	3.22E+05	2.10E+05	4.79E+04	0.2279	0	0
Other	Carbon Dissolved Organic	µg/L	8	290	1300	8100	2278	2554	1.1214	0	0
Other	Carbon Total Organic	µg/L	5	270	370	600	416	155.3	0.3734	0	0
Other	Conductivity	µS/cm	61	100	196	296	187.1	54.04	0.2888	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	6	300	900	4300	1400	1501	1.0719	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	5	100	100	400	180	130.4	0.7244	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	4	200	200	500	275	150	0.5455	0	0
Other	Humic Substances Hydrophilic Total	µg/L	6	400	1200	5200	1717	1787	1.041	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	6	100	350	1500	516.7	511.5	0.9901	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	6	300	600	1300	666.7	403.3	0.605	0	0
Other	Humic Substances Hydrophobic Total	µg/L	6	400	1050	2900	1217	879.6	0.7229	0	0
Other	pH	SU	57	6.8	7.79	8.17	7.721	0.3349	0.0434	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	9	-7.6	-0.2	2.6	-1.189	3.464	-2.9133	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	28	-80	-73	-67	-73.04	2.963	-0.0406	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	39	-11.9	-11.3	-10.1	-11.24	0.3918	-0.0349	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	52	1198	2162	3220	1987	598	0.301	0	0

Table 4.2-4g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	μg/L	52	1238	2164	3101	1999	573.7	0.287	0	0
Other	Balance	μg/L	52	-55.67	10.28	87.33	10.27	31.48	3.0656	0	0
Other	Alkalinity(Lab) CaCO3	μg/L	57	5.37E+04	9.59E+04	1.29E+05	8.57E+04	2.49E+04	0.2905	0	0
Other	Ammonium	μg/L	57	10	30	74.04	29.62	17.85	0.6026	0	19
Other	Ammonium [as N]	μg/L	57	7.778	23.33	57.59	23.03	13.88	0.6026	0	19
Other	Bicarbonate	μg/L	57	6.55E+04	1.10E+05	1.57E+05	1.04E+05	2.99E+04	0.2882	0	0
Other	Carbonate	μg/L	57	0	0	7100	435.1	1464	3.3646	0	0
Other	Chlorate (ClO_3)	μg/L	57	5	10	10	9.474	1.548	0.1634	0	57
Other	Conductivity (Field)	μS/cm	30	51	190	290	197.6	59.52	0.3012	0	0
Other	Dissolved Oxygen (Field)	μg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	μg/L	52	3.55E+04	5.52E+04	1.04E+05	5.58E+04	1.93E+04	0.3461	0	0
Other	Iodide	μg/L	57	5	5	5	5	0	0	0	57
Other	Nitrate	μg/L	57	5	1380	3250	1271	882.2	0.694	0	5
Other	Nitrate [as N]	μg/L	57	1.129	311.6	733.9	287.1	199.2	0.694	0	5
Other	Nitrite	μg/L	57	5	5	30	7.368	4.828	0.6552	0	52
Other	Nitrite [as N]	μg/L	57	0.8974	0.8974	5.385	1.323	0.8665	0.6552	0	52
Other	pH (Field)	SU	52	6.5	7.645	8.27	7.578	0.4445	0.0587	0	0
Other	Phosphate	μg/L	57	3.26	25	80	21.65	16.55	0.7642	0	47
Other	Silicon	μg/L	52	8700	3.13E+04	4.68E+04	2.83E+04	1.14E+04	0.4006	0	0
Other	Sulfite	μg/L	57	5	5	5	5	0	0	0	57
Other	Total Suspended Solids	μg/L	32	50	1106	8.26E+04	1.27E+04	2.28E+04	1.7928	0	6
Other	Turbidity (Field)	NTU	25	0	1.4	5.4	1.936	1.861	0.9614	0	0
Other-ratio	Br/Cl by wt	ratio	52	0	0.009804	0.02311	0.01133	0.005738	0.5066	0	0
Other-ratio	B/Cl by wt	ratio	52	0.001091	0.006282	0.01923	0.0084	0.004615	0.5493	0	0
Other-ratio	Cs/Cl by wt	ratio	52	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	52	0.02845	0.1737	0.2905	0.1581	0.07923	0.501	0	0
Other-ratio	HCO_3/CL by wt	ratio	52	15.75	35.99	71.43	36.37	13.27	0.3648	0	0
Other-ratio	K/Cl by wt	ratio	52	0.3912	0.7395	2.355	0.8169	0.4108	0.5029	0	0
Other-ratio	Li/Cl by wt	ratio	52	0.00351	0.01025	0.01786	0.01035	0.004158	0.4018	0	0
Other-ratio	Na/Cl by wt	ratio	52	2.381	5.779	12.79	6.508	3.05	0.4687	0	0
Other-ratio	SO_4/Cl by wt	ratio	52	0.6276	1.183	4.307	1.638	0.9244	0.5642	0	0
Rad-iso	Americium-241	pCi/L	35	-0.00235	0.008	0.24	0.025	0.05119	2.0477	0	31
Rad-iso	Plutonium-238	pCi/L	35	-0.0203	0.004	0.049	0.006001	0.01091	1.8182	0	34
Rad-iso	Plutonium-239	pCi/L	35	-0.0056	0.0042	0.048	0.00691	0.01106	1.6013	0	33
Rad-iso	Strontium-90	pCi/L	35	-0.15	0.005	0.23	0.01122	0.09039	8.0533	0	35
Rad-iso	Tritium	pCi/L	47	-2.4	0.5107	48	2.228	7.254	3.2561	0	0

Table 4.2-4g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	31	-0.08	0.11	4.04	0.3797	0.7813	2.0578	0	0
Rad-iso	Uranium-234	pCi/L	35	0.1	0.475	1.64	0.5806	0.4243	0.7308	0	0
Rad-iso	Uranium-235	pCi/L	35	-9.50E-04	0.01075	0.065	0.01945	0.01911	0.9824	0	23
Rad-iso	Uranium-238	pCi/L	35	0.055	0.255	0.822	0.2879	0.2124	0.7376	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	23	-0.53	0.145	1.75	0.3264	0.6977	2.1378	0	7
Rad-gross	Gross Beta Radiation	pCi/L	23	-0.16	1.05	4	1.384	1.164	0.8406	0	11
Rad-gross	Gross Gamma Radiation	pCi/L	23	105	191.5	397	202.5	67.37	0.3326	0	4
Rad-gscan[g]	Cesium-137	pCi/L	35	-1.25	-0.15	1.1	-0.1432	0.6188	-4.3222	0	35

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5a
La Mesita Spring Shows Filtered Samples at Detection Limit, for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	11	4.2	26.2	70	26.46	16.96	0.6408	0	8
Metals	Antimony	µg/L	11	0.1	0.683	9.7	1.626	2.826	1.7383	0	10
Metals	Arsenic	µg/L	11	0.5	0.8	3	1.427	1	0.7007	0	5
Metals	Barium	µg/L	11	94	100	129.2	102.3	10.38	0.1015	0	0
Metals	Beryllium	µg/L	11	0.01	1	2	1.079	0.9208	0.8537	0	10
Metals	Boron	µg/L	9	28	50	63.4	49.22	9.931	0.2018	0	1
Metals	Cadmium	µg/L	11	0.13	1	1	0.6327	0.4243	0.6705	0	11
Metals	Calcium	µg/L	11	29400	33400	43390	33670	3682	0.1093	0	0
Metals	Cesium	µg/L	6	1	2	2	1.833	0.4082	0.2227	0	6
Metals	Chromium	µg/L	11	0.79	2	4.2	2.169	1.216	0.5606	0	3
Metals	Cobalt	µg/L	11	0.5	1	2	1.345	0.6475	0.4812	0	9
Metals	Copper	µg/L	11	0.28	2	3.2	1.439	0.9633	0.6694	0	8
Metals	Iron	µg/L	11	6.478	27.3	120	31.53	32.11	1.0185	0	8
Metals	Lead	µg/L	11	0.01	1.3	2	1.32	0.771	0.5841	0	11
Metals	Lithium	µg/L	6	30	30	35	30.83	2.041	0.0662	0	0
Metals	Magnesium	µg/L	11	1000	1240	1744	1288	179.2	0.1391	0	0
Metals	Manganese	µg/L	11	0.93	2	18	4.132	5.549	1.3431	0	5
Metals	Mercury	µg/L	11	0.011	0.05	0.15	0.06036	0.0508	0.8416	0	9
Metals	Molybdenum	µg/L	6	1	2	3	2.167	0.7528	0.3474	0	2
Metals	Nickel	µg/L	11	0.91	1.4	2	1.528	0.4679	0.3062	0	10
Metals	Potassium	µg/L	11	2560	2890	5500	3107	830	0.2671	0	0
Metals	Rubidium	µg/L	6	2	2	4	2.333	0.8165	0.3499	0	0
Metals	Selenium	µg/L	11	0.1	0.8	3.5	1.509	1.49	0.9871	0	10
Metals	Silver	µg/L	11	0.28	1	1.2	0.8682	0.2654	0.3057	0	11
Metals	Sodium	µg/L	11	26300	30400	35050	29850	2379	0.0797	0	0
Metals	Strontium	µg/L	6	710	725	1030	778.3	124.5	0.1599	0	0
Metals	Thallium	µg/L	11	1	2	5.4	2.352	1.147	0.4877	0	9
Metals	Thorium	µg/L	1	1	1	1	1	0	0	0	1
Metals	Tin	µg/L	6	1	5	5	4.333	1.633	0.3768	0	6
Metals	Titanium	µg/L	6	2	2	2	2	0	0	0	6
Metals	Uranium	µg/L	3	8.73	9.1	9.1	8.977	0.2136	0.0238	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	2	8.73	8.915	9.1	8.915	0.2616	0.0293	0	0
Metals	Uranium by TULIKPA	µg/L	2	8.8	8.9	9	8.9	0.1414	0.0159	0	0

Table 4.2-5a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	11	2.8	3.126	5	3.502	0.6971	0.199	0	1
Metals	Zinc	µg/L	10	0.6	6.75	11.78	6.128	4.568	0.7454	0	9
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	9	110	136	200	147.7	32.55	0.2204	0	2
Other	Chloride	µg/L	9	7980	8490	1.20E+04	9074	1304	0.1437	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	9	221.9	290	370	283.7	42.04	0.1482	0	0
Other	Nitrogen Ammonia (as N)	µg/L	2	500	505	510	505	7.071	0.014	0	2
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	2	1800	1900	2000	1900	141.4	0.0744	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	2	2200	2350	2500	2350	212.1	0.0903	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	2	100	100	100	100	0	0	0	2
Other	Nitrogen Total Kjeldahl (as N)	µg/L	2	100	120	140	120	28.28	0.2357	0	1
Other	Oxalate	µg/L	4	20	20	20	20	0	0	0	4
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	3	50	50	200	100	86.6	0.866	0	3
Other	Silica	µg/L	8	2.68E+04	2.87E+04	3.23E+04	2.90E+04	1847	0.0637	0	0
Other	Sulfate	µg/L	9	1.32E+04	1.51E+04	2.95E+04	1.63E+04	4998	0.3058	0	0
Other	Total Dissolved Solids	µg/L	7	2.00E+05	2.79E+05	3.49E+05	2.78E+05	4.31E+04	0.155	0	0
Other	Carbon Dissolved Organic	µg/L	2	1000	1200	1400	1200	282.8	0.2357	0	0
Other	Carbon Total Organic	µg/L	2	580	600	620	600	28.28	0.0471	0	0
Other	Conductivity	µS/cm	7	307	310	392	334.7	36.58	0.1093	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	2	300	450	600	450	212.1	0.4714	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	1	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	2	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Total	µg/L	2	600	650	700	650	70.71	0.1088	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	2	300	400	500	400	141.4	0.3536	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	2	100	150	200	150	70.71	0.4714	0	0
Other	Humic Substances Hydrophobic Total	µg/L	2	400	550	700	550	212.1	0.3857	0	0
Other	pH	SU	6	7.2	7.845	8.15	7.803	0.3547	0.0455	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-74	-71.5	-69	-71.5	3.536	-0.0494	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11	-10.75	-10.5	-10.75	0.3536	-0.0329	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	5	3054	3203	4093	3337	427.5	0.1281	0	0

Table 4.2-5a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	μg/L	5	3163	3214	3939	3360	327.2	0.0974	0	0
Other	Balance	μg/L	5	-38.41	21.07	34.99	9.362	29.57	3.1587	0	0
Other	Alkalinity(Lab) CaCO3	μg/L	6	1.24E+05	1.25E+05	1.50E+05	1.29E+05	1.04E+04	0.0804	0	0
Other	Ammonium	μg/L	6	20	21.06	40	27.02	10.09	0.3734	0	3
Other	Ammonium [as N]	μg/L	6	15.56	16.38	31.11	21.01	7.847	0.3734	0	3
Other	Bicarbonate	μg/L	6	1.37E+05	1.51E+05	1.83E+05	1.53E+05	1.62E+04	0.106	0	0
Other	Carbonate	μg/L	6	0	0	7700	2350	3664	1.559	0	0
Other	Chlorate (ClO3)	μg/L	6	20	20	20	20	0	0	0	6
Other	Conductivity (Field)	μS/cm	3	230	230	320	260	51.96	0.1999	0	0
Other	Dissolved Oxygen (Field)	μg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	μg/L	5	8.75E+04	8.89E+04	1.16E+05	9.43E+04	1.19E+04	0.1263	0	0
Other	Iodide	μg/L	6	10	10	10	10	0	0	0	6
Other	Nitrate	μg/L	6	7710	9180	9880	9017	845.7	0.0938	0	0
Other	Nitrate [as N]	μg/L	6	1741	2073	2231	2036	191	0.0938	0	0
Other	Nitrite	μg/L	6	10	20	40	21.67	11.69	0.5396	0	4
Other	Nitrite [as N]	μg/L	6	1.795	3.59	7.179	3.889	2.098	0.5396	0	4
Other	pH (Field)	SU	5	6.5	7.4	7.48	7.206	0.4146	0.0575	0	0
Other	Phosphate	μg/L	6	6.52	50	50	37.75	19.45	0.5151	0	6
Other	Silicon	μg/L	5	1.25E+04	1.35E+04	1.46E+04	1.35E+04	737.8	0.0548	0	0
Other	Sulfite	μg/L	6	10	10	10	10	0	0	0	6
Other	Total Suspended Solids	μg/L	0	—	—	—	—	—	—	—	—
Other	Turbidity (Field)	NTU	3	7.6	9.3	9.3	8.733	0.9815	0.1124	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.01131	0.01496	0.01914	0.01483	0.002975	0.2007	0	0
Other-ratio	B/Cl by wt	ratio	5	0.004619	0.005704	0.006007	0.005521	5.80E-04	0.1051	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	5	0.01845	0.03469	0.03534	0.03026	0.007352	0.243	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	15.21	16.61	18.33	16.81	1.176	0.07	0	0
Other-ratio	K/Cl by wt	ratio	5	0.2403	0.3026	0.3228	0.2964	0.03258	0.1099	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.002494	0.003534	0.003641	0.003342	4.79E-04	0.1434	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.914	3.625	3.708	3.511	0.3357	0.0956	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.738	1.779	2.452	1.912	0.3036	0.1588	0	0
Rad-iso	Americium-241	pCi/L	4	0.006	0.01	0.087	0.02825	0.03922	1.3883	0	3
Rad-iso	Plutonium-238	pCi/L	4	-0.014	-0.0011	0.016	-5.00E-05	0.01231	-246.152	0	4
Rad-iso	Plutonium-239	pCi/L	4	-0.0111	-0.00215	0.029	0.0034	0.0176	5.1769	0	4
Rad-iso	Strontium-90	pCi/L	4	0	0.1	0.31	0.1275	0.1459	1.1444	0	4
Rad-iso	Tritium	pCi/L	2	0.415	0.5905	0.7661	0.5905	0.2483	0.4204	0	0

Table 4.2-5a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	2	0.13	0.185	0.24	0.185	0.07778	0.4204	0	0
Rad-iso	Uranium-234	pCi/L	4	4.56	4.79	7.79	5.482	1.544	0.2817	0	0
Rad-iso	Uranium-235	pCi/L	4	0.126	0.172	0.263	0.1833	0.05747	0.3136	0	0
Rad-iso	Uranium-238	pCi/L	4	2.77	2.99	4.7	3.362	0.8978	0.267	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	6	6.3	7.2	6.5	0.6245	0.0961	0	0
Rad-gross	Gross Beta Radiation	pCi/L	3	3.4	3.8	5.1	4.1	0.8888	0.2168	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	3	149	165	189	167.7	20.13	0.1201	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-1.5	0.023	0.433	-0.2553	0.8919	-3.4943	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5b
La Mesita Spring Shows Filtered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	11	4.2	13.1	70	17.92	18.52	1.0334	0	8
Metals	Antimony	µg/L	11	0.05	0.3415	4.85	0.8584	1.41	1.6427	0	10
Metals	Arsenic	µg/L	11	0.5	0.8	1.5	0.8773	0.3629	0.4136	0	5
Metals	Barium	µg/L	11	94	100	129.2	102.3	10.38	0.1015	0	0
Metals	Beryllium	µg/L	11	0.005	0.5	1	0.5399	0.4596	0.8512	0	10
Metals	Boron	µg/L	9	28	47	57	45.7	9.894	0.2165	0	1
Metals	Cadmium	µg/L	11	0.065	0.5	0.5	0.3164	0.2121	0.6705	0	11
Metals	Calcium	µg/L	11	29400	33400	43390	33670	3682	0.1093	0	0
Metals	Cesium	µg/L	6	0.5	1	1	0.9167	0.2041	0.2227	0	6
Metals	Chromium	µg/L	11	0.395	2	4	1.903	1.116	0.5864	0	3
Metals	Cobalt	µg/L	11	0.25	1	1	0.7636	0.3334	0.4366	0	9
Metals	Copper	µg/L	11	0.14	1	3.2	0.99	0.913	0.9222	0	8
Metals	Iron	µg/L	11	5	14	120	22.42	33.03	1.4734	0	8
Metals	Lead	µg/L	11	0.005	0.65	1	0.66	0.3855	0.5841	0	11
Metals	Lithium	µg/L	6	30	30	35	30.83	2.041	0.0662	0	0
Metals	Magnesium	µg/L	11	1000	1240	1744	1288	179.2	0.1391	0	0
Metals	Manganese	µg/L	11	0.65	1	18	3.709	5.754	1.5514	0	5
Metals	Mercury	µg/L	11	0.0055	0.025	0.15	0.04291	0.05076	1.183	0	9
Metals	Molybdenum	µg/L	6	1	1.5	3	1.833	0.9832	0.5363	0	2
Metals	Nickel	µg/L	11	0.5	0.91	1	0.8055	0.2131	0.2646	0	10
Metals	Potassium	µg/L	11	2560	2890	5500	3107	830	0.2671	0	0
Metals	Rubidium	µg/L	6	2	2	4	2.333	0.8165	0.3499	0	0
Metals	Selenium	µg/L	11	0.05	0.8	1.75	0.7909	0.7355	0.9299	0	10
Metals	Silver	µg/L	11	0.14	0.5	0.6	0.4341	0.1327	0.3057	0	11
Metals	Sodium	µg/L	11	26300	30400	35050	29850	2379	0.0797	0	0
Metals	Strontium	µg/L	6	710	725	1030	778.3	124.5	0.1599	0	0
Metals	Thallium	µg/L	11	0.5	1	2.91	1.37	0.7478	0.5458	0	9
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	6	0.5	2.5	2.5	2.167	0.8165	0.3768	0	6
Metals	Titanium	µg/L	6	1	1	1	1	0	0	0	6
Metals	Uranium	µg/L	3	8.73	9.1	9.1	8.977	0.2136	0.0238	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	2	8.73	8.915	9.1	8.915	0.2616	0.0293	0	0
Metals	Uranium by TULIKPA	µg/L	2	8.8	8.9	9	8.9	0.1414	0.0159	0	0

Table 4.2-5b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	11	1.8	3.1	5	3.339	0.8634	0.2586	0	1
Metals	Zinc	µg/L	10	0.3	3.375	11.78	3.653	3.518	0.9632	0	9
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	9	100	130	160	125.4	19.68	0.1569	0	2
Other	Chloride	µg/L	9	7980	8490	1.20E+04	9074	1304	0.1437	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	9	221.9	290	370	283.7	42.04	0.1482	0	0
Other	Nitrogen Ammonia (as N)	µg/L	2	250	252.5	255	252.5	3.536	0.014	0	2
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	2	1800	1900	2000	1900	141.4	0.0744	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	2	2200	2350	2500	2350	212.1	0.0903	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	2	50	50	50	50	0	0	0	2
Other	Nitrogen Total Kjeldahl (as N)	µg/L	2	50	95	140	95	63.64	0.6699	0	1
Other	Oxalate	µg/L	4	10	10	10	10	0	0	0	4
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	3	25	25	100	50	43.3	0.866	0	3
Other	Silica	µg/L	8	2.68E+04	2.87E+04	3.23E+04	2.90E+04	1847	0.0637	0	0
Other	Sulfate	µg/L	9	1.32E+04	1.51E+04	2.95E+04	1.63E+04	4998	0.3058	0	0
Other	Total Dissolved Solids	µg/L	7	2.00E+05	2.79E+05	3.49E+05	2.78E+05	4.31E+04	0.155	0	0
Other	Carbon Dissolved Organic	µg/L	2	1000	1200	1400	1200	282.8	0.2357	0	0
Other	Carbon Total Organic	µg/L	2	580	600	620	600	28.28	0.0471	0	0
Other	Conductivity	µS/cm	7	307	310	392	334.7	36.58	0.1093	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	2	300	450	600	450	212.1	0.4714	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	1	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	2	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Total	µg/L	2	600	650	700	650	70.71	0.1088	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	2	300	400	500	400	141.4	0.3536	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	2	100	150	200	150	70.71	0.4714	0	0
Other	Humic Substances Hydrophobic Total	µg/L	2	400	550	700	550	212.1	0.3857	0	0
Other	pH	SU	6	7.2	7.845	8.15	7.803	0.3547	0.0455	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-74	-71.5	-69	-71.5	3.536	-0.049	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11	-10.75	-10.5	-10.75	0.3536	-0.033	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	5	3054	3203	4093	3337	427.5	0.1281	0	0

Table 4.2-5b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	µg/L	5	3163	3214	3939	3360	327.2	0.0974	0	0
Other	Balance	µg/L	5	-38.41	21.07	34.99	9.362	29.57	3.1587	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	6	1.24E+05	1.25E+05	1.50E+05	1.29E+05	1.04E+04	0.0804	0	0
Other	Ammonium	µg/L	6	10	16.06	40	22.02	14.7	0.6675	0	3
Other	Ammonium [as N]	µg/L	6	7.778	12.49	31.11	17.13	11.43	0.6675	0	3
Other	Bicarbonate	µg/L	6	1.37E+05	1.51E+05	1.83E+05	1.53E+05	1.62E+04	0.106	0	0
Other	Carbonate	µg/L	6	0	0	7700	2350	3664	1.559	0	0
Other	Chlorate (ClO_3)	µg/L	6	10	10	10	10	0	0	0	6
Other	Conductivity (Field)	µS/cm	3	230	230	320	260	51.96	0.1999	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	5	8.75E+04	8.89E+04	1.16E+05	9.43E+04	1.19E+04	0.1263	0	0
Other	Iodide	µg/L	6	5	5	5	5	0	0	0	6
Other	Nitrate	µg/L	6	7710	9180	9880	9017	845.7	0.0938	0	0
Other	Nitrate [as N]	µg/L	6	1741	2073	2231	2036	191	0.0938	0	0
Other	Nitrite	µg/L	6	5	10	40	16.67	14.72	0.8832	0	4
Other	Nitrite [as N]	µg/L	6	0.8974	1.795	7.179	2.991	2.642	0.8832	0	4
Other	pH (Field)	SU	5	6.5	7.4	7.48	7.206	0.4146	0.0575	0	0
Other	Phosphate	µg/L	6	3.26	25	25	18.88	9.723	0.5151	0	6
Other	Silicon	µg/L	5	1.25E+04	1.35E+04	1.46E+04	1.35E+04	737.8	0.0548	0	0
Other	Sulfite	µg/L	6	5	5	5	5	0	0	0	6
Other	Total Suspended Solids	µg/L	0	—	—	—	—	—	—	—	—
Other	Turbidity (Field)	NTU	3	7.6	9.3	9.3	8.733	0.9815	0.1124	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.01131	0.01496	0.01914	0.01483	0.002975	0.2007	0	0
Other-ratio	B/Cl by wt	ratio	5	0.004619	0.005704	0.006007	0.005521	5.80E-04	0.1051	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	5	0.01845	0.03469	0.03534	0.03026	0.007352	0.243	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	15.21	16.61	18.33	16.81	1.176	0.07	0	0
Other-ratio	K/Cl by wt	ratio	5	0.2403	0.3026	0.3228	0.2964	0.03258	0.1099	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.002494	0.003534	0.003641	0.003342	4.79E-04	0.1434	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.914	3.625	3.708	3.511	0.3357	0.0956	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.738	1.779	2.452	1.912	0.3036	0.1588	0	0
Rad-iso	Americium-241	pCi/L	4	0.003	0.005	0.087	0.025	0.04135	1.6538	0	3
Rad-iso	Plutonium-238	pCi/L	4	-0.007	-5.50E-04	0.008	-2.50E-05	0.006154	-246.2	0	4
Rad-iso	Plutonium-239	pCi/L	4	-0.00555	-0.00108	0.0145	0.0017	0.008801	5.1769	0	4
Rad-iso	Strontium-90	pCi/L	4	0	0.05	0.155	0.06375	0.07296	1.1444	0	4
Rad-iso	Tritium	pCi/L	2	0.415	0.5905	0.7661	0.5905	0.2483	0.4204	0	0

Table 4.2-5b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	2	0.13	0.185	0.24	0.185	0.07778	0.4204	0	0
Rad-iso	Uranium-234	pCi/L	4	4.56	4.79	7.79	5.482	1.544	0.2817	0	0
Rad-iso	Uranium-235	pCi/L	4	0.126	0.172	0.263	0.1833	0.05747	0.3136	0	0
Rad-iso	Uranium-238	pCi/L	4	2.77	2.99	4.7	3.362	0.8978	0.267	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	6	6.3	7.2	6.5	0.6245	0.0961	0	0
Rad-gross	Gross Beta Radiation	pCi/L	3	3.4	3.8	5.1	4.1	0.8888	0.2168	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	3	149	165	189	167.7	20.13	0.1201	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-0.75	0.0115	0.2165	-0.1276	0.446	-3.494	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5c
La Mesita Spring Shows Nonfiltered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	6	20	95.7	550	218.7	250.1	1.1433	0	3
Metals	Antimony	µg/L	6	0.1	0.35	11.7	2.517	4.592	1.8248	0	5
Metals	Arsenic	µg/L	6	0.5	1	2.4	1.233	0.7967	0.6459	0	1
Metals	Barium	µg/L	6	94.2	99	132.6	104	14.6	0.1404	0	0
Metals	Beryllium	µg/L	6	0.2	2	2	1.41	0.9142	0.6484	0	6
Metals	Boron	µg/L	5	45	51	54.09	50.28	3.782	0.0752	0	1
Metals	Cadmium	µg/L	6	0.2	1	1	0.75	0.3886	0.5181	0	6
Metals	Calcium	µg/L	6	31600	33400	42100	34700	3804	0.1096	0	0
Metals	Cesium	µg/L	4	2	2	2	2	0	0	0	4
Metals	Chromium	µg/L	6	0.86	3	4	2.96	1.13	0.3816	0	2
Metals	Cobalt	µg/L	6	0.5	2	2	1.553	0.6993	0.4502	0	5
Metals	Copper	µg/L	6	0.62	2	3	1.97	0.9528	0.4836	0	2
Metals	Iron	µg/L	6	20	102.5	360	159.7	148.8	0.9316	0	2
Metals	Lead	µg/L	6	1.1	2	2	1.733	0.4179	0.2411	0	6
Metals	Lithium	µg/L	4	30	30	40	32.5	5	0.1538	0	0
Metals	Magnesium	µg/L	6	1220	1345	1728	1380	185.4	0.1344	0	0
Metals	Manganese	µg/L	6	1.6	3.293	14	5.364	4.841	0.9024	0	1
Metals	Mercury	µg/L	6	0.01	0.02	0.13	0.04	0.04648	1.1619	0	5
Metals	Molybdenum	µg/L	4	2	2	4	2.5	1	0.4	0	2
Metals	Nickel	µg/L	6	0.56	2	3	1.777	0.8467	0.4766	0	5
Metals	Potassium	µg/L	6	2500	2720	3240	2780	299	0.1076	0	0
Metals	Rubidium	µg/L	4	2	2.5	3	2.5	0.5774	0.2309	0	0
Metals	Selenium	µg/L	6	0.1	0.2	3.1	1.117	1.461	1.3081	0	4
Metals	Silver	µg/L	6	0.6	1	1.2	0.9667	0.1966	0.2034	0	6
Metals	Sodium	µg/L	6	26500	29650	35470	29950	3089	0.1031	0	0
Metals	Strontium	µg/L	4	710	740	1050	810.1	161.6	0.1995	0	0
Metals	Thallium	µg/L	6	2	2	5.2	2.633	1.28	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	4	5	5	5	5	0	0	0	4
Metals	Titanium	µg/L	4	2	12	24	12.5	10.25	0.8198	0	1
Metals	Uranium	µg/L	1	8.6	8.6	8.6	8.6	0	0	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-5c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	6	3	3.989	9	4.913	2.251	0.4582	0	1
Metals	Zinc	µg/L	6	0.6	10	10	7.2	4.384	0.6088	0	6
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	5	120	130	200	142	32.73	0.2305	0	1
Other	Chloride	µg/L	5	8200	8250	1.18E+04	9023	1581	0.1753	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	2	-81	-80.5	-80	-80.5	0.7071	-0.0088	0	0
Other	Fluoride	µg/L	5	200	230	280	240.9	37.2	0.1544	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	1	2200	2200	2200	2200	0	0	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	1	100	100	100	100	0	0	0	1
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	2	20	20	20	20	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	1	200	200	200	200	0	0	0	1
Other	Silica	µg/L	4	2.95E+04	3.11E+04	3.19E+04	3.09E+04	1135	0.0367	0	0
Other	Sulfate	µg/L	5	1.40E+04	1.49E+04	2.85E+04	1.74E+04	6195	0.3552	0	0
Other	Total Dissolved Solids	µg/L	5	2.10E+05	2.85E+05	3.48E+05	2.82E+05	4.88E+04	0.1732	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	4	308	313	394	332	41.41	0.1247	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.58	7.865	7.88	7.797	0.1457	0.0187	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.9	-1.9	-1.9	-1.9	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-76	-74	-69	-73	3.606	-0.0494	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.1	-10.5	-10.4	-10.7	0.324	-0.0303	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	4	3177	3229	4061	3424	425.5	0.1243	0	0

Table 4.2-5c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	µg/L	4	3079	3239	3900	3364	365.6	0.1087	0	0
Other	Balance	µg/L	4	-40.51	-20.54	15.63	-16.49	25.03	-1.5176	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	4	1.23E+05	1.26E+05	1.50E+05	1.31E+05	1.27E+04	0.0964	0	0
Other	Ammonium	µg/L	4	20	30	40	30	11.55	0.3849	0	2
Other	Ammonium [as N]	µg/L	4	15.56	23.33	31.11	23.33	8.981	0.3849	0	2
Other	Bicarbonate	µg/L	4	1.50E+05	1.54E+05	1.83E+05	1.60E+05	1.54E+04	0.0964	0	0
Other	Carbonate	µg/L	4	0	0	0	0	0	n/a[e]	0	0
Other	Chlorate (ClO_3)	µg/L	4	20	20	20	20	0	0	0	4
Other	Conductivity (Field)	µS/cm	2	230	275	320	275	63.64	0.2314	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	4	8.64E+04	8.91E+04	1.12E+05	9.42E+04	1.21E+04	0.1282	0	0
Other	Iodide	µg/L	4	10	10	10	10	0	0	0	4
Other	Nitrate	µg/L	4	7360	8450	9730	8498	969.1	0.114	0	0
Other	Nitrate [as N]	µg/L	4	1662	1908	2197	1919	218.8	0.114	0	0
Other	Nitrite	µg/L	4	10	15	20	15	5.774	0.3849	0	4
Other	Nitrite [as N]	µg/L	4	1.795	2.692	3.59	2.692	1.036	0.3849	0	4
Other	pH (Field)	SU	4	6.5	7.285	7.48	7.138	0.4449	0.0623	0	0
Other	Phosphate	µg/L	4	33.84	50	50	45.96	8.079	0.1758	0	3
Other	Silicon	µg/L	4	1.38E+04	1.45E+04	1.49E+04	1.44E+04	530.2	0.0367	0	0
Other	Sulfite	µg/L	4	10	10	10	10	0	0	0	4
Other	Total Suspended Solids	µg/L	4	100	1241	4900	1871	2158	1.1537	0	1
Other	Turbidity (Field)	NTU	2	7.6	8.45	9.3	8.45	1.202	0.1423	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.01097	0.01481	0.01583	0.01411	0.002158	0.153	0	0
Other-ratio	B/Cl by wt	ratio	4	0.00457	0.005519	0.006212	0.005455	7.17E-04	0.1314	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	4	0.01814	0.03031	0.0341	0.02822	0.007556	0.2678	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	15.46	17.97	18.76	17.54	1.444	0.0823	0	0
Other-ratio	K/Cl by wt	ratio	4	0.2434	0.2983	0.3118	0.2879	0.03064	0.1064	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.00338	0.003558	0.003654	0.003538	1.31E-04	0.037	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.997	3.515	3.715	3.436	0.3072	0.0894	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.729	1.81	2.408	1.939	0.3152	0.1625	0	0
Rad-iso	Americium-241	pCi/L	3	0.021	0.067	0.172	0.08667	0.0774	0.893	0	1
Rad-iso	Plutonium-238	pCi/L	3	-0.0043	0.0017	0.015	0.004133	0.009877	2.3897	0	3
Rad-iso	Plutonium-239	pCi/L	3	-0.0017	0.0032	0.0054	0.0023	0.003635	1.5802	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.02	0.22	0.25	0.15	0.148	0.9866	0	3
Rad-iso	Tritium	pCi/L	6	-0.06384	0.3512	3.735	0.8991	1.429	1.5897	0	0

Table 4.2-5c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	4	-0.02	0.22	1.17	0.3975	0.5296	1.3322	0	0
Rad-iso	Uranium-234	pCi/L	3	4.64	4.94	8.02	5.867	1.871	0.3189	0	0
Rad-iso	Uranium-235	pCi/L	3	0.161	0.179	0.327	0.2223	0.09109	0.4097	0	0
Rad-iso	Uranium-238	pCi/L	3	2.92	3.1	4.98	3.667	1.141	0.3112	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	4.4	5.6	6.8	5.6	1.697	0.303	0	0
Rad-gross	Gross Beta Radiation	pCi/L	2	2.2	3.35	4.5	3.35	1.626	0.4855	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	2	183	205	227	205	31.11	0.1518	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-1.7	-1.5	1.38	-0.6067	1.723	-2.8408	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] — = No summary information, no samples analyzed.

[e] n/a = Not applicable.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5d
La Mesita Spring Shows Nonfiltered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	6	10	86.68	550	211.5	256.7	1.2137	0	3
Metals	Antimony	µg/L	6	0.05	0.3	5.85	1.3	2.276	1.7511	0	5
Metals	Arsenic	µg/L	6	0.5	0.9	1.9	1.033	0.561	0.5429	0	1
Metals	Barium	µg/L	6	94.2	99	132.6	104	14.6	0.1404	0	0
Metals	Beryllium	µg/L	6	0.1	1	1	0.705	0.4571	0.6484	0	6
Metals	Boron	µg/L	5	26.65	48	54.09	44.95	10.77	0.2397	0	1
Metals	Cadmium	µg/L	6	0.1	0.5	0.5	0.375	0.1943	0.5181	0	6
Metals	Calcium	µg/L	6	31600	33400	42100	34700	3804	0.1096	0	0
Metals	Cesium	µg/L	4	1	1	1	1	0	0	0	4
Metals	Chromium	µg/L	6	0.43	3	4	2.563	1.23	0.4798	0	2
Metals	Cobalt	µg/L	6	0.25	1	1	0.845	0.3002	0.3553	0	5
Metals	Copper	µg/L	6	0.31	1.6	3	1.752	1.107	0.6319	0	2
Metals	Iron	µg/L	6	20	84.76	360	150.2	157	1.0452	0	2
Metals	Lead	µg/L	6	0.55	1	1	0.8667	0.209	0.2411	0	6
Metals	Lithium	µg/L	4	30	30	40	32.5	5	0.1538	0	0
Metals	Magnesium	µg/L	6	1220	1345	1728	1380	185.4	0.1344	0	0
Metals	Manganese	µg/L	6	1	3.293	14	5.198	4.995	0.961	0	1
Metals	Mercury	µg/L	6	0.005	0.01	0.13	0.03083	0.04913	1.5935	0	5
Metals	Molybdenum	µg/L	4	1	1.5	4	2	1.414	0.7071	0	2
Metals	Nickel	µg/L	6	0.28	1	3	1.138	0.9598	0.8432	0	5
Metals	Potassium	µg/L	6	2500	2720	3240	2780	299	0.1076	0	0
Metals	Rubidium	µg/L	4	2	2.5	3	2.5	0.5774	0.2309	0	0
Metals	Selenium	µg/L	6	0.05	0.2	1.55	0.5917	0.7067	1.1944	0	4
Metals	Silver	µg/L	6	0.3	0.5	0.6	0.4833	0.09832	0.2034	0	6
Metals	Sodium	µg/L	6	26500	29650	35470	29950	3089	0.1031	0	0
Metals	Strontium	µg/L	4	710	740	1050	810.1	161.6	0.1995	0	0
Metals	Thallium	µg/L	6	1	1	2.6	1.317	0.6401	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	4	2.5	2.5	2.5	2.5	0	0	0	4
Metals	Titanium	µg/L	4	1	12	24	12.25	10.6	0.8649	0	1
Metals	Uranium	µg/L	1	8.6	8.6	8.6	8.6	0	0	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-5d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	6	2.1	3.639	9	4.563	2.53	0.5545	0	1
Metals	Zinc	µg/L	6	0.3	5	5	3.6	2.192	0.6088	0	6
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	5	100	129.8	130	122	13.01	0.1067	0	1
Other	Chloride	µg/L	5	8200	8250	1.18E+04	9023	1581	0.1753	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	2	-81	-80.5	-80	-80.5	0.7071	-0.0088	0	0
Other	Fluoride	µg/L	5	200	230	280	240.9	37.2	0.1544	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	1	2200	2200	2200	2200	0	0	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	1	50	50	50	50	0	0	0	1
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	2	10	10	10	10	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	1	100	100	100	100	0	0	0	1
Other	Silica	µg/L	4	2.95E+04	3.11E+04	3.19E+04	3.09E+04	1135	0.0367	0	0
Other	Sulfate	µg/L	5	1.40E+04	1.49E+04	2.85E+04	1.74E+04	6195	0.3552	0	0
Other	Total Dissolved Solids	µg/L	5	2.10E+05	2.85E+05	3.48E+05	2.82E+05	4.88E+04	0.1732	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	4	308	313	394	332	41.41	0.1247	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.58	7.865	7.88	7.797	0.1457	0.0187	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.9	-1.9	-1.9	-1.9	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-76	-74	-69	-73	3.606	-0.0494	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.1	-10.5	-10.4	-10.7	0.324	-0.0303	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	4	3177	3229	4061	3424	425.5	0.1243	0	0

Table 4.2-5d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	µg/L	4	3079	3239	3900	3364	365.6	0.1087	0	0
Other	Balance	µg/L	4	-40.51	-20.54	15.63	-16.49	25.03	-1.5176	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	4	1.23E+05	1.26E+05	1.50E+05	1.31E+05	1.27E+04	0.0964	0	0
Other	Ammonium	µg/L	4	10	25	40	25	17.32	0.6928	0	2
Other	Ammonium [as N]	µg/L	4	7.778	19.44	31.11	19.44	13.47	0.6928	0	2
Other	Bicarbonate	µg/L	4	1.50E+05	1.54E+05	1.83E+05	1.60E+05	1.54E+04	0.0964	0	0
Other	Carbonate	µg/L	4	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	4	10	10	10	10	0	0	0	4
Other	Conductivity (Field)	µS/cm	2	230	275	320	275	63.64	0.2314	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	4	8.64E+04	8.91E+04	1.12E+05	9.42E+04	1.21E+04	0.1282	0	0
Other	Iodide	µg/L	4	5	5	5	5	0	0	0	4
Other	Nitrate	µg/L	4	7360	8450	9730	8498	969.1	0.114	0	0
Other	Nitrate [as N]	µg/L	4	1662	1908	2197	1919	218.8	0.114	0	0
Other	Nitrite	µg/L	4	5	7.5	10	7.5	2.887	0.3849	0	4
Other	Nitrite [as N]	µg/L	4	0.8974	1.346	1.795	1.346	0.5181	0.3849	0	4
Other	pH (Field)	SU	4	6.5	7.285	7.48	7.138	0.4449	0.0623	0	0
Other	Phosphate	µg/L	4	25	25	33.84	27.21	4.421	0.1625	0	3
Other	Silicon	µg/L	4	1.38E+04	1.45E+04	1.49E+04	1.44E+04	530.2	0.0367	0	0
Other	Sulfite	µg/L	4	5	5	5	5	0	0	0	4
Other	Total Suspended Solids	µg/L	4	50	1241	4900	1858	2172	1.1689	0	1
Other	Turbidity (Field)	NTU	2	7.6	8.45	9.3	8.45	1.202	0.1423	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.01097	0.01481	0.01583	0.01411	0.002158	0.153	0	0
Other-ratio	B/Cl by wt	ratio	4	0.00457	0.005519	0.006212	0.005455	7.17E-04	0.1314	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	4	0.01814	0.03031	0.0341	0.02822	0.007556	0.2678	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	15.46	17.97	18.76	17.54	1.444	0.0823	0	0
Other-ratio	K/Cl by wt	ratio	4	0.2434	0.2983	0.3118	0.2879	0.03064	0.1064	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.00338	0.003558	0.003654	0.003538	1.31E-04	0.037	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.997	3.515	3.715	3.436	0.3072	0.0894	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.729	1.81	2.408	1.939	0.3152	0.1625	0	0
Rad-iso	Americium-241	pCi/L	3	0.0105	0.067	0.172	0.08317	0.08195	0.9854	0	1
Rad-iso	Plutonium-238	pCi/L	3	-0.00215	8.50E-04	0.0075	0.002067	0.004939	2.3897	0	3
Rad-iso	Plutonium-239	pCi/L	3	-8.50E-04	0.0016	0.0027	0.00115	0.001817	1.5802	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.01	0.11	0.125	0.075	0.07399	0.9866	0	3
Rad-iso	Tritium	pCi/L	6	-0.06384	0.3512	3.735	0.8991	1.429	1.5897	0	0

Table 4.2-5d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	4	-0.02	0.22	1.17	0.3975	0.5296	1.3322	0	0
Rad-iso	Uranium-234	pCi/L	3	4.64	4.94	8.02	5.867	1.871	0.3189	0	0
Rad-iso	Uranium-235	pCi/L	3	0.161	0.179	0.327	0.2223	0.09109	0.4097	0	0
Rad-iso	Uranium-238	pCi/L	3	2.92	3.1	4.98	3.667	1.141	0.3112	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	4.4	5.6	6.8	5.6	1.697	0.303	0	0
Rad-gross	Gross Beta Radiation	pCi/L	2	2.2	3.35	4.5	3.35	1.626	0.4855	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	2	183	205	227	205	31.11	0.1518	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-0.85	-0.75	0.69	-0.3033	0.8617	-2.8408	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5e
La Mesita Spring Shows Filtered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	11	4.2	13.1	70	17.92	18.52	1.0334	0	8
Metals	Antimony	µg/L	11	0.05	0.3415	4.85	0.8584	1.41	1.6427	0	10
Metals	Arsenic	µg/L	11	0.5	0.8	1.5	0.8773	0.3629	0.4136	0	5
Metals	Barium	µg/L	11	94	100	129.2	102.3	10.38	0.1015	0	0
Metals	Beryllium	µg/L	11	0.005	0.5	1	0.5399	0.4596	0.8512	0	10
Metals	Boron	µg/L	9	28	47	57	45.7	9.894	0.2165	0	1
Metals	Cadmium	µg/L	11	0.065	0.5	0.5	0.3164	0.2121	0.6705	0	11
Metals	Calcium	µg/L	11	29400	33400	43390	33670	3682	0.1093	0	0
Metals	Cesium	µg/L	6	0.5	1	1	0.9167	0.2041	0.2227	0	6
Metals	Chromium	µg/L	11	0.395	2	4	1.903	1.116	0.5864	0	3
Metals	Cobalt	µg/L	11	0.25	1	1	0.7636	0.3334	0.4366	0	9
Metals	Copper	µg/L	11	0.14	1	3.2	0.99	0.913	0.9222	0	8
Metals	Iron	µg/L	11	5	14	120	22.42	33.03	1.4734	0	8
Metals	Lead	µg/L	11	0.005	0.65	1	0.66	0.3855	0.5841	0	11
Metals	Lithium	µg/L	6	30	30	35	30.83	2.041	0.0662	0	0
Metals	Magnesium	µg/L	11	1000	1240	1744	1288	179.2	0.1391	0	0
Metals	Manganese	µg/L	11	0.65	1	18	3.709	5.754	1.5514	0	5
Metals	Mercury	µg/L	11	0.0055	0.025	0.15	0.04291	0.05076	1.183	0	9
Metals	Molybdenum	µg/L	6	1	1.5	3	1.833	0.9832	0.5363	0	2
Metals	Nickel	µg/L	11	0.5	0.91	1	0.8055	0.2131	0.2646	0	10
Metals	Potassium	µg/L	11	2560	2890	5500	3107	830	0.2671	0	0
Metals	Rubidium	µg/L	6	2	2	4	2.333	0.8165	0.3499	0	0
Metals	Selenium	µg/L	11	0.05	0.8	1.75	0.7909	0.7355	0.9299	0	10
Metals	Silver	µg/L	11	0.14	0.5	0.6	0.4341	0.1327	0.3057	0	11
Metals	Sodium	µg/L	11	26300	30400	35050	29850	2379	0.0797	0	0
Metals	Strontium	µg/L	6	710	725	1030	778.3	124.5	0.1599	0	0
Metals	Thallium	µg/L	11	0.5	1	2.91	1.37	0.7478	0.5458	0	9
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	6	0.5	2.5	2.5	2.167	0.8165	0.3768	0	6
Metals	Titanium	µg/L	6	1	1	1	1	0	0	0	6
Metals	Uranium	µg/L	3	8.73	9.1	9.1	8.977	0.2136	0.0238	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	2	8.73	8.915	9.1	8.915	0.2616	0.0293	0	0
Metals	Uranium by TULIKPA	µg/L	2	8.8	8.9	9	8.9	0.1414	0.0159	0	0

Table 4.2-5e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	11	1.8	3.1	5	3.339	0.8634	0.2586	0	1
Metals	Zinc	µg/L	10	0.3	3.375	11.78	3.653	3.518	0.9632	0	9
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	9	100	130	160	125.4	19.68	0.1569	0	2
Other	Chloride	µg/L	9	7980	8490	1.20E+04	9074	1304	0.1437	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	9	221.9	290	370	283.7	42.04	0.1482	0	0
Other	Nitrogen Ammonia (as N)	µg/L	2	250	252.5	255	252.5	3.536	0.014	0	2
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	2	1800	1900	2000	1900	141.4	0.0744	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	2	2200	2350	2500	2350	212.1	0.0903	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	2	50	50	50	50	0	0	0	2
Other	Nitrogen Total Kjeldahl (as N)	µg/L	2	50	95	140	95	63.64	0.6699	0	1
Other	Oxalate	µg/L	4	10	10	10	10	0	0	0	4
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	3	25	25	100	50	43.3	0.866	0	3
Other	Silica	µg/L	8	2.68E+04	2.87E+04	3.23E+04	2.90E+04	1847	0.0637	0	0
Other	Sulfate	µg/L	9	1.32E+04	1.51E+04	2.95E+04	1.63E+04	4998	0.3058	0	0
Other	Total Dissolved Solids	µg/L	7	2.00E+05	2.79E+05	3.49E+05	2.78E+05	4.31E+04	0.155	0	0
Other	Carbon Dissolved Organic	µg/L	2	1000	1200	1400	1200	282.8	0.2357	0	0
Other	Carbon Total Organic	µg/L	2	580	600	620	600	28.28	0.0471	0	0
Other	Conductivity	µS/cm	7	307	310	392	334.7	36.58	0.1093	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	2	300	450	600	450	212.1	0.4714	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	1	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	2	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Total	µg/L	2	600	650	700	650	70.71	0.1088	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	2	300	400	500	400	141.4	0.3536	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	2	100	150	200	150	70.71	0.4714	0	0
Other	Humic Substances Hydrophobic Total	µg/L	2	400	550	700	550	212.1	0.3857	0	0
Other	pH	SU	6	7.2	7.845	8.15	7.803	0.3547	0.0455	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-74	-71.5	-69	-71.5	3.536	-0.0494	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11	-10.75	-10.5	-10.75	0.3536	-0.0329	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	5	3054	3203	4093	3337	427.5	0.1281	0	0

Table 4.2-5e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	µg/L	5	3163	3214	3939	3360	327.2	0.0974	0	0
Other	Balance	µg/L	5	-38.41	21.07	34.99	9.362	29.57	3.1587	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	6	1.24E+05	1.25E+05	1.50E+05	1.29E+05	1.04E+04	0.0804	0	0
Other	Ammonium	µg/L	6	10	16.06	40	22.02	14.7	0.6675	0	3
Other	Ammonium [as N]	µg/L	6	7.778	12.49	31.11	17.13	11.43	0.6675	0	3
Other	Bicarbonate	µg/L	6	1.37E+05	1.51E+05	1.83E+05	1.53E+05	1.62E+04	0.106	0	0
Other	Carbonate	µg/L	6	0	0	7700	2350	3664	1.559	0	0
Other	Chlorate (ClO_3)	µg/L	6	10	10	10	10	0	0	0	6
Other	Conductivity (Field)	µS/cm	3	230	230	320	260	51.96	0.1999	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	5	8.75E+04	8.89E+04	1.16E+05	9.43E+04	1.19E+04	0.1263	0	0
Other	Iodide	µg/L	6	5	5	5	5	0	0	0	6
Other	Nitrate	µg/L	6	7710	9180	9880	9017	845.7	0.0938	0	0
Other	Nitrate [as N]	µg/L	6	1741	2073	2231	2036	191	0.0938	0	0
Other	Nitrite	µg/L	6	5	10	40	16.67	14.72	0.8832	0	4
Other	Nitrite [as N]	µg/L	6	0.8974	1.795	7.179	2.991	2.642	0.8832	0	4
Other	pH (Field)	SU	5	6.5	7.4	7.48	7.206	0.4146	0.0575	0	0
Other	Phosphate	µg/L	6	3.26	25	25	18.88	9.723	0.5151	0	6
Other	Silicon	µg/L	5	1.25E+04	1.35E+04	1.46E+04	1.35E+04	737.8	0.0548	0	0
Other	Sulfite	µg/L	6	5	5	5	5	0	0	0	6
Other	Total Suspended Solids	µg/L	0	—	—	—	—	—	—	—	—
Other	Turbidity (Field)	NTU	3	7.6	9.3	9.3	8.733	0.9815	0.1124	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.01131	0.01496	0.01914	0.01483	0.002975	0.2007	0	0
Other-ratio	B/Cl by wt	ratio	5	0.004619	0.005704	0.006007	0.005521	5.80E-04	0.1051	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	5	0.01845	0.03469	0.03534	0.03026	0.007352	0.243	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	15.21	16.61	18.33	16.81	1.176	0.07	0	0
Other-ratio	K/Cl by wt	ratio	5	0.2403	0.3026	0.3228	0.2964	0.03258	0.1099	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.002494	0.003534	0.003641	0.003342	4.79E-04	0.1434	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.914	3.625	3.708	3.511	0.3357	0.0956	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.738	1.779	2.452	1.912	0.3036	0.1588	0	0
Rad-iso	Americium-241	pCi/L	4	0.003	0.005	0.087	0.025	0.04135	1.6538	0	3
Rad-iso	Plutonium-238	pCi/L	4	-0.007	-5.50E-04	0.008	-2.50E-05	0.006154	-246.152	0	4
Rad-iso	Plutonium-239	pCi/L	4	-0.00555	-0.00108	0.0145	0.0017	0.008801	5.1769	0	4
Rad-iso	Strontium-90	pCi/L	4	0	0.05	0.155	0.06375	0.07296	1.1444	0	4
Rad-iso	Tritium	pCi/L	2	0.415	0.5905	0.7661	0.5905	0.2483	0.4204	0	0

Table 4.2-5e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	2	0.13	0.185	0.24	0.185	0.07778	0.4204	0	0
Rad-iso	Uranium-234	pCi/L	4	4.56	4.79	7.79	5.482	1.544	0.2817	0	0
Rad-iso	Uranium-235	pCi/L	4	0.126	0.172	0.263	0.1833	0.05747	0.3136	0	0
Rad-iso	Uranium-238	pCi/L	4	2.77	2.99	4.7	3.362	0.8978	0.267	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	6	6.3	7.2	6.5	0.6245	0.0961	0	0
Rad-gross	Gross Beta Radiation	pCi/L	3	3.4	3.8	5.1	4.1	0.8888	0.2168	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	3	149	165	189	167.7	20.13	0.1201	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-0.75	0.0115	0.2165	-0.1276	0.446	-3.4943	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5f
La Mesita Spring Shows Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	6	10	86.68	550	211.5	256.7	1.2137	0	3
Metals	Antimony	µg/L	6	0.05	0.3	5.85	1.3	2.276	1.7511	0	5
Metals	Arsenic	µg/L	6	0.5	0.9	1.9	1.033	0.561	0.5429	0	1
Metals	Barium	µg/L	6	94.2	99	132.6	104	14.6	0.1404	0	0
Metals	Beryllium	µg/L	6	0.1	1	1	0.705	0.4571	0.6484	0	6
Metals	Boron	µg/L	5	26.65	48	54.09	44.95	10.77	0.2397	0	1
Metals	Cadmium	µg/L	6	0.1	0.5	0.5	0.375	0.1943	0.5181	0	6
Metals	Calcium	µg/L	6	31600	33400	42100	34700	3804	0.1096	0	0
Metals	Cesium	µg/L	4	1	1	1	1	0	0	0	4
Metals	Chromium	µg/L	6	0.43	3	4	2.563	1.23	0.4798	0	2
Metals	Cobalt	µg/L	6	0.25	1	1	0.845	0.3002	0.3553	0	5
Metals	Copper	µg/L	6	0.31	1.6	3	1.752	1.107	0.6319	0	2
Metals	Iron	µg/L	6	20	84.76	360	150.2	157	1.0452	0	2
Metals	Lead	µg/L	6	0.55	1	1	0.8667	0.209	0.2411	0	6
Metals	Lithium	µg/L	4	30	30	40	32.5	5	0.1538	0	0
Metals	Magnesium	µg/L	6	1220	1345	1728	1380	185.4	0.1344	0	0
Metals	Manganese	µg/L	6	1	3.293	14	5.198	4.995	0.961	0	1
Metals	Mercury	µg/L	6	0.005	0.01	0.13	0.03083	0.04913	1.5935	0	5
Metals	Molybdenum	µg/L	4	1	1.5	4	2	1.414	0.7071	0	2
Metals	Nickel	µg/L	6	0.28	1	3	1.138	0.9598	0.8432	0	5
Metals	Potassium	µg/L	6	2500	2720	3240	2780	299	0.1076	0	0
Metals	Rubidium	µg/L	4	2	2.5	3	2.5	0.5774	0.2309	0	0
Metals	Selenium	µg/L	6	0.05	0.2	1.55	0.5917	0.7067	1.1944	0	4
Metals	Silver	µg/L	6	0.3	0.5	0.6	0.4833	0.09832	0.2034	0	6
Metals	Sodium	µg/L	6	26500	29650	35470	29950	3089	0.1031	0	0
Metals	Strontium	µg/L	4	710	740	1050	810.1	161.6	0.1995	0	0
Metals	Thallium	µg/L	6	1	1	2.6	1.317	0.6401	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	4	2.5	2.5	2.5	2.5	0	0	0	4
Metals	Titanium	µg/L	4	1	12	24	12.25	10.6	0.8649	0	1
Metals	Uranium	µg/L	1	8.6	8.6	8.6	8.6	0	0	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-5f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium by TULIKPA	μg/L	0	—	—	—	—	—	—	—	—
Metals	Vanadium	μg/L	6	2.1	3.639	9	4.563	2.53	0.5545	0	1
Metals	Zinc	μg/L	6	0.3	5	5	3.6	2.192	0.6088	0	6
Other	Ammonia	μg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	μg/L	1	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	μg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	μg/L	5	100	129.8	130	122	13.01	0.1067	0	1
Other	Chloride	μg/L	5	8200	8250	1.18E+04	9023	1581	0.1753	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	2	-81	-80.5	-80	-80.5	0.7071	-0.0088	0	0
Other	Fluoride	μg/L	5	200	230	280	240.9	37.2	0.1544	0	0
Other	Nitrogen Ammonia (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	μg/L	1	2200	2200	2200	2200	0	0	0	0
Other	Nitrogen Nitrite (as NO_2)	μg/L	1	50	50	50	50	0	0	0	1
Other	Nitrogen Total Kjeldahl (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	μg/L	2	10	10	10	10	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	μg/L	1	100	100	100	100	0	0	0	1
Other	Silica	μg/L	4	2.95E+04	3.11E+04	3.19E+04	3.09E+04	1135	0.0367	0	0
Other	Sulfate	μg/L	5	1.40E+04	1.49E+04	2.85E+04	1.74E+04	6195	0.3552	0	0
Other	Total Dissolved Solids	μg/L	5	2.10E+05	2.85E+05	3.48E+05	2.82E+05	4.88E+04	0.1732	0	0
Other	Carbon Dissolved Organic	μg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	μg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	μS/cm	4	308	313	394	332	41.41	0.1247	0	0
Other	Humic Substances Hydrophilic Acids	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	μg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.58	7.865	7.88	7.797	0.1457	0.0187	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.9	-1.9	-1.9	-1.9	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-76	-74	-69	-73	3.606	-0.0494	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	5	-11.1	-10.5	-10.4	-10.7	0.324	-0.0303	0	0
Other	Cyanide Reactive	μg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	μg/L	0	—	—	—	—	—	—	—	—

Table 4.2-5f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	µg/L	4	3177	3229	4061	3424	425.5	0.1243	0	0
Other	Cation Sum	µg/L	4	3079	3239	3900	3364	365.6	0.1087	0	0
Other	Balance	µg/L	4	-40.51	-20.54	15.63	-16.49	25.03	-1.5176	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	4	1.23E+05	1.26E+05	1.50E+05	1.31E+05	1.27E+04	0.0964	0	0
Other	Ammonium	µg/L	4	10	25	40	25	17.32	0.6928	0	2
Other	Ammonium [as N]	µg/L	4	7.778	19.44	31.11	19.44	13.47	0.6928	0	2
Other	Bicarbonate	µg/L	4	1.50E+05	1.54E+05	1.83E+05	1.60E+05	1.54E+04	0.0964	0	0
Other	Carbonate	µg/L	4	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	4	10	10	10	10	0	0	0	4
Other	Conductivity (Field)	µS/cm	2	230	275	320	275	63.64	0.2314	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	4	8.64E+04	8.91E+04	1.12E+05	9.42E+04	1.21E+04	0.1282	0	0
Other	Iodide	µg/L	4	5	5	5	5	0	0	0	4
Other	Nitrate	µg/L	4	7360	8450	9730	8498	969.1	0.114	0	0
Other	Nitrate [as N]	µg/L	4	1662	1908	2197	1919	218.8	0.114	0	0
Other	Nitrite	µg/L	4	5	7.5	10	7.5	2.887	0.3849	0	4
Other	Nitrite [as N]	µg/L	4	0.8974	1.346	1.795	1.346	0.5181	0.3849	0	4
Other	pH (Field)	SU	4	6.5	7.285	7.48	7.138	0.4449	0.0623	0	0
Other	Phosphate	µg/L	4	25	25	33.84	27.21	4.421	0.1625	0	3
Other	Silicon	µg/L	4	1.38E+04	1.45E+04	1.49E+04	1.44E+04	530.2	0.0367	0	0
Other	Sulfite	µg/L	4	5	5	5	5	0	0	0	4
Other	Total Suspended Solids	µg/L	4	50	1241	4900	1858	2172	1.1689	0	1
Other	Turbidity (Field)	NTU	2	7.6	8.45	9.3	8.45	1.202	0.1423	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.01097	0.01481	0.01583	0.01411	0.002158	0.153	0	0
Other-ratio	B/Cl by wt	ratio	4	0.00457	0.005519	0.006212	0.005455	7.17E-04	0.1314	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	4	0.01814	0.03031	0.0341	0.02822	0.007556	0.2678	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	15.46	17.97	18.76	17.54	1.444	0.0823	0	0
Other-ratio	K/Cl by wt	ratio	4	0.2434	0.2983	0.3118	0.2879	0.03064	0.1064	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.00338	0.003558	0.003654	0.003538	1.31E-04	0.037	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.997	3.515	3.715	3.436	0.3072	0.0894	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.729	1.81	2.408	1.939	0.3152	0.1625	0	0
Rad-iso	Americium-241	pCi/L	3	0.0105	0.067	0.172	0.08317	0.08195	0.9854	0	1
Rad-iso	Plutonium-238	pCi/L	3	-0.00215	8.50E-04	0.0075	0.002067	0.004939	2.3897	0	3
Rad-iso	Plutonium-239	pCi/L	3	-8.50E-04	0.0016	0.0027	0.00115	0.001817	1.5802	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.01	0.11	0.125	0.075	0.07399	0.9866	0	3

Table 4.2-5f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	pCi/L	6	-0.06384	0.3512	3.735	0.8991	1.429	1.5897	0	0
Rad-iso	Tritium	TU[f]	4	-0.02	0.22	1.17	0.3975	0.5296	1.3322	0	0
Rad-iso	Uranium-234	pCi/L	3	4.64	4.94	8.02	5.867	1.871	0.3189	0	0
Rad-iso	Uranium-235	pCi/L	3	0.161	0.179	0.327	0.2223	0.09109	0.4097	0	0
Rad-iso	Uranium-238	pCi/L	3	2.92	3.1	4.98	3.667	1.141	0.3112	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	4.4	5.6	6.8	5.6	1.697	0.303	0	0
Rad-gross	Gross Beta Radiation	pCi/L	2	2.2	3.35	4.5	3.35	1.626	0.4855	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	2	183	205	227	205	31.11	0.1518	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-0.85	-0.75	0.69	-0.3033	0.8617	-2.8408	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-5g
La Mesita Spring Shows Both Filtered and Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	17	4.2	14.3	550	86.23	172.9	2.0049	0	11
Metals	Antimony	µg/L	17	0.05	0.3415	5.85	1.014	1.706	1.6817	0	15
Metals	Arsenic	µg/L	17	0.5	0.8	1.9	0.9324	0.4319	0.4632	0	6
Metals	Barium	µg/L	17	94	100	132.6	102.9	11.6	0.1128	0	0
Metals	Beryllium	µg/L	17	0.005	1	1	0.5982	0.4516	0.7549	0	16
Metals	Boron	µg/L	14	26.65	47.5	57	45.43	9.803	0.2158	0	2
Metals	Cadmium	µg/L	17	0.065	0.5	0.5	0.3371	0.2019	0.599	0	17
Metals	Calcium	µg/L	17	29400	33400	43390	34030	3640	0.107	0	0
Metals	Cesium	µg/L	10	0.5	1	1	0.95	0.1581	0.1664	0	10
Metals	Chromium	µg/L	17	0.395	2	4	2.136	1.165	0.5454	0	5
Metals	Cobalt	µg/L	17	0.25	1	1	0.7924	0.3151	0.3976	0	14
Metals	Copper	µg/L	17	0.14	1	3.2	1.259	1.022	0.8119	0	10
Metals	Iron	µg/L	17	5	20	360	67.52	111.1	1.6456	0	10
Metals	Lead	µg/L	17	0.005	1	1	0.7329	0.3419	0.4664	0	17
Metals	Lithium	µg/L	10	30	30	40	31.5	3.375	0.1071	0	0
Metals	Magnesium	µg/L	17	1000	1290	1744	1320	181.3	0.1373	0	0
Metals	Manganese	µg/L	17	0.65	1.6	18	4.235	5.388	1.2724	0	6
Metals	Mercury	µg/L	17	0.005	0.01	0.15	0.03865	0.04899	1.2677	0	14
Metals	Molybdenum	µg/L	10	1	1.5	4	1.9	1.101	0.5792	0	4
Metals	Nickel	µg/L	17	0.28	1	3	0.9229	0.5858	0.6347	0	15
Metals	Potassium	µg/L	17	2500	2880	5500	2992	696.1	0.2327	0	0
Metals	Rubidium	µg/L	10	2	2	4	2.4	0.6992	0.2913	0	0
Metals	Selenium	µg/L	17	0.05	0.2	1.75	0.7206	0.7098	0.985	0	14
Metals	Silver	µg/L	17	0.14	0.5	0.6	0.4515	0.1209	0.2677	0	17
Metals	Sodium	µg/L	17	26300	30200	35470	29880	2554	0.0854	0	0
Metals	Strontium	µg/L	10	710	725	1050	791	132.6	0.1676	0	0
Metals	Thallium	µg/L	17	0.5	1	2.91	1.351	0.6915	0.5118	0	15
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	10	0.5	2.5	2.5	2.3	0.6325	0.275	0	10
Metals	Titanium	µg/L	10	1	1	24	5.5	8.436	1.5339	0	7
Metals	Uranium	µg/L	4	8.6	8.915	9.1	8.883	0.2567	0.0289	0	0
Metals	Uranium by NATU	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	2	8.73	8.915	9.1	8.915	0.2616	0.0293	0	0
Metals	Uranium by TULIKPA	µg/L	2	8.8	8.9	9	8.9	0.1414	0.0159	0	0

Table 4.2-5g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	17	1.8	3.126	9	3.771	1.682	0.4461	0	2
Metals	Zinc	µg/L	16	0.3	5	11.78	3.633	3.005	0.8271	0	15
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	2	1.20E+05	1.20E+05	1.20E+05	1.20E+05	0	0	0	0
Other	Bicarbonate as Calcium Carbonate	µg/L	0	—	—	—	—	—	—	—	—
Other	Bromide	µg/L	14	100	129.9	160	124.2	17.13	0.1379	0	3
Other	Chloride	µg/L	14	7980	8425	1.20E+04	9056	1348	0.1488	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	2	-81	-80.5	-80	-80.5	0.7071	-0.0088	0	0
Other	Fluoride	µg/L	14	200	275.5	370	268.4	44.32	0.1651	0	0
Other	Nitrogen Ammonia (as N)	µg/L	2	250	252.5	255	252.5	3.536	0.014	0	2
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	2	1800	1900	2000	1900	141.4	0.0744	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	3	2200	2200	2500	2300	173.2	0.0753	0	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	3	50	50	50	50	0	0	0	3
Other	Nitrogen Total Kjeldahl (as N)	µg/L	2	50	95	140	95	63.64	0.6699	0	1
Other	Oxalate	µg/L	6	10	10	10	10	0	0	0	6
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	4	25	62.5	100	62.5	43.3	0.6928	0	4
Other	Silica	µg/L	12	2.68E+04	2.92E+04	3.23E+04	2.96E+04	1838	0.062	0	0
Other	Sulfate	µg/L	14	1.32E+04	1.50E+04	2.95E+04	1.67E+04	5242	0.3132	0	0
Other	Total Dissolved Solids	µg/L	12	2.00E+05	2.80E+05	3.49E+05	2.80E+05	4.34E+04	0.1552	0	0
Other	Carbon Dissolved Organic	µg/L	2	1000	1200	1400	1200	282.8	0.2357	0	0
Other	Carbon Total Organic	µg/L	2	580	600	620	600	28.28	0.0471	0	0
Other	Conductivity	µS/cm	11	307	312	394	333.7	36.32	0.1088	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	2	300	450	600	450	212.1	0.4714	0	0
Other	Humic Substances Hydrophilic Bases	µg/L	1	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Neutrals	µg/L	2	100	100	100	100	0	0	0	0
Other	Humic Substances Hydrophilic Total	µg/L	2	600	650	700	650	70.71	0.1088	0	0
Other	Humic Substances Hydrophobic Acids	µg/L	2	300	400	500	400	141.4	0.3536	0	0
Other	Humic Substances Hydrophobic Neutrals	µg/L	2	100	150	200	150	70.71	0.4714	0	0
Other	Humic Substances Hydrophobic Total	µg/L	2	400	550	700	550	212.1	0.3857	0	0
Other	pH	SU	10	7.2	7.865	8.15	7.801	0.2775	0.0356	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.9	-1.9	-1.9	-1.9	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	5	-76	-74	-69	-72.4	3.209	-0.0443	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	7	-11.1	-10.5	-10.4	-10.71	0.3024	-0.0282	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	9	3054	3211	4093	3376	401.7	0.119	0	0

Table 4.2-5g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Cation Sum	µg/L	9	3079	3214	3939	3362	321.9	0.0958	0	0
Other	Balance	µg/L	9	-40.51	1.024	34.99	-2.128	29.29	-13.7637	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	10	1.23E+05	1.25E+05	1.50E+05	1.30E+05	1.07E+04	0.0824	0	0
Other	Ammonium	µg/L	10	10	16.06	40	23.21	14.91	0.6425	0	5
Other	Ammonium [as N]	µg/L	10	7.778	12.49	31.11	18.05	11.6	0.6425	0	5
Other	Bicarbonate	µg/L	10	1.37E+05	1.52E+05	1.83E+05	1.56E+05	1.55E+04	0.0995	0	0
Other	Carbonate	µg/L	10	0	0	7700	1410	2988	2.1194	0	0
Other	Chlorate (ClO_3)	µg/L	10	10	10	10	10	0	0	0	10
Other	Conductivity (Field)	µS/cm	5	230	230	320	266	49.3	0.1853	0	0
Other	Dissolved Oxygen (Field)	µg/L	0	—	—	—	—	—	—	—	—
Other	Hardness	µg/L	9	8.64E+04	8.91E+04	1.16E+05	9.43E+04	1.12E+04	0.1189	0	0
Other	Iodide	µg/L	10	5	5	5	5	0	0	0	10
Other	Nitrate	µg/L	10	7360	8710	9880	8809	884.5	0.1004	0	0
Other	Nitrate [as N]	µg/L	10	1662	1967	2231	1989	199.7	0.1004	0	0
Other	Nitrite	µg/L	10	5	10	40	13	12.06	0.928	0	8
Other	Nitrite [as N]	µg/L	10	0.8974	1.795	7.179	2.333	2.165	0.928	0	8
Other	pH (Field)	SU	9	6.5	7.4	7.48	7.176	0.4018	0.056	0	0
Other	Phosphate	µg/L	10	3.26	25	33.84	22.21	8.807	0.3965	0	9
Other	Silicon	µg/L	9	1.25E+04	1.38E+04	1.49E+04	1.39E+04	796.9	0.0573	0	0
Other	Sulfite	µg/L	10	5	5	5	5	0	0	0	10
Other	Total Suspended Solids	µg/L	4	50	1241	4900	1858	2172	1.1689	0	1
Other	Turbidity (Field)	NTU	5	7.6	9.3	9.3	8.62	0.9311	0.108	0	0
Other-ratio	Br/Cl by wt	ratio	9	0.01097	0.01496	0.01914	0.01451	0.002513	0.1732	0	0
Other-ratio	B/Cl by wt	ratio	9	0.00457	0.005704	0.006212	0.005492	6.02E-04	0.1096	0	0
Other-ratio	Cs/Cl by wt	ratio	9	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	9	0.01814	0.03394	0.03534	0.02935	0.007042	0.2399	0	0
Other-ratio	HCO_3/CL by wt	ratio	9	15.21	17.49	18.76	17.13	1.273	0.0743	0	0
Other-ratio	K/Cl by wt	ratio	9	0.2403	0.3026	0.3228	0.2926	0.03004	0.1027	0	0
Other-ratio	Li/Cl by wt	ratio	9	0.002494	0.003534	0.003654	0.003429	3.63E-04	0.1059	0	0
Other-ratio	Na/Cl by wt	ratio	9	2.914	3.616	3.715	3.477	0.3054	0.0878	0	0
Other-ratio	SO_4/Cl by wt	ratio	9	1.729	1.794	2.452	1.924	0.2891	0.1502	0	0
Rad-iso	Americium-241	pCi/L	7	0.003	0.0105	0.172	0.04993	0.06372	1.2762	0	4
Rad-iso	Plutonium-238	pCi/L	7	-0.007	-5.00E-04	0.008	8.71E-04	0.005321	6.1063	0	7
Rad-iso	Plutonium-239	pCi/L	7	-0.00555	-5.50E-04	0.0145	0.001464	0.006318	4.3145	0	7
Rad-iso	Strontium-90	pCi/L	7	-0.01	0.09	0.155	0.06857	0.06725	0.9807	0	7
Rad-iso	Tritium	pCi/L	8	-0.06384	0.4628	3.735	0.822	1.22	1.4842	0	0
Rad-iso	Tritium	TU[f]	6	-0.02	0.2	1.17	0.3267	0.426	1.3042	0	0

Table 4.2-5g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Uranium-234	pCi/L	7	4.56	4.89	8.02	5.647	1.55	0.2744	0	0
Rad-iso	Uranium-235	pCi/L	7	0.126	0.175	0.327	0.2	0.06967	0.3483	0	0
Rad-iso	Uranium-238	pCi/L	7	2.77	3.01	4.98	3.493	0.9292	0.266	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	5	4.4	6.3	7.2	6.14	1.076	0.1753	0	0
Rad-gross	Gross Beta Radiation	pCi/L	5	2.2	3.8	5.1	3.8	1.107	0.2913	0	0
Rad-gross	Gross Gamma Radiation	pCi/L	5	149	183	227	182.6	29.37	0.1609	0	0
Rad-gscan[g]	Cesium-137	pCi/L	7	-0.85	-0.15	0.69	-0.2029	0.5965	-2.9393	0	7

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6a
Pajarito Spring Shows Filtered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	19	2	49	200	56.77	48.98	0.8628	2	9
Metals	Antimony	µg/L	18	0.02	0.683	100	6.859	23.31	3.3979	0	17
Metals	Arsenic	µg/L	20	1	1.9	50	9.08	17.66	1.9449	0	10
Metals	Barium	µg/L	21	10	40	100	43.98	19.77	0.4495	0	2
Metals	Beryllium	µg/L	15	0.01	1	100	7.686	25.55	3.3246	0	14
Metals	Boron	µg/L	20	14.1	22	100	30.96	19.7	0.6364	0	6
Metals	Cadmium	µg/L	21	0	1	30	2.233	6.444	2.8854	0	19
Metals	Calcium	µg/L	21	18670	19600	21200	19780	684.6	0.0346	0	0
Metals	Cesium	µg/L	12	0	1.5	10	1.75	2.768	1.5814	0	7
Metals	Chromium	µg/L	21	2.2	4.1	18	5.081	3.376	0.6645	0	2
Metals	Cobalt	µg/L	21	0.39	2	60	6.97	16.17	2.3196	0	21
Metals	Copper	µg/L	21	0.42	2	40	4.473	8.597	1.9219	0	14
Metals	Iron	µg/L	21	7.3	22	130	40.92	40.49	0.9895	0	16
Metals	Lead	µg/L	17	0.01	2	150	19.85	38.51	1.9399	0	16
Metals	Lithium	µg/L	14	10	30	80	29.86	16.65	0.5576	0	0
Metals	Magnesium	µg/L	21	3740	4480	5300	4465	315.1	0.0706	0	0
Metals	Manganese	µg/L	21	0.05	2	50	6.845	11.27	1.6467	1	18
Metals	Mercury	µg/L	18	0.011	0.05	100	5.665	23.54	4.1557	1	14
Metals	Molybdenum	µg/L	15	1	2	100	9.053	25.25	2.789	0	13
Metals	Nickel	µg/L	18	0.54	2	20	6.56	7.882	1.2015	0	17
Metals	Potassium	µg/L	21	1980	2170	3100	2212	231.8	0.1048	0	0
Metals	Rubidium	µg/L	12	0.2	4	100	20.24	33.53	1.6564	0	6
Metals	Selenium	µg/L	16	0.1	3.1	20	4.444	5.508	1.2395	0	16
Metals	Silver	µg/L	21	0.5	1	100	7.372	22.22	3.0135	0	21
Metals	Sodium	µg/L	21	9700	12000	13700	11900	864.6	0.0727	0	0
Metals	Strontium	µg/L	17	95.7	100	132	110.5	15.41	0.1395	0	1
Metals	Thallium	µg/L	13	0.026	2	100	9.537	27.23	2.8556	0	13
Metals	Thorium	µg/L	1	1	1	1	1	0	0	0	1
Metals	Tin	µg/L	8	1	5	14.1	6.775	4.727	0.6977	0	8
Metals	Titanium	µg/L	9	1.3	2	10	2.886	2.734	0.9474	0	8
Metals	Uranium	µg/L	8	0.368	1.185	100	16.94	34.33	2.027	0	2
Metals	Uranium by NATU	µg/L	2	0.983	0.992	1.001	0.992	0.01273	0.0128	0	0
Metals	Uranium by TUICPMS	µg/L	3	0.368	0.867	0.89	0.7083	0.295	0.4164	0	0
Metals	Uranium by TULIKPA	µg/L	3	0.98	0.98	1	0.9867	0.01155	0.0117	0	0

Table 4.2-6a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	21	1	7.3	20	8.867	5.219	0.5885	0	5
Metals	Zinc	µg/L	12	0.51	5.55	50	8.723	13.79	1.5804	0	10
Other	Ammonia	µg/L	6	40	55	110	63.33	28.75	0.454	0	0
Other	Alkalinity Total	µg/L	0	—[d]	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	8.10E+04	8.10E+04	8.10E+04	8.10E+04	0	0	0	0
Other	Bromide	µg/L	17	0.05	55.96	200	60.94	44.29	0.7268	0	5
Other	Chloride	µg/L	20	4130	5000	6400	4926	535	0.1086	0	1
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	20	330	400	510	415.6	53.75	0.1293	0	1
Other	Nitrogen Ammonia (as N)	µg/L	4	500	500	1340	710	420	0.5915	0	3
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	6	350	3405	5.40E+04	1.57E+04	2.24E+04	1.4296	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	2	1200	1200	1200	1200	0	0	2	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	2	100	100	100	100	0	0	2	0
Other	Nitrogen Total Kjeldahl (as N)	µg/L	3	130	140	260	176.7	72.34	0.4095	0	0
Other	Oxalate	µg/L	2	20	20	20	20	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	50	50	200	110	82.16	0.7469	0	5
Other	Silica	µg/L	18	6.60E+04	6.84E+04	7.50E+04	6.86E+04	2501	0.0364	0	0
Other	Sulfate	µg/L	22	20	5615	7500	5304	1834	0.3459	0	1
Other	Total Dissolved Solids	µg/L	17	1.35E+05	2.18E+05	2.31E+05	2.04E+05	2.91E+04	0.1429	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	4	210	255	370	272.5	71.36	0.2619	0	0
Other	Conductivity	µS/cm	6	187	193	230	198.2	16.42	0.0829	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	5	7.75	8.02	8.06	7.94	0.1444	0.0182	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-72	-71	-70	-71	1.414	-0.0199	0	0

Table 4.2-6a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11.2	-11.15	-11.1	-11.15	0.07071	-0.0063	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	12	1767	1920	2053	1915	83.01	0.0433	0	0
Other	Cation Sum	µg/L	12	1882	1989	2062	1974	53.88	0.0273	0	0
Other	Balance	µg/L	11	-17.35	33.8	92.9	34.93	34.52	0.9882	0	1
Other	Alkalinity(Lab) $CaCO_3$	µg/L	6	7.85E+04	7.96E+04	8.10E+04	7.96E+04	954	0.012	0	0
Other	Ammonium	µg/L	15	0	20	100	25.36	27.68	1.0916	0	4
Other	Ammonium [as N]	µg/L	6	15.56	25.17	40.69	26.11	9.042	0.3463	0	1
Other	Bicarbonate	µg/L	15	8.20E+04	9.59E+04	1.07E+05	9.41E+04	6477	0.0688	0	0
Other	Carbonate	µg/L	13	0	0	6400	1331	2545	1.9127	0	1
Other	Chlorate (ClO_3)	µg/L	9	0	10	20	11.11	9.28	0.8352	0	6
Other	Conductivity (Field)	µS/cm	4	160	200	207	191.8	21.42	0.1117	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	5	6.37E+04	6.91E+04	7.18E+04	6.85E+04	3267	0.0477	0	0
Other	Iodide	µg/L	12	0	5	10	5	5.222	1.0445	0	6
Other	Nitrate	µg/L	15	0	3	4940	1596	2044	1.2803	0	2
Other	Nitrate [as N]	µg/L	6	742.9	854.7	1115	895.6	153.1	0.1709	0	0
Other	Nitrite	µg/L	12	10	1490	4320	1850	1947	1.0525	0	5
Other	Nitrite [as N]	µg/L	6	1.795	1.795	5.385	2.692	1.502	0.5578	0	5
Other	pH (Field)	SU	5	7.3	7.83	7.97	7.778	0.2756	0.0354	0	0
Other	Phosphate	µg/L	12	4	13.26	50	16.88	14.96	0.8866	0	6
Other	Silicon	µg/L	5	3.12E+04	3.17E+04	3.22E+04	3.17E+04	440.6	0.0139	0	0
Other	Sulfite	µg/L	6	10	10	50	16.67	16.33	0.9798	0	6
Other	Total Suspended Solids	µg/L	2	841.1	1081	1321	1081	339.2	0.3138	0	0
Other	Turbidity (Field)	NTU	4	0.4	1.6	5	2.15	1.982	0.9221	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.00616	0.01161	0.01203	0.01066	0.002522	0.2367	0	0
Other-ratio	B/Cl by wt	ratio	5	0.00422	0.004255	0.004517	0.004321	1.25E-04	0.029	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	5	0.08049	0.08863	0.1047	0.08966	0.009081	0.1013	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	18.99	19.11	20.86	19.59	0.8115	0.0414	0	0
Other-ratio	K/Cl by wt	ratio	5	0.4123	0.4374	0.4513	0.4333	0.01835	0.0423	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.004301	0.005803	0.007952	0.005999	0.001305	0.2175	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.351	2.485	2.71	2.486	0.1465	0.0589	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.111	1.195	1.217	1.184	0.04273	0.0361	0	0
Rad-iso	Americium-241	pCi/L	4	0.002	0.01675	0.0249	0.0151	0.009716	0.6435	0	3
Rad-iso	Plutonium-238	pCi/L	4	-0.0011	0.0225	0.032	0.01897	0.01458	0.7685	0	4

Table 4.2-6a (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	4	-0.008	3.50E-04	0.045	0.009425	0.02466	2.6169	0	4
Rad-iso	Strontium-90	pCi/L	4	-0.1	-0.035	0.24	0.0175	0.1528	8.7334	0	4
Rad-iso	Tritium	pCi/L	2	0.6703	0.9895	1.309	0.9895	0.4514	0.4562	0	0
Rad-iso	Tritium	TU[f]	2	0.21	0.31	0.41	0.31	0.1414	0.4562	0	0
Rad-iso	Uranium-234	pCi/L	4	0.693	0.807	0.957	0.816	0.1256	0.1539	0	0
Rad-iso	Uranium-235	pCi/L	4	0.021	0.0355	0.046	0.0345	0.01066	0.309	0	2
Rad-iso	Uranium-238	pCi/L	4	0.292	0.321	0.414	0.337	0.05315	0.1577	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	0.2	0.4	0.7	0.4333	0.2517	0.5808	0	1
Rad-gross	Gross Beta Radiation	pCi/L	3	0.38	1.17	1.8	1.117	0.7115	0.6372	0	2
Rad-gross	Gross Gamma Radiation	pCi/L	3	118	139	219	158.7	53.29	0.3359	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-1.1	0.5545	1.44	0.3622	1.129	3.1174	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6b
Pajarito Spring Shows Filtered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	17	2	30.72	120	41.64	30.62	0.7353	0	9
Metals	Antimony	µg/L	18	0.01	0.3415	50	3.441	11.65	3.386	0	17
Metals	Arsenic	µg/L	20	1	1.2	25	4.848	8.691	1.7929	0	10
Metals	Barium	µg/L	21	10	40	50	39.22	7.531	0.192	0	2
Metals	Beryllium	µg/L	15	0.005	0.665	50	3.865	12.77	3.3039	0	14
Metals	Boron	µg/L	20	7.05	22	50	24.47	11.23	0.4588	0	6
Metals	Cadmium	µg/L	21	0	0.5	15	1.125	3.22	2.8628	0	19
Metals	Calcium	µg/L	21	18670	19600	21200	19780	684.6	0.0346	0	0
Metals	Cesium	µg/L	12	0	0.75	5	0.875	1.384	1.5814	0	7
Metals	Chromium	µg/L	21	1.35	4.1	18	4.779	3.242	0.6784	0	2
Metals	Cobalt	µg/L	21	0.195	1	30	3.485	8.083	2.3196	0	21
Metals	Copper	µg/L	21	0.21	1	20	2.76	4.328	1.5678	0	14
Metals	Iron	µg/L	21	3.65	14.5	130	29.13	37.06	1.2725	0	16
Metals	Lead	µg/L	17	0.005	1	75	10	19.22	1.9218	0	16
Metals	Lithium	µg/L	14	10	30	80	29.86	16.65	0.5576	0	0
Metals	Magnesium	µg/L	21	3740	4480	5300	4465	315.1	0.0706	0	0
Metals	Manganese	µg/L	20	0.027	1.5	25	3.694	5.687	1.5396	0	18
Metals	Mercury	µg/L	17	0.0055	0.05	50	3.015	12.11	4.0158	0	14
Metals	Molybdenum	µg/L	15	1	1	50	4.593	12.6	2.7438	0	13
Metals	Nickel	µg/L	18	0.27	1	10	3.324	3.916	1.1778	0	17
Metals	Potassium	µg/L	21	1980	2170	3100	2212	231.8	0.1048	0	0
Metals	Rubidium	µg/L	12	0.1	4	50	11.04	16.29	1.4762	0	6
Metals	Selenium	µg/L	16	0.05	1.55	10	2.222	2.754	1.2395	0	16
Metals	Silver	µg/L	21	0.25	0.5	50	3.686	11.11	3.0135	0	21
Metals	Sodium	µg/L	21	9700	12000	13700	11900	864.6	0.0727	0	0
Metals	Strontium	µg/L	17	50	100	132	107.5	21.21	0.1973	0	1
Metals	Thallium	µg/L	13	0.013	1	50	4.768	13.62	2.8556	0	13
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	8	0.5	2.5	7.05	3.388	2.364	0.6977	0	8
Metals	Titanium	µg/L	9	0.65	1	5	1.63	1.513	0.9277	0	8
Metals	Uranium	µg/L	8	0.368	1.185	50	10.06	17.57	1.746	0	2
Metals	Uranium by NATU	µg/L	2	0.983	0.992	1.001	0.992	0.01273	0.0128	0	0
Metals	Uranium by TUICPMS	µg/L	3	0.368	0.867	0.89	0.7083	0.295	0.4164	0	0
Metals	Uranium by TULIKPA	µg/L	3	0.98	0.98	1	0.9867	0.01155	0.0117	0	0

Table 4.2-6b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	21	1	6.4	20	7.439	4.658	0.6261	0	5
Metals	Zinc	µg/L	12	0.255	3.05	25	4.442	6.846	1.5413	0	10
Other	Ammonia	µg/L	6	40	55	110	63.33	28.75	0.454	0	0
Other	Alkalinity Total	µg/L	0	—[d]	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	8.10E+04	8.10E+04	8.10E+04	8.10E+04	0	0	0	0
Other	Bromide	µg/L	17	0.025	50	100	49.18	22.94	0.4665	0	5
Other	Chloride	µg/L	20	2500	4940	6400	4801	761.2	0.1585	0	1
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	20	250	400	510	403.1	61.58	0.1528	0	1
Other	Nitrogen Ammonia (as N)	µg/L	4	250	250	1340	522.5	545	1.0431	0	3
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	6	350	3405	5.40E+04	1.57E+04	2.24E+04	1.4296	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	3	130	140	260	176.7	72.34	0.4095	0	0
Other	Oxalate	µg/L	2	10	10	10	10	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	25	25	100	55	41.08	0.7469	0	5
Other	Silica	µg/L	18	6.60E+04	6.84E+04	7.50E+04	6.86E+04	2501	0.0364	0	0
Other	Sulfate	µg/L	22	20	5615	7500	5301	1841	0.3473	0	1
Other	Total Dissolved Solids	µg/L	17	1.35E+05	2.18E+05	2.31E+05	2.04E+05	2.91E+04	0.1429	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	4	210	255	370	272.5	71.36	0.2619	0	0
Other	Conductivity	µS/cm	6	187	193	230	198.2	16.42	0.0829	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	5	7.75	8.02	8.06	7.94	0.1444	0.0182	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-72	-71	-70	-71	1.414	-0.02	0	0

Table 4.2-6b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11.2	-11.15	-11.1	-11.15	0.07071	-0.006	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	12	1767	1920	2053	1915	83.01	0.0433	0	0
Other	Cation Sum	µg/L	12	1882	1989	2062	1974	53.88	0.0273	0	0
Other	Balance	µg/L	11	-17.35	33.8	92.9	34.79	34.67	0.9966	0	1
Other	Alkalinity(Lab) $CaCO_3$	µg/L	6	7.85E+04	7.96E+04	8.10E+04	7.96E+04	954	0.012	0	0
Other	Ammonium	µg/L	15	0	10	52.32	19.03	18.85	0.9904	0	4
Other	Ammonium [as N]	µg/L	6	7.778	25.17	40.69	24.81	11.17	0.45	0	1
Other	Bicarbonate	µg/L	15	8.20E+04	9.59E+04	1.07E+05	9.41E+04	6477	0.0688	0	0
Other	Carbonate	µg/L	13	0	0	6400	1138	2330	2.047	0	1
Other	Chlorate (ClO_3)	µg/L	9	0	5	10	5.556	4.64	0.8352	0	6
Other	Conductivity (Field)	µS/cm	4	160	200	207	191.8	21.42	0.1117	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	5	6.37E+04	6.91E+04	7.18E+04	6.85E+04	3267	0.0477	0	0
Other	Iodide	µg/L	12	0	2.5	5	2.5	2.611	1.0445	0	6
Other	Nitrate	µg/L	15	0	3	4940	1592	2047	1.2864	0	2
Other	Nitrate [as N]	µg/L	6	742.9	854.7	1115	895.6	153.1	0.1709	0	0
Other	Nitrite	µg/L	12	5	1490	4320	1848	1950	1.0553	0	5
Other	Nitrite [as N]	µg/L	6	0.8974	0.8974	5.385	1.795	1.795	1	0	5
Other	pH (Field)	SU	5	7.3	7.83	7.97	7.778	0.2756	0.0354	0	0
Other	Phosphate	µg/L	12	3.26	8	40	11.19	10.75	0.9609	0	6
Other	Silicon	µg/L	5	3.12E+04	3.17E+04	3.22E+04	3.17E+04	440.6	0.0139	0	0
Other	Sulfite	µg/L	6	5	5	25	8.333	8.165	0.9798	0	6
Other	Total Suspended Solids	µg/L	2	841.1	1081	1321	1081	339.2	0.3138	0	0
Other	Turbidity (Field)	NTU	4	0.4	1.6	5	2.15	1.982	0.9221	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.00616	0.01161	0.01203	0.01066	0.002522	0.2367	0	0
Other-ratio	B/Cl by wt	ratio	5	0.00422	0.004255	0.004517	0.004321	1.25E-04	0.029	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	n/a	0	0
Other-ratio	F/Cl by wt	ratio	5	0.08049	0.08863	0.1047	0.08966	0.009081	0.1013	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	18.99	19.11	20.86	19.59	0.8115	0.0414	0	0
Other-ratio	K/Cl by wt	ratio	5	0.4123	0.4374	0.4513	0.4333	0.01835	0.0423	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.004301	0.005803	0.007952	0.005999	0.001305	0.2175	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.351	2.485	2.71	2.486	0.1465	0.0589	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.111	1.195	1.217	1.184	0.04273	0.0361	0	0
Rad-iso	Americium-241	pCi/L	4	0.001	0.008375	0.0249	0.01066	0.01015	0.9519	0	3
Rad-iso	Plutonium-238	pCi/L	4	-5.50E-04	0.01125	0.016	0.009487	0.007292	0.7685	0	4

Table 4.2-6b (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	4	-0.004	1.75E-04	0.0225	0.004712	0.01233	2.6169	0	4
Rad-iso	Strontium-90	pCi/L	4	-0.05	-0.0175	0.12	0.00875	0.07642	8.7334	0	4
Rad-iso	Tritium	pCi/L	2	0.6703	0.9895	1.309	0.9895	0.4514	0.4562	0	0
Rad-iso	Tritium	TU[f]	2	0.21	0.31	0.41	0.31	0.1414	0.4562	0	0
Rad-iso	Uranium-234	pCi/L	4	0.693	0.807	0.957	0.816	0.1256	0.1539	0	0
Rad-iso	Uranium-235	pCi/L	4	0.0105	0.0275	0.046	0.02788	0.01727	0.6197	0	2
Rad-iso	Uranium-238	pCi/L	4	0.292	0.321	0.414	0.337	0.05315	0.1577	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	0.2	0.35	0.4	0.3167	0.1041	0.3287	0	1
Rad-gross	Gross Beta Radiation	pCi/L	3	0.38	0.585	0.9	0.6217	0.2619	0.4213	0	2
Rad-gross	Gross Gamma Radiation	pCi/L	3	118	139	219	158.7	53.29	0.3359	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-0.55	0.2773	0.72	0.1811	0.5646	3.1174	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6c
Pajarito Spring Shows Nonfiltered Samples at Detection Limit for All Years, Includes R-Qualifiers

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	6	7.9	26.43	270	70.16	101.6	1.4477	1	1
Metals	Antimony	µg/L	6	0.1	0.1	3.4	1.05	1.499	1.4276	0	6
Metals	Arsenic	µg/L	6	1.2	1.4	2.7	1.733	0.647	0.3733	0	2
Metals	Barium	µg/L	6	36	41.5	42.13	40.35	2.423	0.06	0	0
Metals	Beryllium	µg/L	6	0.2	2	2	1.4	0.9295	0.6639	0	6
Metals	Boron	µg/L	5	15.5	22	22.58	20.22	2.987	0.1477	0	1
Metals	Cadmium	µg/L	6	0.2	1	1	0.75	0.3886	0.5181	0	6
Metals	Calcium	µg/L	6	18790	20750	21100	20300	929.7	0.0458	0	0
Metals	Cesium	µg/L	4	2	2	2	2	0	0	0	4
Metals	Chromium	µg/L	6	2.4	6	7	5.133	2.254	0.4392	0	1
Metals	Cobalt	µg/L	6	0.5	2	2	1.55	0.7036	0.4539	0	6
Metals	Copper	µg/L	6	0.6	2	3	1.983	0.9432	0.4756	0	4
Metals	Iron	µg/L	6	10	24.1	82.3	40.08	32.28	0.8053	0	3
Metals	Lead	µg/L	6	1.1	2	2	1.75	0.3987	0.2279	0	5
Metals	Lithium	µg/L	4	30	30	70	40	20	0.5	0	0
Metals	Magnesium	µg/L	6	4187	4540	4770	4521	206.2	0.0456	0	0
Metals	Manganese	µg/L	6	0.05	2	2	1.525	0.8073	0.5294	1	4
Metals	Mercury	µg/L	6	0.01	0.02	0.09	0.02833	0.03061	1.0802	1	4
Metals	Molybdenum	µg/L	5	2	2	2.9	2.18	0.4025	0.1846	0	3
Metals	Nickel	µg/L	6	1.6	2	2	1.9	0.1673	0.0881	0	6
Metals	Potassium	µg/L	6	1990	2165	2440	2175	165.8	0.0762	0	0
Metals	Rubidium	µg/L	4	3	3.5	4	3.5	0.5774	0.165	0	0
Metals	Selenium	µg/L	6	0.1	0.2	3.1	1.1	1.474	1.3398	0	5
Metals	Silver	µg/L	6	0.6	1	1	0.9167	0.1602	0.1748	0	6
Metals	Sodium	µg/L	6	11200	11850	12700	11920	598.1	0.0502	0	0
Metals	Strontium	µg/L	5	93	100	133.4	108.7	17.27	0.1589	0	0
Metals	Thallium	µg/L	6	2	2	5.2	2.633	1.28	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	5	5	5	14.1	6.82	4.07	0.5967	0	5
Metals	Titanium	µg/L	5	1.3	2	9	3.682	3.154	0.8567	0	3
Metals	Uranium	µγ/Λ	1	1.17	1.17	1.17	1.17	0	0	0	0
Metals	Uranium by NATU	µγ/Λ	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µγ/Λ	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µγ/Λ	0	—	—	—	—	—	—	—	—

Table 4.2-6c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	6	6	6.75	8	6.844	0.8033	0.1174	0	0
Metals	Zinc	µg/L	6	0.6	10	10	6.927	4.763	0.6876	0	5
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	1	8.01E+04	8.01E+04	8.01E+04	8.01E+04	0	0	0	0
Other	Bromide	µg/L	5	30	57.31	100	59.46	25.52	0.4292	0	1
Other	Chloride	µg/L	5	4658	4930	5700	5066	400.7	0.0791	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	3	-78	-76	-75	-76.33	1.528	-0.02	0	0
Other	Fluoride	µg/L	5	373	420	500	430.6	50.1	0.1164	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	1	1100	1100	1100	1100	0	0	1	0
Other	Nitrogen Nitrite (as NO_2)	µg/L	1	100	100	100	100	0	0	1	0
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0								
Other	Oxalate	µg/L	1	20	20	20	20	0	0	0	1
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	1	200	200	200	200	0	0	0	1
Other	Silica	µg/L	4	6.74E+04	6.81E+04	6.99E+04	6.84E+04	1108	0.0162	0	0
Other	Sulfate	µg/L	5	5480	5830	7100	6048	633.3	0.1047	0	0
Other	Total Dissolved Solids	µg/L	5	1.72E+05	2.19E+05	2.28E+05	2.12E+05	2.27E+04	0.1069	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	4	187	189	198	190.8	4.924	0.0258	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.74	7.955	8.05	7.925	0.1387	0.0175	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.2	-1.2	-1.2	-1.2	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-74	-73	-67	-71.33	3.786	-0.0531	0	0

Table 4.2-6c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	6	-11.3	-10.7	-10.6	-10.85	0.3146	-0.029	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	4	1905	1930	1994	1940	39.31	0.0203	0	0
Other	Cation Sum	µg/L	4	1892	1949	2034	1956	71.03	0.0363	0	0
Other	Balance	µg/L	4	-26.49	-0.2152	58.86	7.985	36.17	4.5296	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	4	7.88E+04	7.94E+04	8.10E+04	7.97E+04	1022	0.0128	0	0
Other	Ammonium	µg/L	4	16.94	25	34.73	25.42	8.345	0.3283	0	0
Other	Ammonium [as N]	µg/L	4	13.17	19.44	27.01	19.77	6.491	0.3283	0	0
Other	Bicarbonate	µg/L	4	9.61E+04	9.69E+04	9.88E+04	9.72E+04	1247	0.0128	0	0
Other	Carbonate	µg/L	4	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	4	10	20	20	17.5	5	0.2857	0	4
Other	Conductivity (Field)	µS/cm	3	160	200	207	189	25.36	0.1342	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	4	6.42E+04	6.87E+04	7.13E+04	6.82E+04	3308	0.0485	0	0
Other	Iodide	µg/L	4	10	10	10	10	0	0	0	4
Other	Nitrate	µg/L	4	3310	3716	4370	3778	448.3	0.1186	0	0
Other	Nitrate [as N]	µg/L	4	747.4	839.2	986.8	853.1	101.2	0.1186	0	0
Other	Nitrite	µg/L	4	10	10	20	12.5	5	0.4	0	4
Other	Nitrite [as N]	µg/L	4	1.795	1.795	3.59	2.244	0.8974	0.4	0	4
Other	pH (Field)	SU	4	7.3	7.895	7.97	7.765	0.3165	0.0408	0	0
Other	Phosphate	µg/L	4	20	20	50	27.5	15	0.5455	0	4
Other	Silicon	µg/L	4	3.15E+04	3.18E+04	3.27E+04	3.20E+04	517.9	0.0162	0	0
Other	Sulfite	µg/L	4	10	10	10	10	0	0	0	4
Other	Total Suspended Solids	µg/L	3	100	600	1300	666.7	602.8	0.9042	0	1
Other	Turbidity (Field)	NTU	3	0.4	1.6	5	2.333	2.386	1.0226	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.006173	0.01086	0.0123	0.01005	0.002737	0.2723	0	0
Other-ratio	B/Cl by wt	ratio	4	0.003854	0.004387	0.004848	0.004369	4.22E-04	0.0966	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	—	0	0
Other-ratio	F/Cl by wt	ratio	4	0.08009	0.087	0.1029	0.08924	0.009771	0.1095	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	19.07	19.8	20.63	19.82	0.6724	0.0339	0	0
Other-ratio	K/Cl by wt	ratio	4	0.3904	0.435	0.4616	0.4305	0.03613	0.0839	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.005792	0.006307	0.0142	0.008151	0.004041	0.4957	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.259	2.441	2.727	2.467	0.2083	0.0844	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.112	1.191	1.224	1.18	0.04829	0.0409	0	0
Rad-iso	Americium-241	pCi/L	3	0.003	0.021	0.027	0.017	0.01249	0.7347	0	3
Rad-iso	Plutonium-238	pCi/L	3	0.002	0.004	0.007	0.004333	0.002517	0.5808	0	3

Table 4.2-6c (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	3	0.0012	0.003	0.02	0.008067	0.01037	1.286	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.16	0.13	0.17	0.04667	0.1801	3.8591	0	3
Rad-iso	Tritium	pCi/L	7	-0.09579	0.24	1.628	0.4949	0.642	1.2973	0	0
Rad-iso	Tritium	TU[f]	3	0.01	0.36	0.51	0.2933	0.2566	0.8747	0	0
Rad-iso	Uranium-234	pCi/L	3	0.666	0.69	0.915	0.757	0.1374	0.1814	0	0
Rad-iso	Uranium-235	pCi/L	3	0.041	0.044	0.064	0.04967	0.0125	0.2517	0	1
Rad-iso	Uranium-238	pCi/L	3	0.278	0.359	0.375	0.3373	0.052	0.1542	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	0.18	0.39	0.6	0.39	0.297	0.7615	0	1
Rad-gross	Gross Beta Radiation	pCi/L	2	1.2	1.8	2.4	1.8	0.8485	0.4714	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	2	174	201	228	201	38.18	0.19	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-1.7	-1.61	-0.51	-1.273	0.6626	-0.5204	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6d
Pajarito Spring Shows Nonfiltered Samples at One-Half Detection Limit for All Years, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	5	3.95	37.71	270	81.36	109.4	1.3446	0	1
Metals	Antimony	µg/L	6	0.05	0.05	1.7	0.525	0.7495	1.4276	0	6
Metals	Arsenic	µg/L	6	1.2	1.3	1.5	1.308	0.1114	0.0852	0	2
Metals	Barium	µg/L	6	36	41.5	42.13	40.35	2.423	0.06	0	0
Metals	Beryllium	µg/L	6	0.1	1	1	0.7	0.4648	0.6639	0	6
Metals	Boron	µg/L	5	7.75	22	22.58	18.67	6.262	0.3355	0	1
Metals	Cadmium	µg/L	6	0.1	0.5	0.5	0.375	0.1943	0.5181	0	6
Metals	Calcium	µg/L	6	18790	20750	21100	20300	929.7	0.0458	0	0
Metals	Cesium	µg/L	4	1	1	1	1	0	0	0	4
Metals	Chromium	µg/L	6	1.2	6	7	4.933	2.576	0.5221	0	1
Metals	Cobalt	µg/L	6	0.25	1	1	0.775	0.3518	0.4539	0	6
Metals	Copper	µg/L	6	0.3	1	3	1.492	1.197	0.8023	0	4
Metals	Iron	µg/L	6	5	20.65	80	30.15	27.2	0.9021	0	3
Metals	Lead	µg/L	6	0.55	1	2	1.042	0.5064	0.4861	0	5
Metals	Lithium	µg/L	4	30	30	70	40	20	0.5	0	0
Metals	Magnesium	µg/L	6	4187	4540	4770	4521	206.2	0.0456	0	0
Metals	Manganese	µg/L	5	1	1	1.1	1.02	0.04472	0.0438	0	4
Metals	Mercury	µg/L	5	0.005	0.01	0.09	0.024	0.03698	1.5408	0	4
Metals	Molybdenum	µg/L	5	1	1.45	2	1.49	0.5005	0.3359	0	3
Metals	Nickel	µg/L	6	0.8	1	1	0.95	0.08367	0.0881	0	6
Metals	Potassium	µg/L	6	1990	2165	2440	2175	165.8	0.0762	0	0
Metals	Rubidium	µg/L	4	3	3.5	4	3.5	0.5774	0.165	0	0
Metals	Selenium	µg/L	6	0.05	0.15	1.55	0.5667	0.7257	1.2807	0	5
Metals	Silver	µg/L	6	0.3	0.5	0.5	0.4583	0.0801	0.1748	0	6
Metals	Sodium	µg/L	6	11200	11850	12700	11920	598.1	0.0502	0	0
Metals	Strontium	µg/L	5	93	100	133.4	108.7	17.27	0.1589	0	0
Metals	Thallium	µg/L	6	1	1	2.6	1.317	0.6401	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	5	2.5	2.5	7.05	3.41	2.035	0.5967	0	5
Metals	Titanium	µg/L	5	0.65	1	9	3.152	3.558	1.1289	0	3
Metals	Uranium	µg/L	1	1.17	1.17	1.17	1.17	0	0	0	0
Metals	Uranium by NATU	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µg/L	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-6d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	µg/L	6	6	6.75	8	6.844	0.8033	0.1174	0	0
Metals	Zinc	µg/L	6	0.3	5	10	4.297	3.593	0.8363	0	5
Other	Ammonia	µg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	1	8.01E+04	8.01E+04	8.01E+04	8.01E+04	0	0	0	0
Other	Bromide	µg/L	5	30	50	60	49.46	11.75	0.2375	0	1
Other	Chloride	µg/L	5	4658	4930	5700	5066	400.7	0.0791	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	3	-78	-76	-75	-76.33	1.528	-0.02	0	0
Other	Fluoride	µg/L	5	373	420	500	430.6	50.1	0.1164	0	0
Other	Nitrogen Ammonia (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	µg/L	1	10	10	10	10	0	0	0	1
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	1	100	100	100	100	0	0	0	1
Other	Silica	µg/L	4	6.74E+04	6.81E+04	6.99E+04	6.84E+04	1108	0.0162	0	0
Other	Sulfate	µg/L	5	5480	5830	7100	6048	633.3	0.1047	0	0
Other	Total Dissolved Solids	µg/L	5	1.72E+05	2.19E+05	2.28E+05	2.12E+05	2.27E+04	0.1069	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	µS/cm	4	187	189	198	190.8	4.924	0.0258	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.74	7.955	8.05	7.925	0.1387	0.0175	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.2	-1.2	-1.2	-1.2	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-74	-73	-67	-71.33	3.786	-0.0531	0	0

Table 4.2-6d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	6	-11.3	-10.7	-10.6	-10.85	0.3146	-0.029	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	4	1905	1930	1994	1940	39.31	0.0203	0	0
Other	Cation Sum	µg/L	4	1892	1949	2034	1956	71.03	0.0363	0	0
Other	Balance	µg/L	4	-26.49	-0.2152	58.86	7.985	36.17	4.5296	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	4	7.88E+04	7.94E+04	8.10E+04	7.97E+04	1022	0.0128	0	0
Other	Ammonium	µg/L	4	16.94	25	34.73	25.42	8.345	0.3283	0	0
Other	Ammonium [as N]	µg/L	4	13.17	19.44	27.01	19.77	6.491	0.3283	0	0
Other	Bicarbonate	µg/L	4	9.61E+04	9.69E+04	9.88E+04	9.72E+04	1247	0.0128	0	0
Other	Carbonate	µg/L	4	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	4	5	10	10	8.75	2.5	0.2857	0	4
Other	Conductivity (Field)	µS/cm	3	160	200	207	189	25.36	0.1342	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	4	6.42E+04	6.87E+04	7.13E+04	6.82E+04	3308	0.0485	0	0
Other	Iodide	µg/L	4	5	5	5	5	0	0	0	4
Other	Nitrate	µg/L	4	3310	3716	4370	3778	448.3	0.1186	0	0
Other	Nitrate [as N]	µg/L	4	747.4	839.2	986.8	853.1	101.2	0.1186	0	0
Other	Nitrite	µg/L	4	5	5	10	6.25	2.5	0.4	0	4
Other	Nitrite [as N]	µg/L	4	0.8974	0.8974	1.795	1.122	0.4487	0.4	0	4
Other	pH (Field)	SU	4	7.3	7.895	7.97	7.765	0.3165	0.0408	0	0
Other	Phosphate	µg/L	4	10	10	25	13.75	7.5	0.5455	0	4
Other	Silicon	µg/L	4	3.15E+04	3.18E+04	3.27E+04	3.20E+04	517.9	0.0162	0	0
Other	Sulfite	µg/L	4	5	5	5	5	0	0	0	4
Other	Total Suspended Solids	µg/L	3	50	600	1300	650	626.5	0.9638	0	1
Other	Turbidity (Field)	NTU	3	0.4	1.6	5	2.333	2.386	1.0226	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.006173	0.01086	0.0123	0.01005	0.002737	0.2723	0	0
Other-ratio	B/Cl by wt	ratio	4	0.003854	0.004387	0.004848	0.004369	4.22E-04	0.0966	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	n/a	0	0
Other-ratio	F/Cl by wt	ratio	4	0.08009	0.087	0.1029	0.08924	0.009771	0.1095	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	19.07	19.8	20.63	19.82	0.6724	0.0339	0	0
Other-ratio	K/Cl by wt	ratio	4	0.3904	0.435	0.4616	0.4305	0.03613	0.0839	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.005792	0.006307	0.0142	0.008151	0.004041	0.4957	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.259	2.441	2.727	2.467	0.2083	0.0844	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.112	1.191	1.224	1.18	0.04829	0.0409	0	0
Rad-iso	Americium-241	pCi/L	3	0.0015	0.0105	0.0135	0.0085	0.006245	0.7347	0	3
Rad-iso	Plutonium-238	pCi/L	3	0.001	0.002	0.0035	0.002167	0.001258	0.5808	0	3

Table 4.2-6d (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	3	6.00E-04	0.0015	0.01	0.004033	0.005187	1.286	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.08	0.065	0.085	0.02333	0.09005	3.8591	0	3
Rad-iso	Tritium	pCi/L	7	-0.09579	0.24	1.628	0.4949	0.642	1.2973	0	0
Rad-iso	Tritium	TU[f]	3	0.01	0.36	0.51	0.2933	0.2566	0.8747	0	0
Rad-iso	Uranium-234	pCi/L	3	0.666	0.69	0.915	0.757	0.1374	0.1814	0	0
Rad-iso	Uranium-235	pCi/L	3	0.022	0.041	0.064	0.04233	0.02103	0.4968	0	1
Rad-iso	Uranium-238	pCi/L	3	0.278	0.359	0.375	0.3373	0.052	0.1542	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	0.18	0.24	0.3	0.24	0.08485	0.3536	0	1
Rad-gross	Gross Beta Radiation	pCi/L	2	0.6	1.5	2.4	1.5	1.273	0.8485	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	2	174	201	228	201	38.18	0.19	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-0.85	-0.805	-0.255	-0.6367	0.3313	-0.5204	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6e
Pajarito Spring Shows Filtered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	10	2	25.96	60	25.79	16.75	0.6493	0	5
Metals	Antimony	µg/L	12	0.05	0.3415	1.7	0.527	0.6418	1.2178	0	11
Metals	Arsenic	µg/L	12	1.15	1.2	1.5	1.254	0.1233	0.0983	0	6
Metals	Barium	µg/L	12	34	39.32	41.6	39.46	1.997	0.0506	0	0
Metals	Beryllium	µg/L	12	0.005	0.5825	1	0.5396	0.4501	0.8342	0	11
Metals	Boron	µg/L	11	7.05	22	32	19.85	7.364	0.371	0	3
Metals	Cadmium	µg/L	12	0.065	0.4185	0.5	0.3222	0.1979	0.6142	0	11
Metals	Calcium	µg/L	12	18670	19800	21200	19870	866.4	0.0436	0	0
Metals	Cesium	µg/L	6	0.5	1	1	0.9167	0.2041	0.2227	0	6
Metals	Chromium	µg/L	12	1.35	4.1	6	4.029	1.442	0.3579	0	1
Metals	Cobalt	µg/L	12	0.195	0.45	1	0.5983	0.3662	0.612	0	12
Metals	Copper	µg/L	12	0.21	0.4	3	0.9142	1.027	1.1229	0	10
Metals	Iron	µg/L	12	3.65	12.75	40	15.22	12.06	0.7921	0	10
Metals	Lead	µg/L	12	0.005	0.85	2.58	0.8367	0.6598	0.7886	0	11
Metals	Lithium	µg/L	6	20	30	40	29.67	6.377	0.215	0	0
Metals	Magnesium	µg/L	12	4010	4415	4720	4412	221.3	0.0502	0	0
Metals	Manganese	µg/L	11	0.027	0.5	2.064	0.6258	0.6504	1.0393	0	10
Metals	Mercury	µg/L	11	0.0055	0.01	0.11	0.02795	0.03187	1.1401	0	9
Metals	Molybdenum	µg/L	8	1	1	1.45	1.113	0.2083	0.1872	0	7
Metals	Nickel	µg/L	12	0.27	0.9	1.6	0.82	0.3701	0.4514	0	11
Metals	Potassium	µg/L	12	1980	2150	2440	2182	115.7	0.0531	0	0
Metals	Rubidium	µg/L	6	3	4	4	3.667	0.5164	0.1408	0	0
Metals	Selenium	µg/L	12	0.05	0.75	1.9	0.8792	0.8779	0.9985	0	12
Metals	Silver	µg/L	12	0.3	0.475	0.5	0.43	0.08707	0.2025	0	12
Metals	Sodium	µg/L	12	10900	11950	12700	11730	670.6	0.0572	0	0
Metals	Strontium	µg/L	8	95.7	98.5	130	105.7	14.98	0.1418	0	0
Metals	Thallium	µg/L	12	0.013	1	2.95	0.9991	0.8793	0.8801	0	12
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	8	0.5	2.5	7.05	3.388	2.364	0.6977	0	8
Metals	Titanium	µg/L	8	0.65	1	3.374	1.209	0.8888	0.735	0	7
Metals	Uranium by NATU	µg/L	2	0.983	0.992	1.001	0.992	0.01273	0.0128	0	0
Metals	Uranium by TUICPMS	µg/L	3	0.368	0.867	0.89	0.7083	0.295	0.4164	0	0
Metals	Uranium by TULIKPA	µg/L	3	0.98	0.98	1	0.9867	0.01155	0.0117	0	0
Metals	Vanadium	µg/L	12	3	6.55	8	6.268	1.462	0.2332	0	0

Table 4.2-6e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Uranium	µg/L	5	0.368	0.89	1.19	0.899	0.3342	0.3717	0	0
Metals	Zinc	µg/L	11	0.255	1.1	5	2.573	2.336	0.9078	0	9
Other	Ammonia	µg/L	0	—[d]	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	2	8.10E+04	8.10E+04	8.10E+04	8.10E+04	0	0	0	0
Other	Bromide	µg/L	11	0.025	55.96	100	47.82	28.77	0.6017	0	5
Other	Chloride	µg/L	11	4190	5030	5500	4913	428.9	0.0873	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	0	—	—	—	—	—	—	—	—
Other	Fluoride	µg/L	11	374.3	400	510	423.8	41.74	0.0985	0	0
Other	Nitrogen Ammonia (as N)	µg/L	3	250	250	250	250	0	0	0	3
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	3	350	800	810	653.3	262.7	0.4022	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	3	130	140	260	176.7	72.34	0.4095	0	0
Other	Oxalate	µg/L	2	10	10	10	10	0	0	0	2
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	5	25	25	100	55	41.08	0.7469	0	5
Other	Silica	µg/L	9	6.68E+04	6.85E+04	7.45E+04	6.88E+04	2261	0.0329	0	0
Other	Sulfate	µg/L	11	4690	5640	6700	5756	644.6	0.112	0	0
Other	Total Dissolved Solids	µg/L	8	1.70E+05	2.20E+05	2.29E+05	2.09E+05	2.42E+04	0.1157	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	4	210	255	370	272.5	71.36	0.2619	0	0
Other	Conductivity	µS/cm	6	187	193	230	198.2	16.42	0.0829	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	5	7.75	8.02	8.06	7.94	0.1444	0.0182	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	0	—	—	—	—	—	—	—	—
Other-iso	Deuterium Hydrogen Ratio	ratio	2	-72	-71	-70	-71	1.414	-0.0199	0	0

Table 4.2-6e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	2	-11.2	-11.15	-11.1	-11.15	0.07071	-0.0063	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	µg/L	5	1888	1922	1983	1928	34.85	0.0181	0	0
Other	Cation Sum	µg/L	5	1882	2010	2031	1972	64.47	0.0327	0	0
Other	Balance	µg/L	5	-17.35	23.94	44.56	22.51	24.63	1.0942	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	6	7.85E+04	7.96E+04	8.10E+04	7.96E+04	954	0.012	0	0
Other	Ammonium	µg/L	6	10	32.36	52.32	31.9	14.36	0.45	0	1
Other	Ammonium [as N]	µg/L	6	7.778	25.17	40.69	24.81	11.17	0.45	0	1
Other	Bicarbonate	µg/L	6	9.58E+04	9.71E+04	9.88E+04	9.72E+04	1164	0.012	0	0
Other	Carbonate	µg/L	6	0	0	0	0	0	n/a	0	0
Other	Chlorate (ClO_3)	µg/L	6	5	10	10	8.333	2.582	0.3098	0	6
Other	Conductivity (Field)	µS/cm	4	160	200	207	191.8	21.42	0.1117	0	0
Other	Dissolved Oxygen (Field)	µg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	5	6.37E+04	6.91E+04	7.18E+04	6.85E+04	3267	0.0477	0	0
Other	Iodide	µg/L	6	5	5	5	5	0	0	0	6
Other	Nitrate	µg/L	6	3290	3785	4940	3966	677.8	0.1709	0	0
Other	Nitrate [as N]	µg/L	6	742.9	854.7	1115	895.6	153.1	0.1709	0	0
Other	Nitrite	µg/L	6	5	5	30	10	10	1	0	5
Other	Nitrite [as N]	µg/L	6	0.8974	0.8974	5.385	1.795	1.795	1	0	5
Other	pH (Field)	SU	5	7.3	7.83	7.97	7.778	0.2756	0.0354	0	0
Other	Phosphate	µg/L	6	3.26	10	25	11.38	7.198	0.6327	0	6
Other	Silicon	µg/L	5	3.12E+04	3.17E+04	3.22E+04	3.17E+04	440.6	0.0139	0	0
Other	Sulfite	µg/L	6	5	5	25	8.333	8.165	0.9798	0	6
Other	Total Suspended Solids	µg/L	2	841.1	1081	1321	1081	339.2	0.3138	0	0
Other	Turbidity (Field)	NTU	4	0.4	1.6	5	2.15	1.982	0.9221	0	0
Other-ratio	Br/Cl by wt	ratio	5	0.00616	0.01161	0.01203	0.01066	0.002522	0.2367	0	0
Other-ratio	B/Cl by wt	ratio	5	0.00422	0.004255	0.004517	0.004321	1.25E-04	0.029	0	0
Other-ratio	Cs/Cl by wt	ratio	5	0	0	0	0	0	n/a	0	0
Other-ratio	F/Cl by wt	ratio	5	0.08049	0.08863	0.1047	0.08966	0.009081	0.1013	0	0
Other-ratio	HCO_3/CL by wt	ratio	5	18.99	19.11	20.86	19.59	0.8115	0.0414	0	0
Other-ratio	K/Cl by wt	ratio	5	0.4123	0.4374	0.4513	0.4333	0.01835	0.0423	0	0
Other-ratio	Li/Cl by wt	ratio	5	0.004301	0.005803	0.007952	0.005999	0.001305	0.2175	0	0
Other-ratio	Na/Cl by wt	ratio	5	2.351	2.485	2.71	2.486	0.1465	0.0589	0	0
Other-ratio	SO_4/Cl by wt	ratio	5	1.111	1.195	1.217	1.184	0.04273	0.0361	0	0
Rad-iso	Americium-241	pCi/L	4	0.001	0.008375	0.0249	0.01066	0.01015	0.9519	0	3
Rad-iso	Plutonium-238	pCi/L	4	-5.50E-04	0.01125	0.016	0.009487	0.007292	0.7685	0	4

Table 4.2-6e (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	4	-0.004	1.75E-04	0.0225	0.004712	0.01233	2.6169	0	4
Rad-iso	Strontium-90	pCi/L	4	-0.05	-0.0175	0.12	0.00875	0.07642	8.7334	0	4
Rad-iso	Tritium	pCi/L	2	0.6703	0.9895	1.309	0.9895	0.4514	0.4562	0	0
Rad-iso	Tritium	TU[f]	2	0.21	0.31	0.41	0.31	0.1414	0.4562	0	0
Rad-iso	Uranium-234	pCi/L	4	0.693	0.807	0.957	0.816	0.1256	0.1539	0	0
Rad-iso	Uranium-235	pCi/L	4	0.0105	0.0275	0.046	0.02788	0.01727	0.6197	0	2
Rad-iso	Uranium-238	pCi/L	4	0.292	0.321	0.414	0.337	0.05315	0.1577	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	3	0.2	0.35	0.4	0.3167	0.1041	0.3287	0	1
Rad-gross	Gross Beta Radiation	pCi/L	3	0.38	0.585	0.9	0.6217	0.2619	0.4213	0	2
Rad-gross	Gross Gamma Radiation	pCi/L	3	118	139	219	158.7	53.29	0.3359	0	0
Rad-gscan[g]	Cesium-137	pCi/L	4	-0.55	0.2773	0.72	0.1811	0.5646	3.1174	0	4

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6f
Pajarito Spring Shows Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	5	3.95	37.71	270	81.36	109.4	1.3446	0	1
Metals	Antimony	µg/L	6	0.05	0.05	1.7	0.525	0.7495	1.4276	0	6
Metals	Arsenic	µg/L	6	1.2	1.3	1.5	1.308	0.1114	0.0852	0	2
Metals	Barium	µg/L	6	36	41.5	42.13	40.35	2.423	0.06	0	0
Metals	Beryllium	µg/L	6	0.1	1	1	0.7	0.4648	0.6639	0	6
Metals	Boron	µg/L	5	7.75	22	22.58	18.67	6.262	0.3355	0	1
Metals	Cadmium	µg/L	6	0.1	0.5	0.5	0.375	0.1943	0.5181	0	6
Metals	Calcium	µg/L	6	18790	20750	21100	20300	929.7	0.0458	0	0
Metals	Cesium	µg/L	4	1	1	1	1	0	0	0	4
Metals	Chromium	µg/L	6	1.2	6	7	4.933	2.576	0.5221	0	1
Metals	Cobalt	µg/L	6	0.25	1	1	0.775	0.3518	0.4539	0	6
Metals	Copper	µg/L	6	0.3	1	3	1.492	1.197	0.8023	0	4
Metals	Iron	µg/L	6	5	20.65	80	30.15	27.2	0.9021	0	3
Metals	Lead	µg/L	6	0.55	1	2	1.042	0.5064	0.4861	0	5
Metals	Lithium	µg/L	4	30	30	70	40	20	0.5	0	0
Metals	Magnesium	µg/L	6	4187	4540	4770	4521	206.2	0.0456	0	0
Metals	Manganese	µg/L	5	1	1	1.1	1.02	0.04472	0.0438	0	4
Metals	Mercury	µg/L	5	0.005	0.01	0.09	0.024	0.03698	1.5408	0	4
Metals	Molybdenum	µg/L	5	1	1.45	2	1.49	0.5005	0.3359	0	3
Metals	Nickel	µg/L	6	0.8	1	1	0.95	0.08367	0.0881	0	6
Metals	Potassium	µg/L	6	1990	2165	2440	2175	165.8	0.0762	0	0
Metals	Rubidium	µg/L	4	3	3.5	4	3.5	0.5774	0.165	0	0
Metals	Selenium	µg/L	6	0.05	0.15	1.55	0.5667	0.7257	1.2807	0	5
Metals	Silver	µg/L	6	0.3	0.5	0.5	0.4583	0.0801	0.1748	0	6
Metals	Sodium	µg/L	6	11200	11850	12700	11920	598.1	0.0502	0	0
Metals	Strontium	µg/L	5	93	100	133.4	108.7	17.27	0.1589	0	0
Metals	Thallium	µg/L	6	1	1	2.6	1.317	0.6401	0.4861	0	6
Metals	Thorium	µg/L	0	—[d]	—	—	—	—	—	—	—
Metals	Tin	µg/L	5	2.5	2.5	7.05	3.41	2.035	0.5967	0	5
Metals	Titanium	µg/L	5	0.65	1	9	3.152	3.558	1.1289	0	3
Metals	Uranium	µγ/Λ	1	1.17	1.17	1.17	1.17	0	0	0	0
Metals	Uranium by NATU	µγ/Λ	0	—	—	—	—	—	—	—	—
Metals	Uranium by TUICPMS	µγ/Λ	0	—	—	—	—	—	—	—	—
Metals	Uranium by TULIKPA	µγ/Λ	0	—	—	—	—	—	—	—	—

Table 4.2-6f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Vanadium	μg/L	6	6	6.75	8	6.844	0.8033	0.1174	0	0
Metals	Zinc	μg/L	6	0.3	5	10	4.297	3.593	0.8363	0	5
Other	Ammonia	μg/L	0	—	—	—	—	—	—	—	—
Other	Alkalinity Total	μg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	μg/L	1	8.01E+04	8.01E+04	8.01E+04	8.01E+04	0	0	0	0
Other	Bromide	μg/L	5	30	50	60	49.46	11.75	0.2375	0	1
Other	Chloride	μg/L	5	4658	4930	5700	5066	400.7	0.0791	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	3	-78	-76	-75	-76.33	1.528	-0.02	0	0
Other	Fluoride	μg/L	5	373	420	500	430.6	50.1	0.1164	0	0
Other	Nitrogen Ammonia (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate + Nitrite (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrate (as NO_3)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	μg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	μg/L	0	—	—	—	—	—	—	—	—
Other	Oxalate	μg/L	1	10	10	10	10	0	0	0	1
Other	Phosphorus Orthophosphate (as PO_4)	μg/L	1	100	100	100	100	0	0	0	1
Other	Silica	μg/L	4	6.74E+04	6.81E+04	6.99E+04	6.84E+04	1108	0.0162	0	0
Other	Sulfate	μg/L	5	5480	5830	7100	6048	633.3	0.1047	0	0
Other	Total Dissolved Solids	μg/L	5	1.72E+05	2.19E+05	2.28E+05	2.12E+05	2.27E+04	0.1069	0	0
Other	Carbon Dissolved Organic	μg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	μg/L	0	—	—	—	—	—	—	—	—
Other	Conductivity	μS/cm	4	187	189	198	190.8	4.924	0.0258	0	0
Other	Humic Substances Hydrophilic Acids	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	μg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	μg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	4	7.74	7.955	8.05	7.925	0.1387	0.0175	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.2	-1.2	-1.2	-1.2	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	3	-74	-73	-67	-71.33	3.786	-0.0531	0	0

Table 4.2-6f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	6	-11.3	-10.7	-10.6	-10.85	0.3146	-0.029	0	0
Other	Cyanide Reactive	μg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	μg/L	0	—	—	—	—	—	—	—	—
Other	Anion Sum	μg/L	4	1905	1930	1994	1940	39.31	0.0203	0	0
Other	Cation Sum	μg/L	4	1892	1949	2034	1956	71.03	0.0363	0	0
Other	Balance	μg/L	4	-26.49	-0.2152	58.86	7.985	36.17	4.5296	0	0
Other	Alkalinity(Lab) $CaCO_3$	μg/L	4	7.88E+04	7.94E+04	8.10E+04	7.97E+04	1022	0.0128	0	0
Other	Ammonium	μg/L	4	16.94	25	34.73	25.42	8.345	0.3283	0	0
Other	Ammonium [as N]	μg/L	4	13.17	19.44	27.01	19.77	6.491	0.3283	0	0
Other	Bicarbonate	μg/L	4	9.61E+04	9.69E+04	9.88E+04	9.72E+04	1247	0.0128	0	0
Other	Carbonate	μg/L	4	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	μg/L	4	5	10	10	8.75	2.5	0.2857	0	4
Other	Conductivity (Field)	μS/cm	3	160	200	207	189	25.36	0.1342	0	0
Other	Dissolved Oxygen (Field)	μg/L	1	8600	8600	8600	8600	0	0	0	0
Other	Hardness	μg/L	4	6.42E+04	6.87E+04	7.13E+04	6.82E+04	3308	0.0485	0	0
Other	Iodide	μg/L	4	5	5	5	5	0	0	0	4
Other	Nitrate	μg/L	4	3310	3716	4370	3778	448.3	0.1186	0	0
Other	Nitrate [as N]	μg/L	4	747.4	839.2	986.8	853.1	101.2	0.1186	0	0
Other	Nitrite	μg/L	4	5	5	10	6.25	2.5	0.4	0	4
Other	Nitrite [as N]	μg/L	4	0.8974	0.8974	1.795	1.122	0.4487	0.4	0	4
Other	pH (Field)	SU	4	7.3	7.895	7.97	7.765	0.3165	0.0408	0	0
Other	Phosphate	μg/L	4	10	10	25	13.75	7.5	0.5455	0	4
Other	Silicon	μg/L	4	3.15E+04	3.18E+04	3.27E+04	3.20E+04	517.9	0.0162	0	0
Other	Sulfite	μg/L	4	5	5	5	5	0	0	0	4
Other	Total Suspended Solids	μg/L	3	50	600	1300	650	626.5	0.9638	0	1
Other	Turbidity (Field)	NTU	3	0.4	1.6	5	2.333	2.386	1.0226	0	0
Other-ratio	Br/Cl by wt	ratio	4	0.006173	0.01086	0.0123	0.01005	0.002737	0.2723	0	0
Other-ratio	B/Cl by wt	ratio	4	0.003854	0.004387	0.004848	0.004369	4.22E-04	0.0966	0	0
Other-ratio	Cs/Cl by wt	ratio	4	0	0	0	0	0	0	0	0
Other-ratio	F/Cl by wt	ratio	4	0.08009	0.087	0.1029	0.08924	0.009771	0.1095	0	0
Other-ratio	HCO_3/CL by wt	ratio	4	19.07	19.8	20.63	19.82	0.6724	0.0339	0	0
Other-ratio	K/Cl by wt	ratio	4	0.3904	0.435	0.4616	0.4305	0.03613	0.0839	0	0
Other-ratio	Li/Cl by wt	ratio	4	0.005792	0.006307	0.0142	0.008151	0.004041	0.4957	0	0
Other-ratio	Na/Cl by wt	ratio	4	2.259	2.441	2.727	2.467	0.2083	0.0844	0	0
Other-ratio	SO_4/Cl by wt	ratio	4	1.112	1.191	1.224	1.18	0.04829	0.0409	0	0
Rad-iso	Americium-241	pCi/L	3	0.0015	0.0105	0.0135	0.0085	0.006245	0.7347	0	3
Rad-iso	Plutonium-238	pCi/L	3	0.001	0.002	0.0035	0.002167	0.001258	0.5808	0	3

Table 4.2-6f (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Plutonium-239	pCi/L	3	6.00E-04	0.0015	0.01	0.004033	0.005187	1.286	0	3
Rad-iso	Strontium-90	pCi/L	3	-0.08	0.065	0.085	0.02333	0.09005	3.8591	0	3
Rad-iso	Tritium	pCi/L	7	-0.09579	0.24	1.628	0.4949	0.642	1.2973	0	0
Rad-iso	Tritium	TU[f]	3	0.01	0.36	0.51	0.2933	0.2566	0.8747	0	0
Rad-iso	Uranium-234	pCi/L	3	0.666	0.69	0.915	0.757	0.1374	0.1814	0	0
Rad-iso	Uranium-235	pCi/L	3	0.022	0.041	0.064	0.04233	0.02103	0.4968	0	1
Rad-iso	Uranium-238	pCi/L	3	0.278	0.359	0.375	0.3373	0.052	0.1542	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	2	0.18	0.24	0.3	0.24	0.08485	0.3536	0	1
Rad-gross	Gross Beta Radiation	pCi/L	2	0.6	1.5	2.4	1.5	1.273	0.8485	0	1
Rad-gross	Gross Gamma Radiation	pCi/L	2	174	201	228	201	38.18	0.19	0	0
Rad-gscan[g]	Cesium-137	pCi/L	3	-0.85	-0.805	-0.255	-0.6367	0.3313	-0.5204	0	3

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-6g
Pajarito Spring Shows Both Filtered and Nonfiltered Samples at One-Half Detection Limit, Post-1997, R-Qualifiers Not Included

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Metals	Aluminum	µg/L	15	2	27	270	44.31	65.84	1.4858	0	6
Metals	Antimony	µg/L	18	0.05	0.1958	1.7	0.5264	0.6571	1.2484	0	17
Metals	Arsenic	µg/L	18	1.15	1.225	1.5	1.272	0.1191	0.0936	0	8
Metals	Barium	µg/L	18	34	39.82	42.13	39.76	2.12	0.0533	0	0
Metals	Beryllium	µg/L	18	0.005	0.8325	1	0.5931	0.448	0.7553	0	17
Metals	Boron	µg/L	16	7.05	22	32	19.48	6.851	0.3516	0	4
Metals	Cadmium	µg/L	18	0.065	0.5	0.5	0.3398	0.1926	0.5668	0	17
Metals	Calcium	µg/L	18	18670	20100	21200	20010	884.7	0.0442	0	0
Metals	Cesium	µg/L	10	0.5	1	1	0.95	0.1581	0.1664	0	10
Metals	Chromium	µg/L	18	1.2	4.15	7	4.331	1.868	0.4313	0	2
Metals	Cobalt	µg/L	18	0.195	0.75	1	0.6572	0.3613	0.5497	0	18
Metals	Copper	µg/L	18	0.21	0.825	3	1.107	1.087	0.9823	0	14
Metals	Iron	µg/L	18	3.65	14.8	80	20.2	19.08	0.9447	0	13
Metals	Lead	µg/L	18	0.005	1	2.58	0.905	0.6058	0.6694	0	16
Metals	Lithium	µg/L	10	20	30	70	33.8	13.58	0.4018	0	0
Metals	Magnesium	µg/L	18	4010	4475	4770	4448	216.8	0.0487	0	0
Metals	Manganese	µg/L	16	0.027	1	2.064	0.749	0.564	0.7531	0	14
Metals	Mercury	µg/L	16	0.005	0.01	0.11	0.02672	0.03233	1.2101	0	13
Metals	Molybdenum	µg/L	13	1	1	2	1.258	0.3813	0.3031	0	10
Metals	Nickel	µg/L	18	0.27	1	1.6	0.8633	0.3077	0.3564	0	17
Metals	Potassium	µg/L	18	1980	2150	2440	2180	129.5	0.0594	0	0
Metals	Rubidium	µg/L	10	3	4	4	3.6	0.5164	0.1434	0	0
Metals	Selenium	µg/L	18	0.05	0.15	1.9	0.775	0.8225	1.0613	0	17
Metals	Silver	µg/L	18	0.3	0.5	0.5	0.4394	0.08356	0.1901	0	18
Metals	Sodium	µg/L	18	10900	11950	12700	11790	635.7	0.0539	0	0
Metals	Strontium	µg/L	13	93	99	133.4	106.9	15.26	0.1428	0	0
Metals	Thallium	µg/L	18	0.013	1	2.95	1.105	0.8028	0.7266	0	18
Metals	Thorium	µg/L	1	0.5	0.5	0.5	0.5	0	0	0	1
Metals	Tin	µg/L	13	0.5	2.5	7.05	3.396	2.154	0.6342	0	13
Metals	Titanium	µg/L	13	0.65	1	9	1.956	2.377	1.2148	0	10
Metals	Uranium	µγ/Λ	6	0.368	1.03	1.19	0.9442	0.3187	0.3376	0	0
Metals	Uranium by NATU	µγ/Λ	2	0.983	0.992	1.001	0.992	0.01273	0.0128	0	0
Metals	Uranium by TUICPMS	µγ/Λ	3	0.368	0.867	0.89	0.7083	0.295	0.4164	0	0
Metals	Uranium by TULIKPA	µγ/Λ	3	0.98	0.98	1	0.9867	0.01155	0.0117	0	0
Metals	Vanadium	µγ/Λ	18	3	6.6	8	6.46	1.285	0.1989	0	0

Table 4.2-6g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Metals	Zinc	µg/L	17	0.255	5	10	3.181	2.858	0.8982	0	14
Other	Ammonia	µg/L	0	—[d]	—	—	—	—	—	—	—
Other	Alkalinity Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Bicarbonate as Calcium Carbonate	µg/L	3	8.01E+04	8.10E+04	8.10E+04	8.07E+04	519.6	0.0064	0	0
Other	Bromide	µg/L	16	0.025	52.98	100	48.33	24.28	0.5023	0	6
Other	Chloride	µg/L	16	4190	4980	5700	4960	413.3	0.0833	0	0
Other-iso	Delta deuterium versus Std. Mean Ocean Water	n/a[e]	3	-78	-76	-75	-76.33	1.528	-0.02	0	0
Other	Fluoride	µg/L	16	373	410	510	425.9	42.91	0.1008	0	0
Other	Nitrogen Ammonia (as N)	µg/L	3	250	250	250	250	0	0	0	3
Other	Nitrogen Nitrate + Nitrite (as N)	µg/L	3	350	800	810	653.3	262.7	0.4022	0	0
Other	Nitrogen Nitrate (as NO_3)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Nitrite (as NO_2)	µg/L	0	—	—	—	—	—	—	—	—
Other	Nitrogen Total Kjeldahl (as N)	µg/L	3	130	140	260	176.7	72.34	0.4095	0	0
Other	Oxalate	µg/L	3	10	10	10	10	0	0	0	3
Other	Phosphorus Orthophosphate (as PO_4)	µg/L	6	25	62.5	100	62.5	41.08	0.6573	0	6
Other	Silica	µg/L	13	6.68E+04	6.85E+04	7.45E+04	6.87E+04	1938	0.0282	0	0
Other	Sulfate	µg/L	16	4690	5730	7100	5848	635.2	0.1086	0	0
Other	Total Dissolved Solids	µg/L	13	1.70E+05	2.19E+05	2.29E+05	2.10E+05	2.27E+04	0.108	0	0
Other	Carbon Dissolved Organic	µg/L	0	—	—	—	—	—	—	—	—
Other	Carbon Total Organic	µg/L	4	210	255	370	272.5	71.36	0.2619	0	0
Other	Conductivity	µS/cm	10	187	189	230	195.2	13.14	0.0673	0	0
Other	Humic Substances Hydrophilic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Bases	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophilic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Acids	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Neutrals	µg/L	0	—	—	—	—	—	—	—	—
Other	Humic Substances Hydrophobic Total	µg/L	0	—	—	—	—	—	—	—	—
Other	pH	SU	9	7.74	8.01	8.06	7.933	0.133	0.0168	0	0
Other-iso	Nitrogen-15/Nitrogen-14 Ratio	ratio	1	-1.2	-1.2	-1.2	-1.2	0	0	0	0
Other-iso	Deuterium Hydrogen Ratio	ratio	5	-74	-72	-67	-71.2	2.775	-0.039	0	0
Other-iso	Oxygen-18/Oxygen-16 Ratio	ratio	8	-11.3	-10.9	-10.6	-10.92	0.3012	-0.0276	0	0
Other	Cyanide Reactive	µg/L	0	—	—	—	—	—	—	—	—
Other	Sulfide Reactive	µg/L	0	—	—	—	—	—	—	—	—

Table 4.2-6g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Other	Anion Sum	µg/L	9	1888	1922	1994	1933	35.03	0.0181	0	0
Other	Cation Sum	µg/L	9	1882	1999	2034	1965	63.58	0.0324	0	0
Other	Balance	µg/L	9	-26.49	20.33	58.86	16.05	29.2	1.8187	0	0
Other	Alkalinity(Lab) $CaCO_3$	µg/L	10	7.85E+04	7.96E+04	8.10E+04	7.97E+04	924.2	0.0116	0	0
Other	Ammonium	µg/L	10	10	30	52.32	29.31	12.2	0.4164	0	1
Other	Ammonium [as N]	µg/L	10	7.778	23.33	40.69	22.79	9.492	0.4164	0	1
Other	Bicarbonate	µg/L	10	9.58E+04	9.71E+04	9.88E+04	9.72E+04	1127	0.0116	0	0
Other	Carbonate	µg/L	10	0	0	0	0	0	—	0	0
Other	Chlorate (ClO_3)	µg/L	10	5	10	10	8.5	2.415	0.2841	0	10
Other	Conductivity (Field)	µS/cm	7	160	200	207	190.6	21.12	0.1108	0	0
Other	Dissolved Oxygen (Field)	µg/L	2	8600	8600	8600	8600	0	0	0	0
Other	Hardness	µg/L	9	6.37E+04	6.91E+04	7.18E+04	6.84E+04	3076	0.045	0	0
Other	Iodide	µg/L	10	5	5	5	5	0	0	0	10
Other	Nitrate	µg/L	10	3290	3716	4940	3891	575.9	0.148	0	0
Other	Nitrate [as N]	µg/L	10	742.9	839.2	1115	878.6	130	0.148	0	0
Other	Nitrite	µg/L	10	5	5	30	8.5	7.835	0.9218	0	9
Other	Nitrite [as N]	µg/L	10	0.8974	0.8974	5.385	1.526	1.406	0.9218	0	9
Other	pH (Field)	SU	9	7.3	7.83	7.97	7.772	0.2749	0.0354	0	0
Other	Phosphate	µg/L	10	3.26	10	25	12.33	7.003	0.5681	0	10
Other	Silicon	µg/L	9	3.12E+04	3.17E+04	3.27E+04	3.18E+04	464.8	0.0146	0	0
Other	Sulfite	µg/L	10	5	5	25	7	6.325	0.9035	0	10
Other	Total Suspended Solids	µg/L	5	50	841.1	1321	822.4	529.8	0.6443	0	1
Other	Turbidity (Field)	NTU	7	0.4	1.6	5	2.229	1.968	0.883	0	0
Other-ratio	Br/Cl by wt	ratio	9	0.00616	0.01158	0.0123	0.01039	0.002468	0.2376	0	0
Other-ratio	B/Cl by wt	ratio	9	0.003854	0.004255	0.004848	0.004342	2.74E-04	0.0632	0	0
Other-ratio	Cs/Cl by wt	ratio	9	0	0	0	0	0	0	0	0
Other-ratio	F/Cl by wt	ratio	9	0.08009	0.08863	0.1047	0.08948	0.008779	0.0981	0	0
Other-ratio	HCO_3/CL by wt	ratio	9	18.99	19.53	20.86	19.69	0.7173	0.0364	0	0
Other-ratio	K/Cl by wt	ratio	9	0.3904	0.4374	0.4616	0.432	0.02569	0.0595	0	0
Other-ratio	Li/Cl by wt	ratio	9	0.004301	0.00616	0.0142	0.006956	0.002874	0.4132	0	0
Other-ratio	Na/Cl by wt	ratio	9	2.259	2.485	2.727	2.477	0.1646	0.0665	0	0
Other-ratio	SO_4/Cl by wt	ratio	9	1.111	1.195	1.224	1.182	0.04233	0.0358	0	0
Rad-iso	Americium-241	pCi/L	7	0.001	0.0095	0.0249	0.009736	0.008115	0.8335	0	6
Rad-iso	Plutonium-238	pCi/L	7	-5.50E-04	0.0035	0.016	0.00635	0.006513	1.0257	0	7
Rad-iso	Plutonium-239	pCi/L	7	-0.004	0.0015	0.0225	0.004421	0.009227	2.087	0	7
Rad-iso	Strontium-90	pCi/L	7	-0.08	-0.005	0.12	0.015	0.07539	5.0259	0	7
Rad-iso	Tritium	pCi/L	9	-0.09579	0.3512	1.628	0.6048	0.6182	1.0222	0	0

Table 4.2-6g (continued)

Group	Analyte	Units	Count	Minimum	Median	Maximum	Mean	Std. Dev.	CV	Rejected	Nondetects
Rad-iso	Tritium	TU[f]	5	0.01	0.36	0.51	0.3	0.1949	0.6498	0	0
Rad-iso	Uranium-234	pCi/L	7	0.666	0.729	0.957	0.7907	0.1232	0.1558	0	0
Rad-iso	Uranium-235	pCi/L	7	0.0105	0.039	0.064	0.03407	0.01888	0.5541	0	3
Rad-iso	Uranium-238	pCi/L	7	0.278	0.323	0.414	0.3371	0.0481	0.1427	0	0
Rad-gross	Gross Alpha Radiation	pCi/L	5	0.18	0.3	0.4	0.286	0.09476	0.3313	0	2
Rad-gross	Gross Beta Radiation	pCi/L	5	0.38	0.6	2.4	0.973	0.819	0.8417	0	3
Rad-gross	Gross Gamma Radiation	pCi/L	5	118	174	228	175.6	48.19	0.2744	0	0
Rad-gscan[g]	Cesium-137	pCi/L	7	-0.85	-0.255	0.72	-0.1694	0.6222	-3.6736	0	7

[y] The mean is calculated as the arithmetic average.

[b] Std. Dev. = Standard deviation.

[c] CV = Coefficient of variation = std. dev./mean.
NATU = Natural uranium.
TUICPMS = Total uranium inductively coupled plasma mass spectrometry.
TULIKPA = Total uranium kinetic phosphorimetric analysis.

[d] n/a = Not applicable.

[e] — = No summary information, no samples analyzed.

[f] TU = tritium unit, 1 TU=3.193 pCi/kg or 3.193 pCi/L tritium.

[g] Rad-gscan = gamma spectroscopy.

Table 4.2-7
Reporting Limits Provided by EES-6 and Paragon Analytics, Inc.

Analyte	Analytical Method[a]		Reporting Limit (ppm or mg/L)	
	EES-6	Paragon	EES-6	Paragon
Ag	GFAA	ICPAES	0.001	0.01
Al	ICPAES	ICPAES	0.02	0.2
Alkalinity	Titration	Titration	1	1
As	Hydride-AA	ICPAES	0.0001	0.01
B	ICPAES	ICPAES	0.002	Not analyzed
Ba	ICPAES	ICPAES	0.002	0.1
Be	ICPAES	ICPAES	0.002	0.005
Br	IC	IC	0.01	0.01
Ca	ICPAES	ICPAES	0.02	1
Cd[b]	GFAA	GFAA	0.001	0.005
Cl	IC	IC	0.01	0.01
ClO_3	IC	IC	0.02	Not analyzed
Co	GFAA	ICPAES	0.002	0.01
$CO_3/HCO_3/OH$	Titration	Titration	0.5	0.5
Conductivity	Electrode	Electrode	0.5	0.5
Cr	GFAA	ICPAES	0.002	0.01
Cs	GFAA	GFAA	0.002	Not analyzed
Cu	GFAA	GFAA	0.002	0.01
F	IC	IC	0.01	0.01
Fe	ICPAES	ICPAES	0.01	0.1
Hardness	Calculated	Calculated	Calculated	Calculated
HCO_3	Titration	Titration	0.5	0.5
Hg	Cold Vapor AA	Cold Vapor AA	0.0002	0.0002
I	IC	IC	0.01	Not analyzed
K	AA	ICPAES	0.01	1
Li	ICPAES	ICPAES	0.01	Not analyzed
Mg	ICPAES	ICPAES	0.01	1
Mn	ICPAES	ICPAES	0.002	0.01
Mo	GFAA	ICPAES	0.002	0.01
Na	AA	ICPAES	0.01	1
NH_4	Electrode	Electrode	0.02	0.5
Ni	GFAA	ICPAES	0.002	0.02
NO_2	IC	IC	0.01	0.05
NO_3	IC	IC	0.01	0.05
OH	Titration	Titration	0.5	Not analyzed
Pb[b]	GFAA	ICPAES	0.002	0.003
pH	Electrode	Electrode	0.05	0.05

Table 4.2-7 (continued)

Analyte	Analytical Method[a]		Reporting Limit (ppm or mg/L)	
	EES-6	Paragon	EES-6	Paragon
PO_4	IC	IC	0.02	0.05
Rb	GFAA	ICPAES	0.002	Not analyzed
Sb[b]	Hydride AA	ICPAES	0.0001	0.02
Se	Hydride AA	ICPAES	0.0001	0.005
Si	ICPAES	ICPAES	0.02	0.02
SO_4	IC	IC	0.02	0.02
S_2O_3	IC	IC	0.01	Not analyzed
Sn	GFAA	ICPAES	0.005	0.02
Sr	ICPAES	ICPAES	0.002	0.02
Ti	ICPAES	ICPAES	0.002	0.002
Tl[b]	GFAA	ICPAES	0.002	0.01
TSS	Filtration 1L	Filtration 1L	0.1	Not analyzed
U[b]	ICPMS	LIKPA	Not analyzed	0.0002
V	ICPAES	ICPAES	0.002	0.01
Zn	ICPAES	ICPAES	0.01	0.02
TDS	Calculated	Calculated	Calculated	Calculated

[a] AA = atomic absorption spectroscopy, GFAA = graphite furnace atomic absorption, IC = ion chromatography, ICPES = inductively coupled plasma atomic emission spectroscopy, ICPMS = inductively coupled plasma mass spectroscopy, LIKPA = laser-induced kinetic phosphorimetric analysis.

[b] ICP-MS was used for Sb, Cd, Pb, Tl, and U by the General Engineering Laboratories (GEL) for samples collected in December 1999/January 2000 and March/April 2000.

Table 4.2-8
List of Key Groundwater Analytes

Group	Analyte	Regulatory Standard			Geochemical-Conceptual Model and Pathway Analysis	Detection Rate[a]	Data Source
		NMED	EPA	DOE			
Field	Temperature	—	—	—	x	100%	Field
Field	Specific conductance (conductivity)	—	—	—	x	100%	Field
Field	pH	x	x	—	x	100%	Field
Metals	Aluminum	x	x	—	x	29%	CL[b]
Metals	Antimony		x	—	x	3%	CL
Metals	Arsenic	x	x	—	x	15%	CL
Metals	Barium	x	x	—	x	97%	CL
Metals	Beryllium		x	—	x	24%	CL
Metals	Boron	x		—	x	26%	CL
Metals	Cadmium	x	x	—	x	6%	CL
Metals	Calcium			—	x	100%	CL
Metals	Chromium, total	x	x	—	x	42%	CL
Metals	Cobalt	x	x	—	x	19%	CL
Metals	Copper	x	x	—	x	21%	CL
Metals	Iron	x	x	—	x	24%	CL
Metals	Lead	x	x	—	x	16%	CL
Metals	Magnesium	—	—	—	x	97%	CL
Metals	Manganese	x	x	—	x	56%	CL
Metals	Mercury	x	x	—	x	7%	CL
Metals	Molybdenum	x	x	—	x	15%	CL
Metals	Nickel	x	x	—	x	37%	CL
Metals	Potassium			—	x	100%	CL
Metals	Selenium	x	x	—	x	1%	CL
Metals	Silver	—	x	—	x	4%	CL
Metals	Sodium	—	—	—	x	100%	CL
Metals	Strontium	—	—	—	x	87%	CL
Metals	Thallium	—	x	—	x	19%	CL
Metals	Uranium	x	x	—	x	100%	CL
Metals	Zinc	x	x	—	x	44%	CL
Other	Alkalinity (Lab) $CaCO_3$	—	—	—	x	100%	EES[c]
Other	Ammonium [as N]	—	—	—	x	68%	EES
Other	Bicarbonate	—	—	—	x	100%	EES
Other	Carbon, dissolved organic	—	—	—	x	100%	CL
Other	Chloride	x	x	—	x	100%	EES
Other	Cyanide[d]	x	x	—	x	na[e]	na
Other	Fluoride	x	x	—	x	100%	EES
Other	Nitrate [as N]	x	x	—	x	91%	EES
Other	Nitrite [as N]	—	x	—	x	19%	EES
Other	Low-level perchlorate	—	—	—	x	100%	NMED

Table 4.2-8 (continued)

Group	Analyte	Regulatory Standard			Geochemical-Conceptual Model and Pathway Analysis	Detection Rate[a]	Data Source
		NMED	EPA	DOE			
Other	Silica	—	—	—	x	100%	EES
Other	Total dissolved solids	x	x	—	x	100%	EES
Other	Deuterium hydrogen ratio	—	—	—	x	100%	CL
Other	Delta deuterium	—	—	—	x	100%	CL
Other	Nitrogen-15/nitrogen-14 Ratio	—	—	—	x	100%	CL
Other	Oxygen-18/oxygen-16 Ratio	—	—	—	x	100%	CL
Rads	Gross alpha radiation	x	x	x	x	83%	CL
Rads	Americium-241	—	—	x	x	15%	CL
Rads	Plutonium-238	—	—	x	x	8%	CL
Rads	Plutonium-239	—	—	x	x	9%	CL
Rads	Radium-226	x	x	x	x	na	na
Rads	Radium-228	x	x	x	x	na	na
Rads	Strontium-90	x	x	x	x	0%	CL
Rads	Tritium	—	—	x	x	100%	CL
Rads	Uranium-234	—	—	x	x	89%	CL
Rads	Uranium-235	—	—	x	x	25%	CL
Rads	Uranium-238	—	—	x	x	87%	CL

[a] For filtered samples.
[b] CL = Contract laboratory.
[c] EES = Earth and Environmental Sciences Division (EES-6) Laboratory.
[d] There is a single sample result for reactive cyanide.
[e] na = Not available because of lack of data.
[f] n.c. = Not calculated because baseline validation for University of Miami tritium sample results was incomplete.

Table 4.2-9
Background Perchlorate Concentration in the Pajarito Plateau Groundwaters (NMED 2004, 88768)

Aquifer-prep	Units	Count	Minimum	Median	Maximum	Mean[a]	Std. Dev.[b]	CV[c]	Rejected	Nondetects
Regional-filtered	µg/L	36	0.025	0.26	0.46	0.2735	0.09198	0.3363	0	1
Volcanic-filtered	µg/L	20	0.17	0.2615	0.45	0.272	0.06831	0.2511	0	0
Combined	µg/L	56	0.025	0.26	0.46	0.2729	0.08364	0.3064	0	1

[a] The mean is calculated as the arithmetic average
[b] Std. Dev. = standard deviation
[c] CV = coefficient of variation = Std. Dev /Mean

Table 4.4-1
Analytical Results (ppm) for Selected Springs within the Sierra de los Valles (June 2000)

Spring	Al	Alkalinity (mg $CaCO_3$/L)	Ba	Ca	Cl	F	Fe	K	Mg	Mn	Na	NH_4	NO_3 (N)	PO_4 (P)	SO_4	Sr	TDS
Water Canyon Gallery	0.012	41.1	0.009	7.04	0.91	0.07	0.03	1.58	3.13	[0.001]	5.6	[0.02]	0.36	[0.02]	1.14	0.049	113
Upper Cañon de Valle	0.042	51.6	0.028	12.2	1.24	0.06	0.07	2.86	3.31	0.015	4.9	0.03	0.35	0.14	3.36	0.088	134
Pine	0.12	64.2	0.059	18.3	2.98	0.10	0.16	5.55	4.15	0.32	6.4	0.12	0.27	0.33	16.5	0.12	181
Apache	0.045	55.0	0.072	13.2	16.9	0.05	0.08	4.56	5.02	0.009	10.4	[0.02]	0.26	0.03	5.26	0.11	178

Note: Concentrations of total dissolved solids (TDS) were calculated from the summation of solutes. [0.001] means less than detection with the method detection limit given in brackets.

Appendix A

Samples Taken and Field Measurements

Appendix B

Statistical Plots and Tables

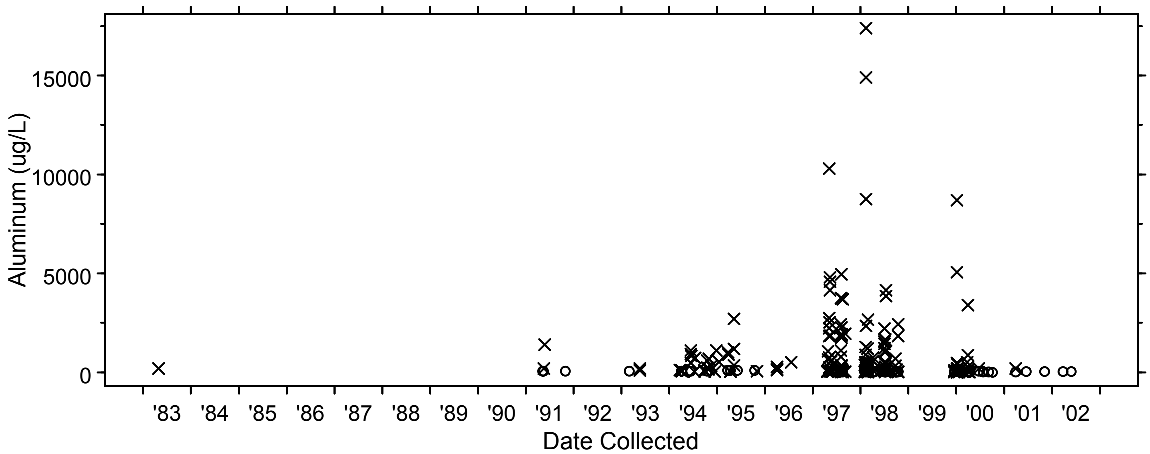
Figures

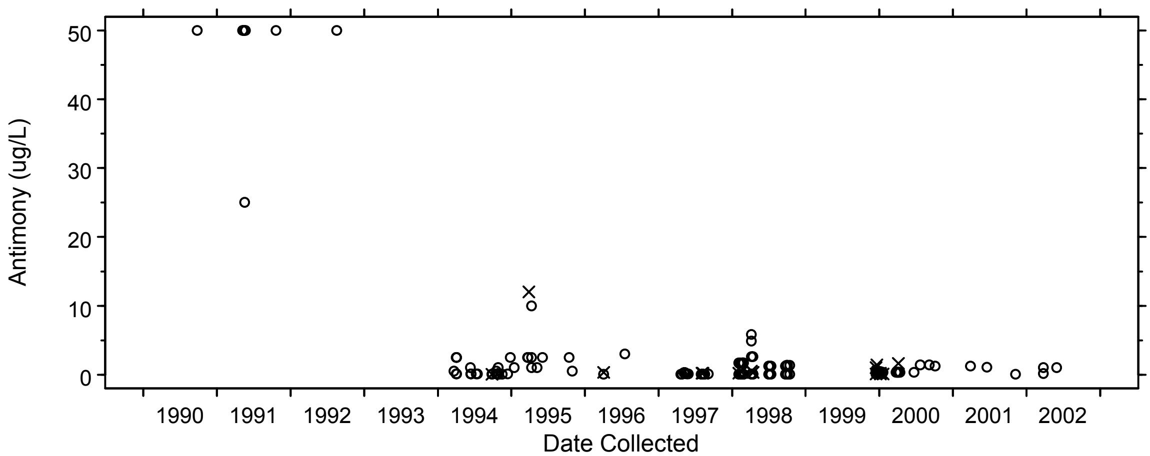
Tables

Location by Metals

Location by Other Analytes

Location by Radionuclides





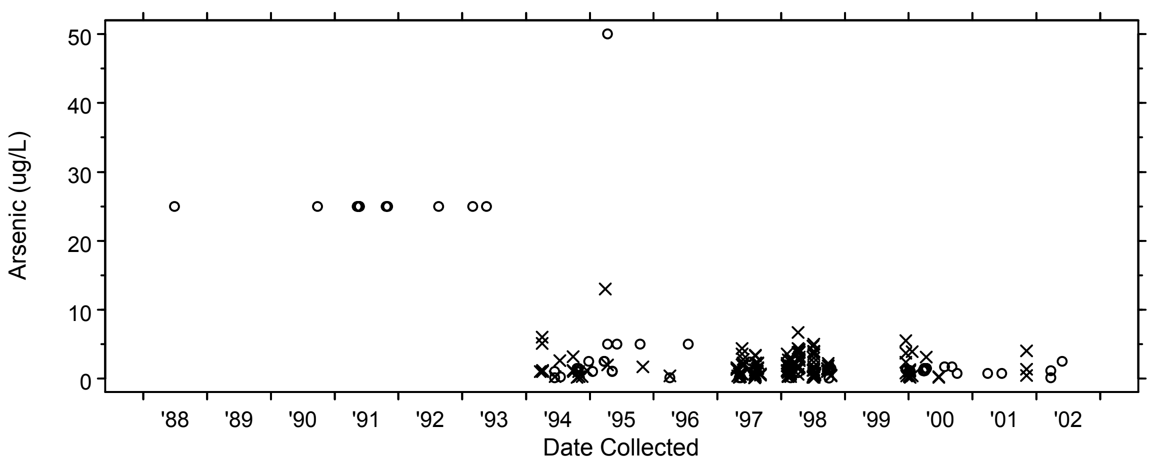


Figure B-1. Time sequence of aluminum, antimony, and arsenic results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

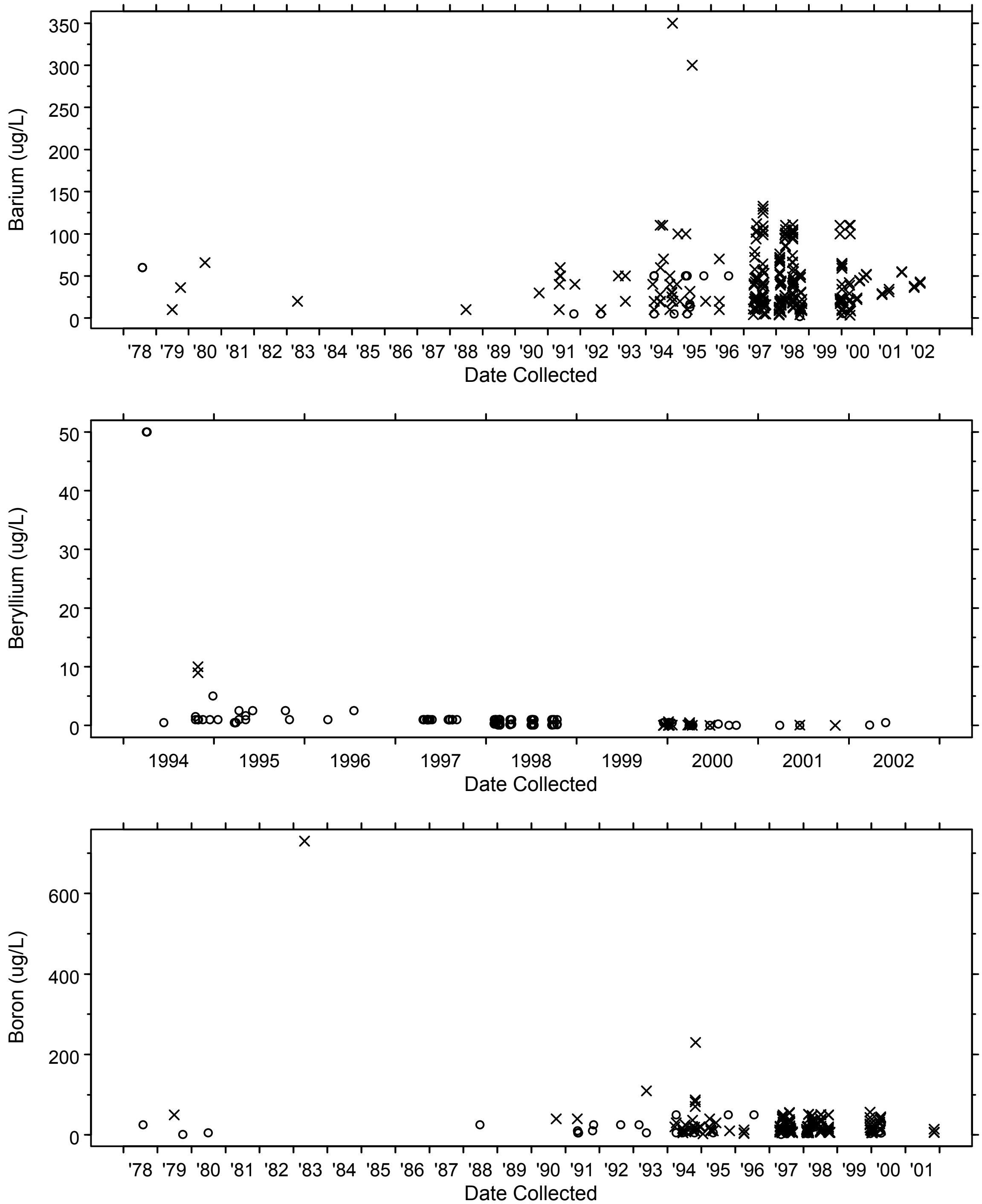


Figure B-2. **Time sequence of barium, beryllium, and boron results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]**

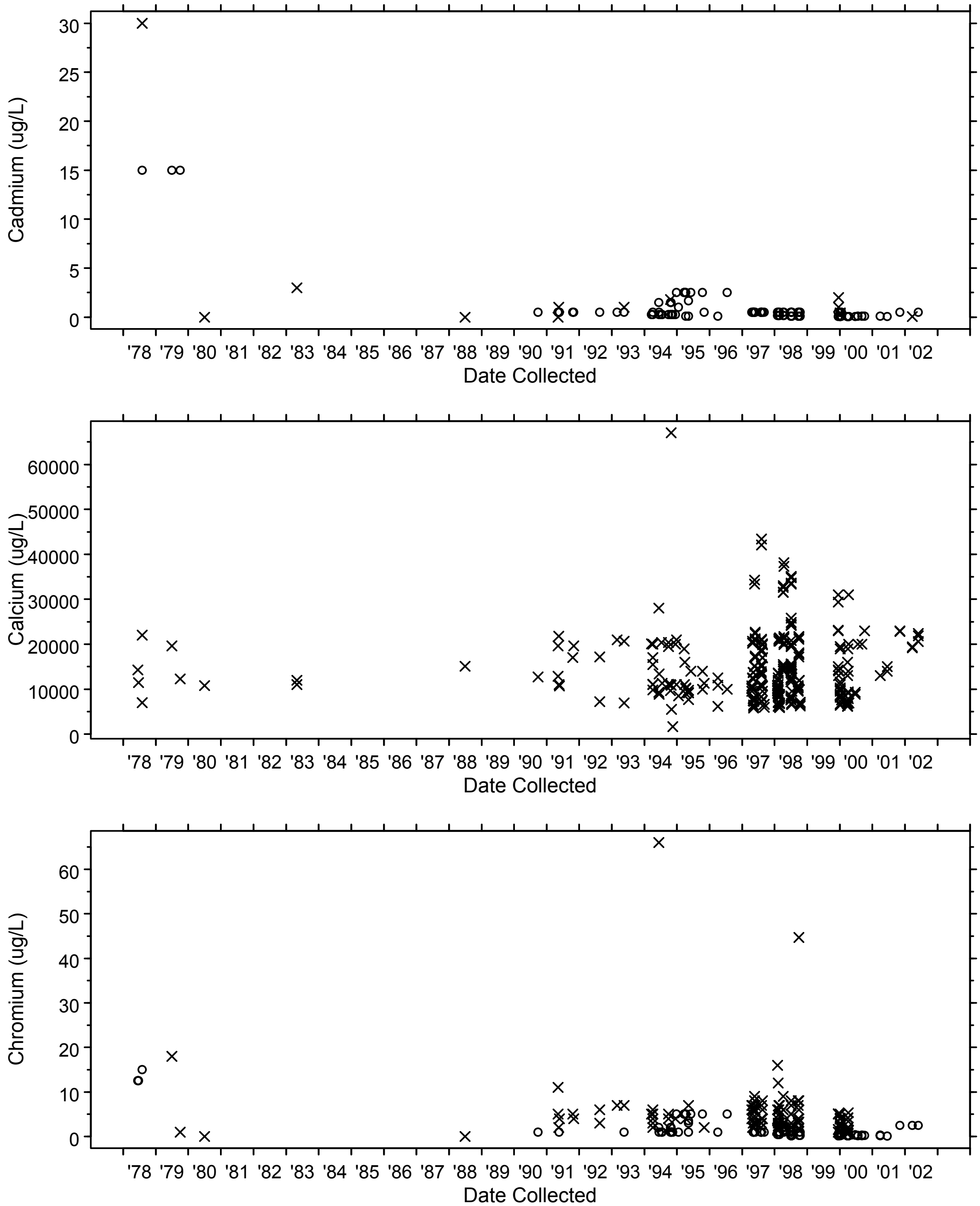


Figure B-3. Time sequence of cadmium, calcium, and chromium results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

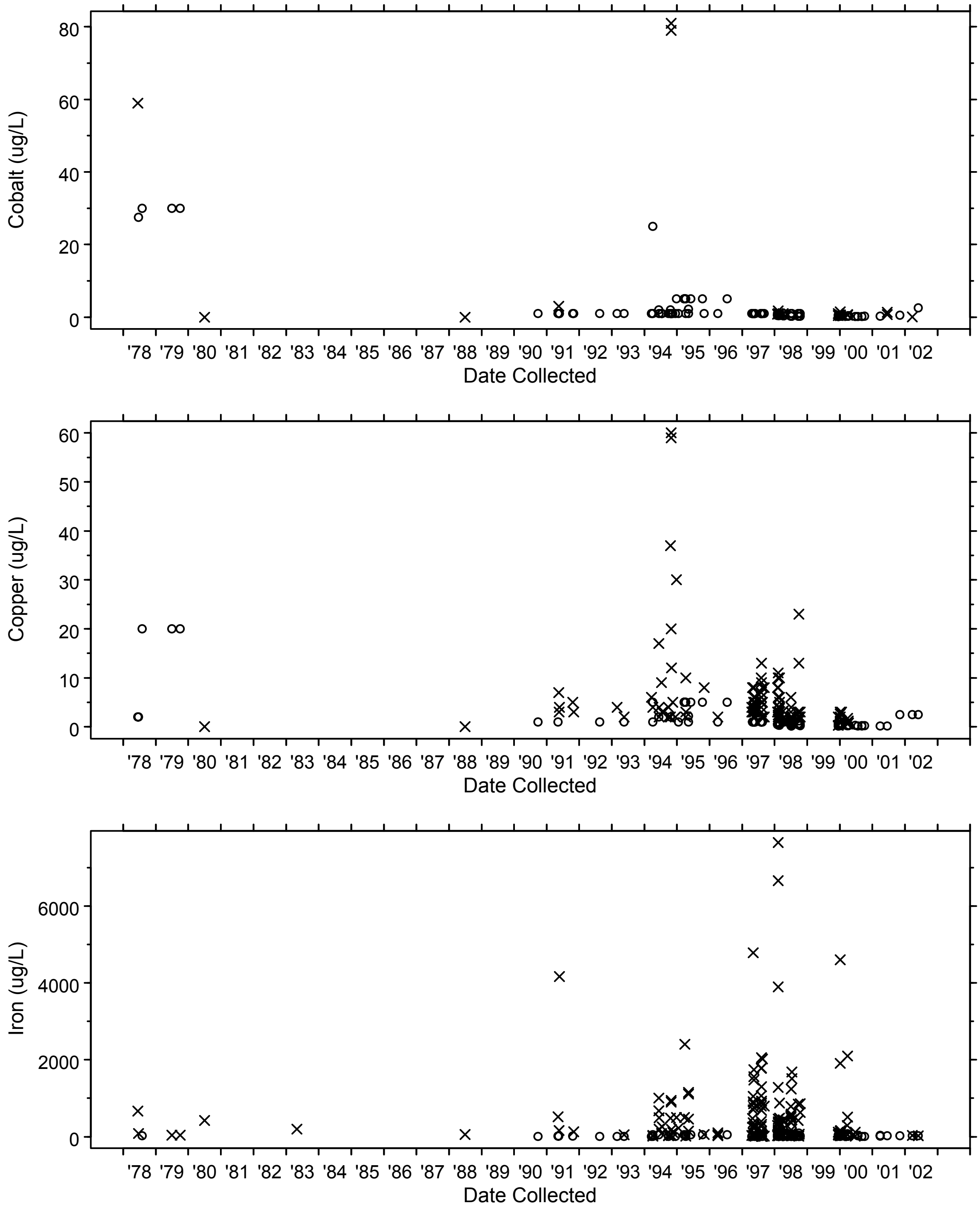


Figure B-4. Time sequence of cobalt, copper, and iron results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

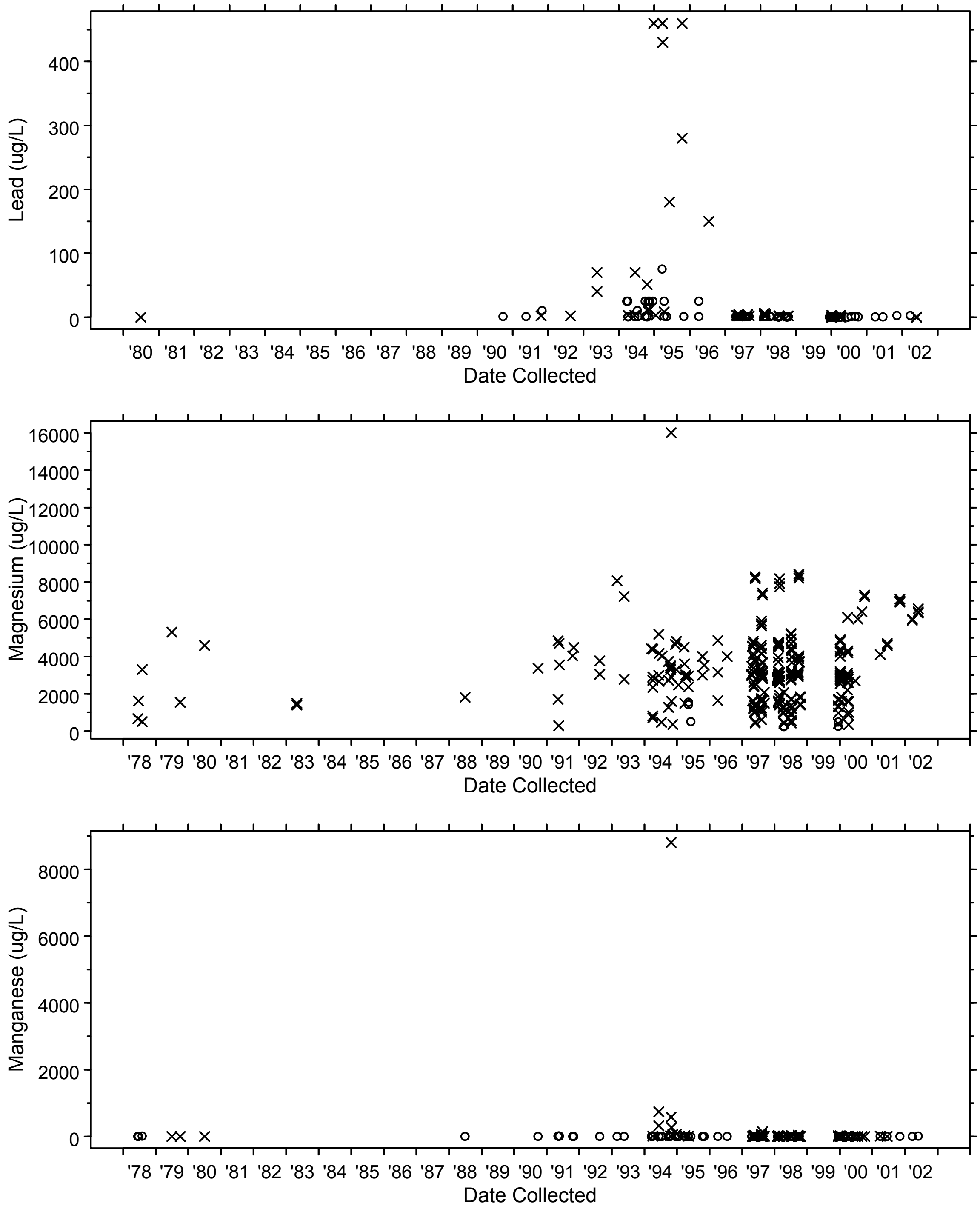


Figure B-5. Time sequence of lead, magnesium, and manganese results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

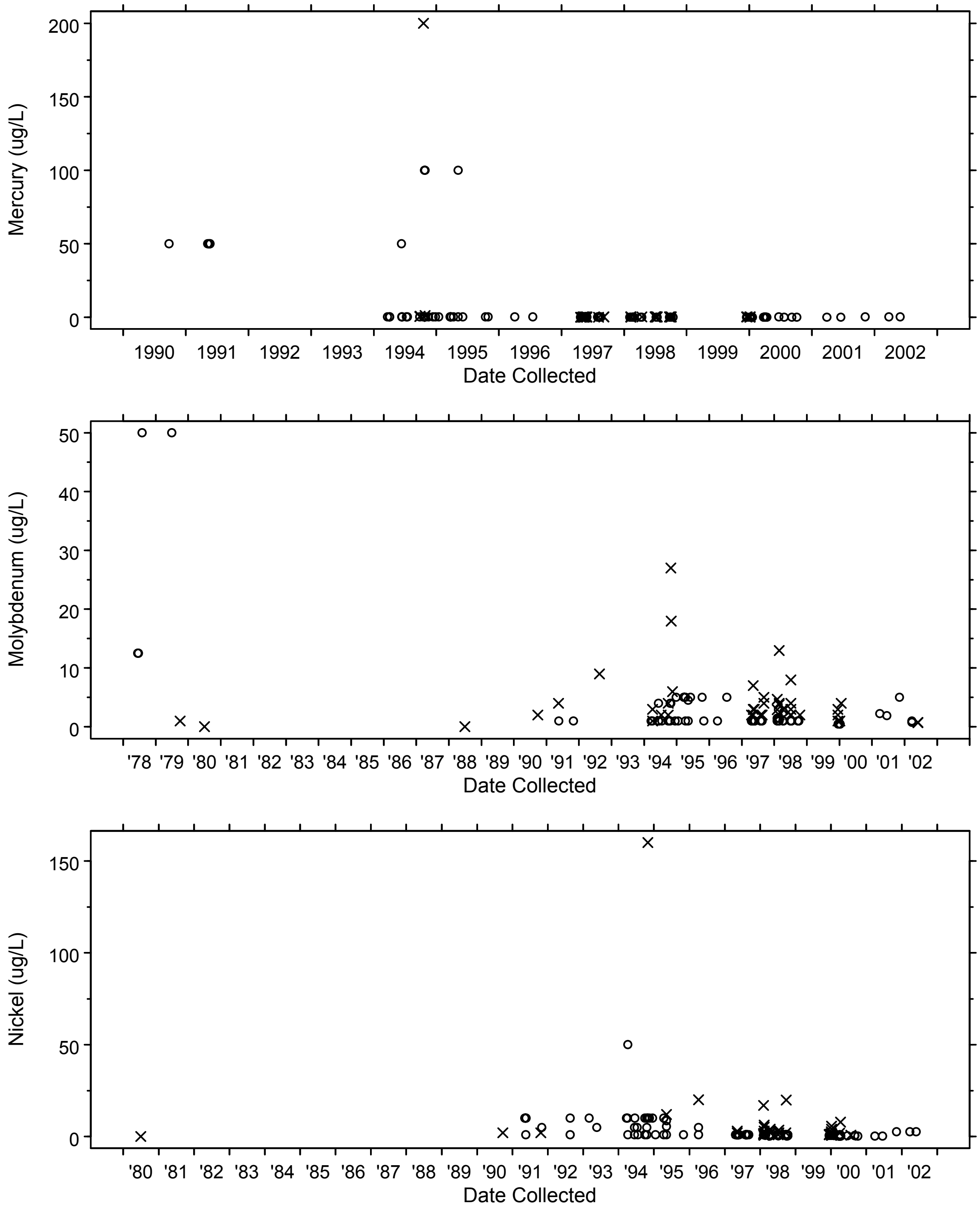


Figure B-6. Time sequence of mercury, molybdenum, and nickel results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

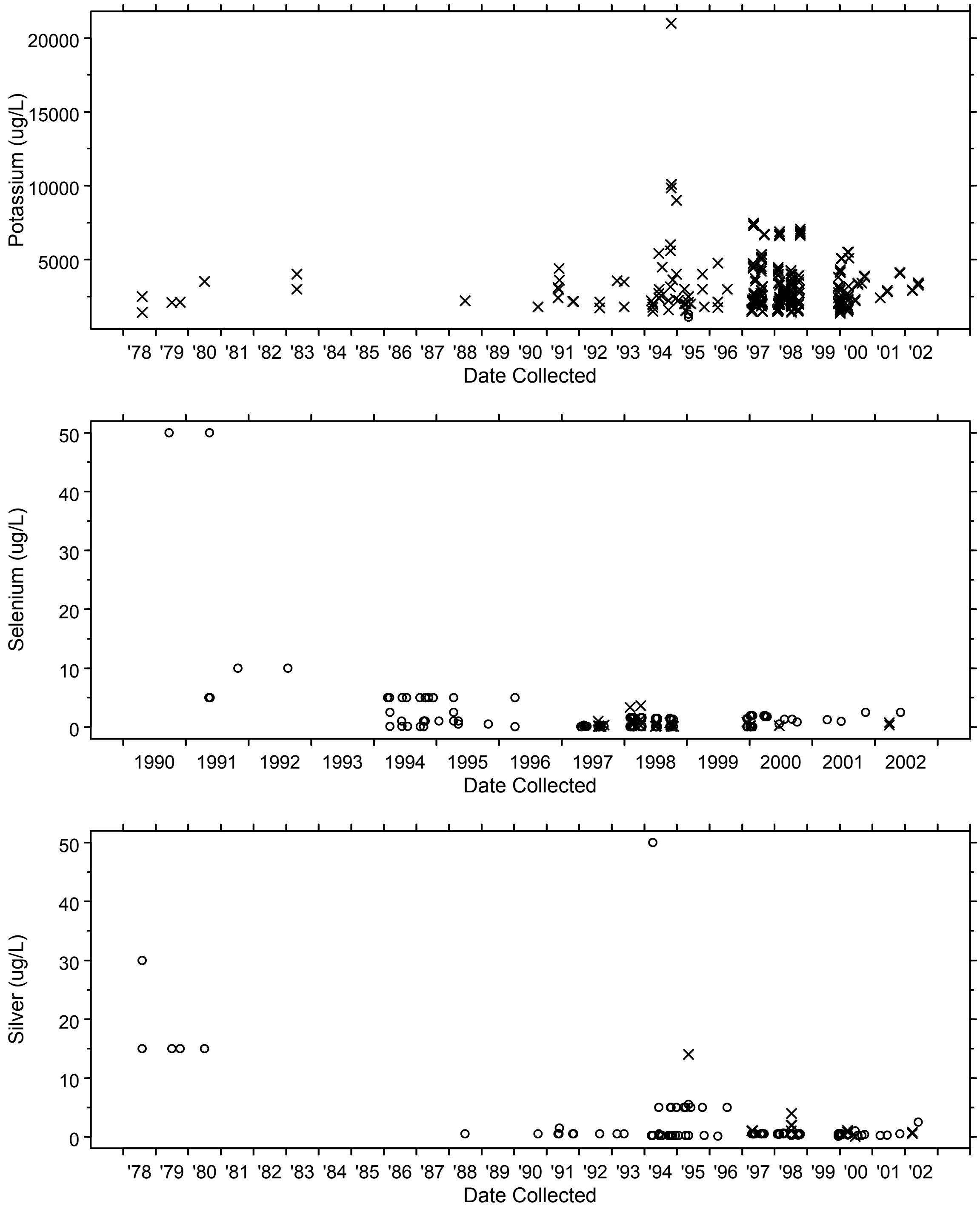


Figure B-7. Time sequence of potassium, selenium, and silver results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

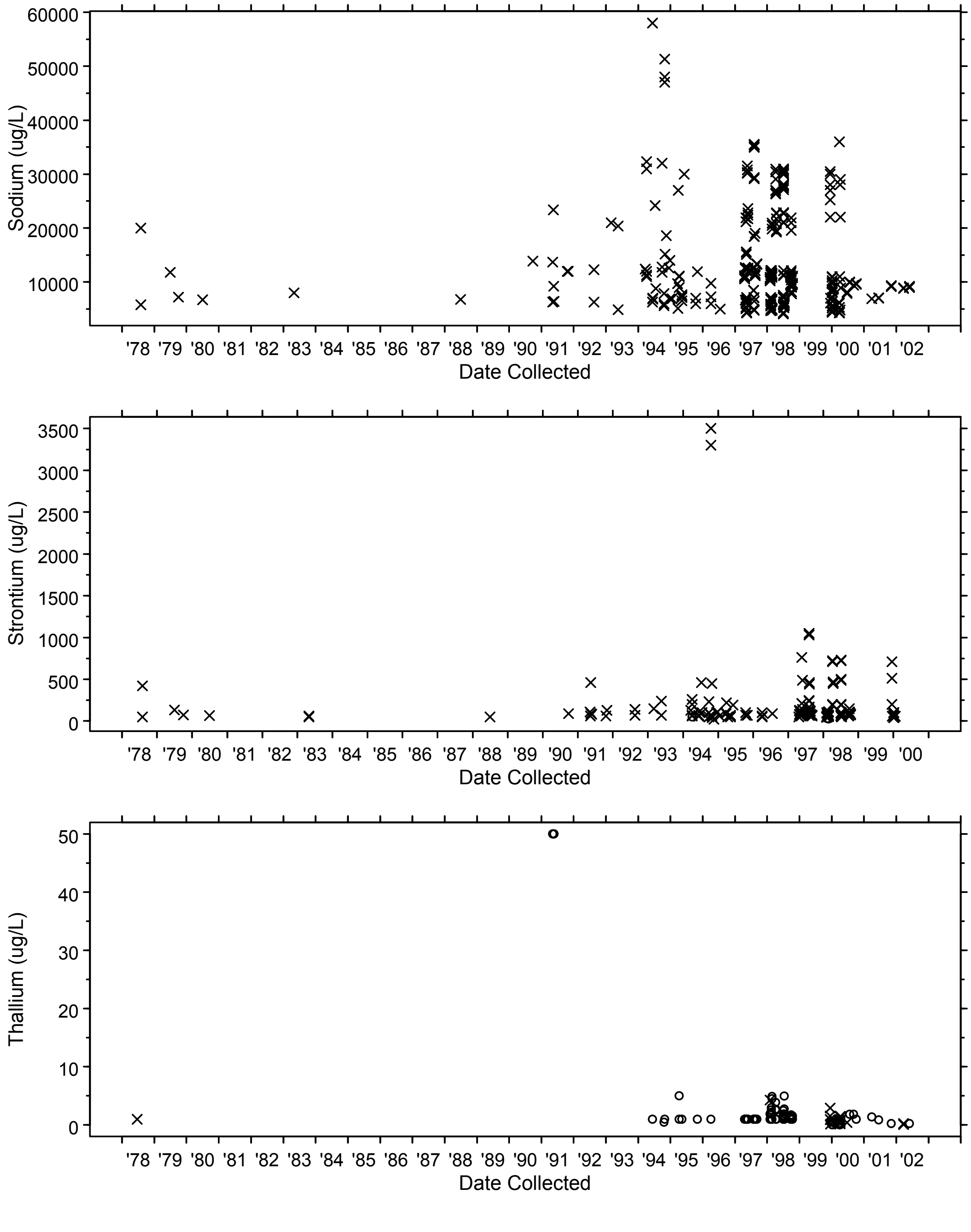


Figure B-8. Time sequence of sodium, strontium, and thallium results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

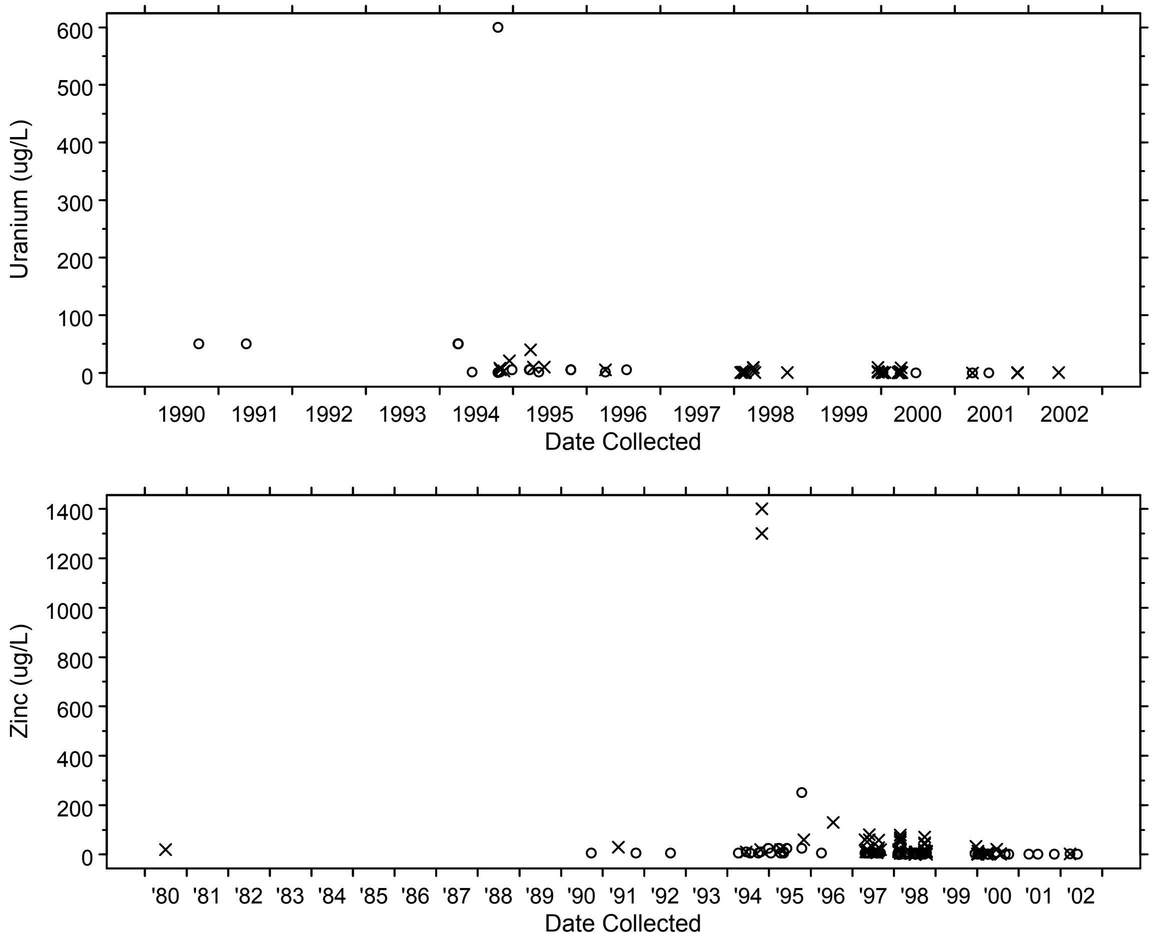


Figure B-9. Time sequence of uranium and zinc results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

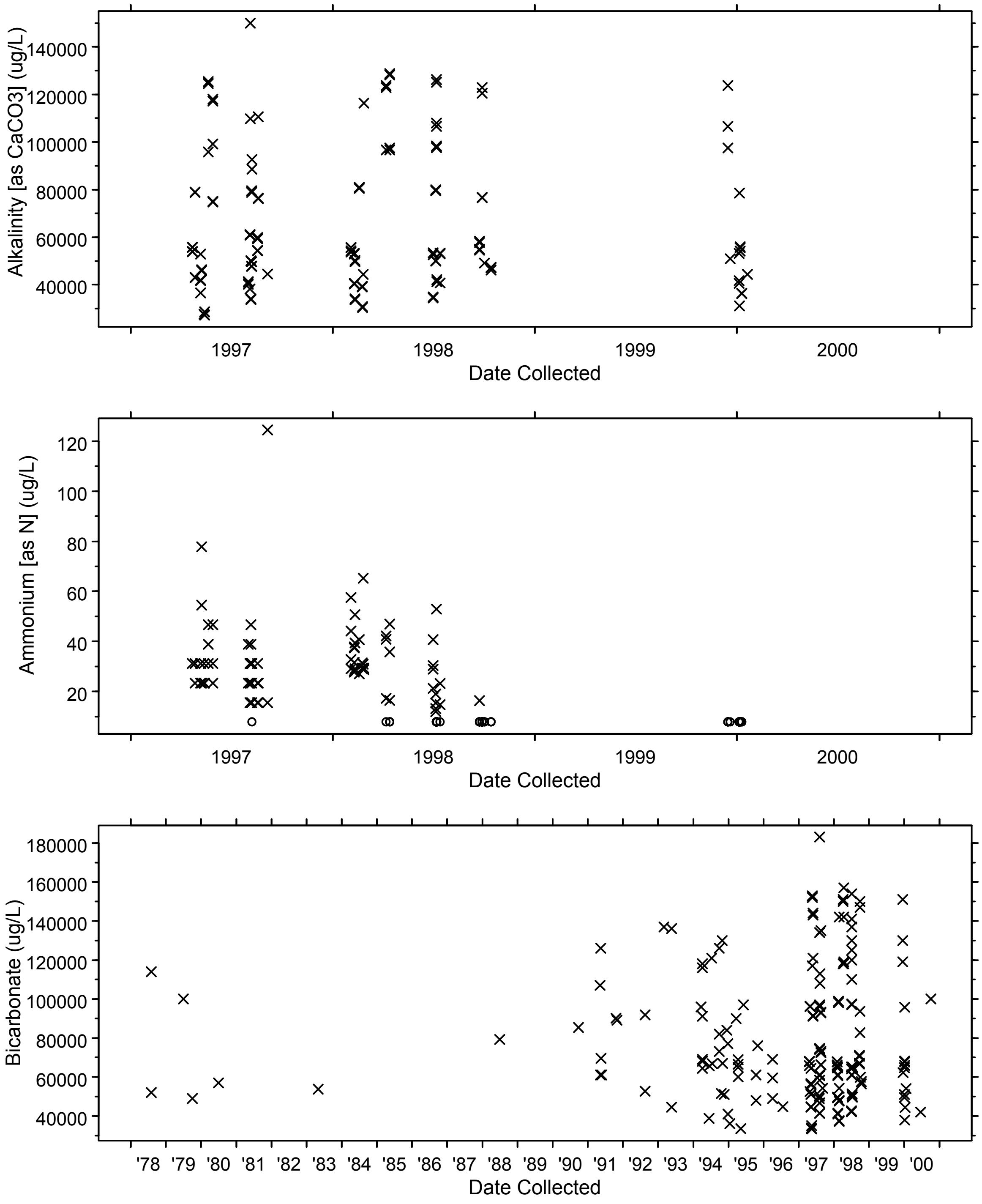


Figure B-10. Time sequence of alkalinity, ammonium, and bicarbonate results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

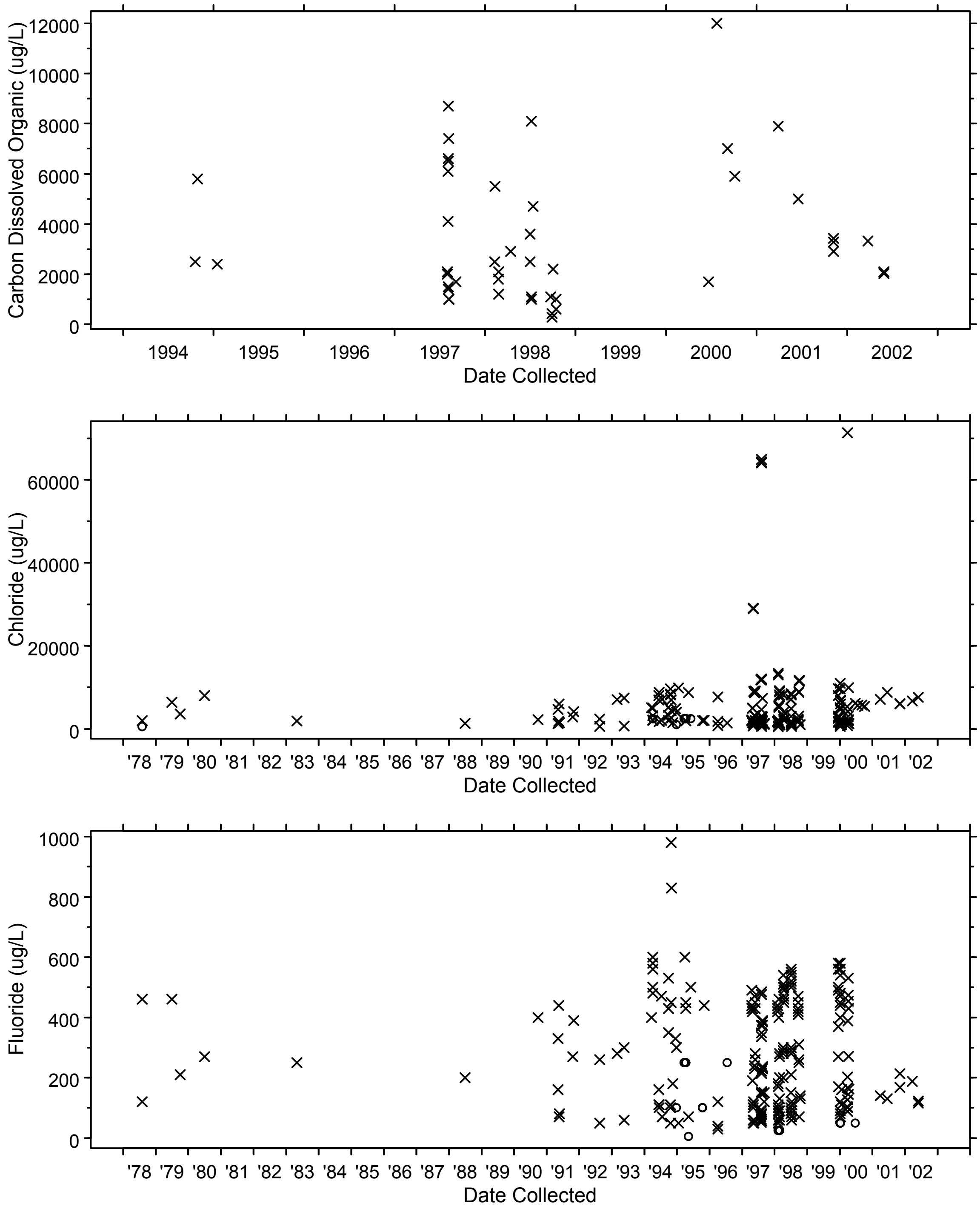


Figure B-11. Time sequence of dissolved organic carbon, chloride, and fluoride results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

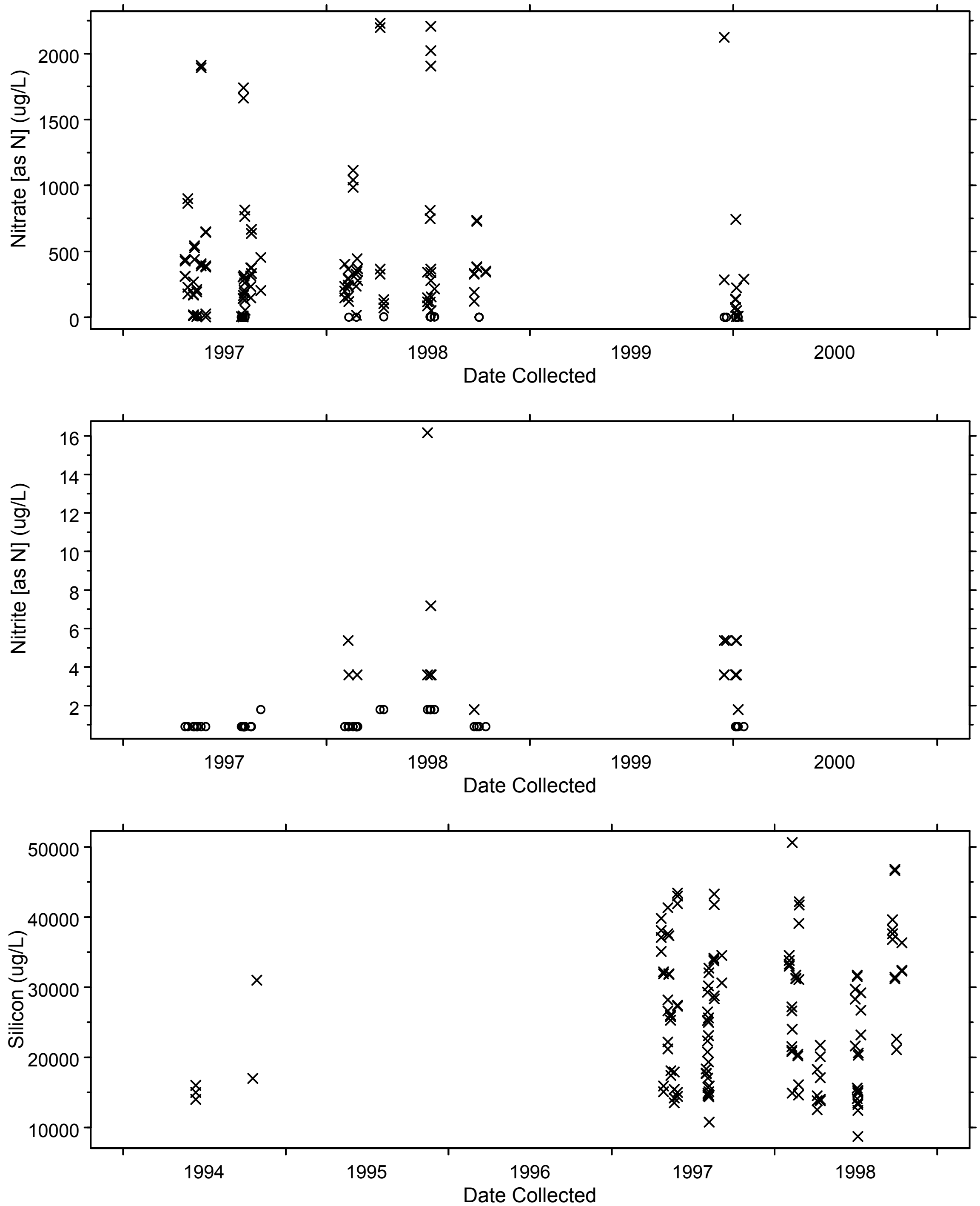


Figure B-12. Time sequence of nitrate, nitrite, and silicon results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

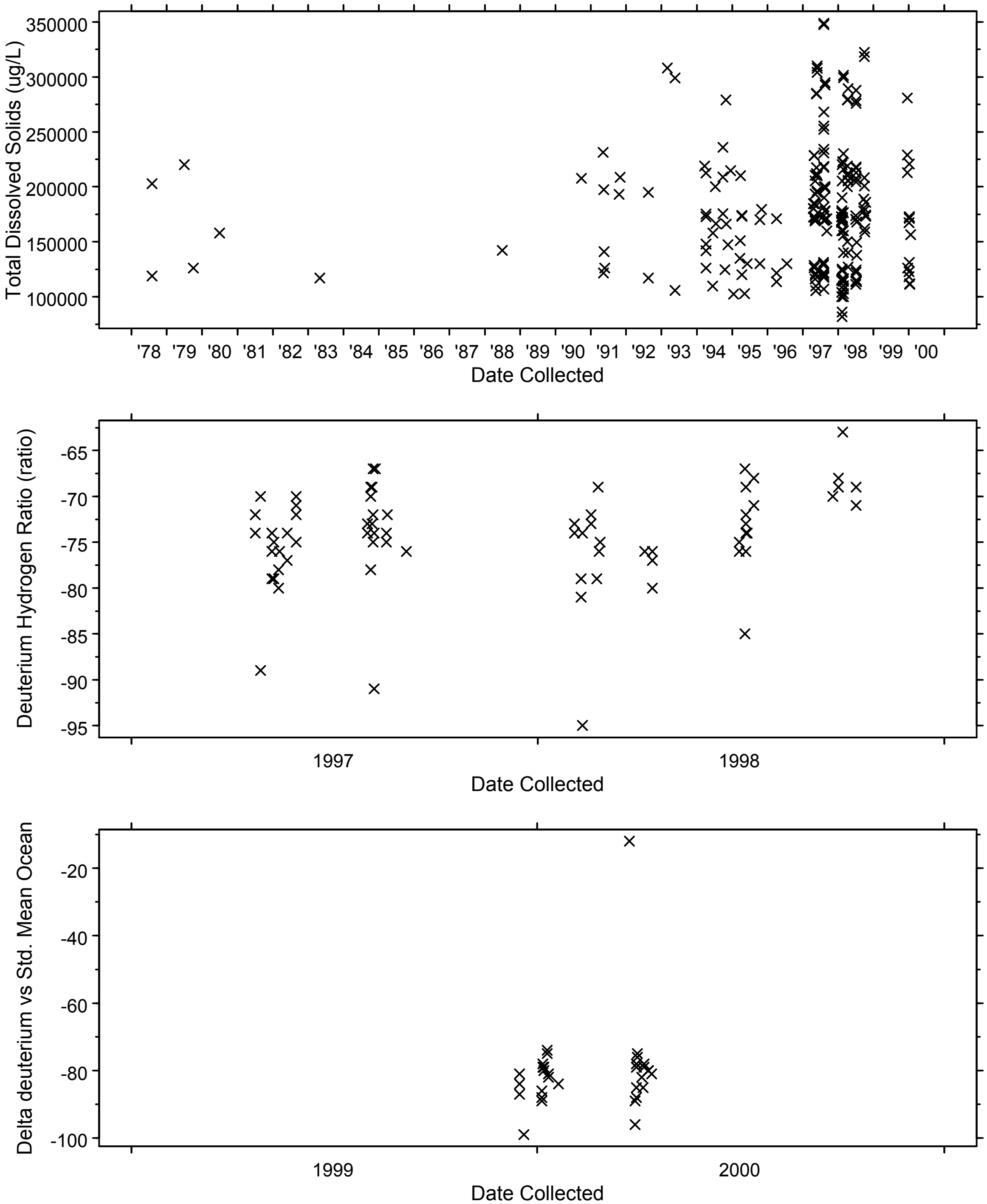


Figure B-13. Time sequence of total dissolved solids, deuterium/hydrogen ratio, and delta deuterium vs std. mean ocean water results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

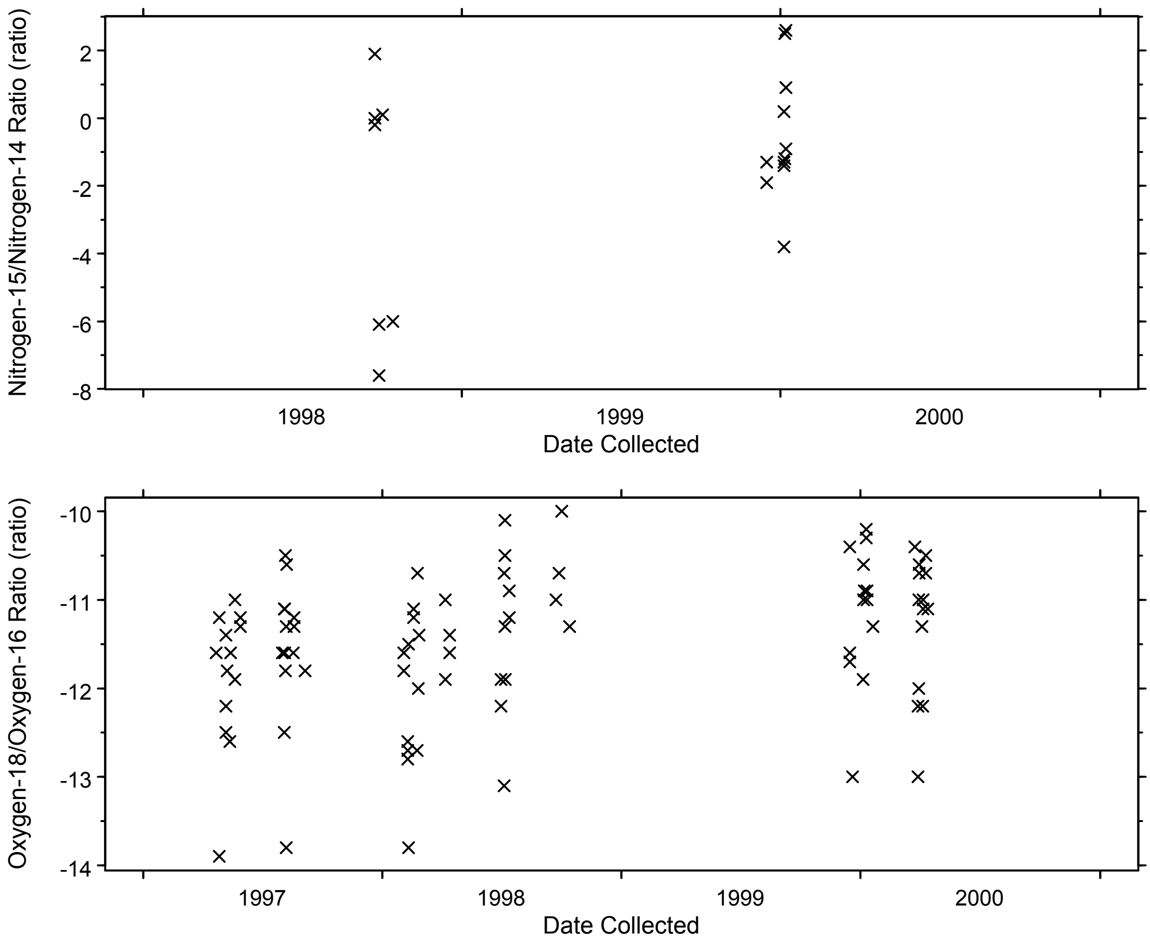


Figure B-14. Time sequence of nitrogen-15/nitrogen-14 ratio and oxygen-18/oxygen-16 ratio results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

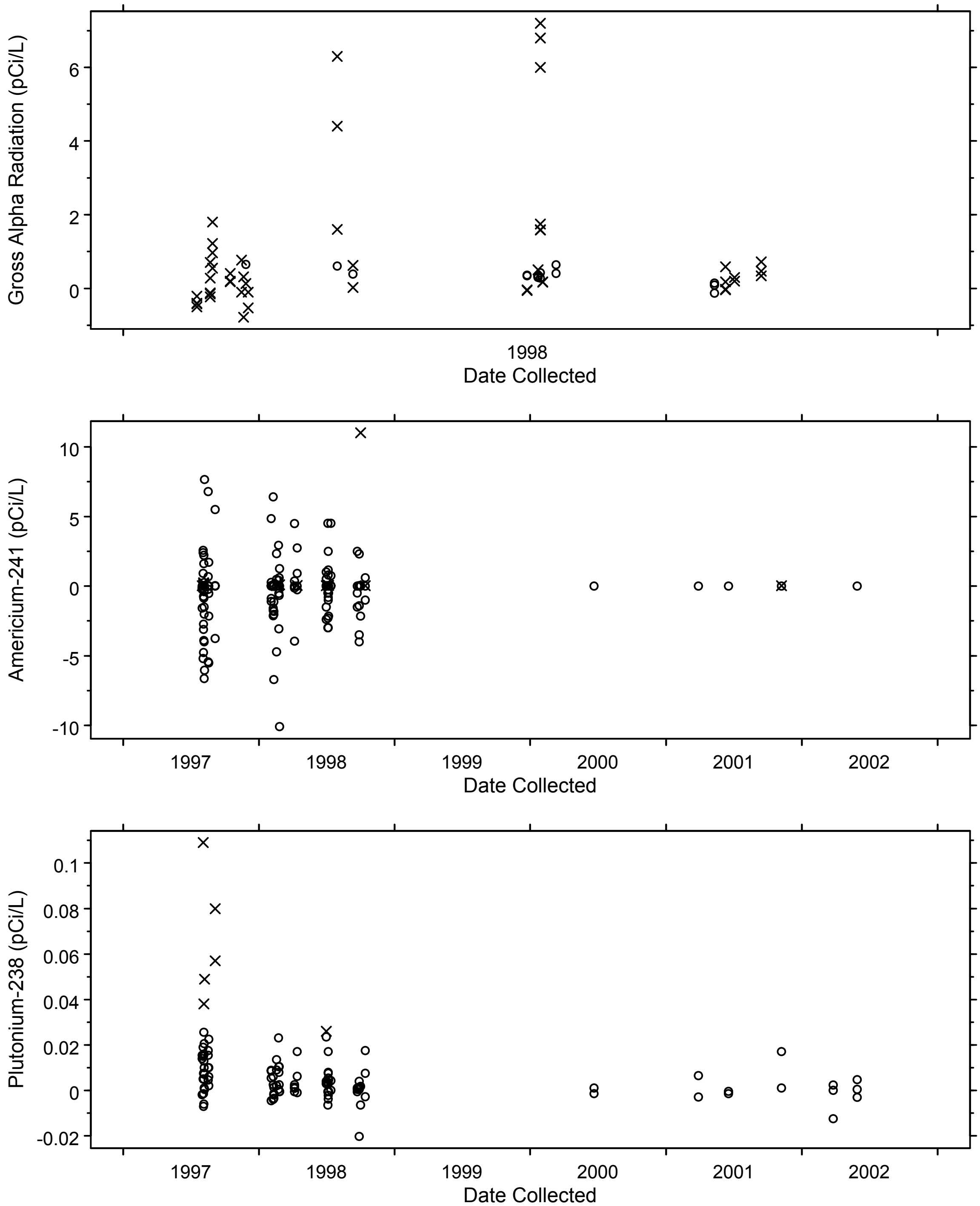


Figure B-15. Time sequence of gross alpha radiation, americium-241, and plutonium-238 results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

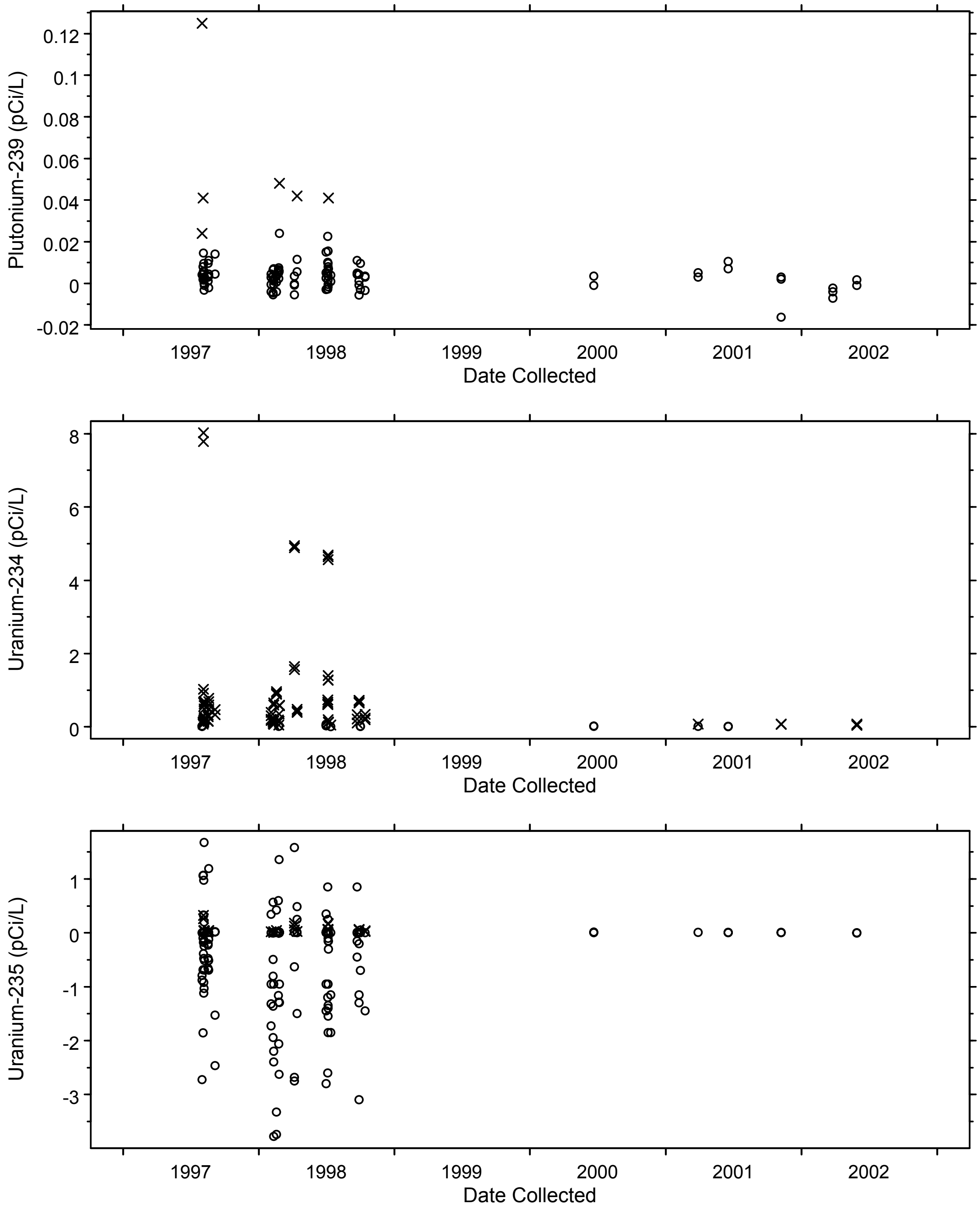


Figure B-16. Time sequence of plutonium-239/240, uranium-234, and uranium-235 results [note that "x" indicates detected concentrations, and "o" indicates nondetect results/2]

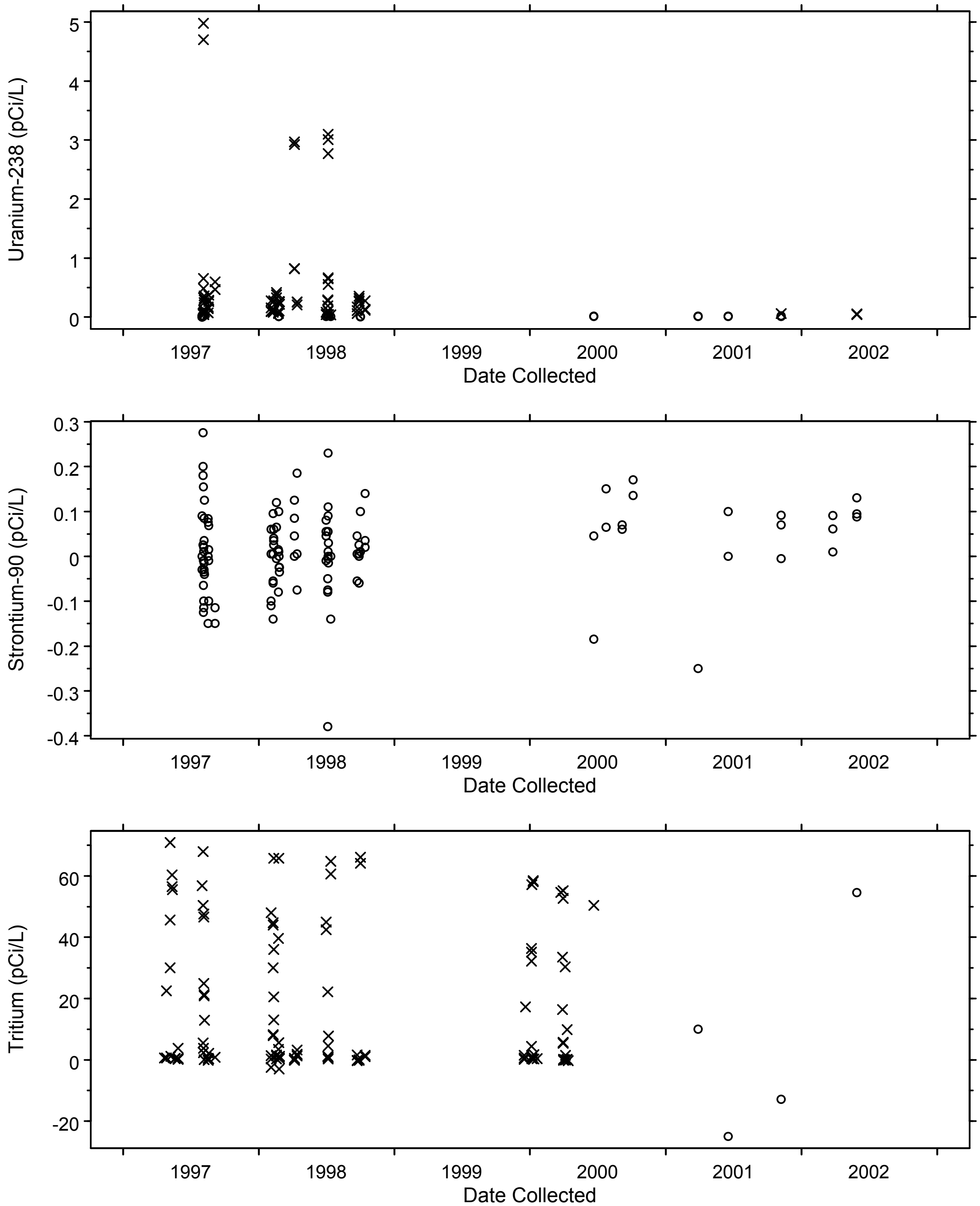


Figure B-17. Time sequence of uranium-238, strontium-90, and tritium results [note that “x” indicates detected concentrations, and “o” indicates nondetect results/2]

Appendix C

Statistical Plots

Figures

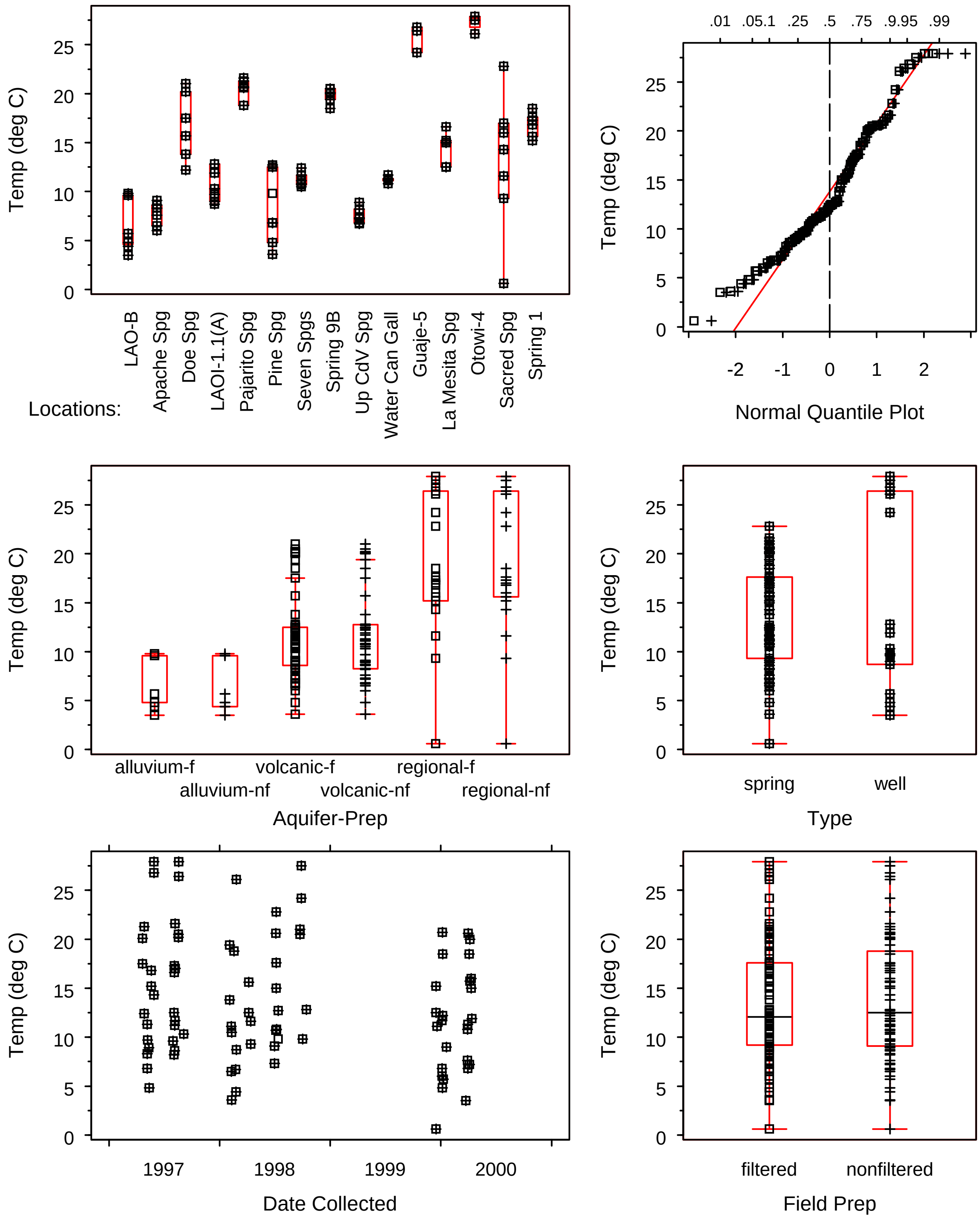


Figure C-1. Temperature plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

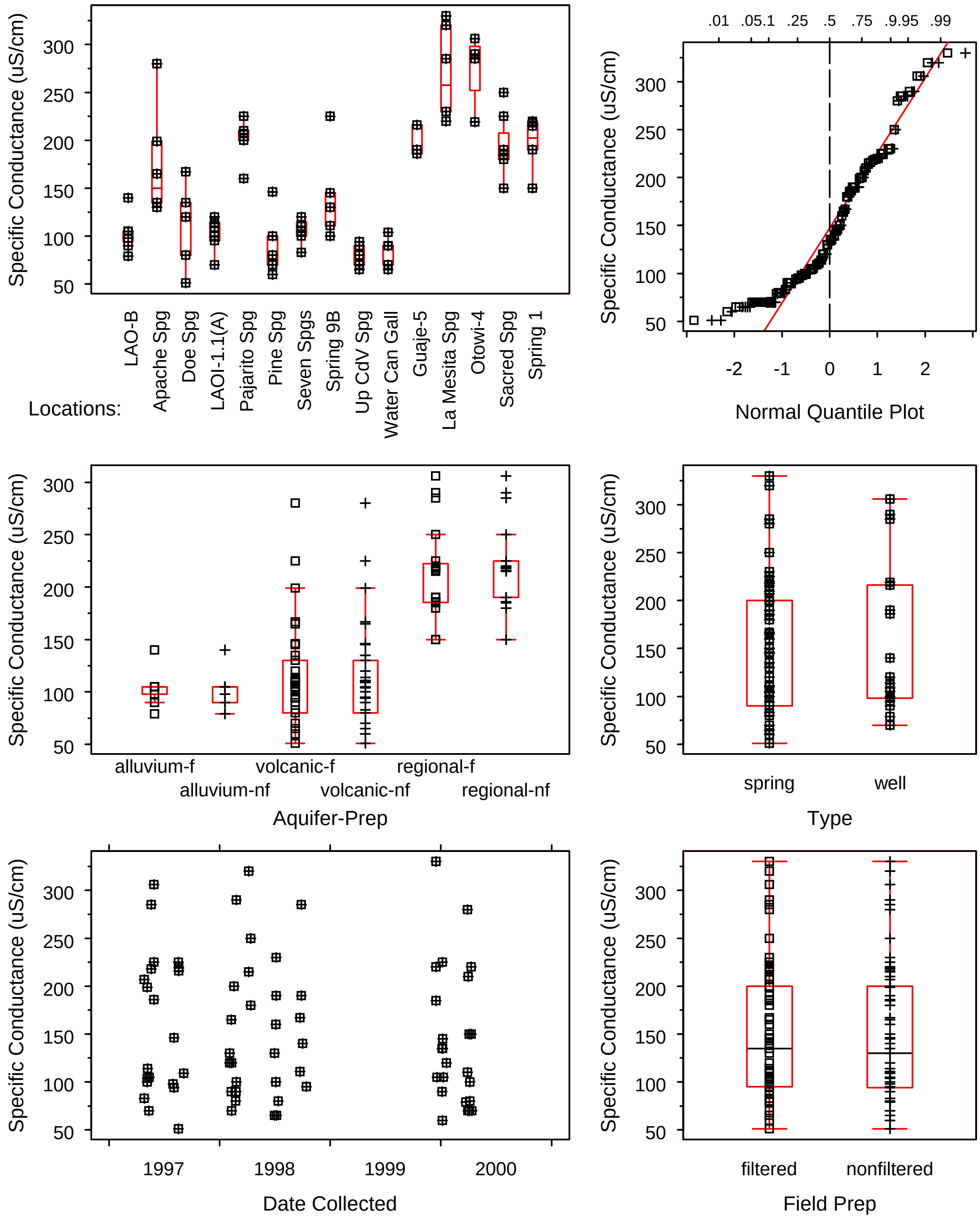


Figure C-2. Specific conductance (conductivity) lots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

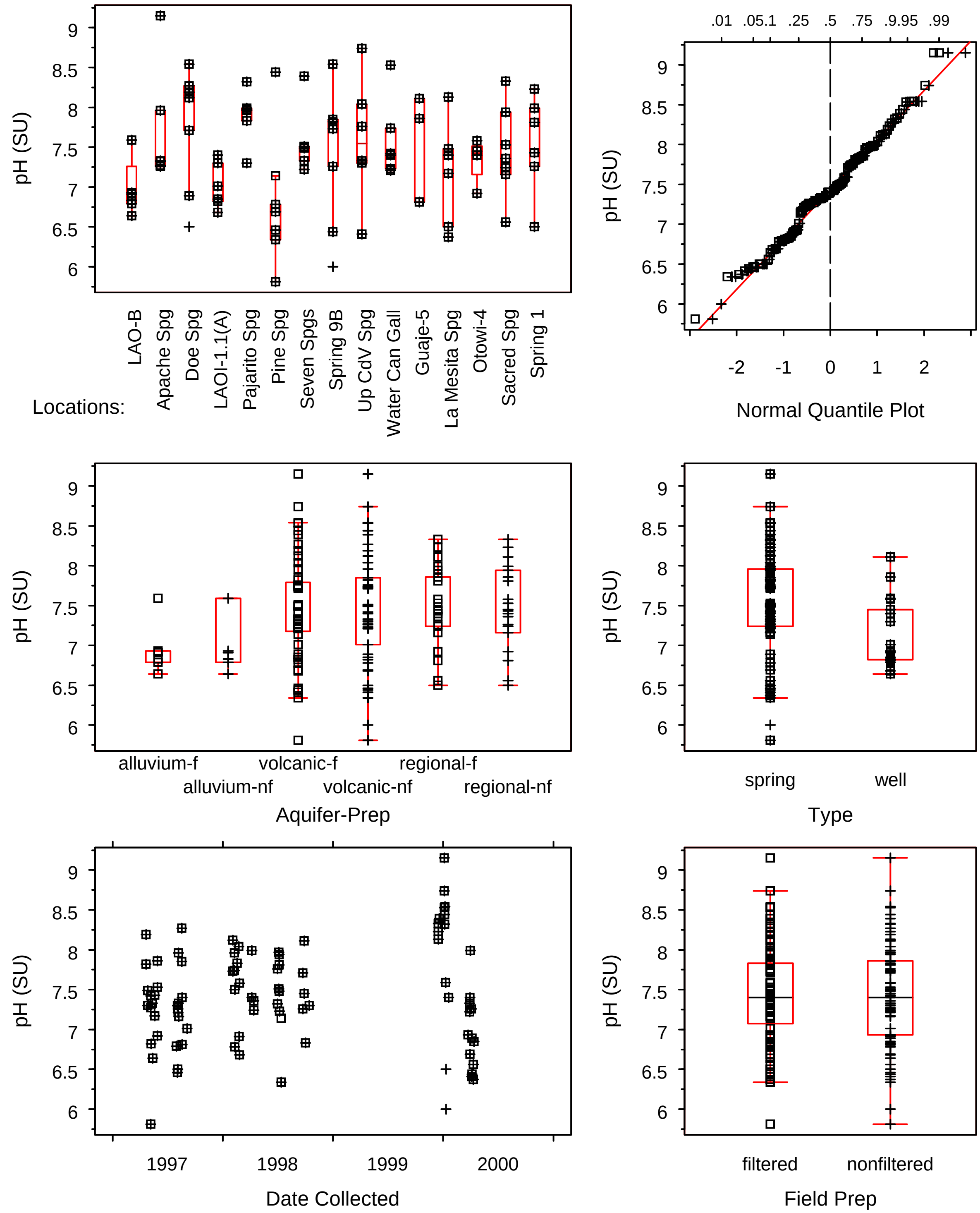


Figure C-3. **pH plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]**

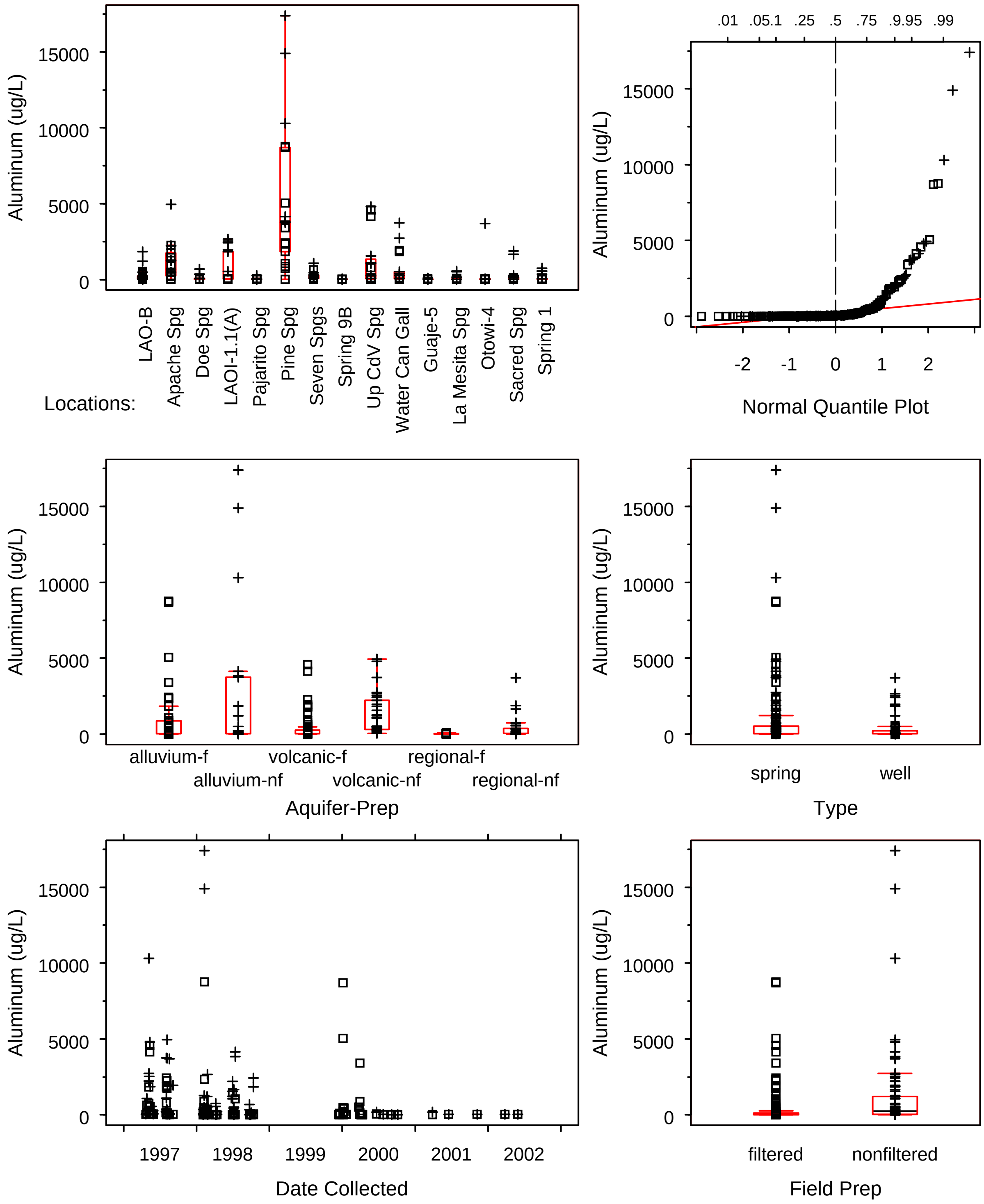


Figure C-4. Aluminum plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

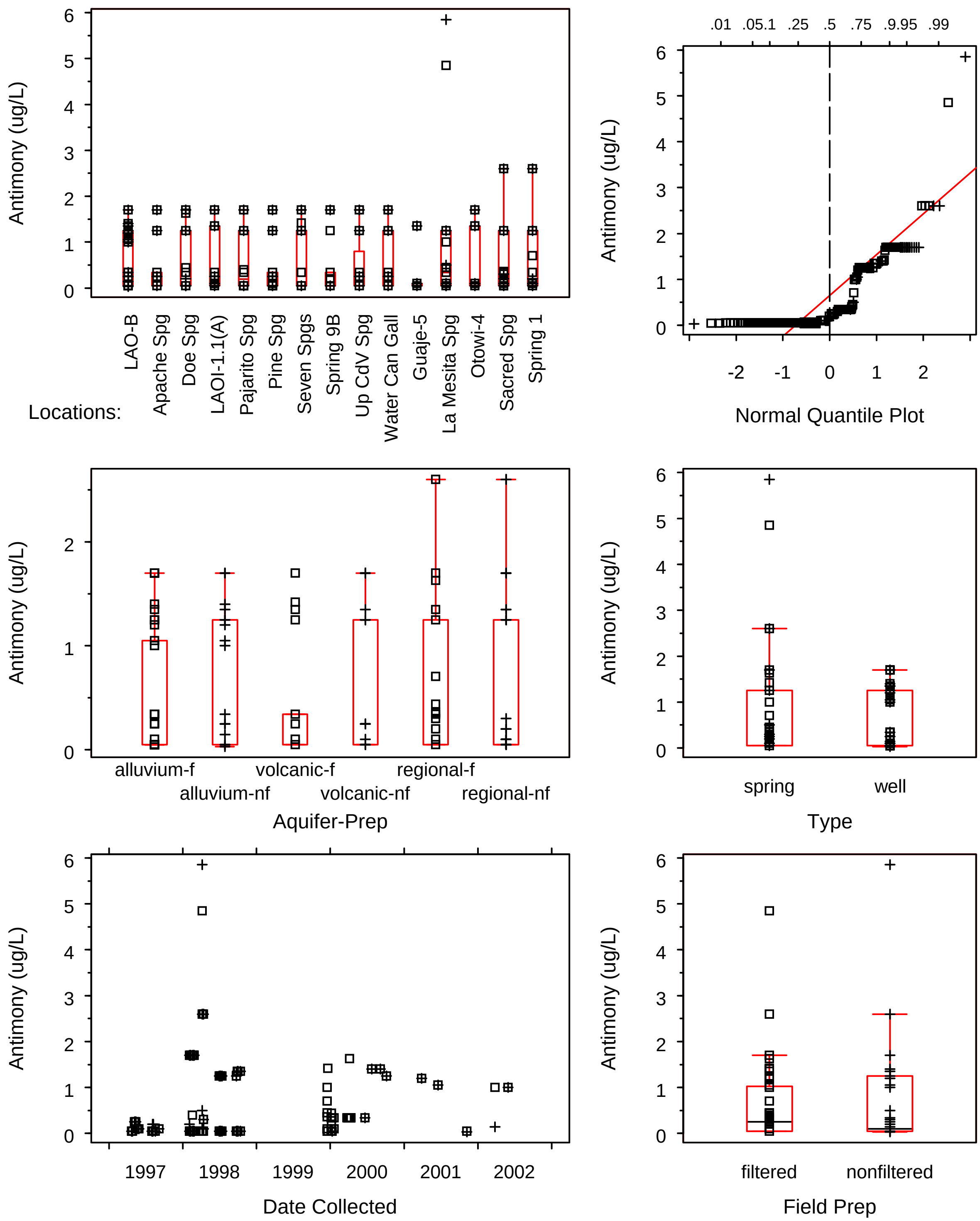


Figure C-5. Antimony plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

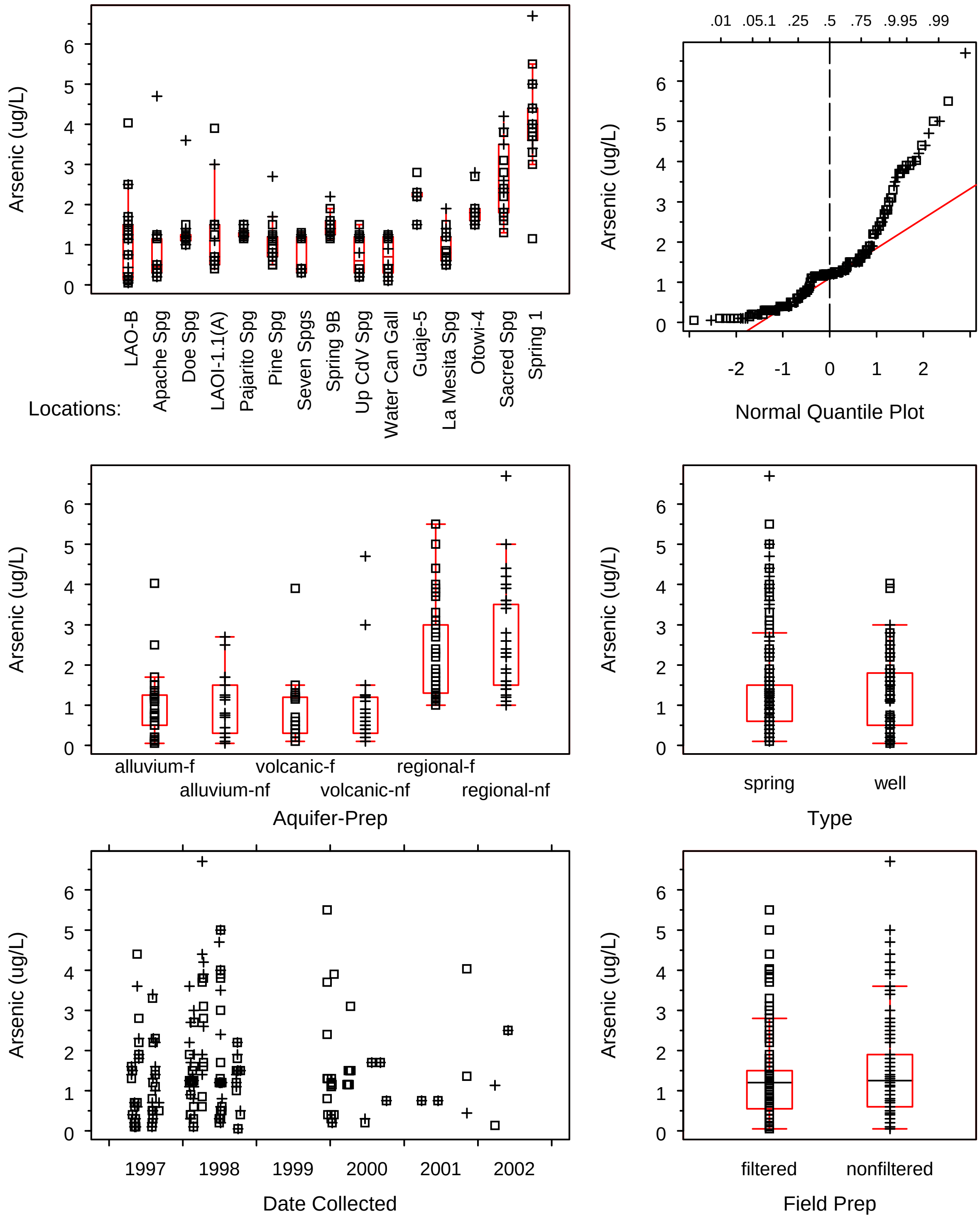


Figure C-6. Arsenic plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

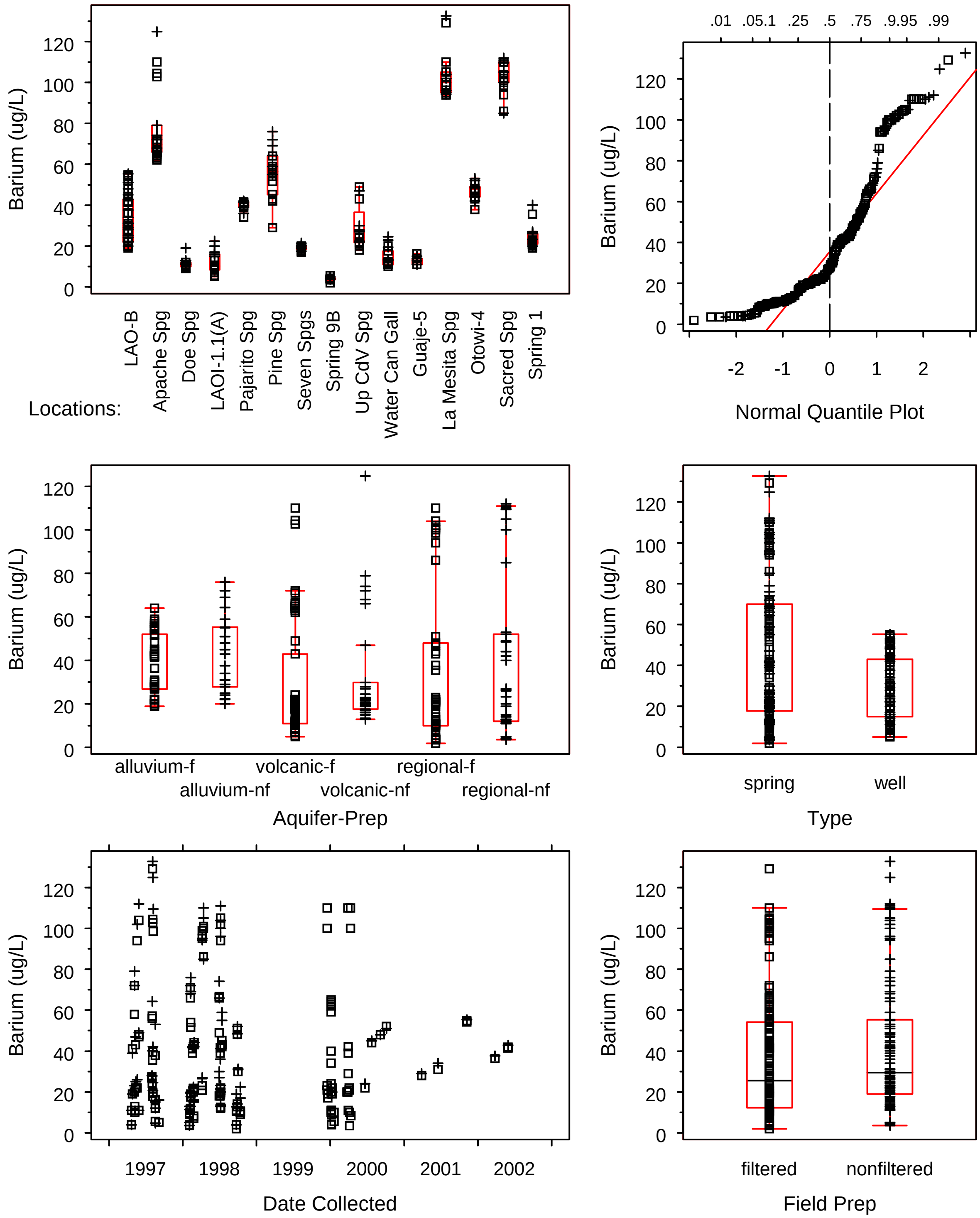


Figure C-7. Barium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

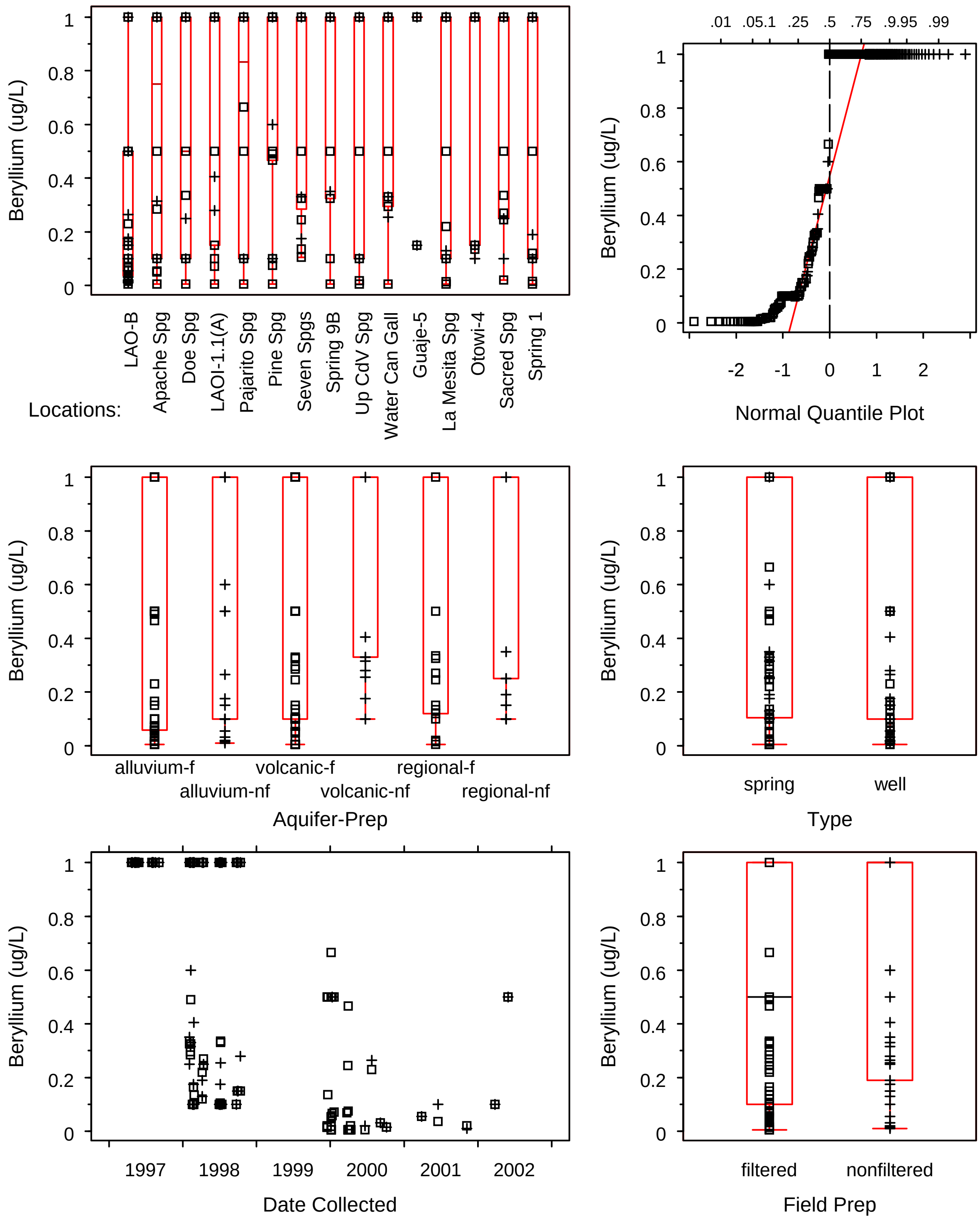


Figure C-8. Beryllium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

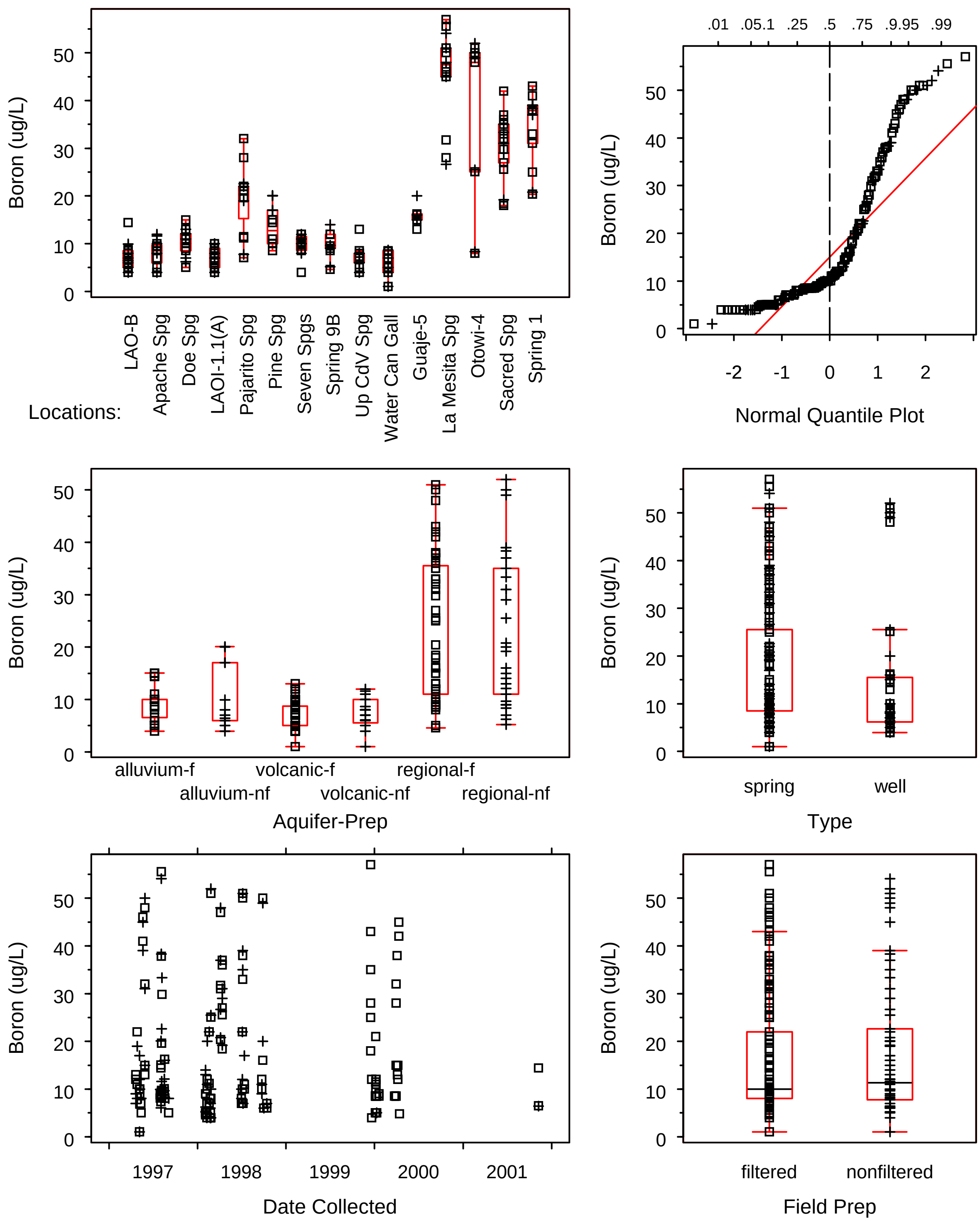


Figure C-9. Boron plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

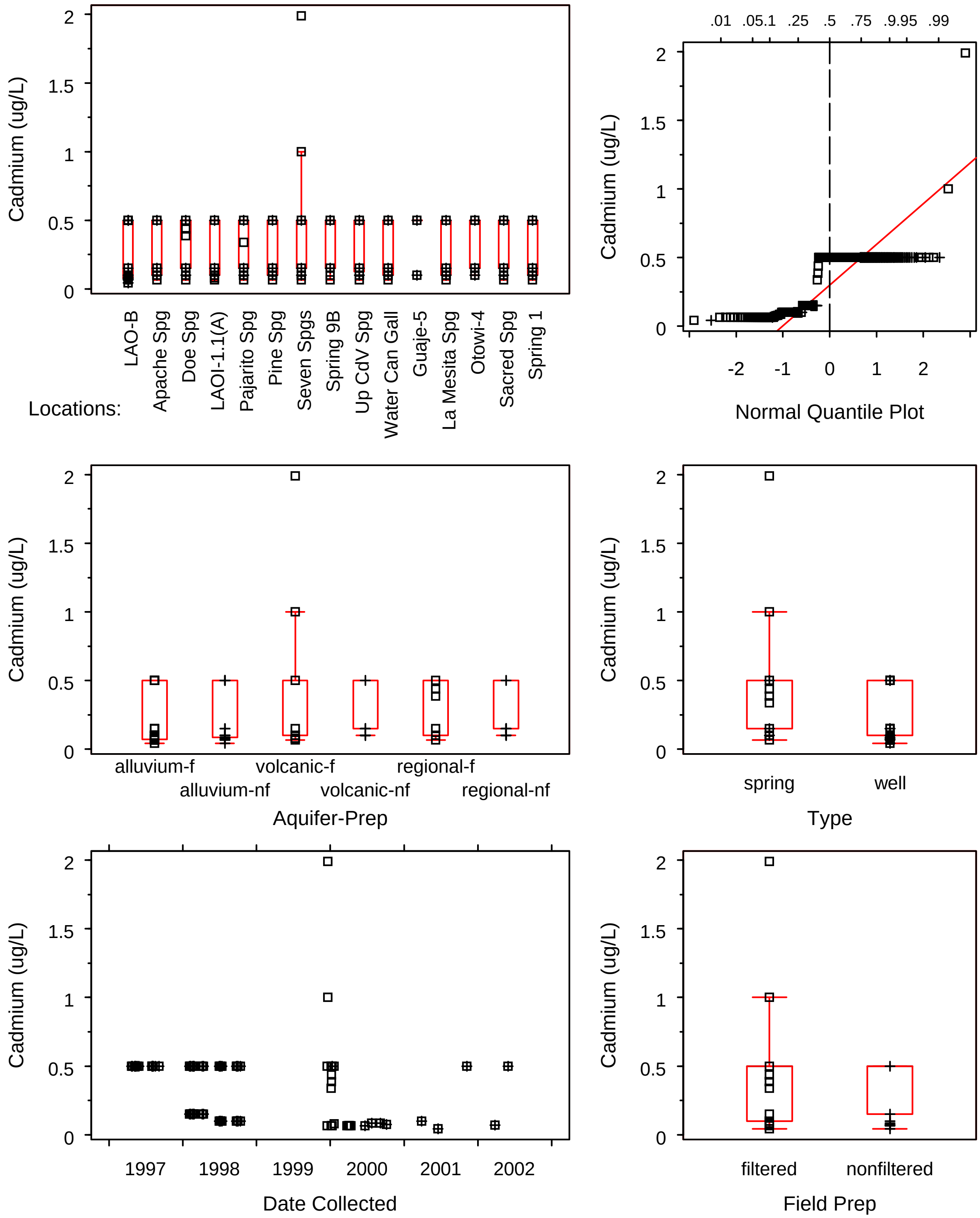


Figure C-10. Cadmium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

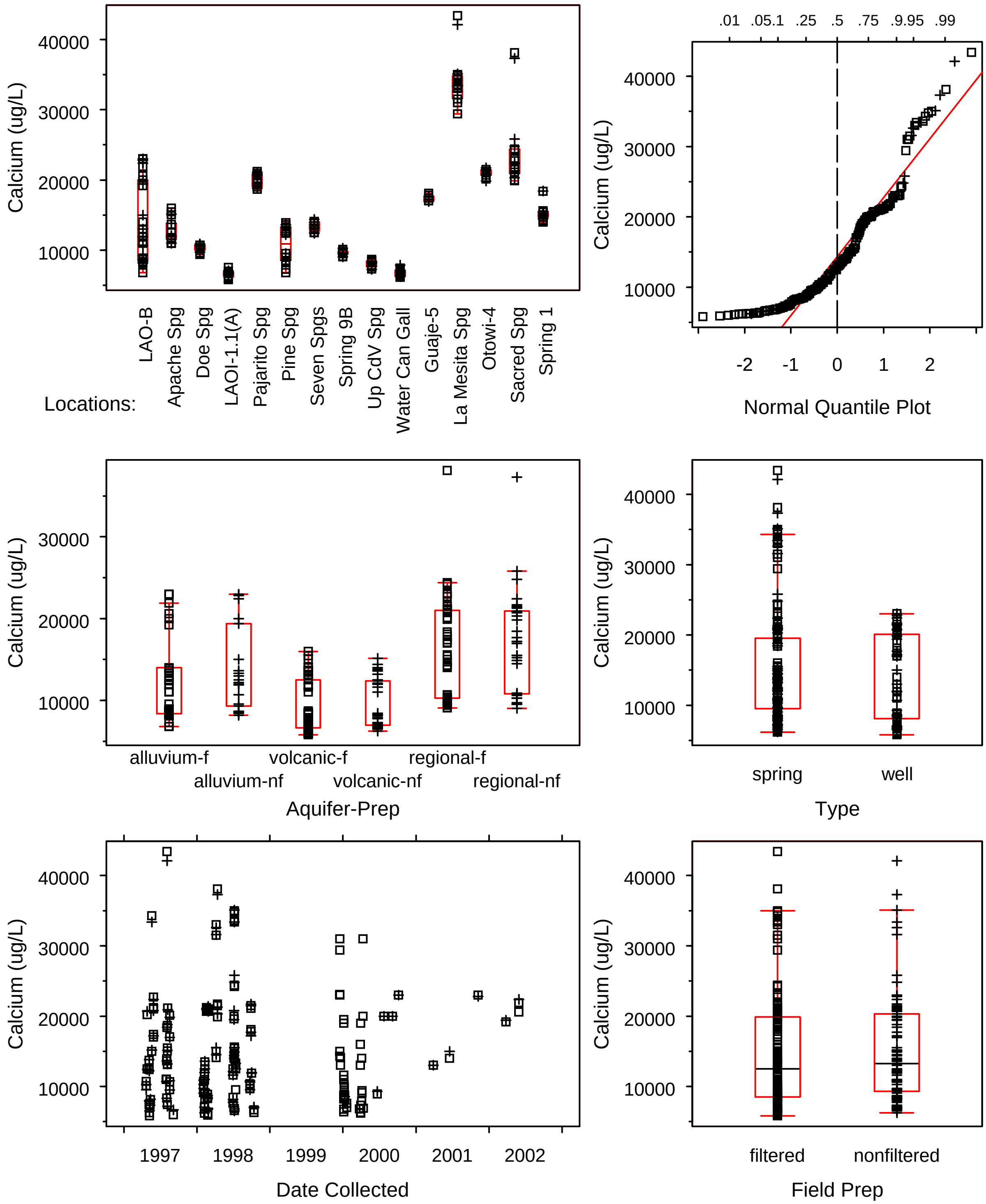


Figure C-11. **Calcium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]**

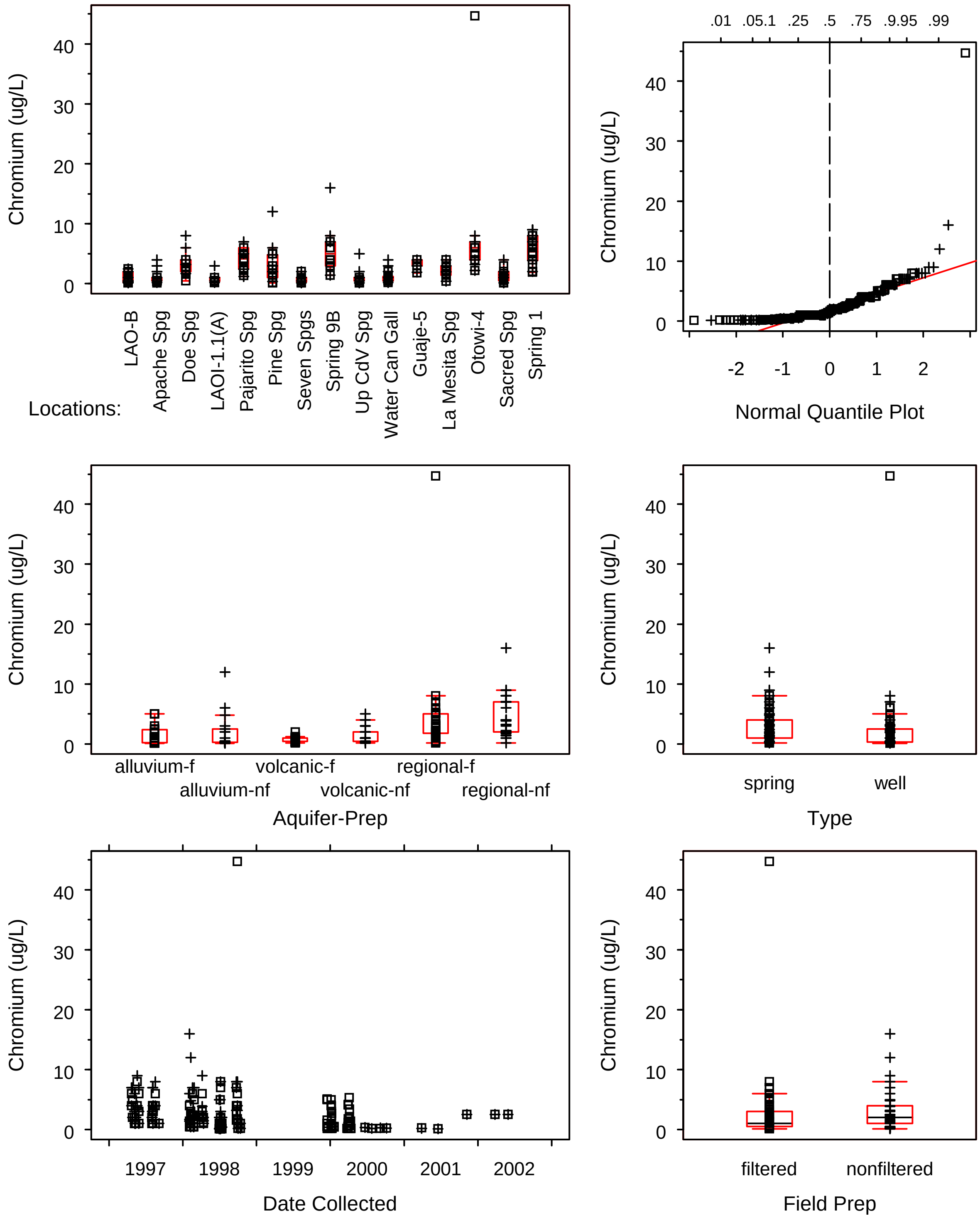


Figure C-12. Total chromium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

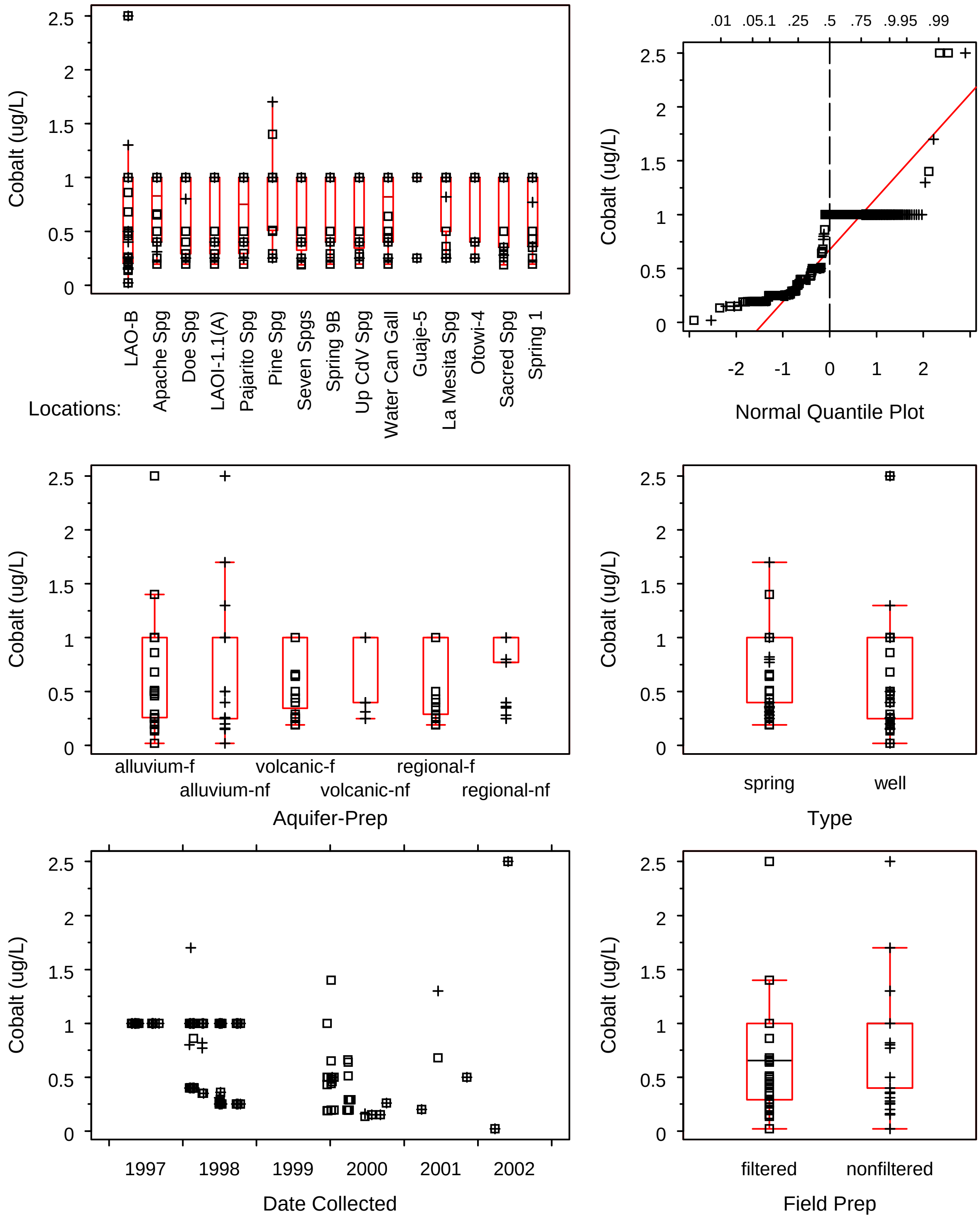


Figure C-13. Cobalt plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

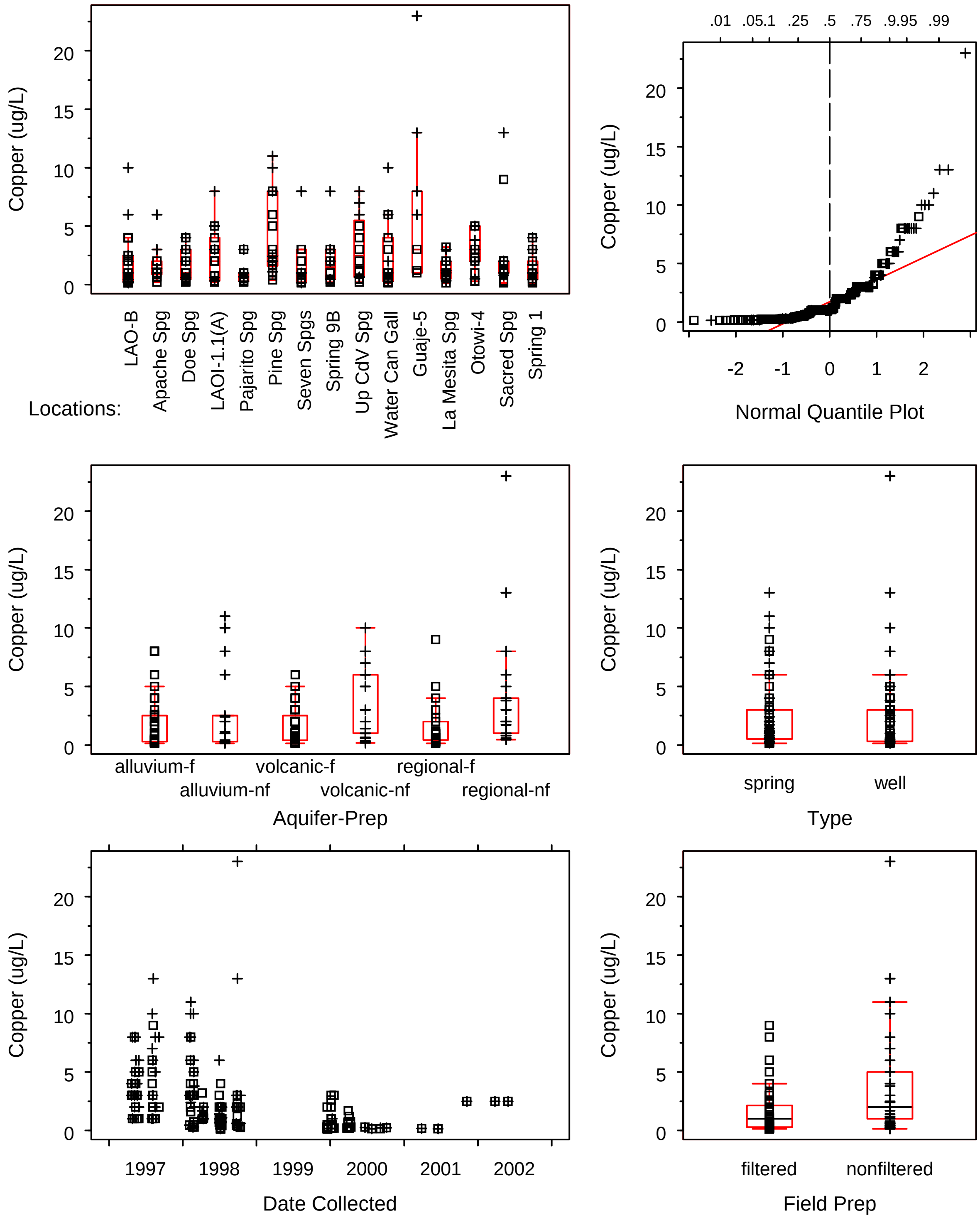


Figure C-14. Copper plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

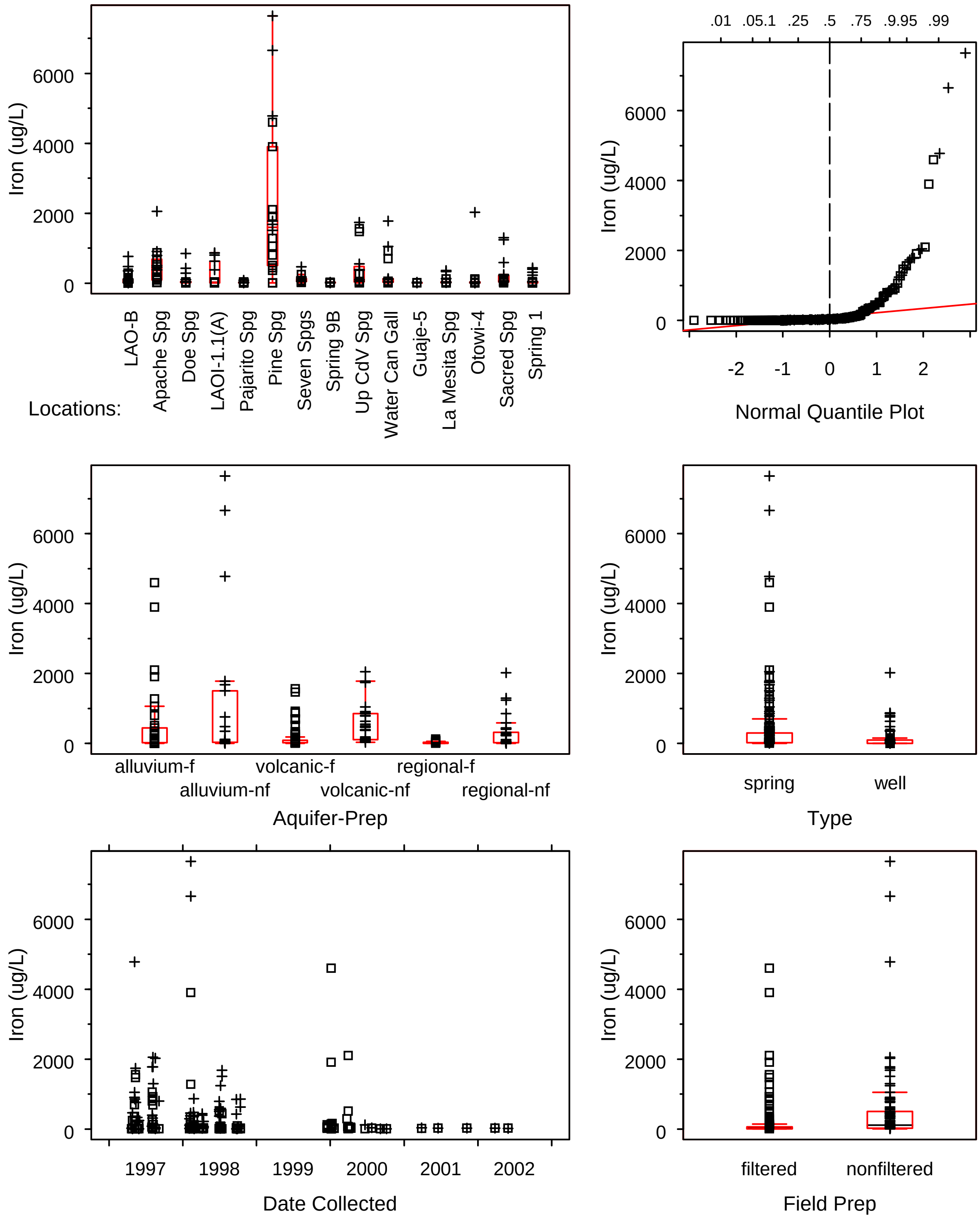


Figure C-15. Iron plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

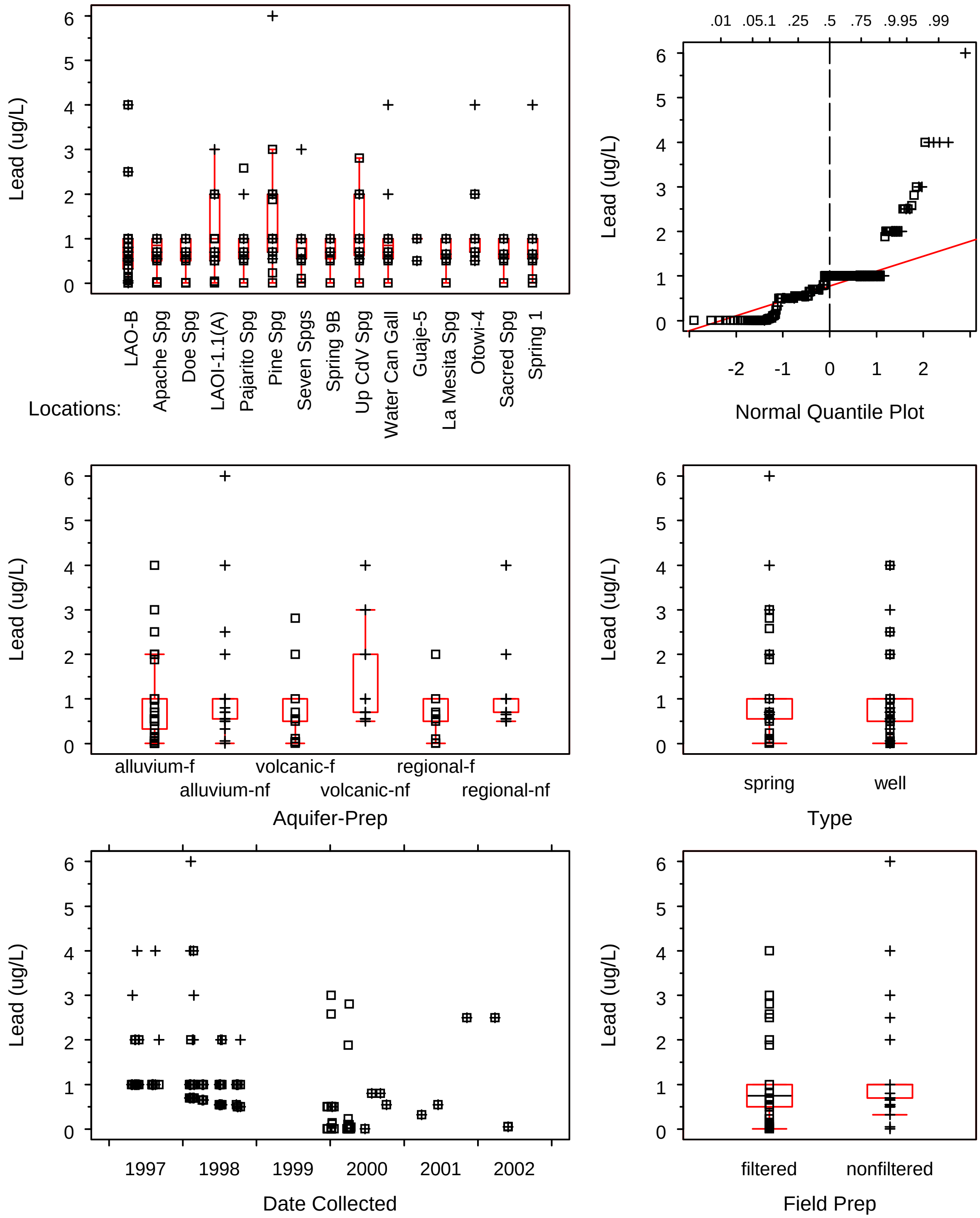


Figure C-16. Lead plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

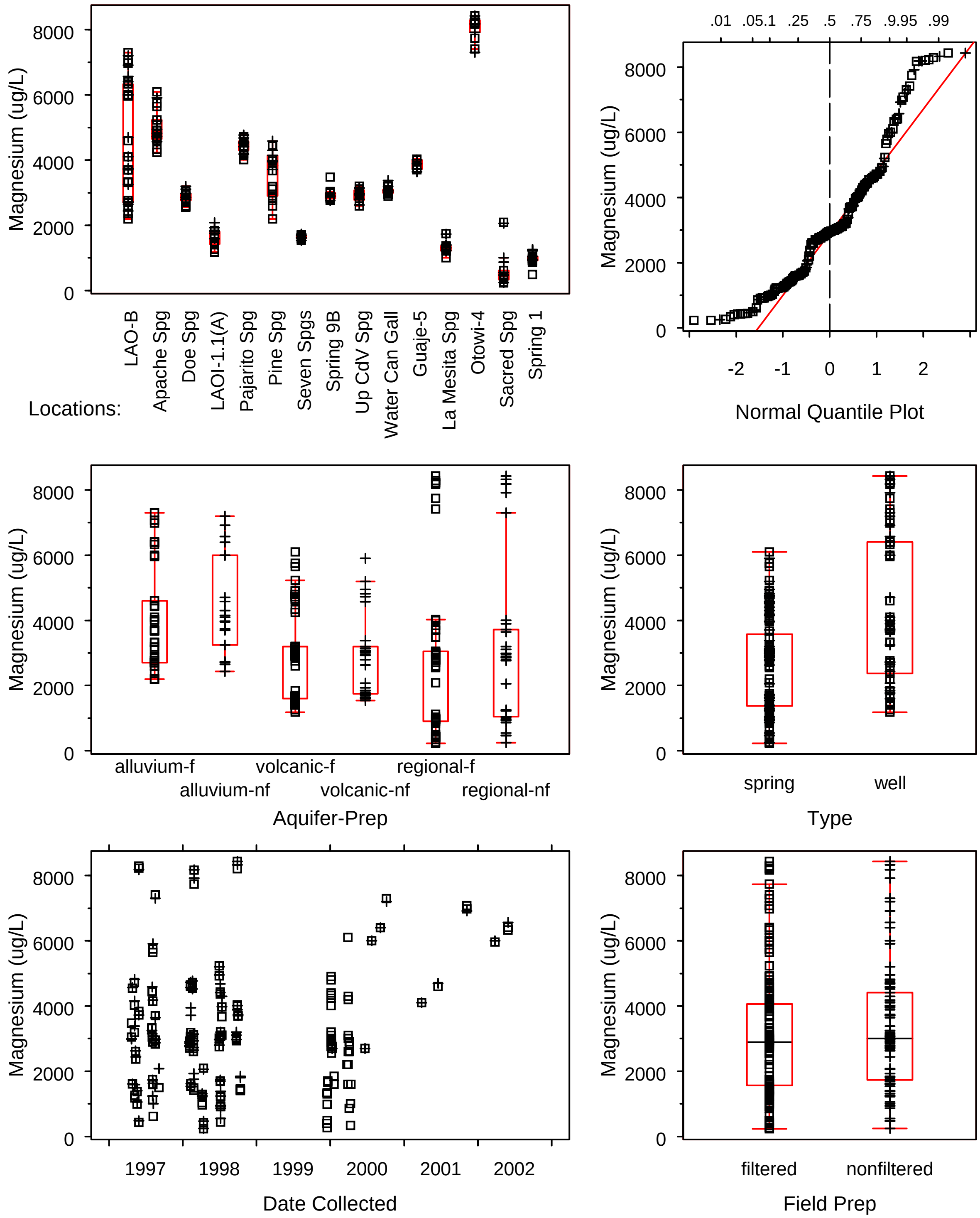


Figure C-17. Magnesium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

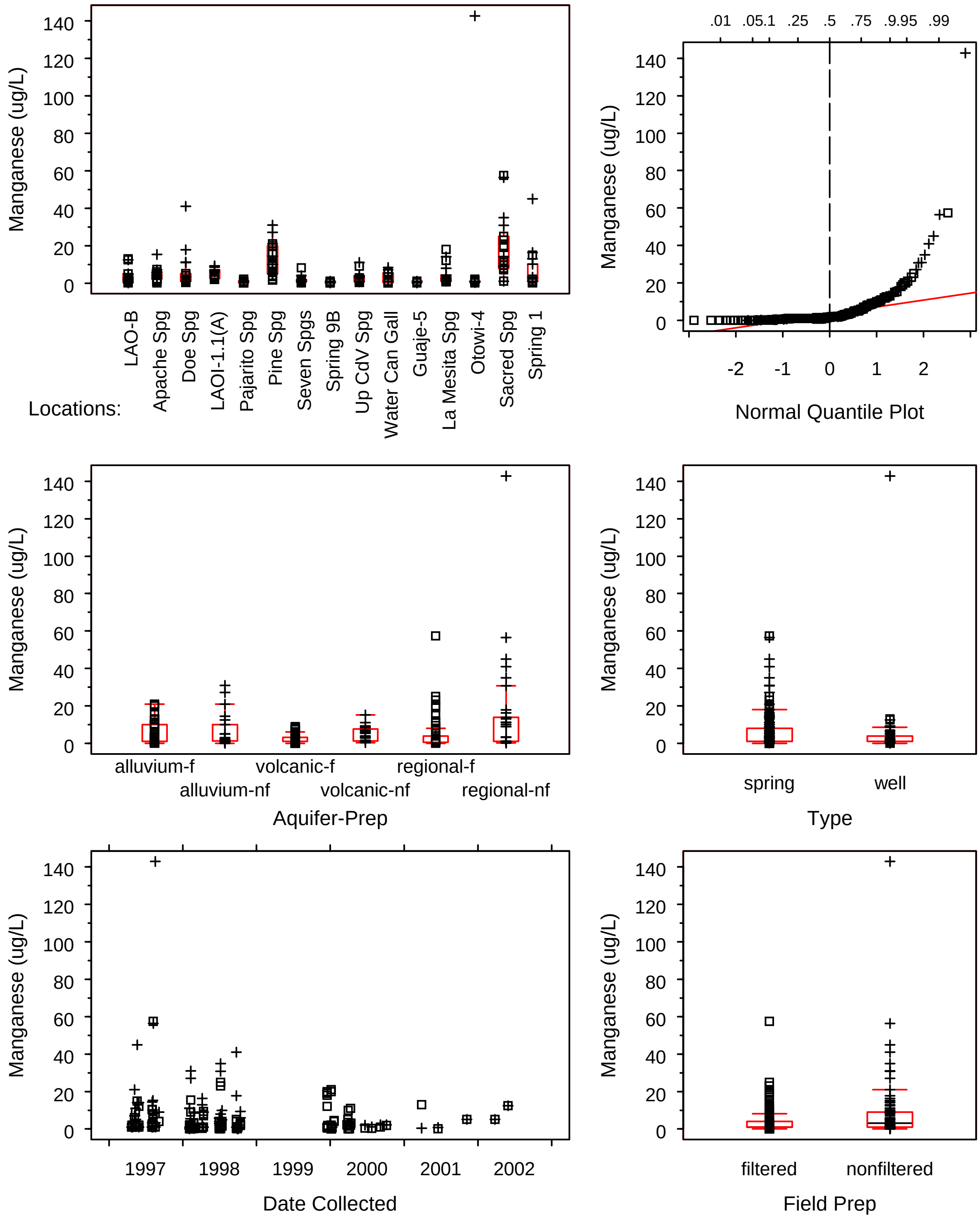


Figure C-18. Manganese plots [note that “+” signs are nonfiltered samples and that squares are filtered samples]

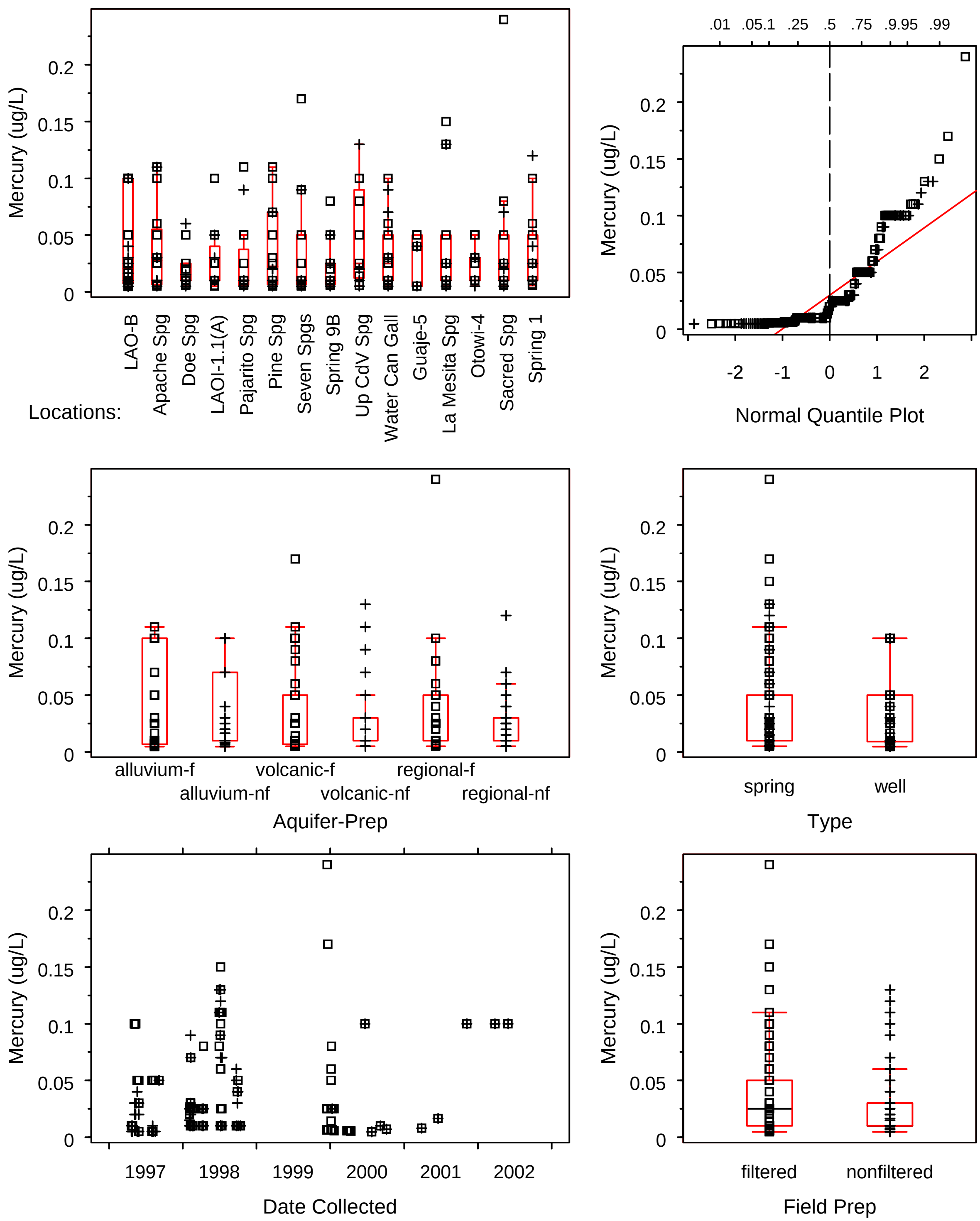


Figure C-19. Mercury plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

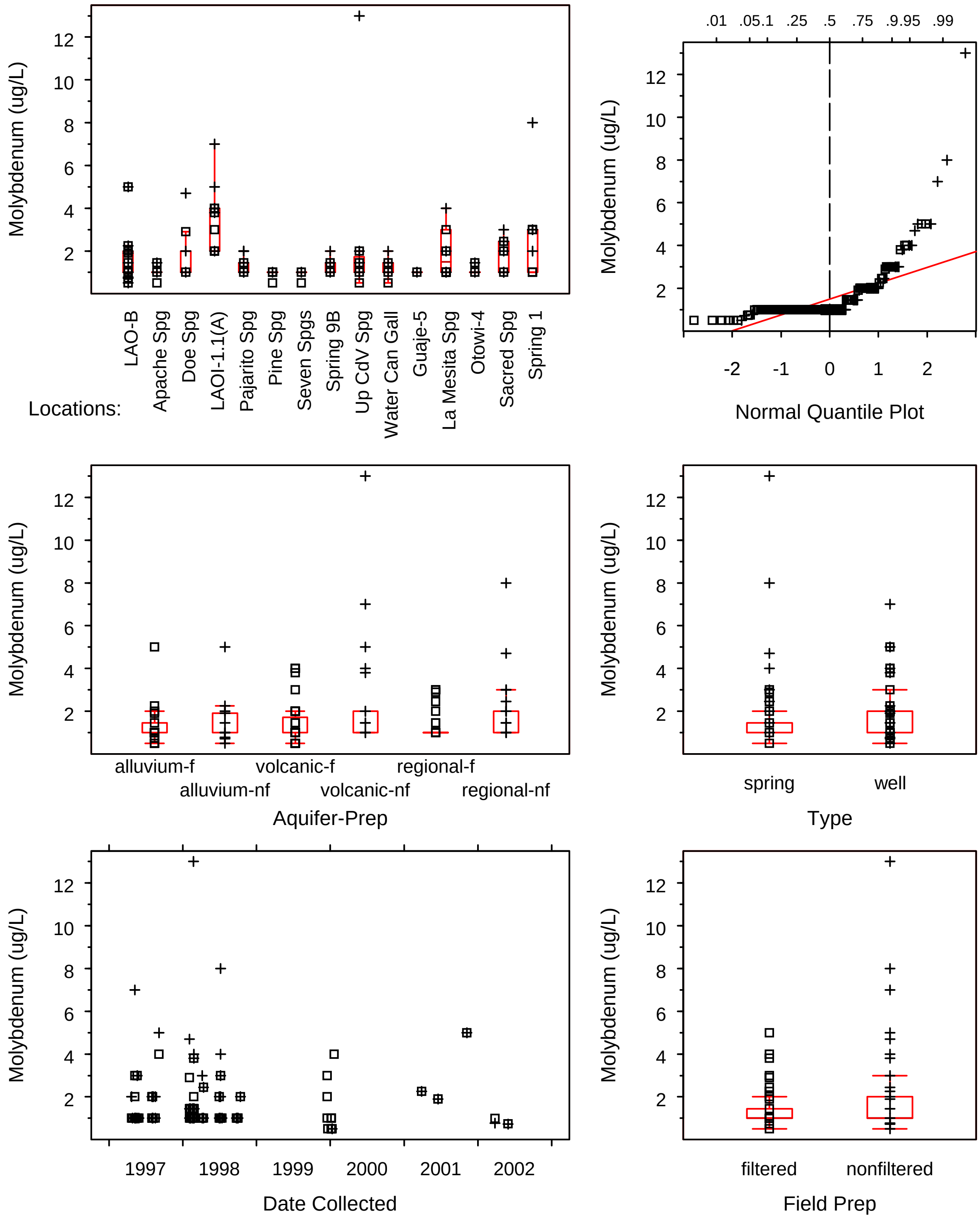


Figure C-20. Molybdenum plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

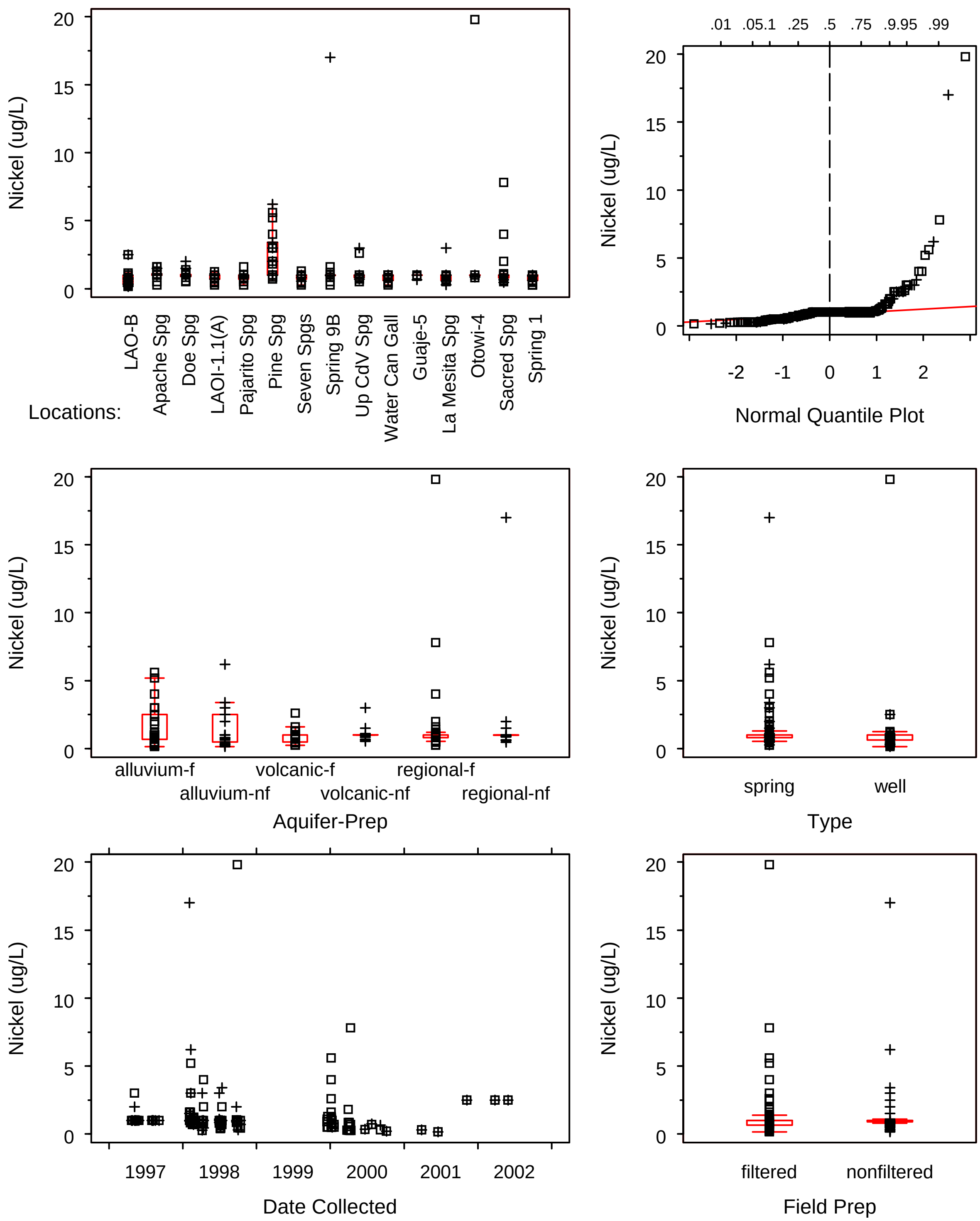


Figure C-21. Nickel plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

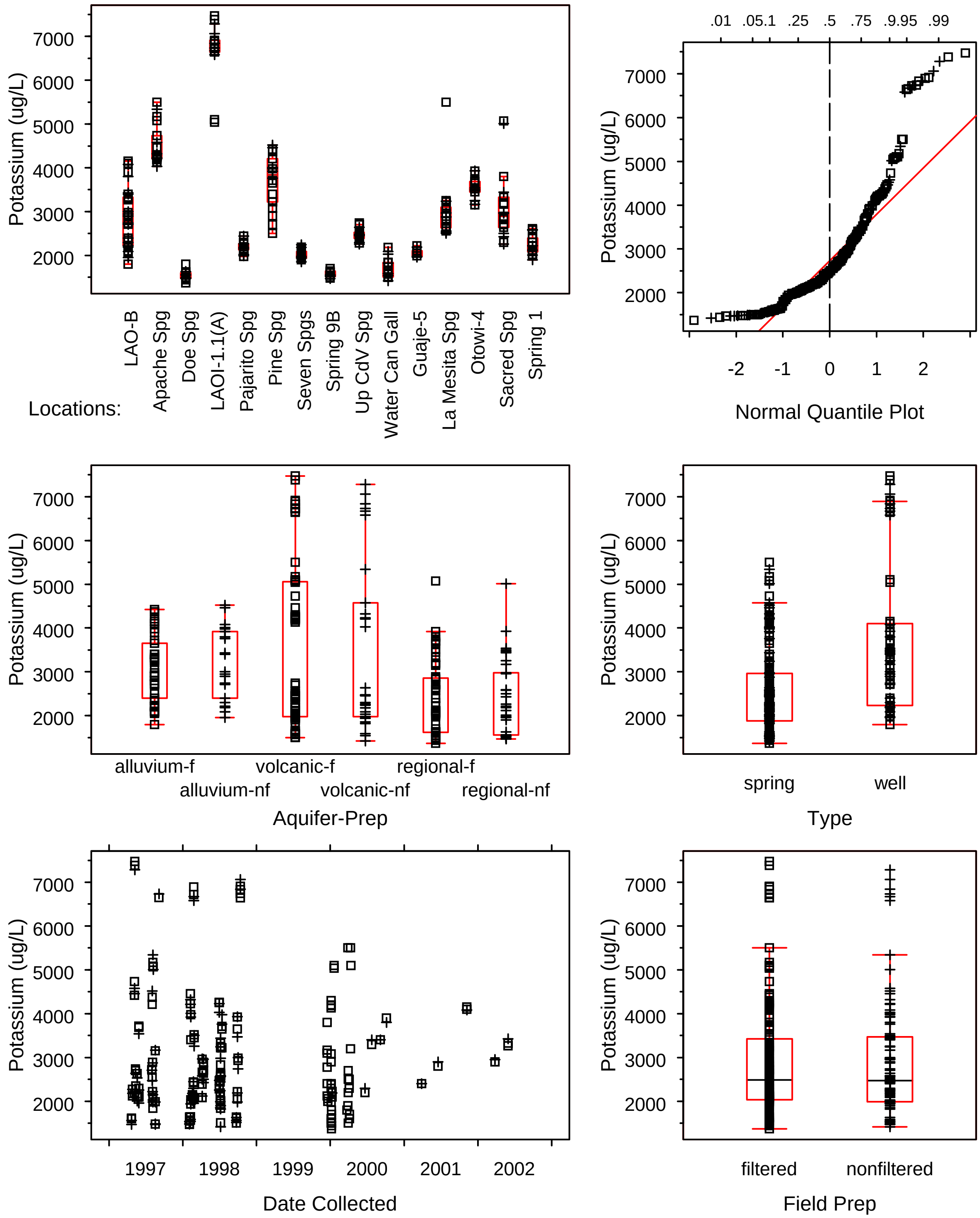


Figure C-22. Potassium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

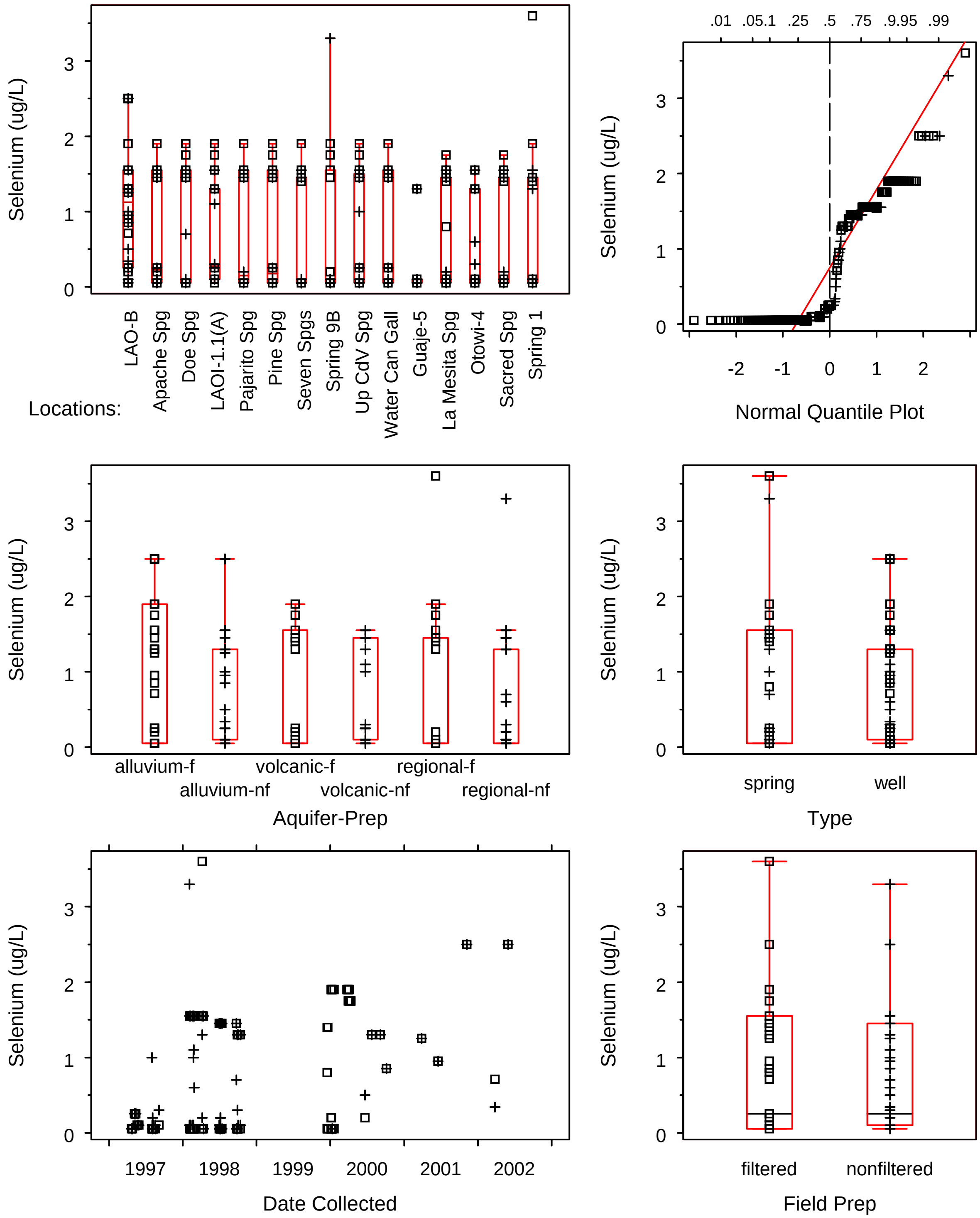


Figure C-23. Selenium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

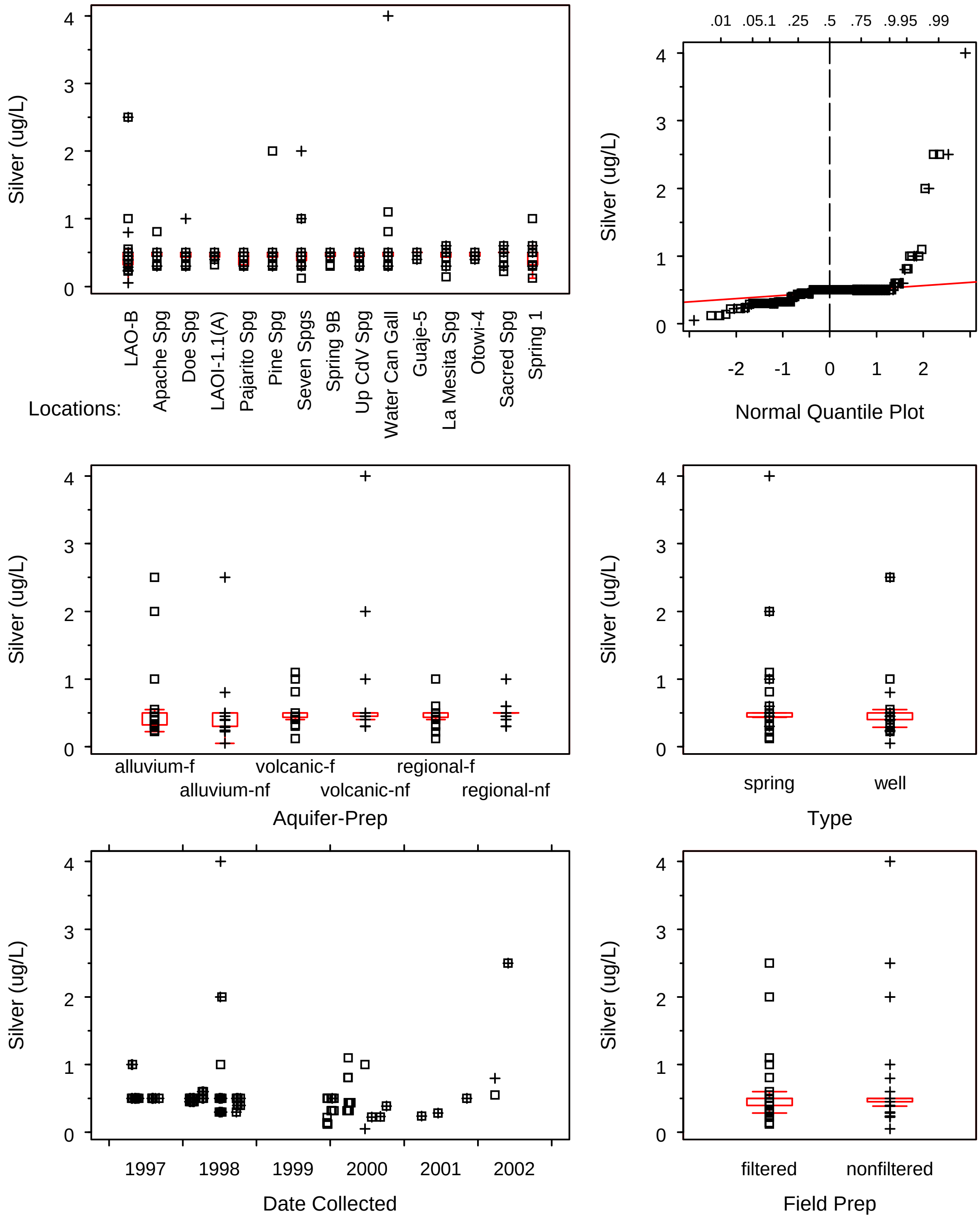


Figure C-24. Silver plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

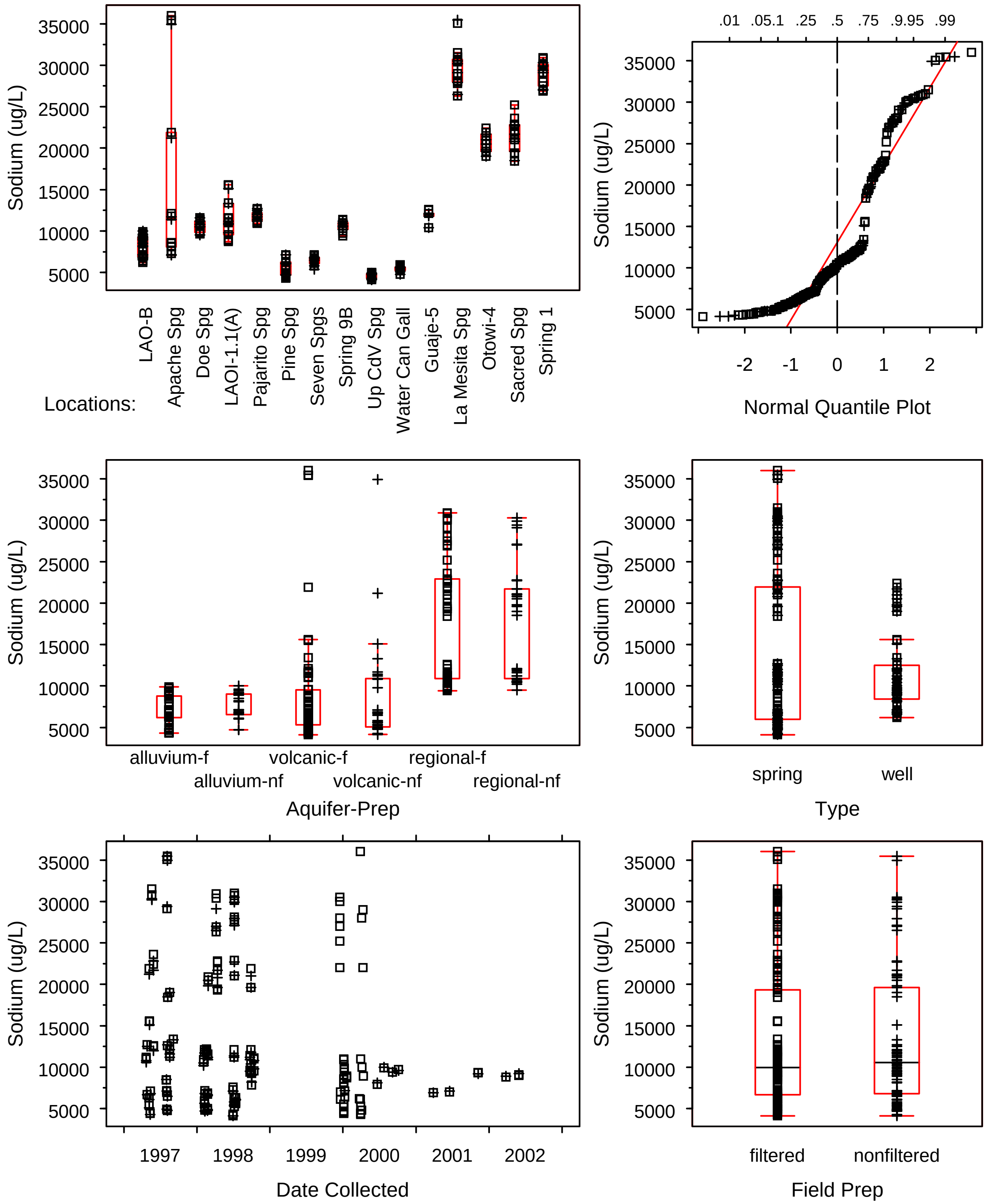


Figure C-25. Sodium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

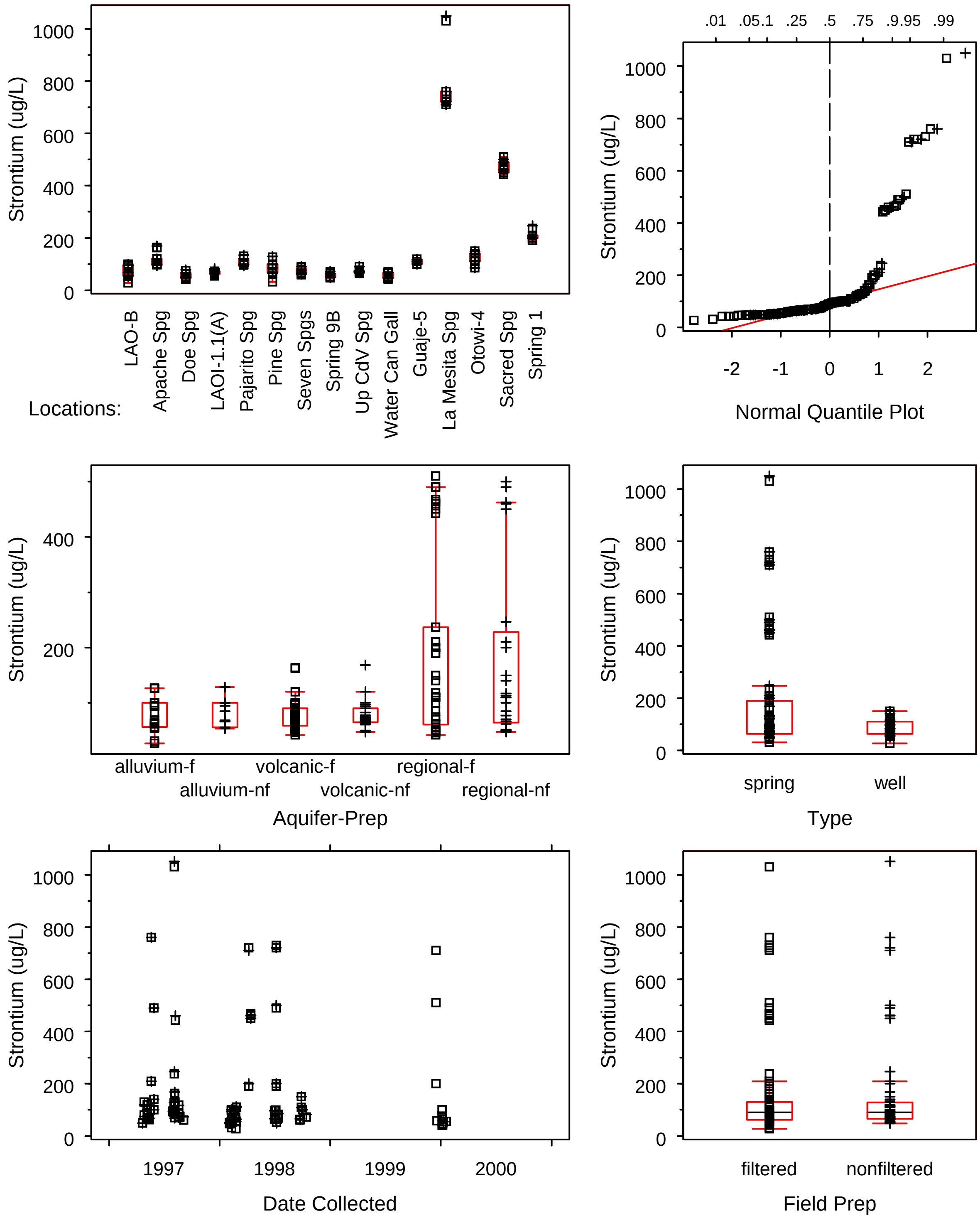


Figure C-26. Strontium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

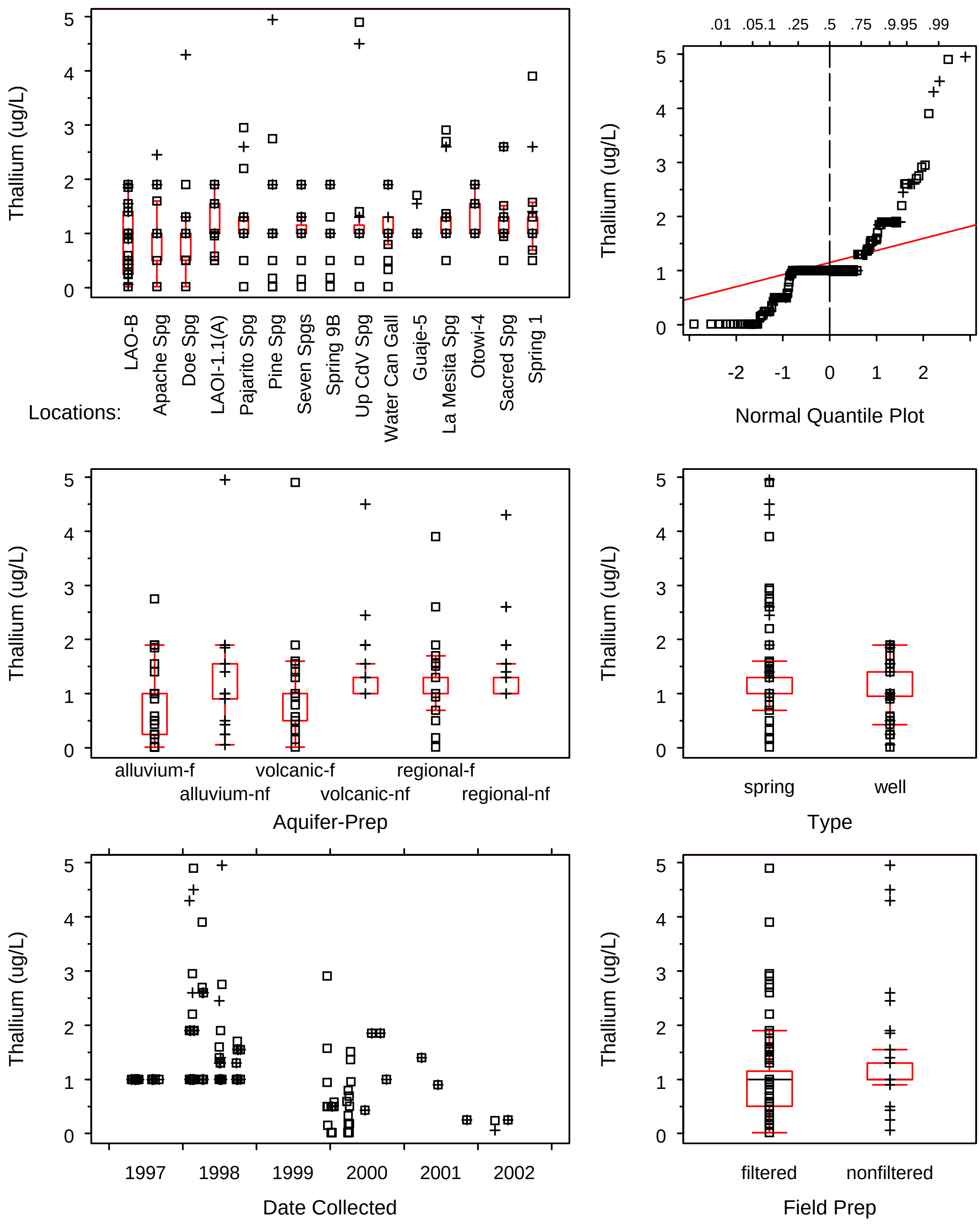


Figure C-27. Thallium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

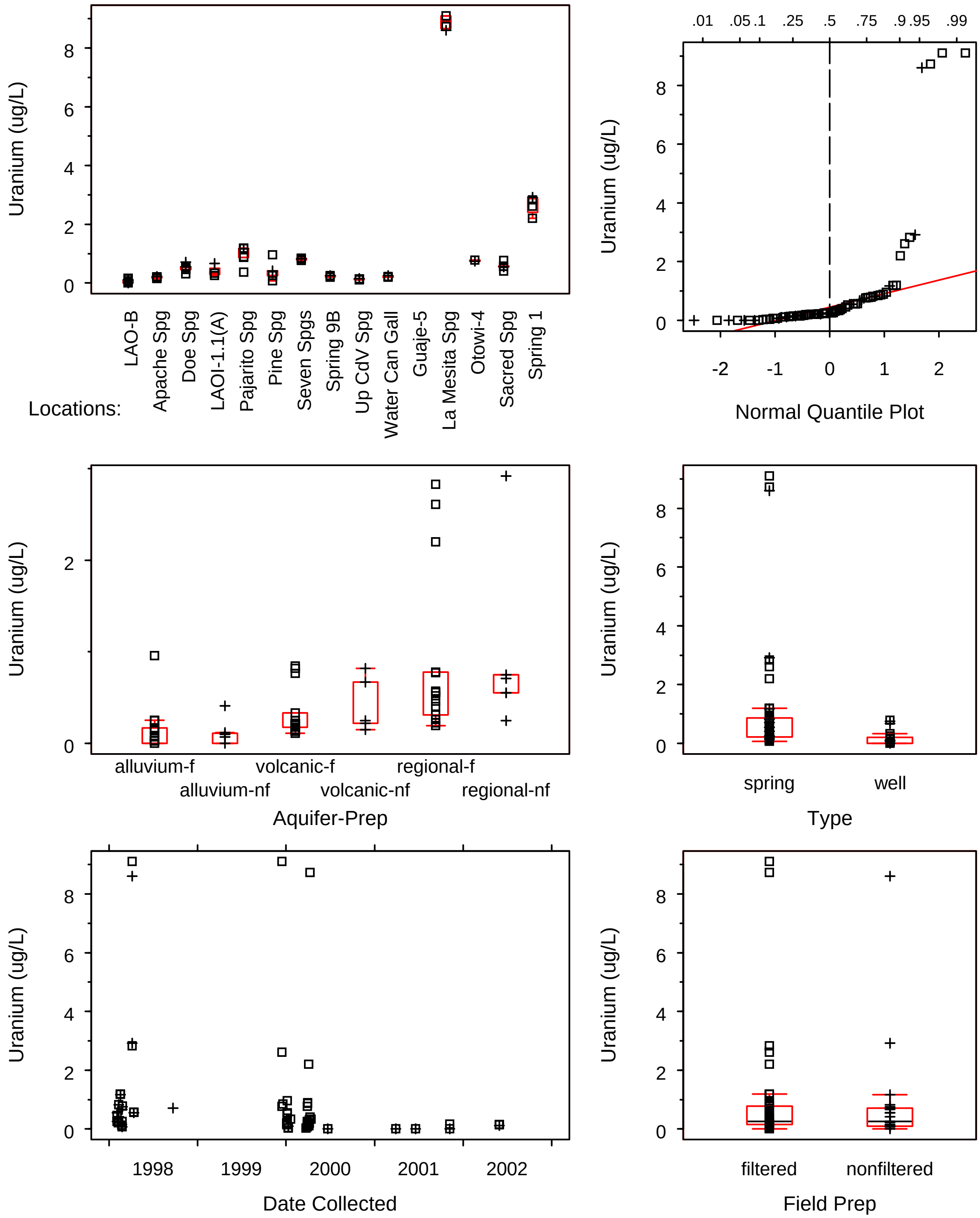


Figure C-28. Uranium plots [note that “+” signs are nonfiltered samples and that squares are filtered samples]

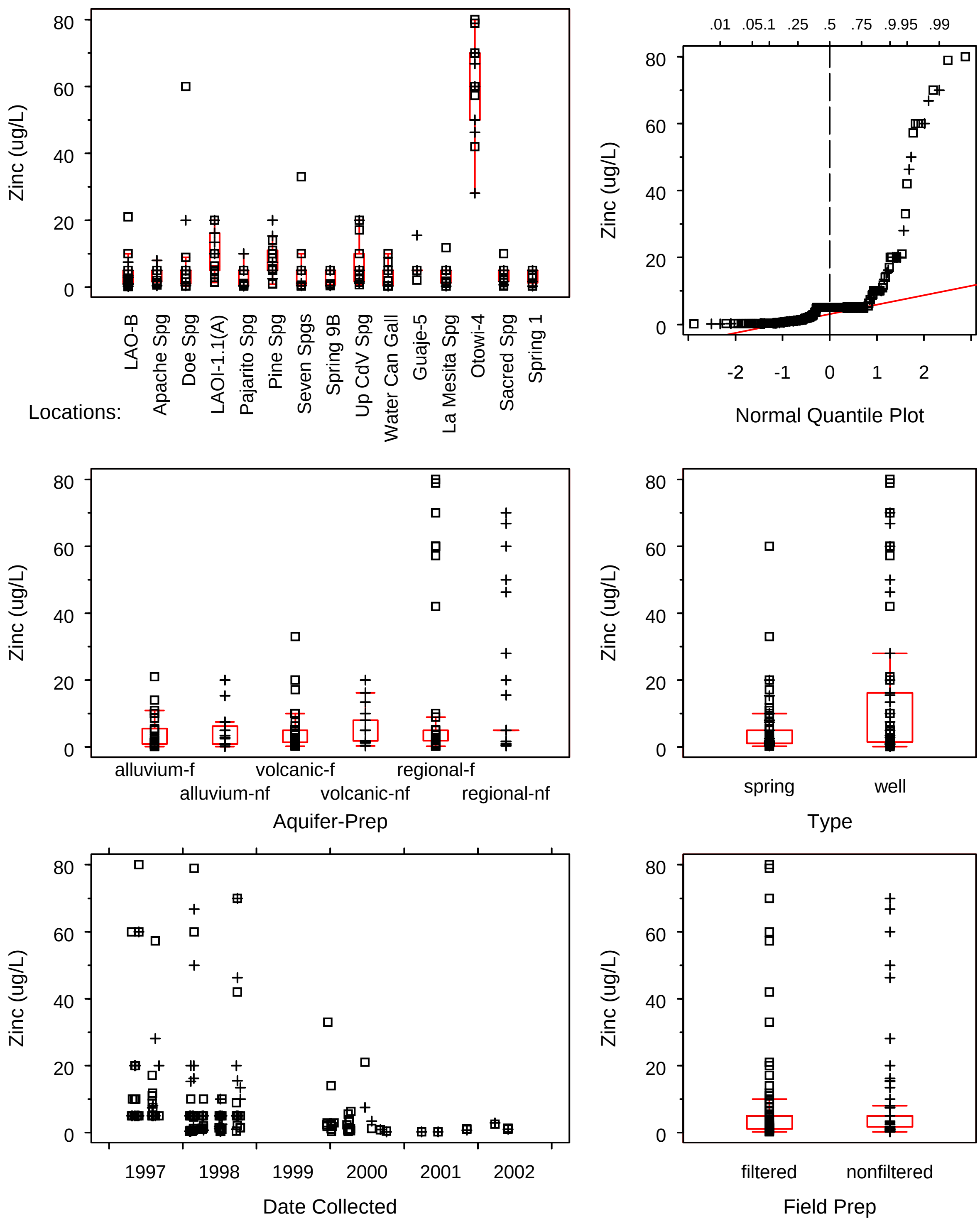


Figure C-29. Zinc plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

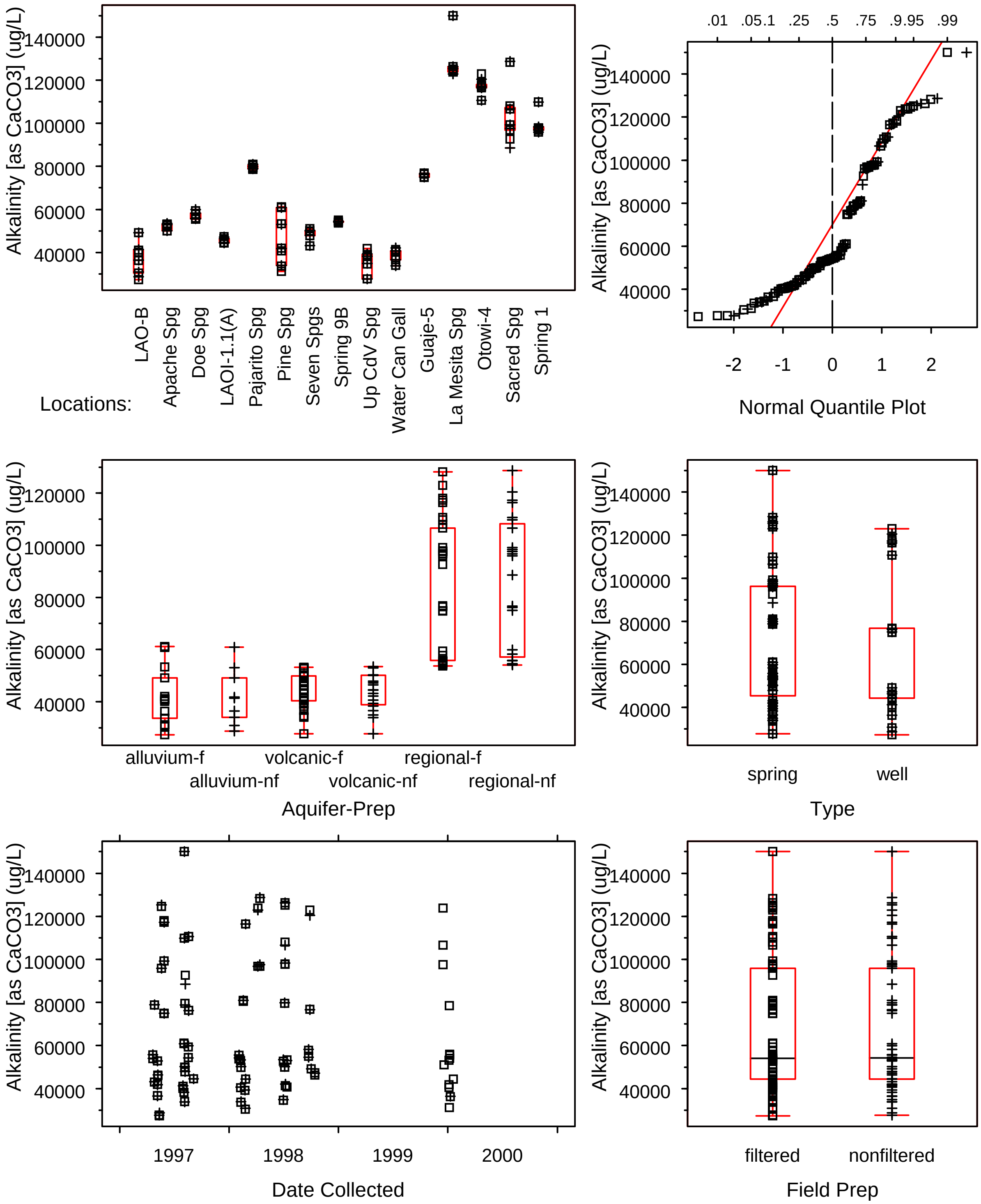


Figure C-30. Alkalinity plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

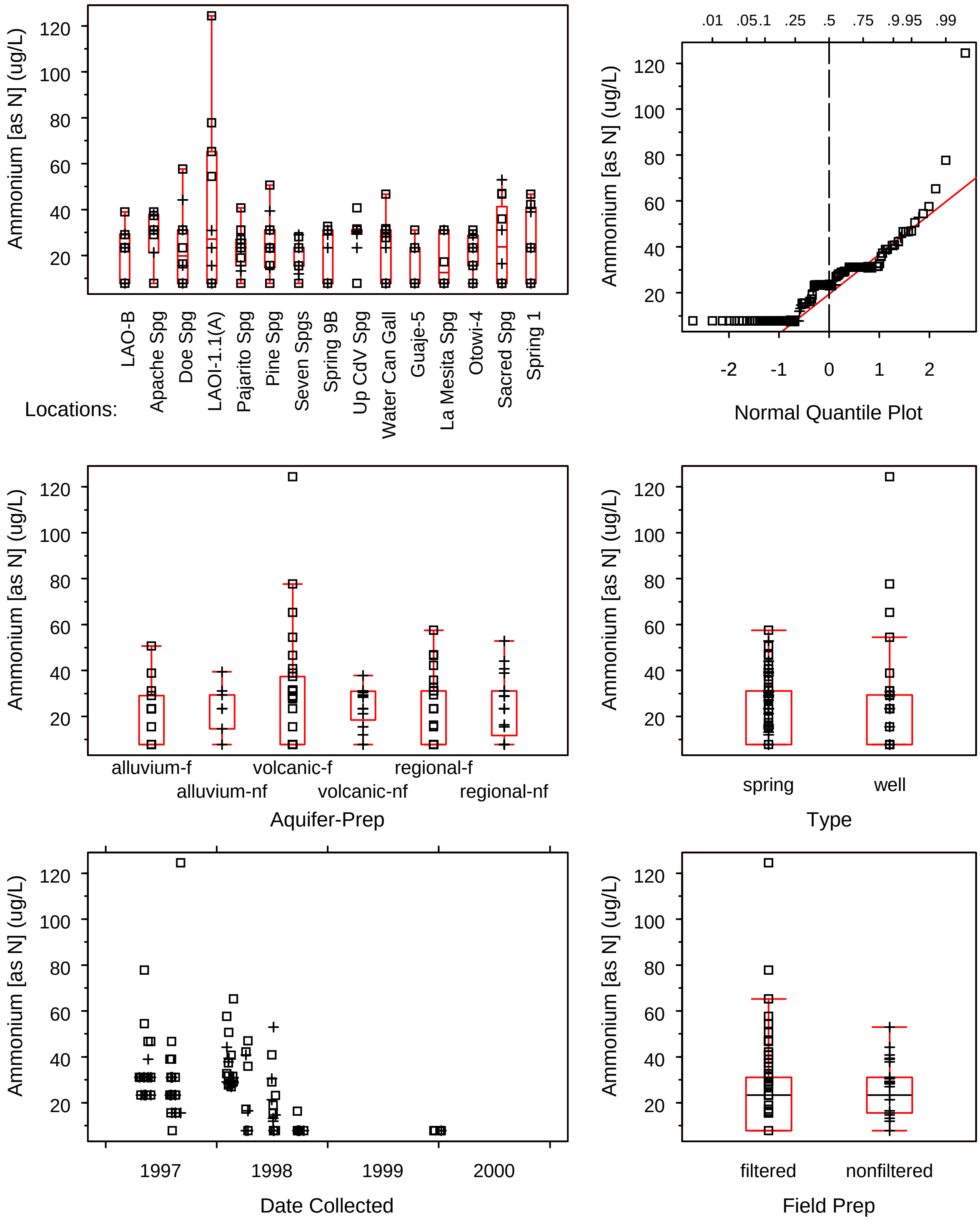


Figure C-31. Ammonium plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

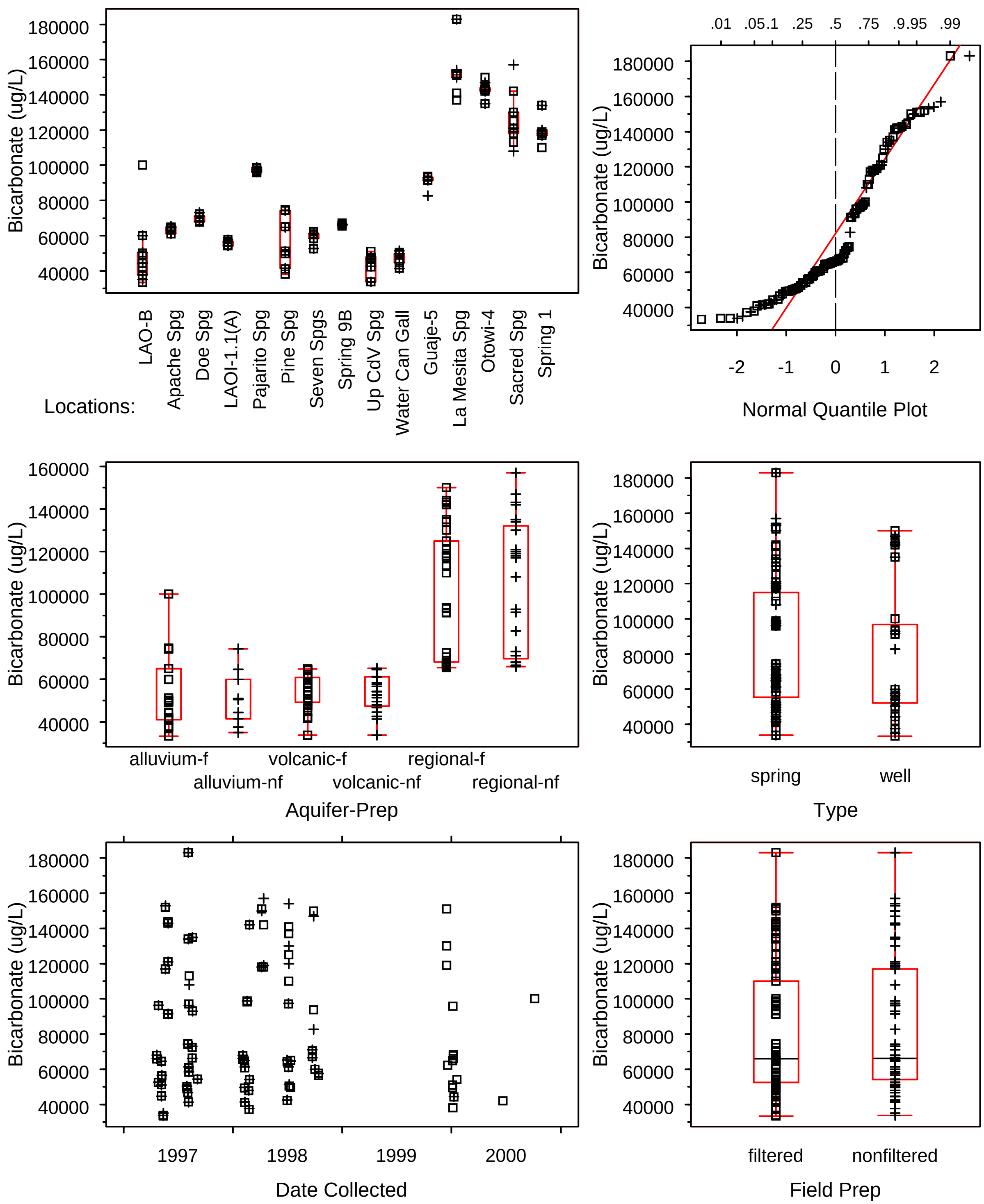


Figure C-32. Bicarbonate plots [note "+" are filtered samples and squares are filtered samples]

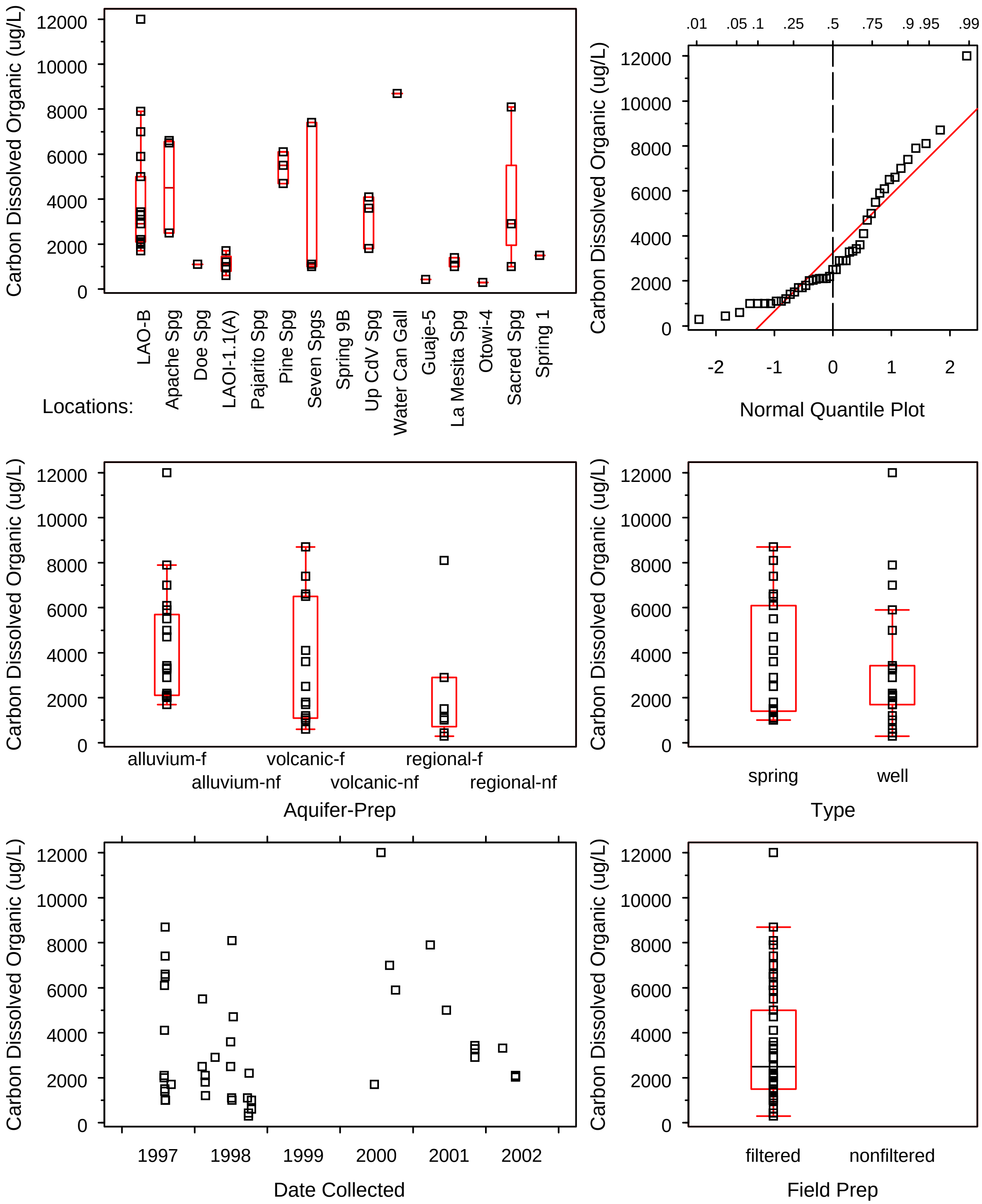


Figure C-33. Dissolved organic carbon plots [note squares are filtered samples]

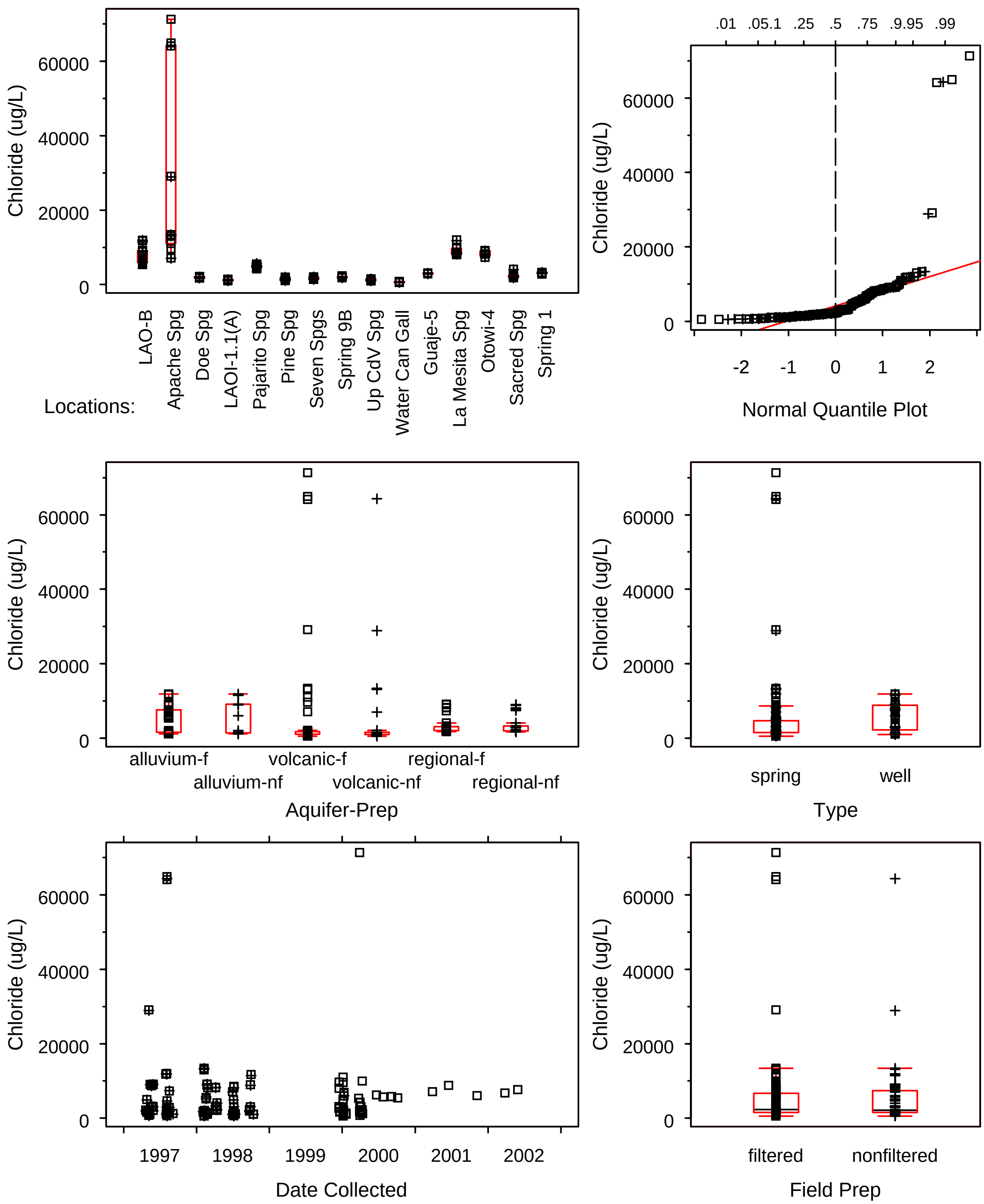


Figure C-34. Chloride plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

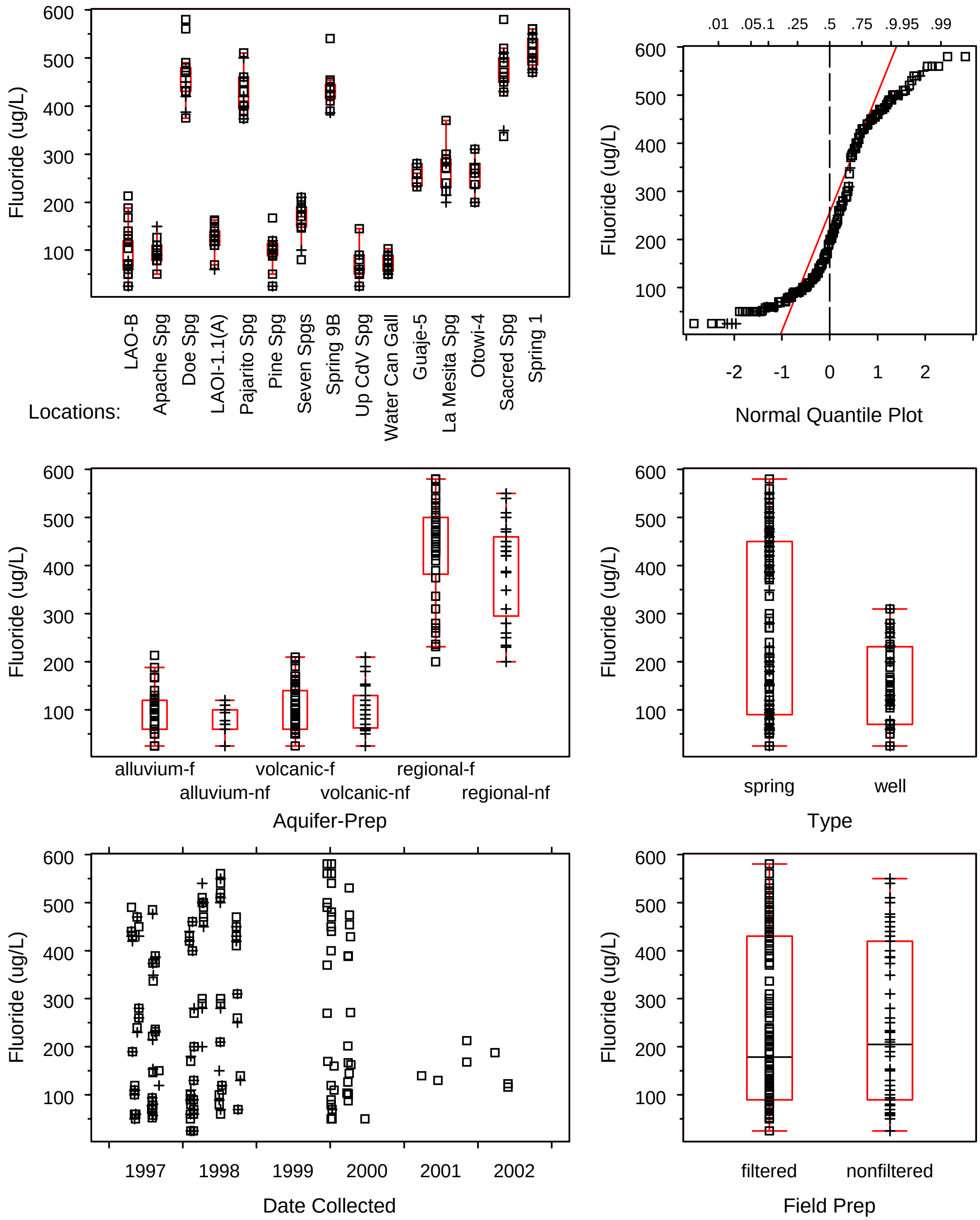


Figure C-35. Fluoride plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

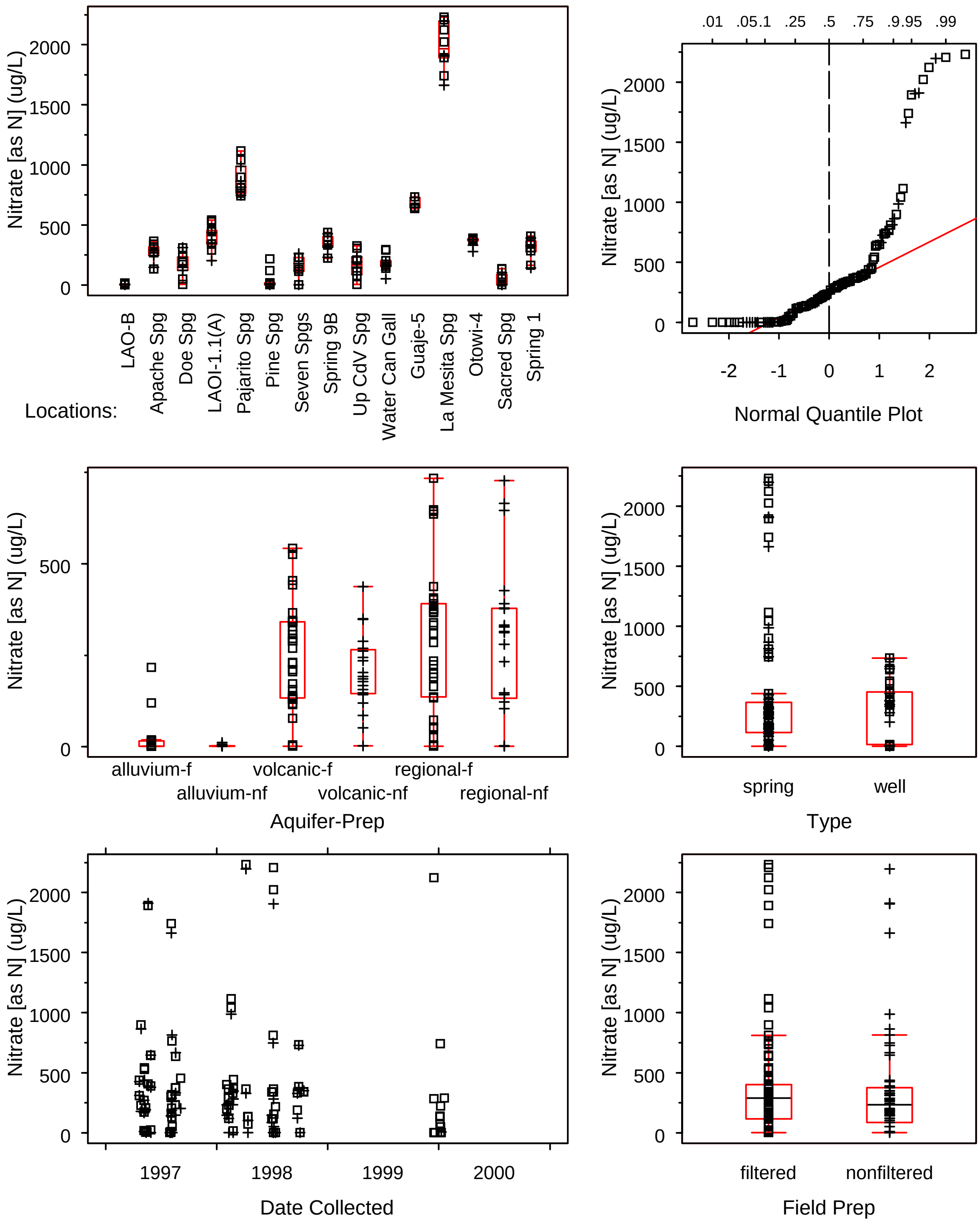


Figure C-36. Nitrate [reported as N] plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

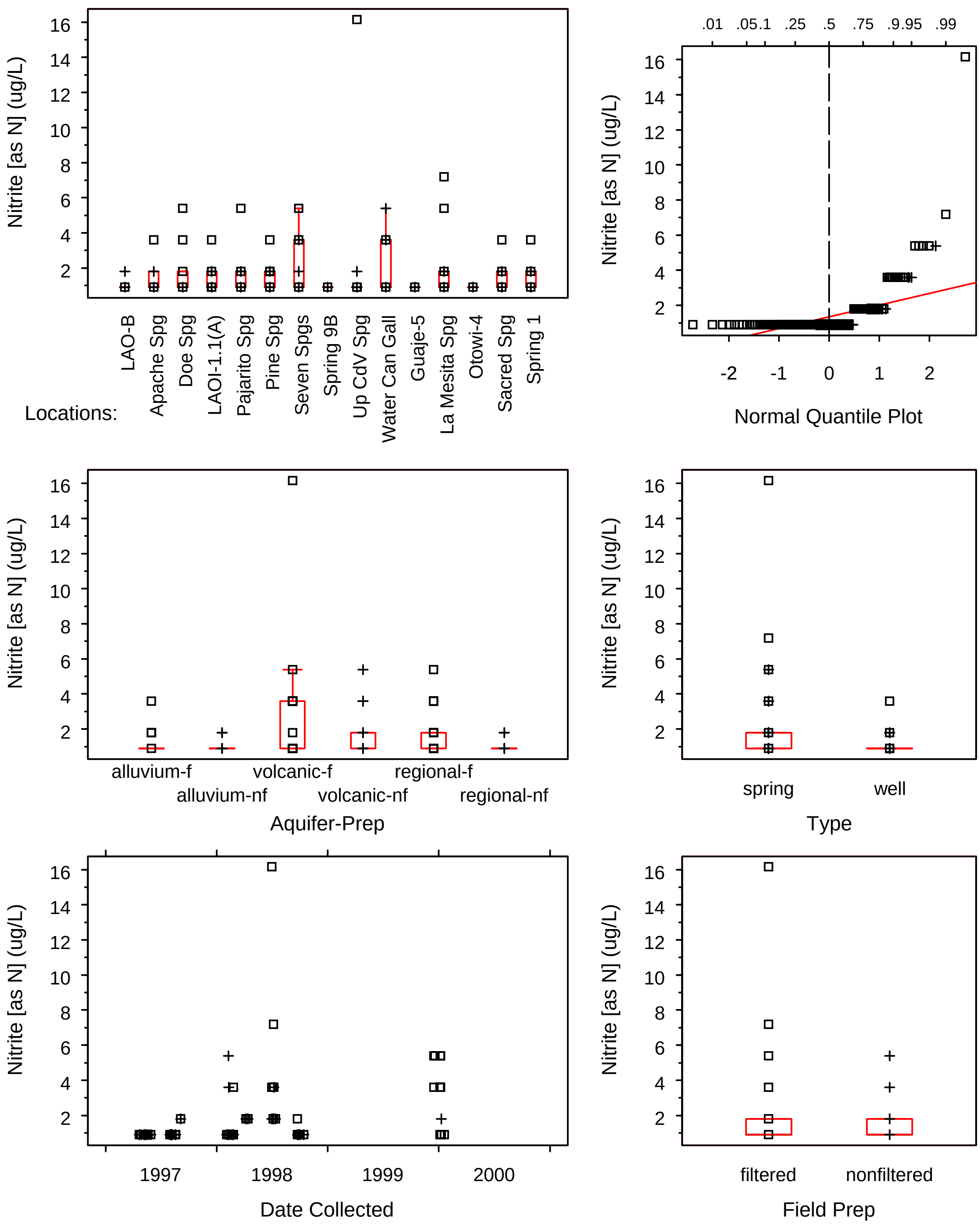


Figure C-37. Nitrite [reported as N] plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

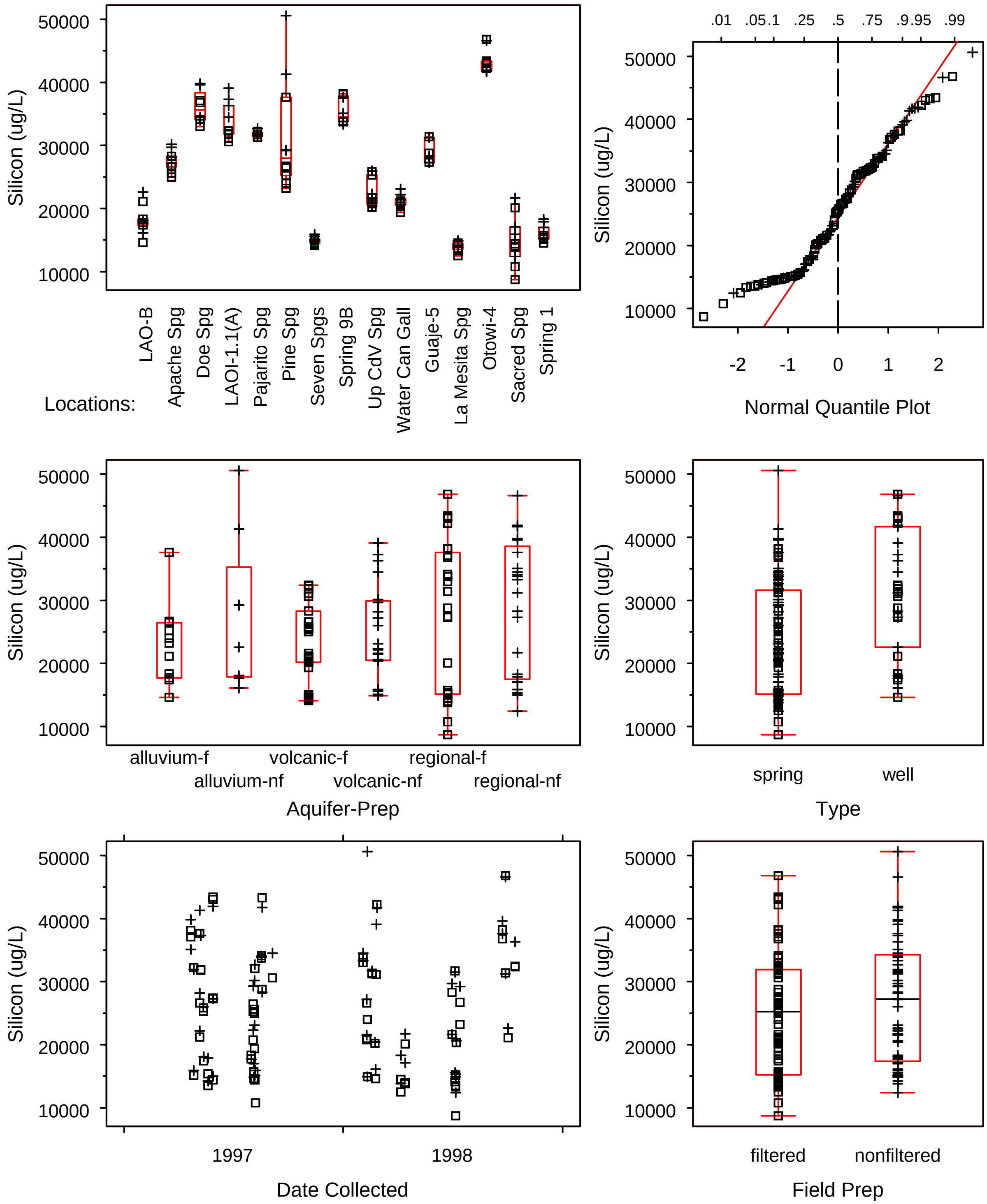


Figure C-38. Silica plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

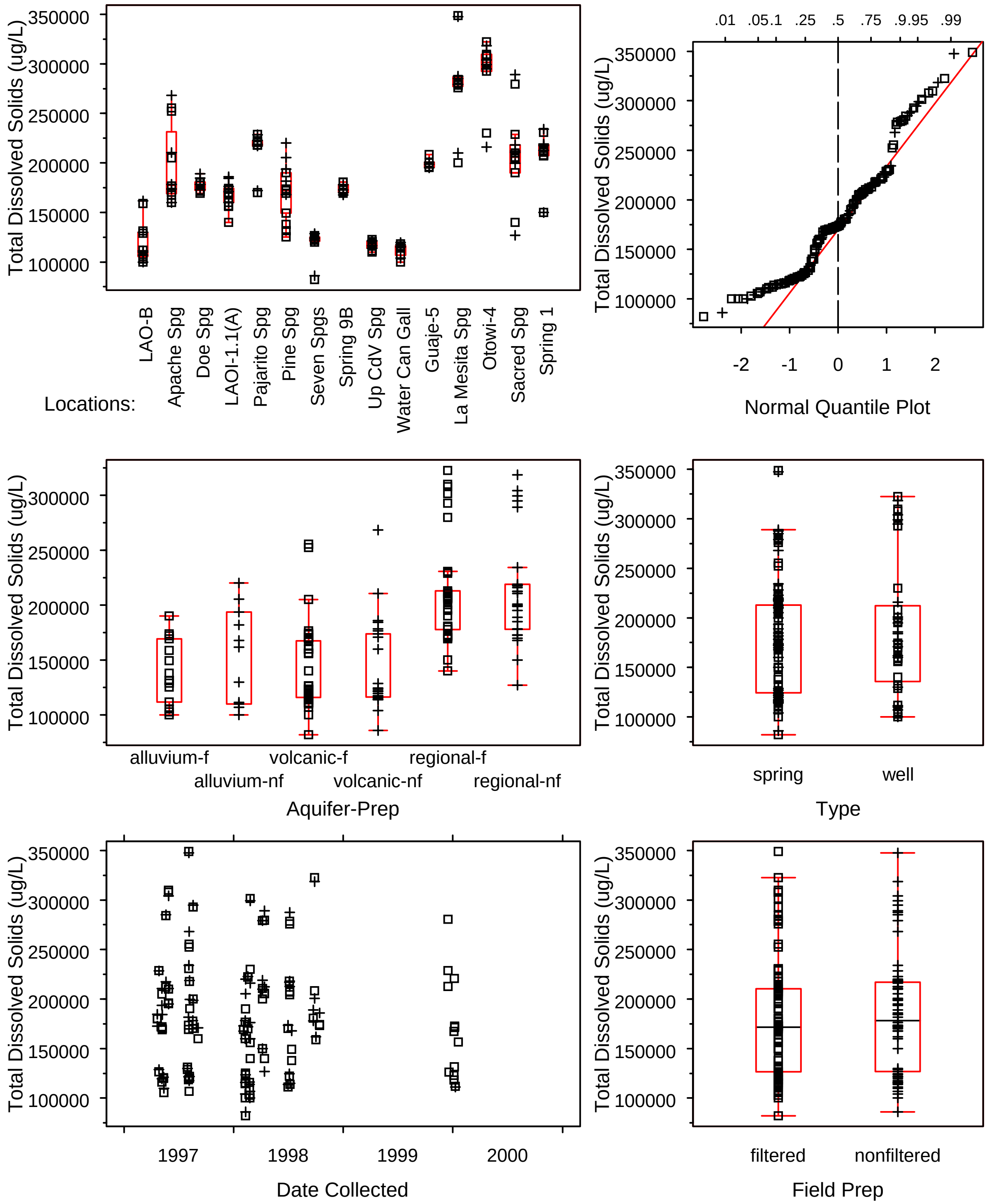


Figure C-39. Total dissolved solids and total solids plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

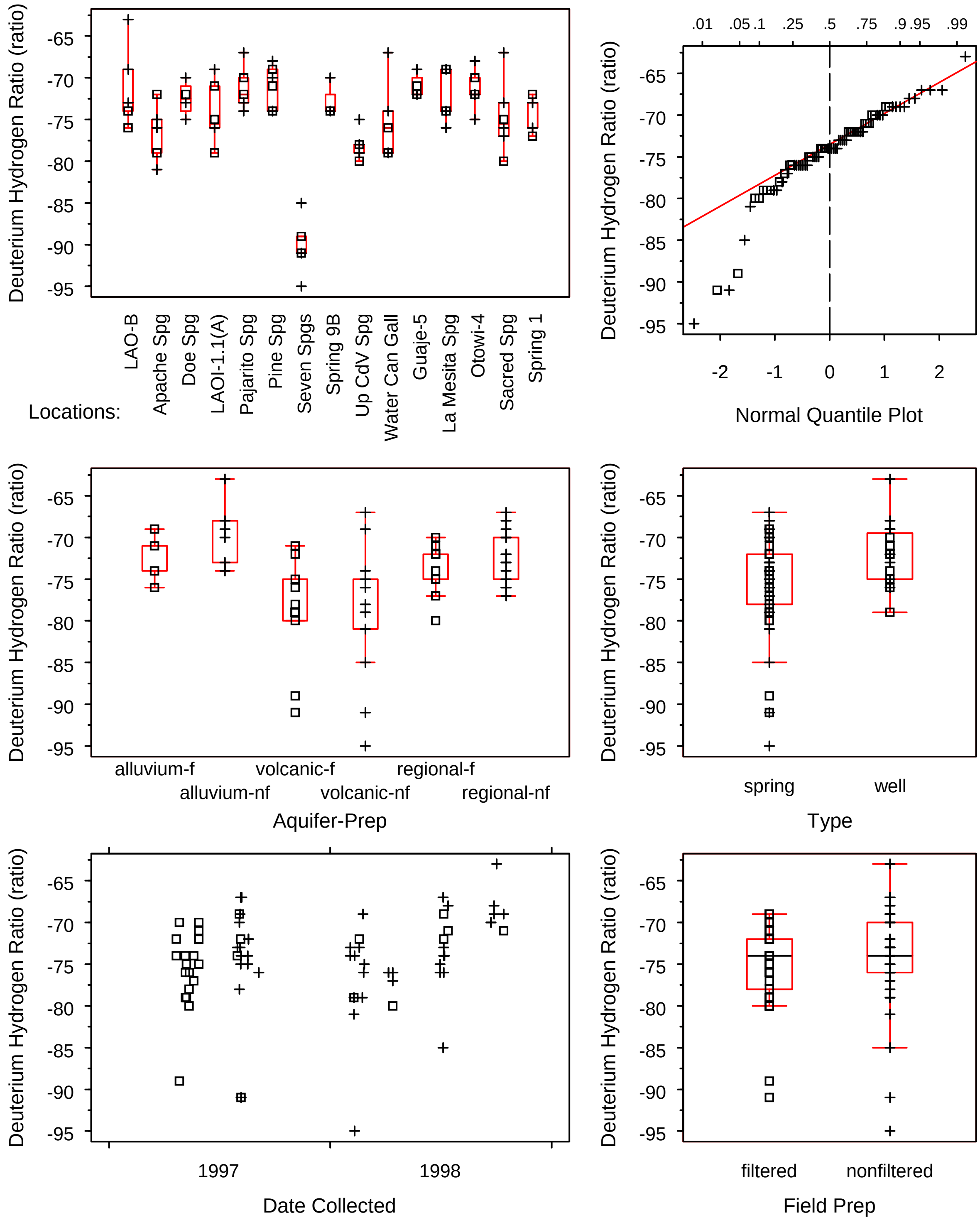


Figure C-40. Deuterium/hydrogen ratio plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

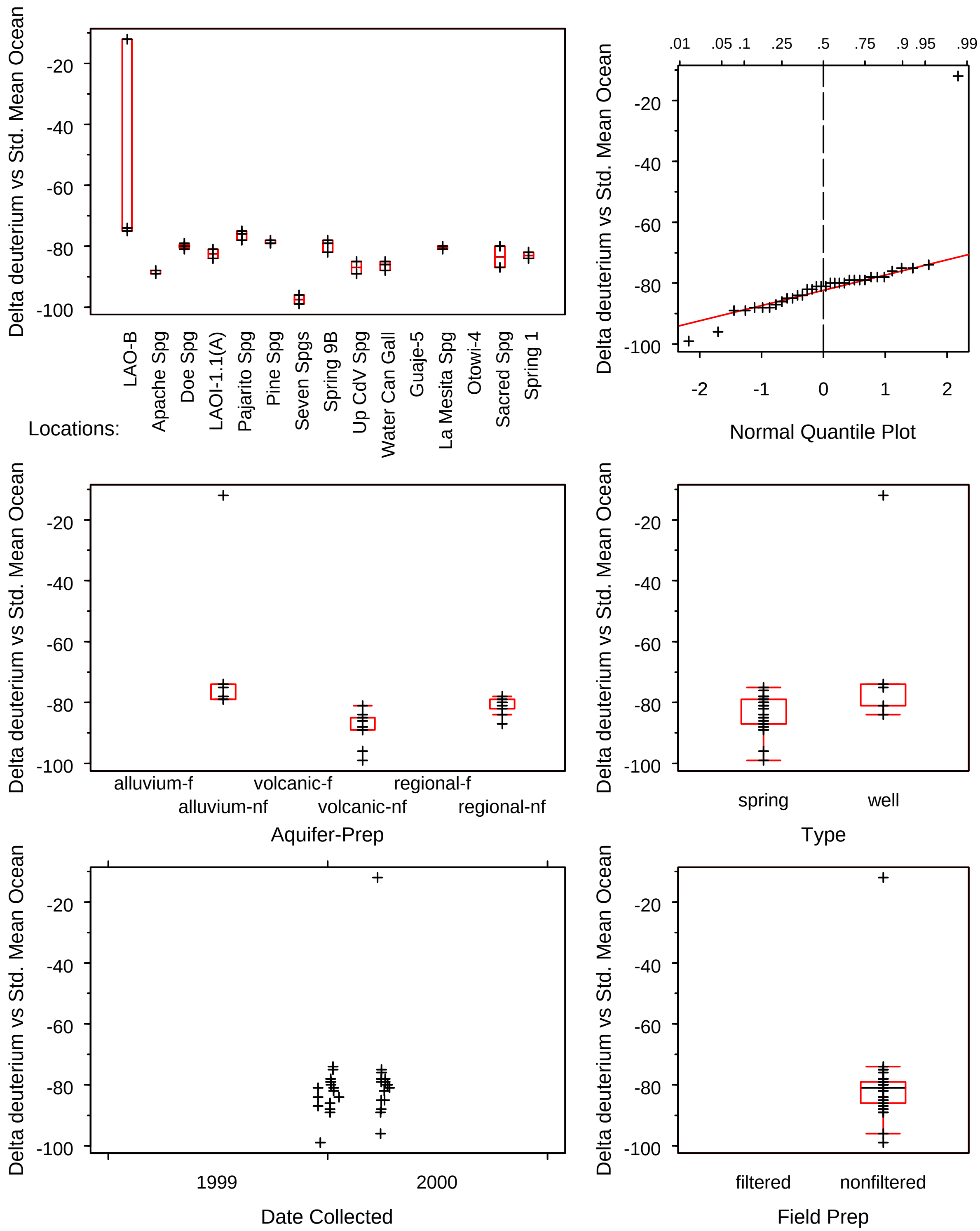


Figure C-41. **Delta deuterium versus standard mean oceanic water plots [note "+" are non-filtered samples]**

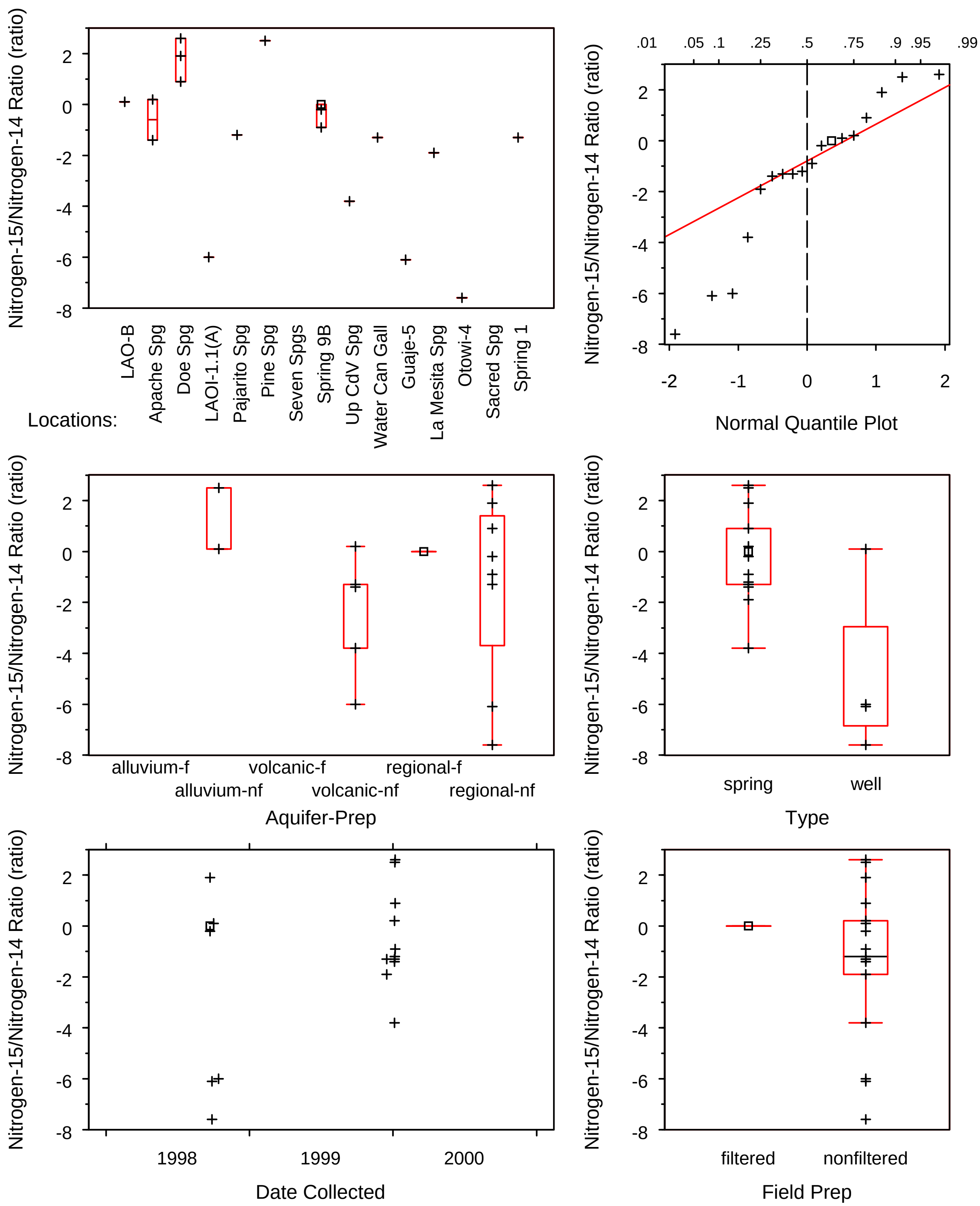


Figure C-42. Nitrogen-15/nitrogen-14 ratio plots [note "+" are nonfiltered samples]

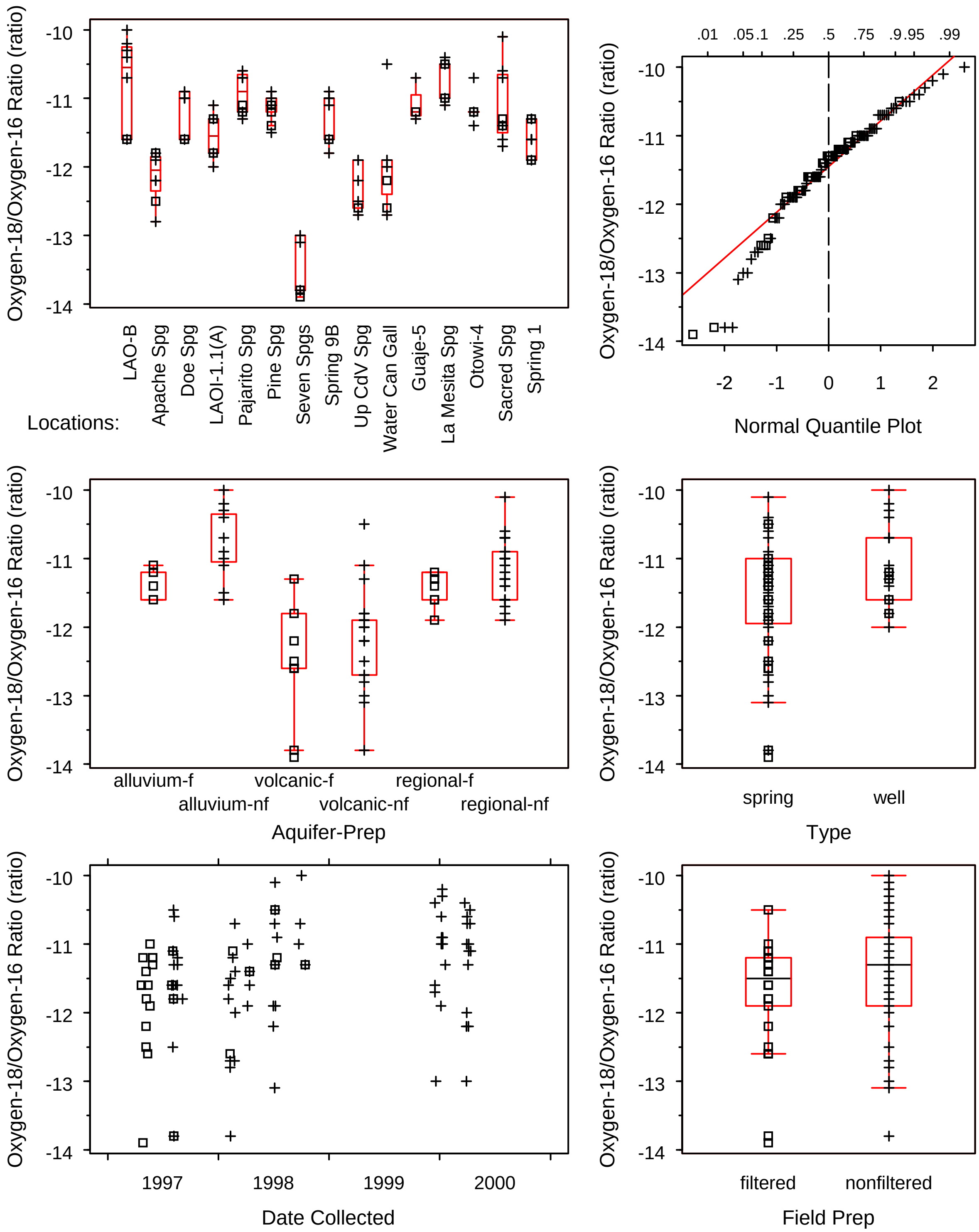


Figure C-43. Oxygen-18/oxygen-16 ratio plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

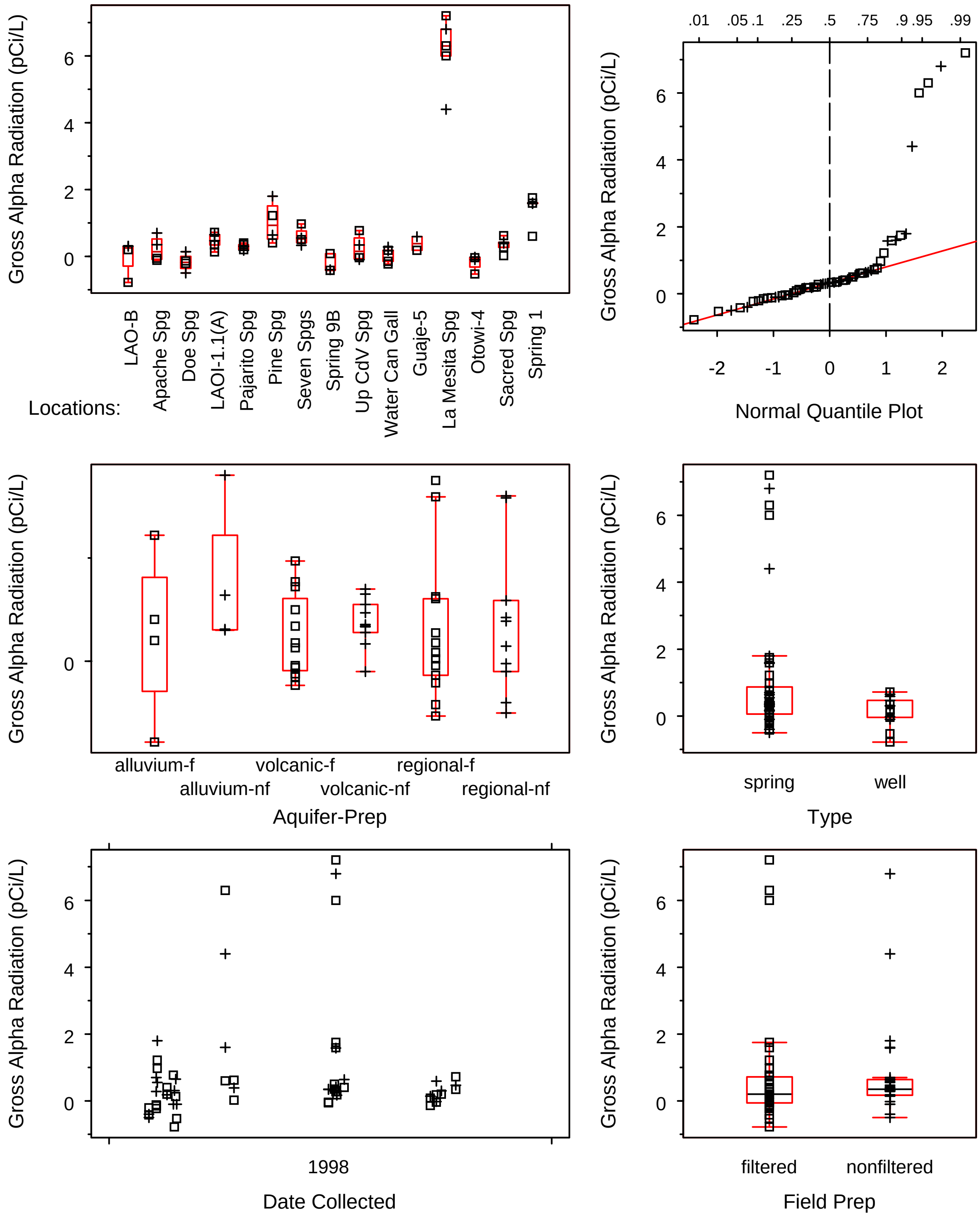


Figure C-44. Gross alpha radiation plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

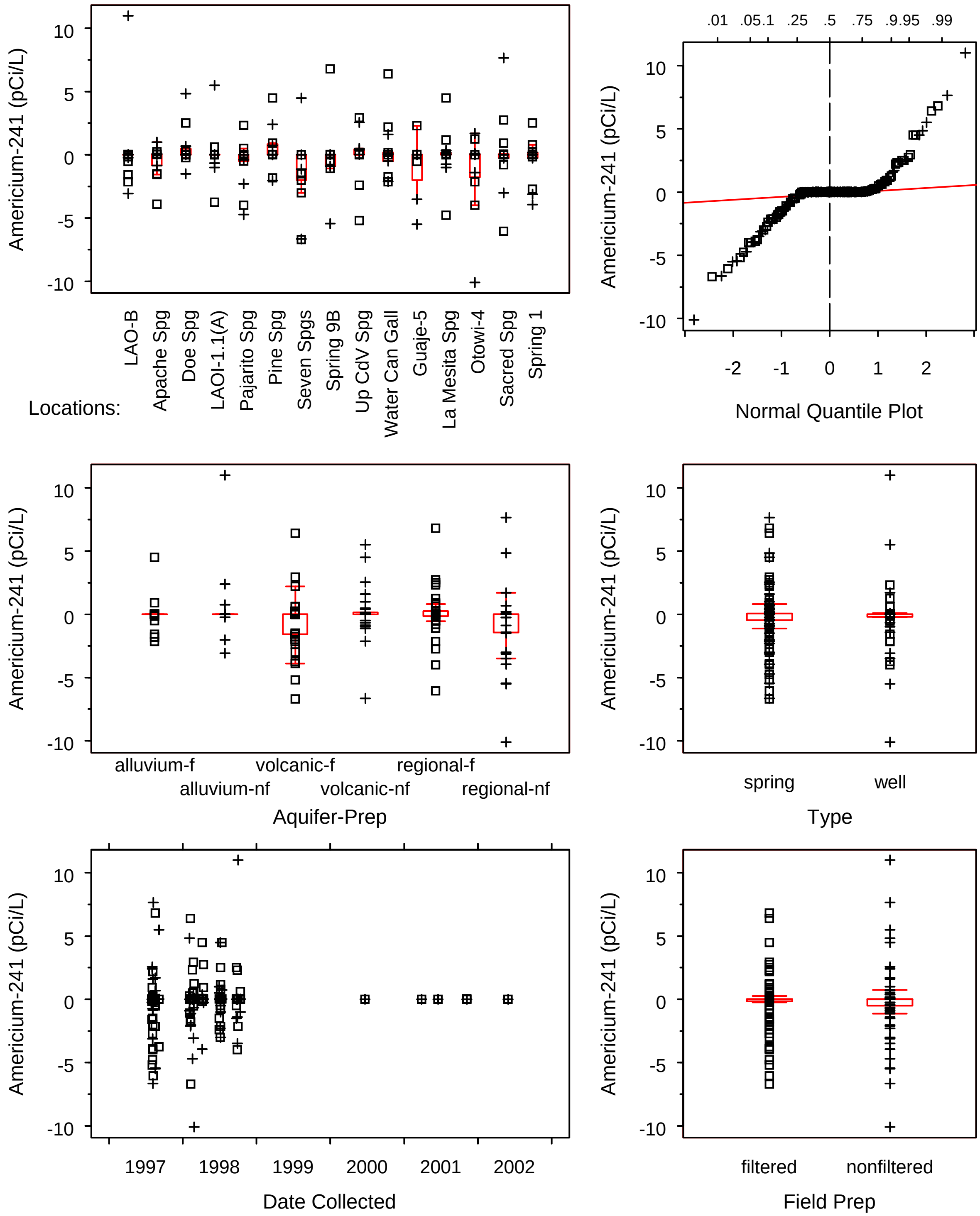


Figure C-45. **Americium-241 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]**

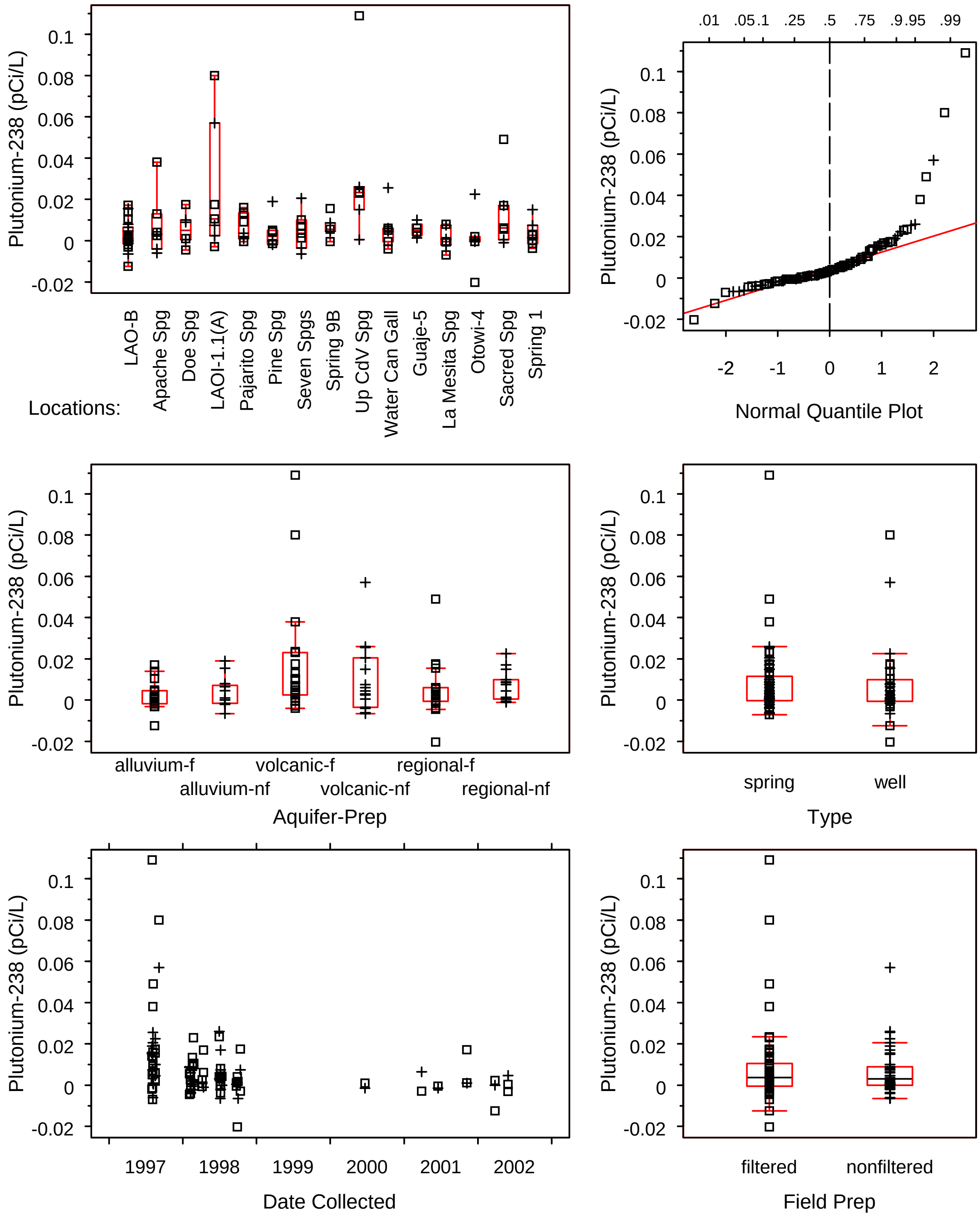


Figure C-46. Plutonium-238 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

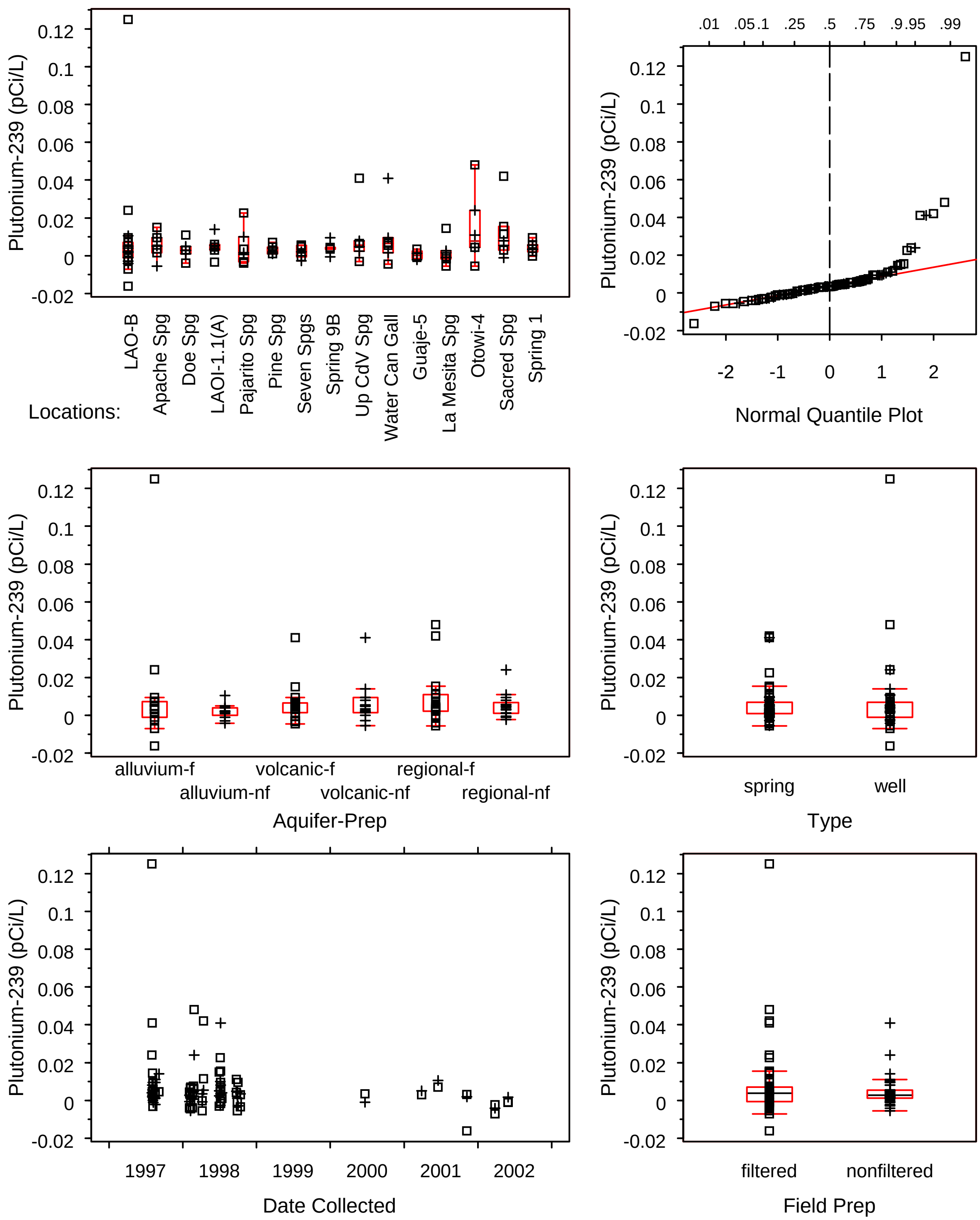


Figure C-47. Plutonium-239,240 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

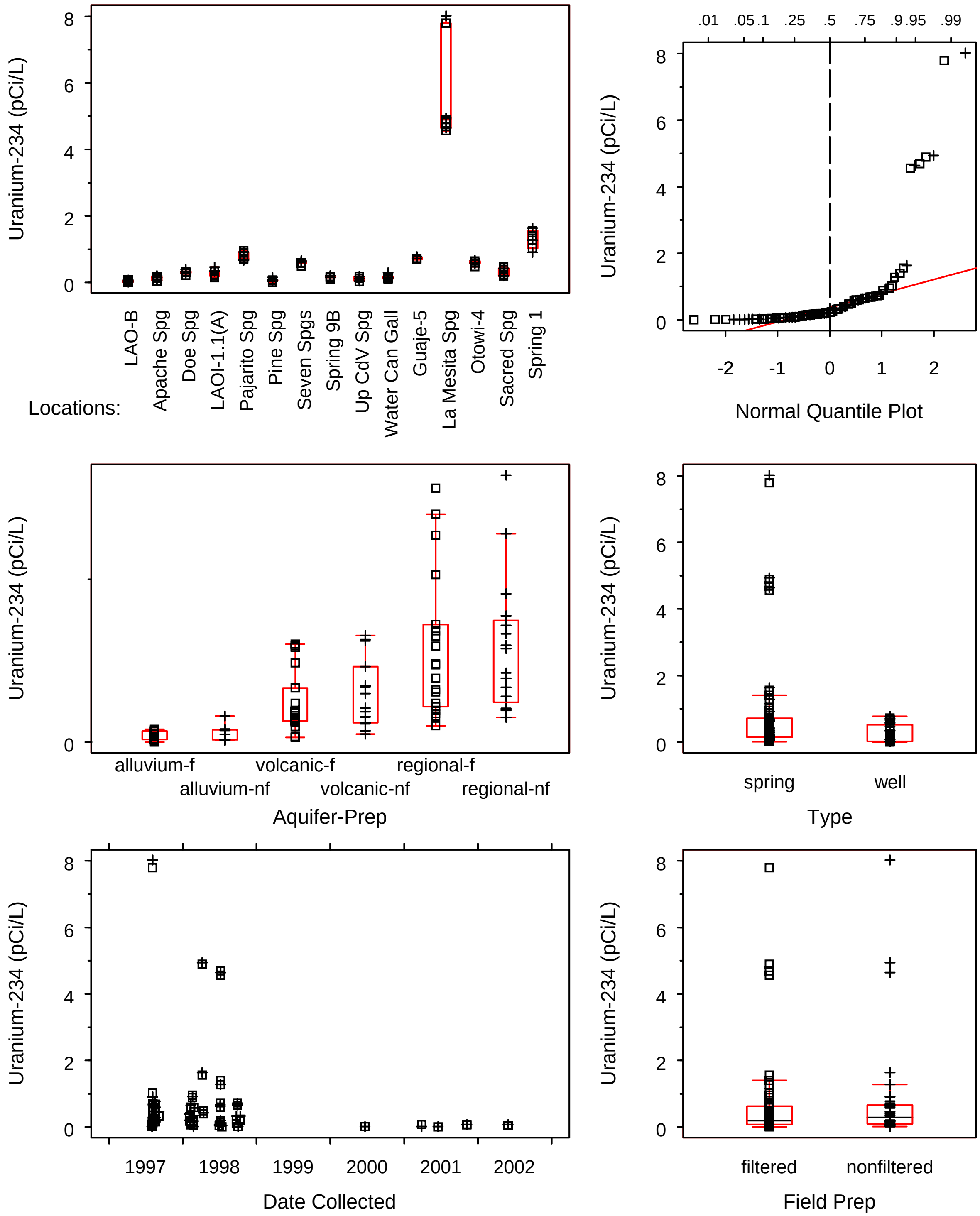


Figure C-48. Uranium-234 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

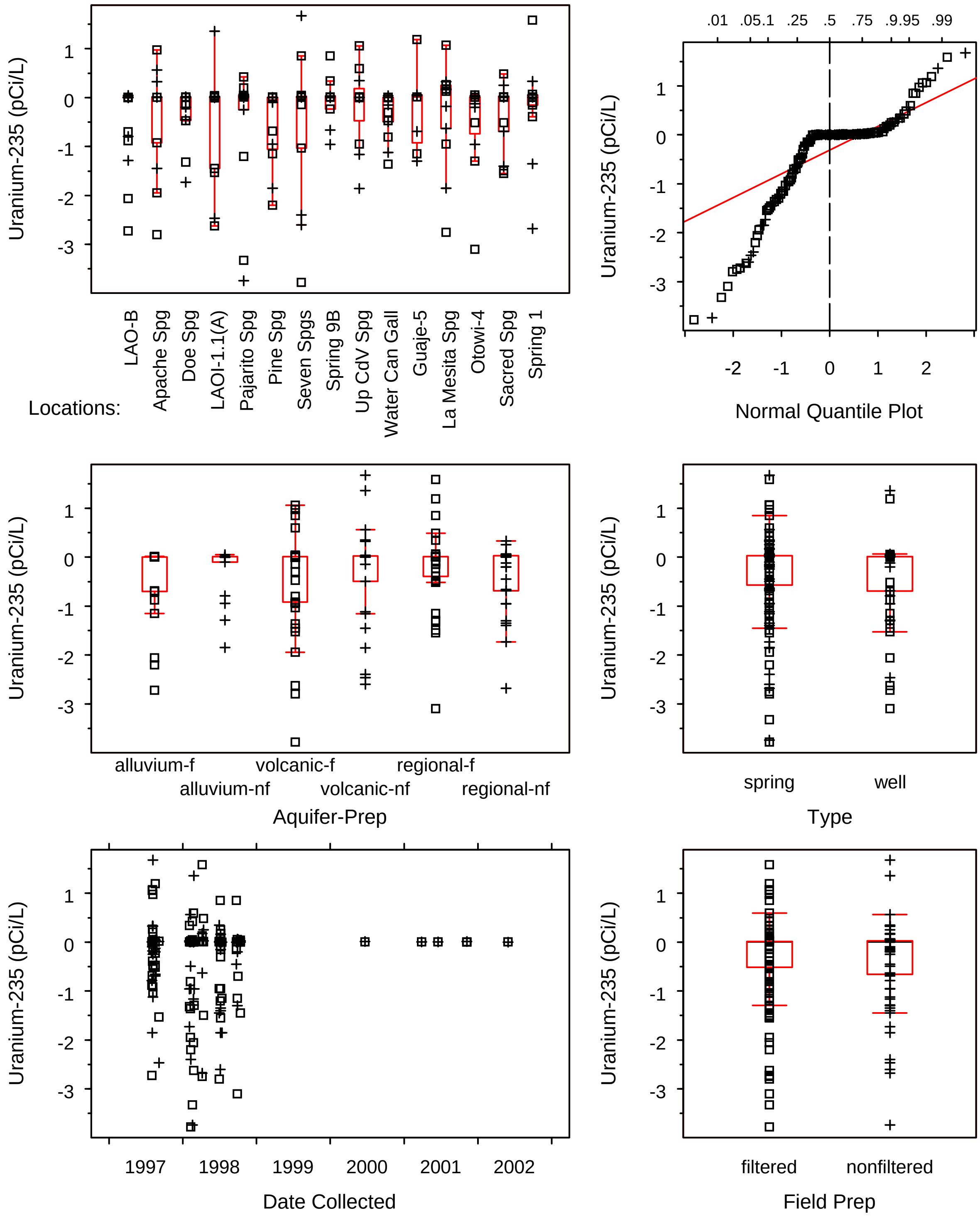


Figure C-49. Uranium-235 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

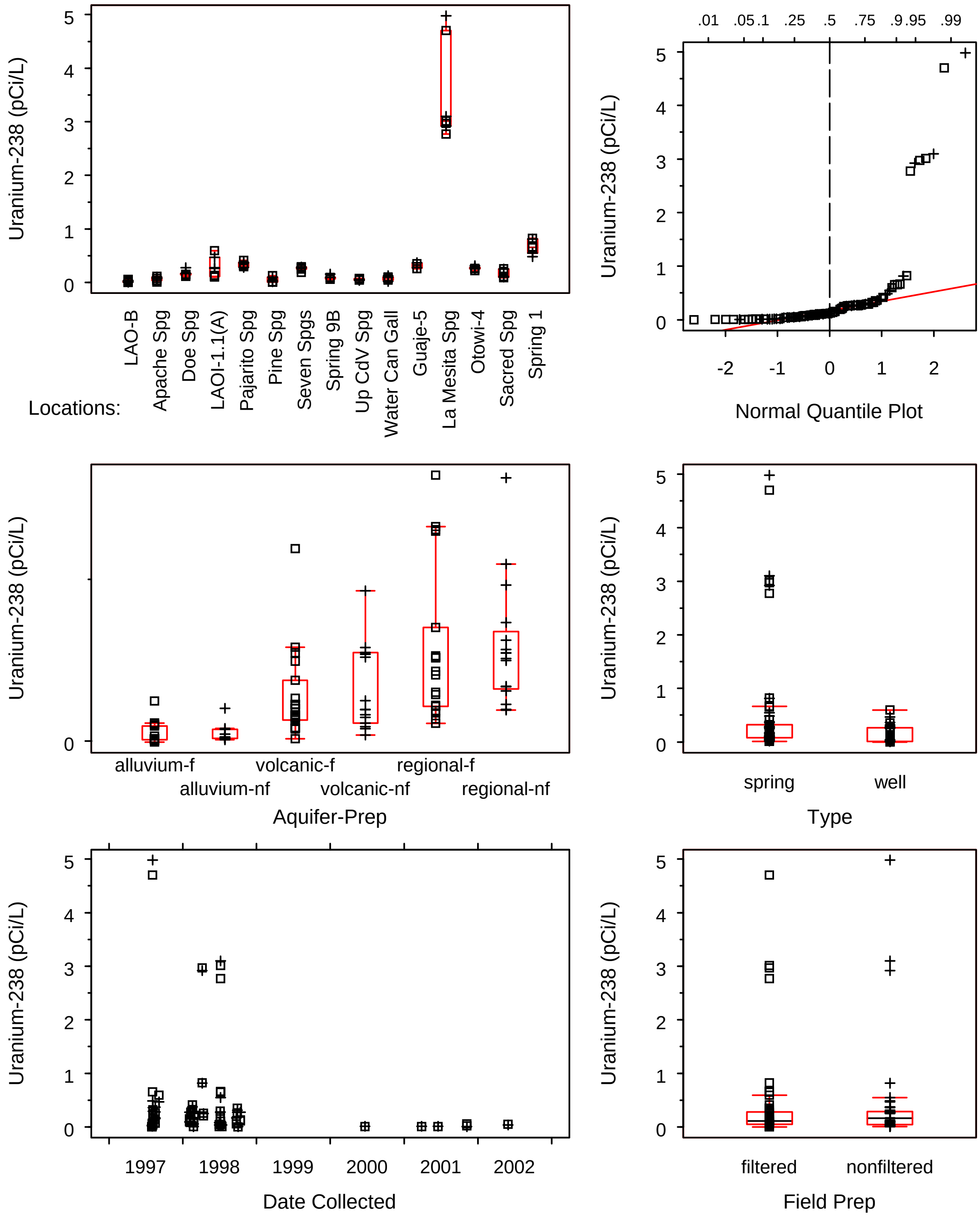


Figure C-50. Uranium-238 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

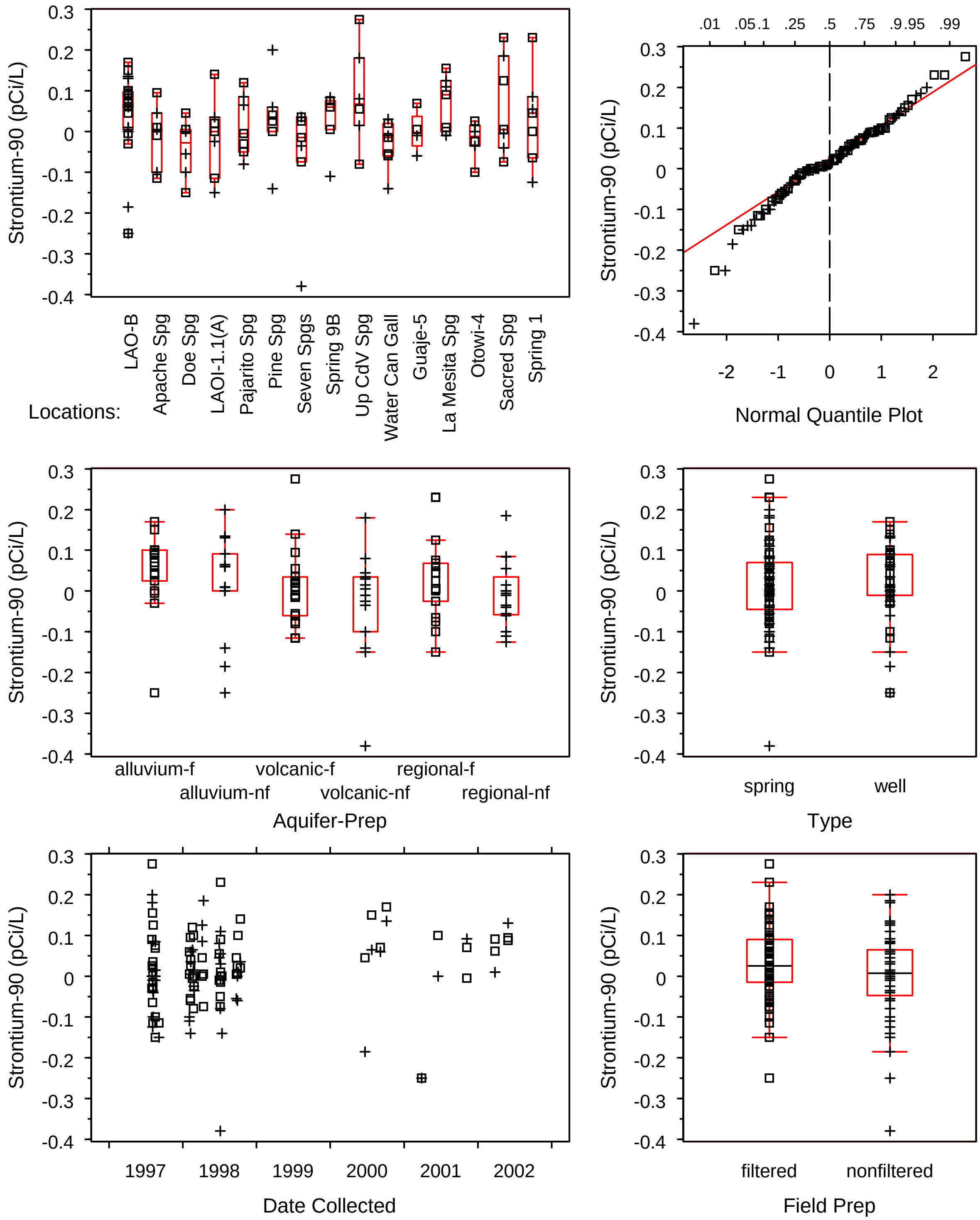


Figure C-51. Strontium-90 plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

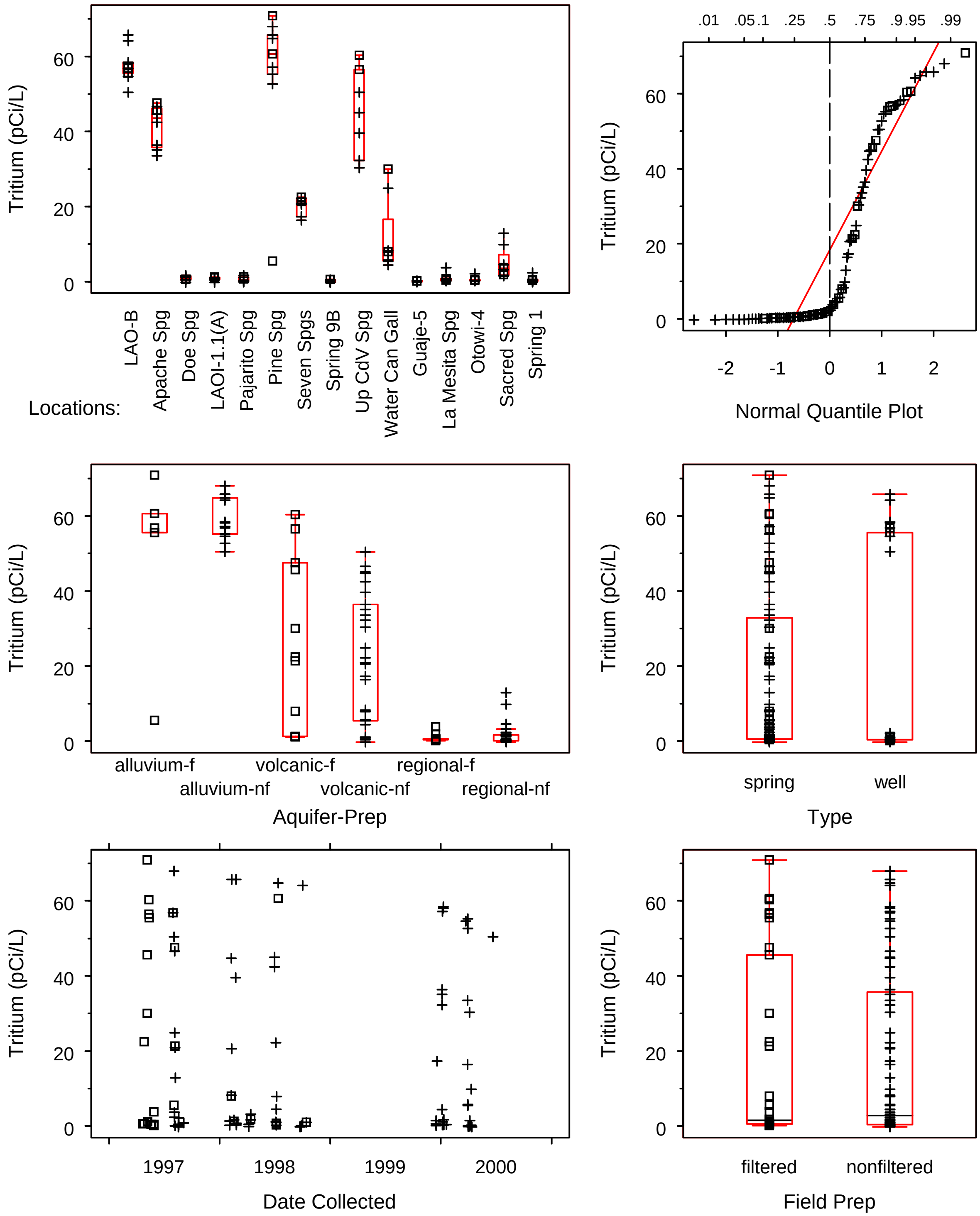


Figure C-52. Tritium ALL [combined analytical laboratory data] plots [note that "+" signs are nonfiltered samples and that squares are filtered samples]

Appendix D

Statistical Analyses of Pre-1997 Hydrogeochemical Data

Figures

Tables

D.1 STATISTICAL ANALYSES OF PRE-1997 HYDROGEOCHEMICAL DATA

This section presents results of statistical analyses performed on pre-1997 groundwater-quality data collected within and surrounding the Laboratory. This statistical analysis was performed as a basis of comparison to the data collected in 1997 and later years. Sources of groundwater-quality data are defined, and the accuracy and precision of the data are evaluated. Analytical precision for nonfiltered water samples is usually poor because of the presence of suspended solids, which when partially or completely digested with nitric acid at pH 2 or less introduce false positives for metals and trace elements. Therefore, groundwater data were screened to evaluate analytical results mainly for those samples that were filtered before analyses.

D.1.1 Methodology

D.1.1-1 Data Adequacy of Water Samples

Data adequacy of the pre-1997 groundwater background data was evaluated by both qualitative and quantitative methods. Analytical results for filtered groundwater samples from different data sources were evaluated. Removal of suspended solids in filtered samples was essential to evaluate baseline or background hydrochemistry. The presence of suspended solids positively biases concentrations of analytes because of partial or complete dissolution of the solids during acidification of the water samples. Digestion of suspended solids in water samples also results in poor charge balances (> ±10%), and the charge balance relationship is one quantitative metric of data quality.

The overall adequacy of the data was assessed by evaluating the standardized residuals from the regression analysis of total dissolved anions versus total dissolved cations. One metric is based on the frequency of standardized residuals with an absolute value greater than 1.96. The expected value of residuals with this magnitude is 5%, and the data set would be judged to be in charge balance if the frequency of residuals is not statistically different from 5%.

Charge-balance errors for the pre-1997 analytical results were calculated for major and trace ions as follows:

(100)[(∑ milliequivalents cations – ∑ milliequivalents anions) divided by
(∑ milliequivalents cations + ∑ milliequivalents anions)]

Other quantitative metrics of data quality employed the calculation of variability resulting from replicate laboratory analyses of the same sample. This value provided a baseline for temporal variation in samples collected from a given location, as well as differences in concentration between sampling locations.

D.1.1-2 Exploratory Data Analyses

Statistical analyses of the selected pre-1997 background data involve several exploratory data analysis (EDA) tools. The purpose of EDA is to identify possible outliers in the data, understand relationships between analytes, evaluate parametric and nonparametric statistical modeling options, and determine the frequency of nondetect values by analyte and by potential data subpopulations.

One of these methods involves bivariate plots. A bivariate plot of anion sum versus cation sum is shown in Figure D.1-1. A bivariate plot of laboratory duplicates (mean values) versus relative standard deviation is shown in Figure D.1-2. A correlation matrix for major ions, cation sum, and anion sum is provided in Figure D.1-3. Figure D.1-4 consists of total dissolved solids (TDS) versus bicarbonate concentrations for different aquifer material made up of alluvial and perched intermediate groundwater and the regional aquifer.

The first step for EDA is the assembly of the data set under evaluation, which includes a summary of the number of samples collected from each location (Table D.1-1). Other tools include normal quantile plots of untransformed and transformed data (Figure D.1-5), box plots to compare possible data groups (Figure D.1-6), and statistical data summaries (Tables D.1-2 and D.1-3). Based on these sample data, the concentration range of nondetect and detect data can be summarized.

<u>Box plots</u>: Box plots are used to show differences between two or more sample collection areas, or depths. This type of plot is shown as Figures D.1-5 and D.1-6. Box plots summarize information about the shape and spread of the distribution of concentrations for an analyte. They consist of a box and a (median) line across the box. The y-axis shows the observed concentrations in the reported units. The area enclosed by the box shows the concentration range containing the middle half of the data; that is, the lower box edge is at the 25th percentile, and the upper box edge is at the 75th percentile. The height of the box is a measure of the spread of the concentrations. The horizontal line across the box represents the median (50th percentile) of the data, which is a measure of the center of the concentration distribution. If the median line divides the box into two approximately equal parts, the shape of the distribution of concentrations is symmetric; if not, the distribution is skewed or nonsymmetrical. All concentrations are plotted as points overlying the box plot.

<u>Normal quantile plots</u>: As a companion plot to some box plots, the normal quantile plots for the data groups are also depicted in Figures D.1-5 and D.1-6. Normal quantile plots (also known as a normal quantile-quantile or q-q plot) are a particular type of quantile plot. The data set concentrations are plotted in increasing order and spread out to allow for comparison of their distribution to that of a theoretical distribution, the standard normal distribution. The quantiles of the data set (y-axis) are plotted against the quantiles for a standard normal (x-axis). The quantiles of a standard normal, that is normal with mean = 0 and standard deviation = 1, are those for the theoretical distribution and can be found in published tables of the cumulative normal distribution. For example, the 50th quantile is 0, the 90th quantile is approximately 1.282, the 95th quantile is about 1.645, etc. If data are derived from a normal statistical distribution, the points in the plot will lie close to the diagonal straight line overlying the data points. The subsets of the data set that differ the most from those expected from a normal distribution are seen as points straying from the line. Multiple data groups can be compared to each other and to a normal distribution by plotting a separate line for each data set in the same display. The observer can see where, if anywhere, the two plots follow the same line, overlap or intersect, indicating that they have equal concentrations at that (those) associated quantile(s).

<u>Regression analysis and scatter plots</u>: Regression analysis provides a measure of the association between pairs of variables. An *x-y* scatter plot is used to graphically depict this relationship. Regression analysis provides a correlation coefficient and an associated measure of statistical significance (or p-value). The correlation coefficients can potentially range between –1 and +1. A correlation coefficient of zero indicates no correlation between the two measurements. A correlation coefficient of +1 indicates a perfect positive relationship between the measurements. A correlation coefficient of –1 indicates a perfect negative relationship (no correlation) between the measurements.

D.2 STATISTICAL AND GEOCHEMICAL ANALYSES OF PRE-1997 WATER-QUALITY DATA SETS

D.2.1 Data Evaluation

Table D.1-1 presents a summary of the analytes included in the available background hydrogeochemical data and the range of nondetect and detected values. The pre-1997 data were derived from seven data sources and were collected at irregular intervals from June 1978 to July 1996.Most of the major elements were always detected, but many of the trace elements have low detection rates. A low detection rate limits the utility of many statistical analyses. Varying analytical methods greatly influence analytical method detection limits (MDLs) for the analytes. Chemical results for water samples reported by the Laboratory's Earth and Environmental Sciences group, EES-6, Shevenell et al. (1987, 06673), Vuataz and Goff (1986, 73686), Dale et al. (1996, 57014), and Yanicak (1998, 57583) were analyzed by either AA (metals), ICPOES (metals), IC (anions), and/or inductively coupled plasma mass spectrometry (ICPMS) (metals). Water samples collected under the National Uranium Resource Evaluation (NURE) Project were analyzed by neutron activation analysis (NAA) and delayed neutron activation analysis (DNAA). Analytical results for nitrogen species were reported as nitrogen compounds (nitrate and nitrite) and not as nitrogen. The same reporting procedure applies to phosphorus (phosphate).

The analysis of the charge balance for 55 water samples showed good agreement between the cation sum and the anion sum (Figure D.1-1 and Table D.2-2). In five values out of 55, the absolute value of the standardized residual exceeded 1.96, (mean plus 2 σ) which represents 9% rather than the expected 5%. This outcome is not improbable under the assumption that the statistical problem represents a binomial experiment of 55 trials with a probability of success of 5% per trial.

There were 10 laboratory duplicates for the groundwater samples. Because many of the trace element (e.g., beryllium, antimony, cadmium) results were nondetects, the agreement between the laboratory duplicates could not be calculated for many analytes. Figure D.1-2a and 2b show the laboratory duplicate variation as a function of the mean concentration of the laboratory duplicate results. The data show, excluding sample AAB1336 (Figure D.1-2b), that with the exception of two values with mean analyte concentrations near zero, laboratory variation is less than a 20% relative standard deviation.

The interrelationship of five major solutes (silica, calcium, sodium, bicarbonate, and chloride) with TDS, anion sum, and cation sum are shown in Figure D.1-3. This correlation matrix suggests significant correlations between sodium, bicarbonate, TDS, and anion and cation sums. This correlation implies that there are geochemical interactions between sodium and bicarbonate and that these two solutes contribute to TDS and cation/anion sums. These geochemical distinctions were used to separate different aquifers (e.g., alluvial, intermediate, and regional). For example, La Mesita spring is a sodium-bicarbonate-type water. However, silica correlates poorly with sodium and bicarbonate and this demonstrates that silica does not form complexes with sodium and bicarbonate in this groundwater. The correlation matrix also shows an apparent outlier value for calcium.

A more detailed correlation plot shows the relationship between bicarbonate and TDS (Figure D.1-4). This plot shows that groundwater samples collected from the Santa Fe Group (regional aquifer) have the highest concentrations of both bicarbonate and TDS and exhibit the greatest variation.

To evaluate the appropriate parametric distribution for statistically modeling the groundwater background data, two types of graphical displays are used to interpret the data. Figure D.1-5 shows histograms and probability plots for bicarbonate and TDS for all data combined over aquifers. Bicarbonate was selected because it is the dominant anion contributing to TDS. Figure D.1-6 shows box plots and probability plots by aquifer group for bicarbonate and TDS. These plots suggest that the combined data represent a mixture distribution based on differences in aqueous geochemistry between aquifers, where the major difference is between the Santa Fe Group/Puye Formation versus the alluvial/Bandelier Tuff/Cerros del Rio basalt/Tschicoma Formation.

D.3 CONCLUSIONS

Adequacy of the pre-1997 groundwater baseline data was evaluated by both qualitative and quantitative methods. Analytical results for filtered groundwater samples from different data sources were evaluated. The removal of suspended solids by filtration of samples was essential for evaluating background hydrochemistry.

The analysis of the charge balance for 55 water samples showed good agreement between the cation sum and the anion sum. There were five values out of 55 where the absolute value of the standardized residual exceeded 1.96, which represents 9% rather than the expected 5%.

There were ten laboratory duplicates for the 55 groundwater samples. Because many of the results were nondetect, the agreement between the laboratory duplicates could not be calculated for many analytes.

The interrelationships of five major solutes (silica, calcium, sodium, bicarbonate, and chloride) with TDS, anion sum, and cation sum were evaluated. This correlation matrix suggests significant correlations between sodium, bicarbonate, TDS, and anion and cation sums.

Groundwater samples collected from the Santa Fe Group (regional aquifer) have the highest concentrations of bicarbonate and TDS. The regional aquifer also shows the greatest variation in TDS and individual solutes.

To evaluate the appropriate parametric distribution to statistically model the groundwater background data, two types of graphical displays are used to interpret the data. Histograms and probability plots for bicarbonate and TDS for all data were combined for the three aquifer types: alluvial, volcanic (perched intermediate), and the regional aquifer. Box plots and probability plots by aquifer group for bicarbonate and TDS suggest that the combined data represent a mixture distribution based on differences in aqueous geochemistry between aquifers. The major difference is between the Santa Fe Group/Puye Formation versus the alluvial/Bandelier Tuff/Cerros del Rio basalt/Tschicoma Formation.

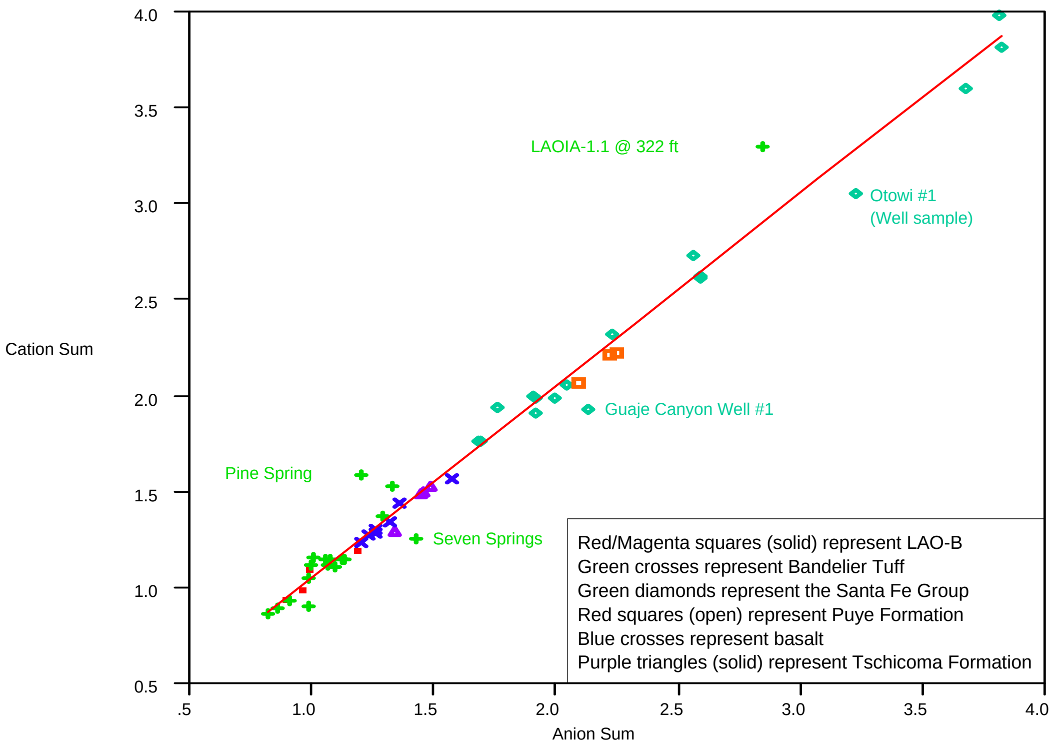


Figure D.1-1. Evaluation of charge balance for background water samples (filtered) (cation sum = 0.04429 + 1.00292 anion sum, r^2 = 0.982, n = 55 samples)

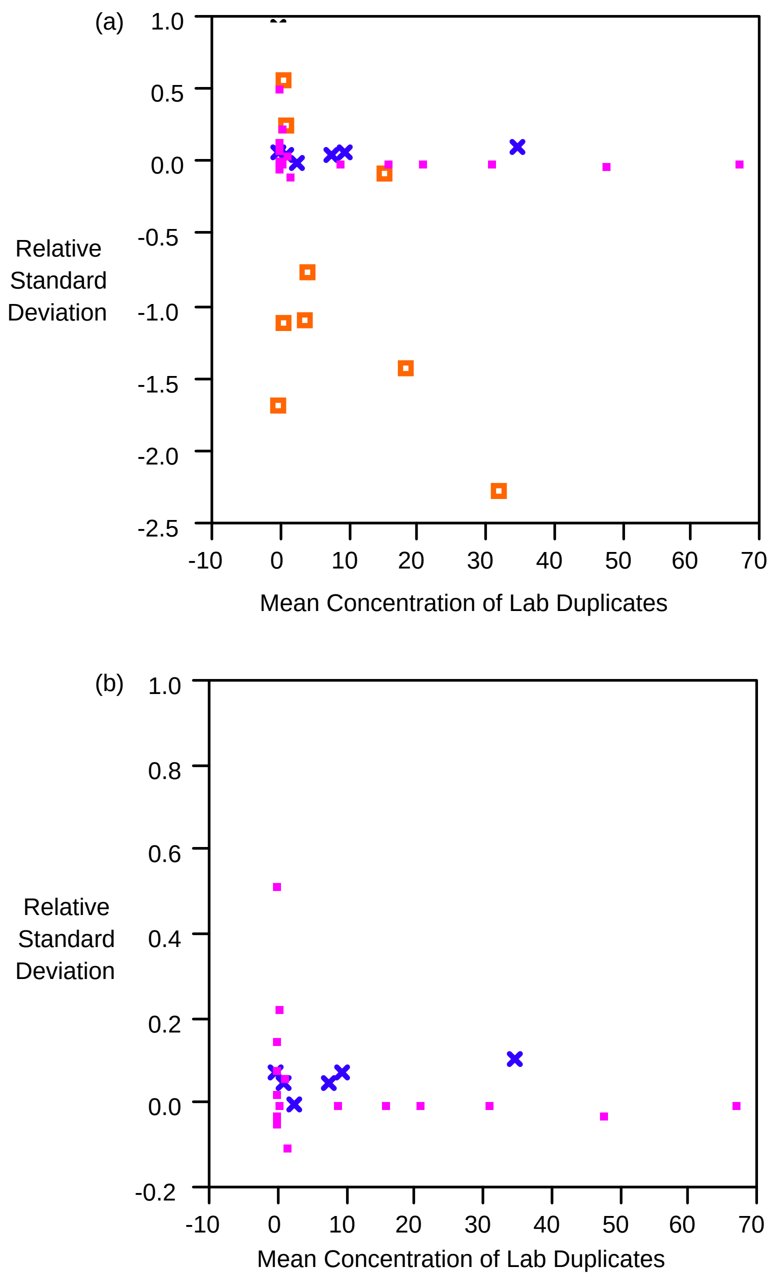


Figure D.1-2. Summary of variability from laboratory duplicate analyses. (a) Samples AAB1336, AAB8498, AAB8512, and 0441-95-0013. (b) Samples AAB8498, AAB8512, and 0441-95-0013. Excluding sample AAB1336 in plot (b) results in a laboratory variation of less than 20% of the relative standard deviation, with the exception of two samples with mean analyte concentrations near zero. See Figure D.1-1 for symbols representing sample sites.

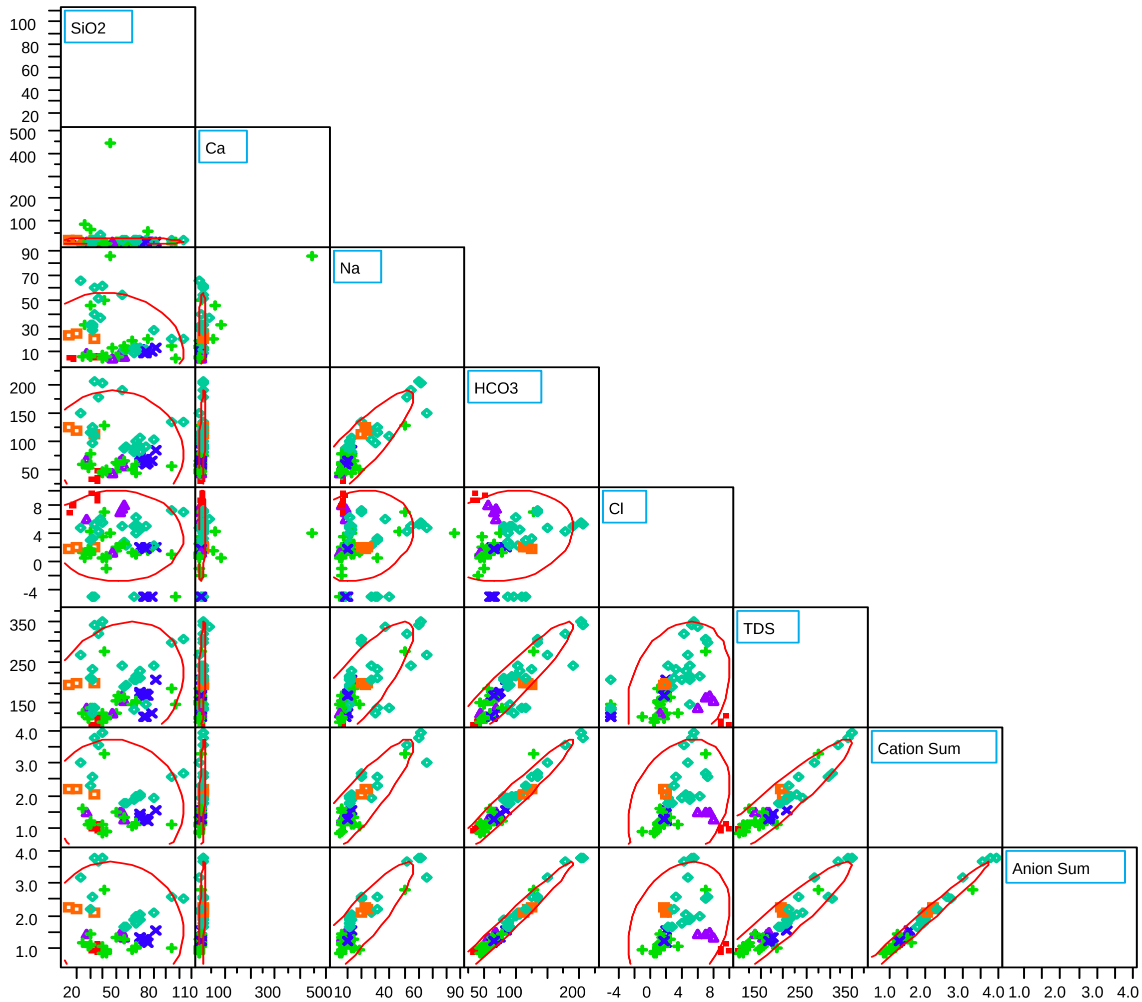


Figure D.1-3. Correlation matrix of major solutes, anion sum, and cation sum. See Figure D.1-1 for symbols representing sample sites.

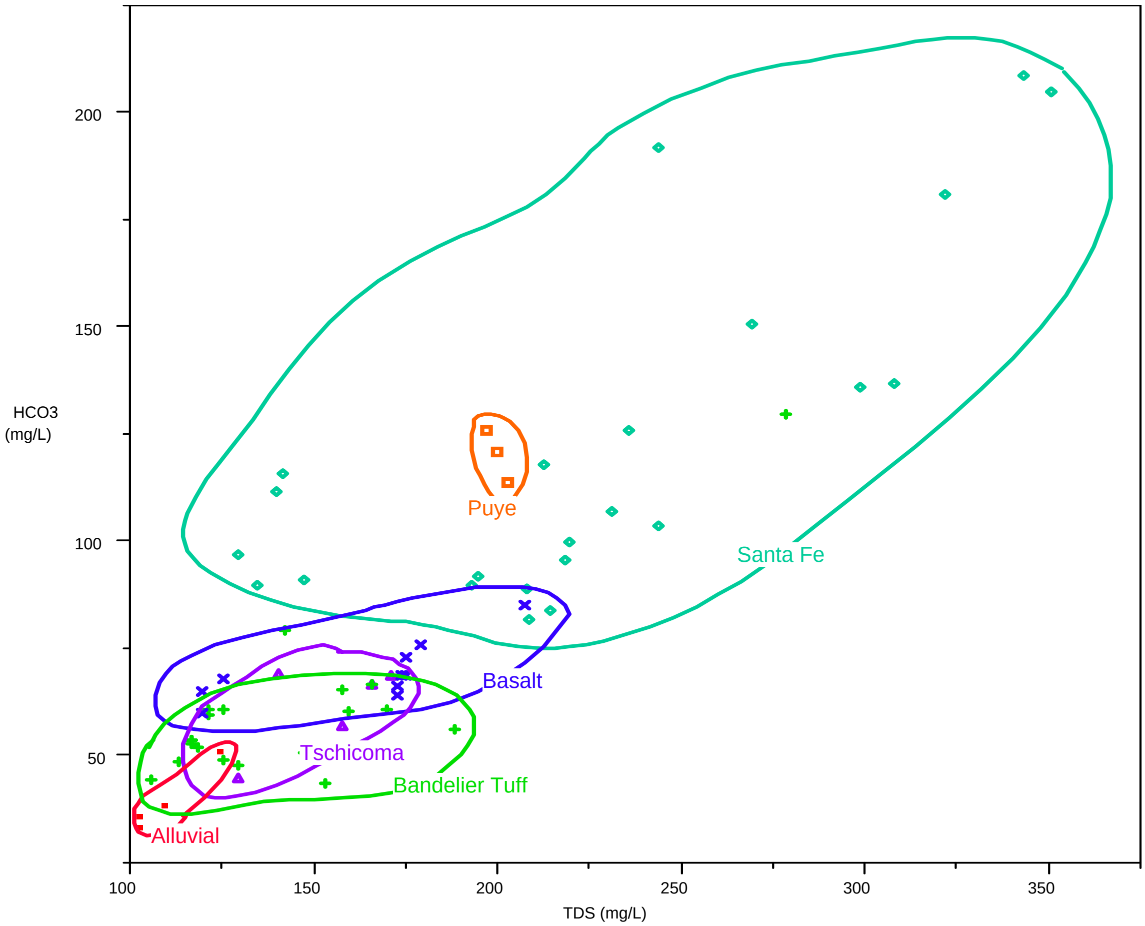
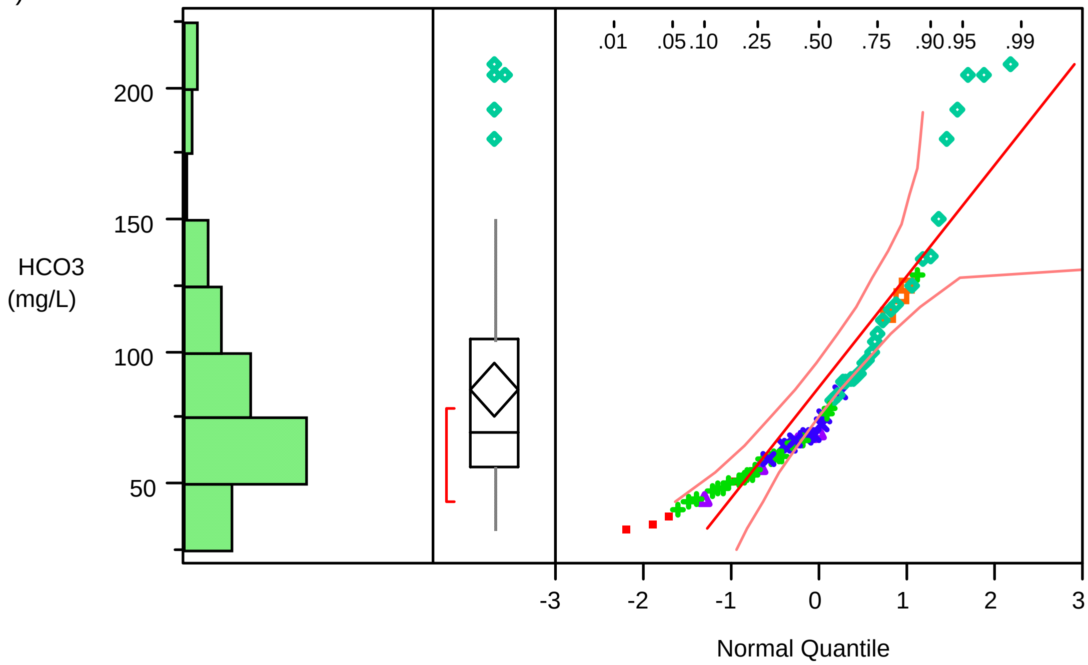


Figure D.1-4. Relationship between TDS and bicarbonate for pre-1997 baseline groundwater samples. See Figure D.1-1 for symbols representing sample sites.

a)



b)

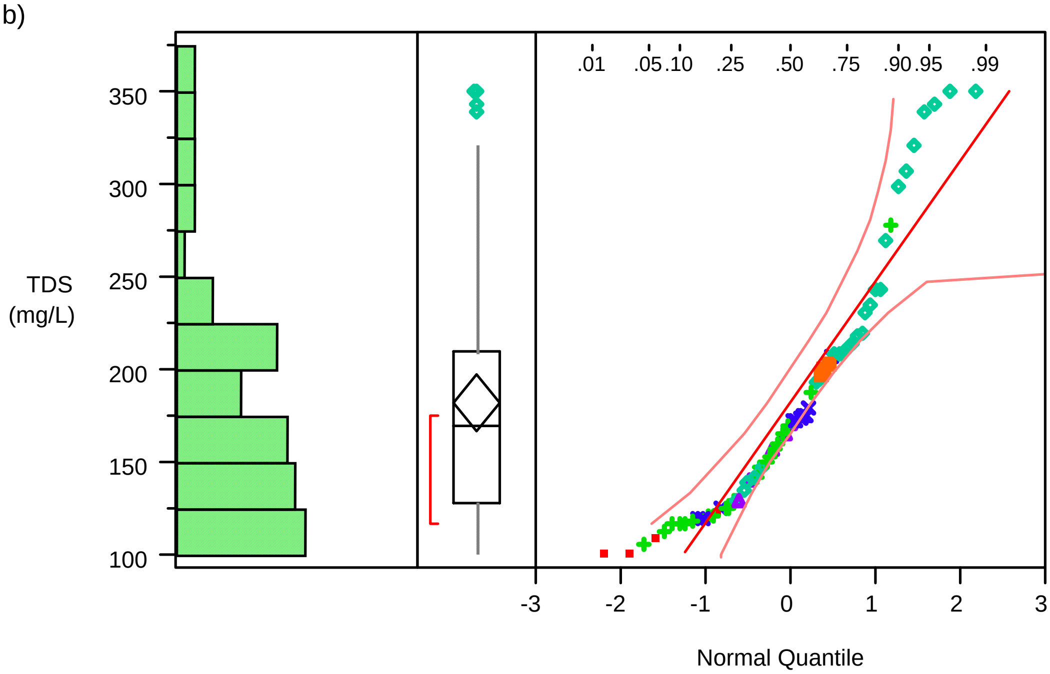
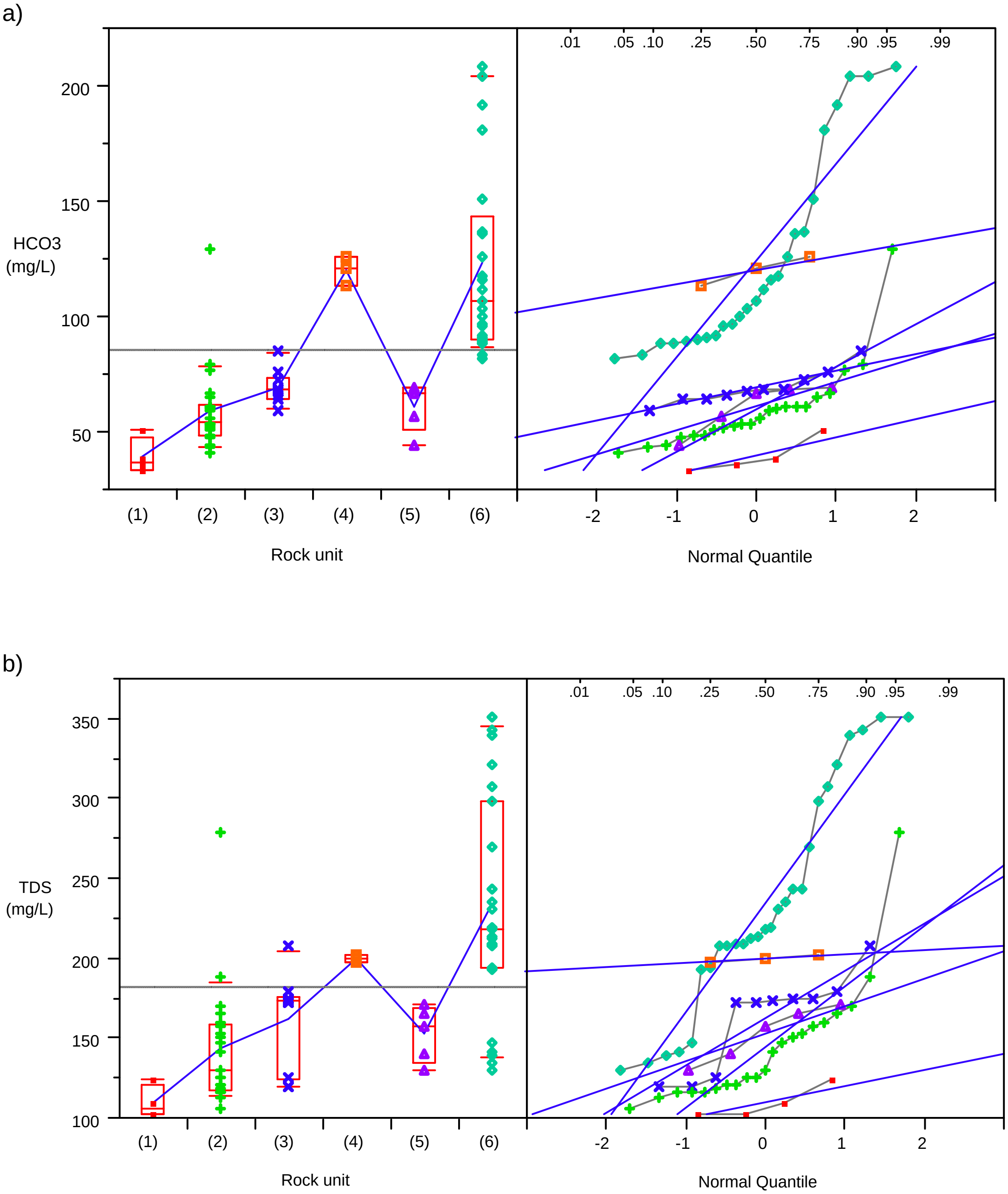


Figure D.1-5. Histogram and normal probability plots for a) bicarbonate (HCO_3) and b) TDS for pre-1997 baseline groundwater samples (filtered). See text for statistical nomenclature and Figure D.1-1 for symbols representing sample sites.

a)



b)

Figure D.1-6. Box plots showing a) bicarbonate and b) TDS by aquifer material for pre-1997 baseline groundwater samples. See text for statistical nomenclature and Figure D.1-1 for symbols representing sample sites.

Table D.1-1
Summary of pre-1997 Filtered Groundwater Samples Collected by Location

		Data Sources							
Group	Location	Blake et al. (1995, 49931)	EES-6 (1994-1995)	ER Project (1994-1995)	Meeker et al. (1990, 54783)	Dale et al. (1996, 57014); Yanicak (1998, 57583)	Shevenell et al. (1987, 06673)	NURE	Total
(1) Alluvial	LAO-B	0	4	7 (3)	0	0	0	0	**11 (3)**
	Pine Spring	1	1	0	0	5	0	1	**8**
(2) Volcanic rocks	Apache Spring	1	2	0	0	0	1	0	**4**
	LAOI(A)-1.1	0	3	1 (4)	0	0	0	0	**4 (4)**
	Seven Springs	1	1	0	1	0	3	1	**7**
	Upper Cañon de Valle	0	0	0	0	1	0	0	**1**
	Water Canyon Gallery	2	1	0	0	0	1	0	**4**
(3) Regional aquifer	Doe Spring	1	5	0	0	2	0	0	**8**
	Guaje Canyon Well #5	2	0	0	0	0	0	0	**2**
	Otowi #4	2	0	0	0	0	0	0	**2**
	Pajarito Spring	2	4	0	0	2	1	0	**9**
	Sacred Spring	1	1	0	0	0	1	0	**3**
	Spring 1	0	2	0	0	3	0	0	**5**
	Spring 9B	0	1	0	0	1	0	0	**2**
Total		**13**	**25**	**8 (7)**	**1**	**14**	**7**	**2**	**70 (7)**

Note: Values in parentheses represent laboratory duplicate results.
NURE = National uranium resource evaluation.

Table D.2-1
Summary of pre-1997 Groundwater Data for Background Locations
(Concentration Units in mg/L or ppm)

	Nondetects			Detects			Detection
Analyte	Count	Min	Max	Count	Min	Max	Rate
Anion Sum	0	n/a*	n/a	46	0.832	2.85	100%
Balance	4	0.0026	0.012	34	0.0046	0.2757	89%
Cation Sum	0	n/a	n/a	46	0.865	3.298	100%
DOC	0	n/a	n/a	3	2.4	5.8	100%
TDS	0	n/a	n/a	58	102.4	308.2	100%
B	30	0.003	0.1	38	0.003	0.73	56%
Br	22	0.00001	0.001	23	0.00001	0.00027	51%
Ca	0	0	0	72	1.63	67	100%
Cl	10	0.001	0.005	55	0.00064	0.00985	85%
CO_3	43	0	0.005	4	0.0059	0.008	9%
F	10	0.00001	0.0005	57	0.00003	0.00098	85%
HCO_3	0	0	0	58	0.0335	0.137	100%
K	2	2.2	2.6	68	1.4	21	97%
Li	22	0.004	0.02	40	0.005	0.08	65%
Mg	3	1	3.08	69	0.29	16	96%
Na	0	0	0	70	4.9	58	100%
SiO_2	0	0	0	68	0.014	0.105	100%
SO_4	7	1	50	60	1.05	66	90%
Sr	2	0.1	0.1	66	0.02	3.5	97%
Ag	66	0.0002	0.1	1	0.014	0.014	1%
Al	16	0.1	0.2	42	0.03	2.71	72%
As	37	0.0002	0.1	23	0.0002	0.013	38%
Ba	19	0.01	0.12	50	0.01	0.35	72%
Be	34	0.001	0.1	2	0.009	0.01	6%
Cd	63	0	0.03	6	0.001	0.03	9%
Co	65	0	0.06	4	0.003	0.081	6%
Cr	40	0	0.03	29	0.001	0.066	42%
Cs	35	0	0.01	4	0.002	0.008	10%
Cu	36	0	0.04	33	0.002	0.06	48%
Fe	27	0.01	0.1	44	0.01	4.17	62%
Hg	51	0.0002	0.2	5	0.0004	0.2	9%
I	38	0	0	0	0	0	0%
Mn	54	0.002	0.05	15	0.001	8.8	22%

Table D.2-1 (continued)

	Nondetects			Detects			Detection
Analyte	Count	Min	Max	Count	Min	Max	Rate
Mo	46	0	0.1	14	0.001	0.027	23%
Ni	45	0	0.1	6	0.002	0.16	12%
Pb	32	0	0.15	19	0.002	0.46	37%
Ru	30	0.0001	0.1	17	0.0004	0.01	36%
S_2O_3	22	0	0.1	5	0.02	0.03	19%
Sb	50	2e-05	0.1	3	0.00003	0.012	6%
Se	41	2e-05	0.1	0	0	0	0%
Sn	6	0	0.1	3	0.005	0.02	33%
Ti	13	0	0.01	1	0.014	0.014	7%
Tl	18	0.001	0.1	1	0.001	0.001	5%
U	20	0.001	1.2	8	0.003	0.04	29%
V	33	0.002	0.1	24	0.001	0.25	42%
Zn	27	0.01	0.5	9	0.01	1.4	25%
NH_4	34	0	0.1	22	0.002	0.18	39%
NO_2	20	0.01	0.04	25	0.02	4.32	56%
NO_3	39	0	0.2	23	0.002	2.76	37%
PO_4	15	0.02	0.2	29	0.002	0.13	66%

*n/a = Not applicable.

Table D-2.2
Summary of pre-1977 Samples Where Anions Do Not Balance Cations

Data Source	Rock Unit	Location	Sample ID	Standardized Residual
Blake et al. (1995, 49931)	Santa Fe	Guaje Canyon Well #1	G-1	-2.30
EES-6	Bandelier Tuff	LAOI(A)-1.1 @ 322 ft	PP94-113	+3.73
EES-6	Santa Fe	Otowi #1	OT-1	-2.14
Blake et al. (1995, 49931)	Bandelier Tuff	Pine Spring	VA-356	+3.14
Meeker et al. (1990, 54783)	Bandelier Tuff	Seven Springs	VC2B-28	-2.08

Appendix E

Descriptions of Wells and Springs

Figures

E.1 APACHE SPRING (LAVA IN TSCHICOMA FORMATION)

Location: Bland 7.5 min USGS topo quad (Latitude N 35˚49'28.3", Longitude W106˚23'23.36709", Elevation 2522 m)

Ownership: Bandelier National Monument

Geologic Map: Smith et al. (1970, 09752); Goff et al. (1990, 21574)

Description: Apache Spring issues on the north side of a shallow ravine about 0.5 km south of State Highway 4 in the southern Sierra del los Valles. The spring orifice is covered by a rock and concrete crib from which water leaks out at the base (Figure E.1-1). The maximum recorded flow is 15 L/min, but on most occasions it is much less. The groundwater is not used for human consumption or irrigation.

The spring discharges from colluvium consisting of angular blocks of gray, densely welded rhyolite tuff (Tshirege Member, Bandelier Tuff) and gray porphyritic dacite (Tschicoma Formation, Polvadera Group) in a matrix of volcanic sand and soil. About 10 m above the spring, outcrops of dacite with pronounced horizontal platy jointing are exposed along the access trail (Figure E.1-2). The dacite contains phenocrysts of plagioclase, hornblende, orthopyroxene, and clinopyroxene in a sugary, devitrified matrix. The contact of dacite with overlying ignimbrite is hidden, but its approximate location can be identified using the presence of float, about 20 m above the spring.

E.2 SPRING 9B (LAVA AND HYDROMAGMATIC DEPOSITS IN CERROS DEL RIO VOLCANIC FIELD)

Location: White Rock 7.5 min USGS topo quad (Latitude N35˚45'40.46", Longitude W106˚14'36.88", Elevation 1674 m)

Ownership: U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752); Dethier (1997, 49843)

Description: Spring 9B issues from a small cave eroded into the intersection of a cooling joint and basal scoria at the bottom of a lava flow (Figure E.2-1). The spring occurs on the northwest side of White Rock Canyon, roughly 200 m downstream of the mouth of Chaquehui Canyon. The spring is about 25 m above the Rio Grande. The flow rate is ≤3 L/min. The spring water supports the growth of a wedge of trees and shrubs that fill a shallow ravine descending towards the river (Figure E.2-2).

The geology of White Rock Canyon at this location has been described by Heiken et al. (1996, 54425, Figure W18). From bottom to top, the stratigraphy consists of hydromagmatic (maar) deposits, a sequence of interbedded basalt flows and hydromagmatic deposits, a thick lava flow of benmoreite (a type of chemically evolved basalt), and the Tshirege Member of the Bandelier Tuff (Figure E.2-2). The mafic deposits beneath the tuff are part of the Cerros del Rio volcanic field.

The lava flow hosting Spring 9B is the lowest exposed lava in this sector of the canyon wall and is a tholeiite dated at 2.78 ±0.04 Ma. The benmoreite is dated at 2.75 ±0.08 Ma (WoldeGabriel et al. 1996, 54427) and is an important stratigraphic marker. It consists of at least two flow units of highly foliated lava, locally exceeds 100 m in thickness, and extends into Frijoles Canyon. It is the highest lava flow in the sequence at Upper Falls in Frijoles Canyon. The dates indicate that roughly 215 m of Cerros del Rio deposits were emplaced in <100 ka.

The hydromagmatic beds beneath Spring 9B display classic characteristics of such deposits (Fisher and Schminke 1984, 88744; Heiken et al. 1996, 54425; Figure. E.2-3). They consist of massive to cross-bedded sandstone, siltstone, and mudstone composed of basalt and basaltic glass with subordinate quartz, microcline, and crystalline rock grains. The basaltic glass has been altered to a pale-brown-to-yellow palagonite clay. Accretionary lapilli up to 0.5 cm in diameter are found in some of the muddy layers. Basalt bomb sags deform the beds, particularly the mudstone layers. Lithic fragments consist of angular basalt and rounded-to-subrounded cobbles and pebbles of quartzite, microcline, granite, gneiss, and intermediate-composition volcanic rocks. Occasional coarse-grained lenses of the latter rocks are scattered throughout the beds. These lithologies originate from beds in the Santa Fe Group underlying Cerros del Rio deposits.

E.3 DOE SPRING (HYDROMAGMATIC DEPOSITS IN THE CERROS DEL RIO VOLCANIC FIELD)

Location: White Rock 7.5 min USGS topo quad (Latitude N35˚45'53.51", Longitude W106˚14'34.55", Elevation 1689 m)

Ownership: U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752); Dethier (1997, 49843)

Description: Doe Spring flows from the northeast wall of lower Chaquehui Canyon, about 30 m above the canyon floor. The spring drips from several discharge points, forming a wet, moss-covered wall (Figure E.3-1) and has a total discharge of ≤5 L/min. Individual sampling points have considerably less flow. The spring is partially hidden by heavy brush and vegetation and is accessed from a short path that climbs up the canyon wall. The spring water is used by game and is not considered potable for humans.

The spring issues from fractures in bedded, hydromagmatic (maar) deposits underlying a lava flow dated at 2.78 Ma (WoldeGabriel et al. 1996, 54227; see description of Spring 9B above). Additional lava flows dated as young as 2.45 ±0.06 Ma occur higher in the northern wall of Chaquehui Canyon (WoldeGabriel et al. 1996, 54227). The maar deposits display cross-bedding, and contain basalt bombs, sag structures, abundant cobbles, and lithic fragments of quartzite and microcline. Pale-brown-to-yellow palagonitic alteration of basaltic glass is evident. These deposits and lavas are part of the Cerros del Rio volcanic field. Careful inspection of Chaquehui Canyon revealed no exposures of sedimentary deposits of the Santa Fe Group as implied by Purtymun (1995, 45344).

E.4 LA MESITA SPRING (LANDSLIDE? IN SANTA FE GROUP)

Location: White Rock 7.5 min USGS topo quad (Latitude N35˚52'13.74", Longitude W106˚08'34.23", Elevation 1701 m)

Ownership: San Ildefonso Pueblo

Geologic Map: Smith et al. (1970, 09752); Dethier (1997, 49843)

Description: La Mesita Spring issues within a shallow ravine on the northwest side of Buckman Mesa (La Mesita) about 500 m downstream of the Otowi Bridge that spans the Rio Grande. The ravine is filled with trees and shrubs (Figure E.4-1) watered by the spring. The uppermost source of water is about 20 m above river level, and the flow rate is ≤5 L/min (Figure E.4-2). The spring water is used by livestock and game and is not considered potable for humans.

Dethier (1997, 49843) indicates that all rocks in this area consist of coalesced landslides. Older rocks consist of unconsolidated sedimentary deposits of the Santa Fe Group having a consistent but shallow dip to the east. Along ridge crests, these older sediments are covered with coarse-grained gravels of the ancestral Rio Grande. Draperies of these gravels and basalt blocks and scoria from La Mesita cover the slopes. The basalt blocks are derived from the Cerros del Rio volcanic field.

E.5 PAJARITO SPRING (4A)(LANDSLIDE BLOCK IN CERROS DEL RIO VOLCANIC FIELD, TOTAVI LENTIL, AND SANTA FE GROUP)

Location: White Rock 7.5 min USGS topo quad (Latitude N35˚56'34.4", Longitude W106˚11'47.38", Elevation 1703 m)

Ownership: Los Alamos County

Geologic Map: Smith et al. (1970, 09752); Dethier (1997, 49843)

Description: Pajarito Spring (Spring 4A of Purtymun 1995, 45344) issues from near the base of an east-facing landslide (toreva) block in White Rock Canyon about 0.4 km west of the Rio Grande. There are actually several discharge points for the spring, which collect to form a small creek flowing south in a ravine between two large landslide blocks. The total flow rate of the spring(s) usually exceeds 300 L/min. The largest spring source, which we sampled from, occurs in a stand of trees and shrubs (Figure E.5-1).

Rocks in the discharge channel of the spring consist primarily of angular basalt (Cerros del Rio volcanic field) and minor rounded cobbles of quartzite, chert, and other lithologies. Exposures of the toreva block from which the spring issues are found in a gully about 70 m south of the spring. Rocks in the lower gully wall consist of large jumbled boulders of basalt in a pink-to-tan matrix of arkosic-to-volcanic sand. Occasional blocks of bedded siltstone and mudstone up to 1 m long are also incorporated into the jumble (Figure E.5-2). Parts of the matrix and fragments resemble lithologies in the Santa Fe Group. Because of slumping, cracks and small open spaces form around fragment margins in the toreva block.

Higher up on the gully wall, the basalt boulders are interbedded with layers containing rounded cobbles and pebbles of river gravel in a sandy matrix (Figure E.5-3). The cobbles consist primarily of quartzite, other crystalline rocks (granite and gneiss), altered intermediate-to-silicic composition volcanic rocks, chert, and basalt such as those that occur in the Totavi Lentil.

The large landslide block east of the ravine consists of about 25 to 30 m of interbedded gravel, sandstone, and siltstone overlain by about 20 m of jumbled basalt blocks. A lag of coarse river gravel occurs on the south shoulder of the landslide block. The cobbles in the gravels resemble those in the Totavi Lentil. Small patches of unconsolidated El Cajete Pumice are found in flat areas on top of the landslide complex both above and below the spring area.

E.6 PINE SPRING (PUYE FORMATION AND LAVAS OF THE KERES GROUP)

Location: Guaje Mountain 7.5 min USGS topo quad (Latitude N35˚57'21.95", Longitude W106˚17'04.52", Elevation 2206 m)

Ownership: U.S. Forest Service

Geologic Map: Smith et al. (1970, 09752), Kempter and Kelley (2002, 88777)

Description: Pine Spring is located in upper Garcia Canyon on the east side of Forest Service Road 445 at Bench Mark 7216, about 6 km north of Los Alamos. The foundation of a burned log cabin stands in a small clearing on a rise west of the road. The spring is surrounded by a circular crib of cemented stone, which is breached on the south side and from which grows a ponderosa pine tree (Figure E.6-1). The water is generally murky, and the flow rate rarely exceeds 2 L/min. Other springs occur in the gullies 0.2 to 0.5 km west of the road. The springs are used by livestock and game but are not considered potable for humans.

Pine Spring lies on the down-thrown side of a north-south-trending fault juxtaposing alluvium consisting of boulder-bearing sediments of the Puye Formation (to the west) against mafic-to-intermediate composition lavas and overlying Puye deposits (to the east) (Smith et al. 1970, 09752; Kempter and Kelley 2002, 88777). The Tshirege Member of the Bandelier Tuff covers the mesa tops. Poorly exposed fall deposits of the Cerro Toledo Rhyolite occur between the Puye sediments and the Bandelier Tuff in a gully on the bluff east of the spring.

The lowermost lava in the bluff east of the fault is exposed about 150 m downstream of the spring (Figure E.6-2). It is highly fractured and weathered, and appears to be an olivine andesite. It contains rare phenocrysts of plagioclase and microphenocrysts of iddingsite-bearing olivine in a sugary groundmass of plagioclase, orthopyroxene, and clinopyroxene. Smith et al. (1970, 09752) assigned the andesite to the Lobato Basalt.

E.7 SACRED SPRING (SANTA FE GROUP)

Location: Puye 7.5 min USGS topo quad (Latitude N35˚53'33.05" Longitude W106˚08'59.13", Elevation 1722 m)

Ownership: San Ildefonso Pueblo

Geologic Map: Smith et al. (1970, 09752)

Description: Sacred Spring is a pool about 10 m in diameter that occurs in a small, grassy clearing surrounded by cottonwood trees **(**Figure E.7-1). The spring is located south of a shallow ravine about 0.5 km north of the junction of State Highways 4 and 30 and about 100 m east of State Highway 30. The spring flow is usually diffuse, and the flow rate rarely exceeds 5 L/min. The spring is used mostly by livestock and game and is not considered potable for humans.

Sacred Spring issues from unconsolidated, pale-pink-to-tan sedimentary rocks of the Santa Fe Group. Nearby terraces are overlain by coarse-grained gravels of the ancestral Rio Grande. Bluffs located about 0.5 km west of the spring expose gray beds of the Puye Formation (Figure E.7-2) overlying the Santa Fe Group. The extrapolated contact between the Santa Fe Group and the Puye Formation is roughly 10 to 20 m above the position of the spring.

E.8 SEVEN SPRINGS (OTOWI MEMBER, BANDELIER TUFF)

Location: Seven Springs 7.5 minute USGS topo quad (Latitude N35˚48'14.05", Longitude W106˚42'14.0", Elevation 2482 m)

Ownership: U.S. Forest Service

Geologic Map: Smith et al. (1970, 09752)

Description: Seven Springs discharges from the west side of a narrow valley in Calaveras Canyon, about 400 m upstream of State Highway 126, west of the Valles Caldera on the Jemez Plateau. There are several springs in the immediate vicinity, some discharging from valley alluvium, some from outcrops of densely welded rhyolite tuff. University of New Mexico researchers (C. Dahm, L. Crossey, and M. Campana) have been conducting long-term hydrologic and geochemical measurements in the vicinity.

Water from the springs is collected into a 10-in.-diameter pipeline that heads downstream towards the Fish Hatchery on the Rio Cebolla and the small community of Seven Springs.

The Laboratory took samples from the largest spring, which issues from an open crack in a low cliff of welded tuff about 2 m above the valley floor (Figure E.8-1). Flow rates over the past 20 years have varied considerably. On some occasions, spring water literally forms a 1-m-high fountain or "rooster tail" at the crack. Shevenell et al. (1987, 06673) report a flow rate of 60 L/min. During dry periods, the flow is much less. Immediately below the spring, the water flows through a small pool filled with watercress.

The tuff, which is the Otowi Member of the Bandelier Tuff, is quite different in appearance at Seven Springs than on the Pajarito Plateau east of Valles Caldera. At Seven Springs it is a gray, densely welded, lithic rich, and devitrified ignimbrite, with pale gray fiamme. The tuff has a pronounced horizontal foliation and erodes into hackly plates about 3 to 10 cm wide. Phenocrysts consist of clear quartz, clear sanidine, and tiny dark-green-to-black clinopyroxene. Lithic fragments consist primarily of black andesitic rocks.

The Otowi Member forms a steep slope that rises about 50 m to a cliff formed of the Tshirege Member of the Bandelier Tuff (Smith et al. 1970, 09752). There is no Tsankawi pumice fall deposit at the contact immediately above the springs. Rather, the contact is undulating, suggesting that there was too much relief for fall deposits to remain in place. The basal part of the Tshirege is composed of nonwelded tuff with occasional large pumice fragments (≤20 cm). Lithic fragments consist primarily of black andesitic rocks.

E.9 SPRING 1 (LANDSLIDE BLOCK IN CERROS DEL RIO VOLCANIC FIELD, TOTAVI LENTIL, AND SANTA FE GROUP)

Location: White Rock 7.5 min USGS topo quad (Latitude N35˚51'32.55", Longitude W106˚08'34.08", Elevation 1702 m)

Ownership: San Ildefonso Pueblo

Geologic Map: Smith et al. (1970, 09752), Dethier (1997, 49843)

Description: Spring 1 issues from a small bench covered with trees and vegetation about 40 m above the northeast side of the Rio Grande and about 1.5 km downstream of the Otowi Bridge. Water flows from several discharge points, creating a marshy area with abundant grasses, and the combined total flow is ≤30 L/m (Figure E.9-1).

The bench from which the spring issues occurs within a landslide complex made up primarily of pale-pink-to-tan bedded pebble conglomerate, sandstone, siltstone, and mudstone of the Santa Fe Group (Figure E.9-2). Lithic fragments consist of quartz, microcline, gneiss, schist, granite, quartzite, and rare volcanics. About 20 m above the spring, the beds dip about 5° to the WNW. At the top of the complex and roughly 100 m to the west is another landslide block in which highly tilted columnar basalt overlies coarse boulder conglomerate of mostly quartzite and crystalline rocks. These lithologies belong to the Cerros del Rio volcanic field and Totavi Lentil.

E.10 UPPER CAÑON DE VALLE SPRING (TSHIREGE MEMBER, BANDELIER TUFF)

Location: Bland 7.5 min USGS topo quad (Latitude N35˚51'32.38", Longitude W106˚22'47.09", Elevation 2569 m)

Ownership: U.S. Forest Service

Geologic Map: Smith et al. (1970, 09752)

Description: Upper Cañon de Valle spring issues about 6 m in front of a collapsed, wood-framed tunnel entrance (Figure E.10-1), about 2.4 km west of State Highway 501. The spring and tunnel are situated on a tiny bench on the north canyon wall, about 20 m above the bottom of upper Cañon de Valle. Measured flow rates of the spring are generally small (≤5 L/m). The horizontal penetration distance of the tunnel into the bedrock is not known.

The tunnel is constructed into pale-tan-to-gray, devitrified, densely welded Tshirege Member of the Bandelier Tuff. At this location, open horizontal and vertical joints break the tuff, forming slabs about 0.2 m thick. Some zones in the tuff contain cream-to-white lithophysal cavities up to 4 cm wide. The tuff is relatively crystal-rich with phenocrysts of clear quartz, chatoyant sanidine, and tiny black clinopyroxene. Lithic fragments are rare. Fiamme appear as white devitrified streaks.

About 50 m downstream of the spring, an outcrop of flow-banded porphyritic dacite (Tschicoma Formation) occurs along the north side of the canyon drainage. Another 200 m downstream is a 50-m-tall spire and an underlying talus pile of similar dacite. Thus, it appears that the Tshirege Member fills preexisting topography in the vicinity of the spring and that the thickness of tuff is not uniform.

E.11 WATER CANYON GALLERY (TSHIREGE MEMBER, BANDELIER TUFF)

Location: Frijoles 7.5 min USGS topo quad (Latitude N35˚50'39", Longitude W106˚22'19", Elevation 2439 m)

Ownership: The U.S. Forest Service with water rights granted to the U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752), Goff et al. (2002a, 88776)

Description: Water Canyon Gallery is an improved spring occurring in the north branch of uppermost Water Canyon, about 1.3 km west of State Highway 501 and just west of the Pajarito Plateau. The spring issues from a horizontal tunnel about 1.3 m high and roughly 35 m long extending into a cliff of densely welded rhyolite tuff. Stone blocks flank the mouth of the tunnel, and the tunnel entrance is built at the top of a talus pile of tuff (Figure E.11-1). Water is collected in a 10-in.-diameter pipe inside the tunnel, and the pipe follows the canyon downhill. About 200 m southeast of the gallery, the pipe is disconnected, and spring water empties into the canyon bottom drainage (Figure E.11-2). The Laboratory's Technical Area 16 used the water previously. Flow rates during the last 20 years have varied from 50 to at least 200 L/min. (The 1989 annual average was 166 L/min [Stoker et al. 1992, 12017]; the annual average was 65 L/min [Purtymun et al. 1993, 15371]).

The tuff at the gallery consists of dark gray, densely welded, devitrified ignimbrite of the Tshirege Member of the Bandelier Tuff. The tuff at the gallery mouth is massive with broadly spaced vertical cooling joints and other open cracks. About 10 m above the spring is a discontinuous, up to 1-m-wide zone of open, horizontally flattened cavities resembling large vesicles (Figure E.11-3). These cavities may mark a flow unit boundary within Qbt4. No surge beds were found in the tuff immediately near the gallery. Above the zone of cavities, the tuff displays horizontal jointing.

Phenocrysts in the tuff consist of clear quartz and sanidine, the latter displaying chatoyancy. Tiny clinopyroxene phenocrysts are oxidized to orange iron (oxy)hydroxides. The tuff contains conspicuous fiamme but extremely rare lithic fragments.

E.12 GUAJE CANYON #5 WELL (SANTA FE GROUP)

Location: Guaje Mountain 7.5 min USGS topo quad (Latitude N35˚54'51", Longitude W106˚13'37", Elevation 1926 m)

Ownership: U.S. Forest Service with water rights to U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752), Kempter and Kelley (2002, 88777)

Total Drilled Depth: 614 m

Description: Well G-5 was completed in May 1951 to a depth of 608.8 m (Purtymun 1995, 45344) and was reliably used as a water supply well until it was plugged and abandoned in 1998. The initial static water level was 125 m below surface but through time the water level has descended as a result of production and draw-down (148 m in 1991). The production rate was about 1960 L/min. The screened interval and production horizon of the well were entirely within the Santa Fe Group. Before being abandoned in 1998, the well was sampled from a faucet near the wellhead during pumping.

The stratigraphy at G-5 was formerly interpreted as valley-fill alluvium to 2.4 m, fanglomerate of the Puye Formation to 38.7 m, and interbedded sedimentary rocks, lavas, and volcanic breccias of the Santa Fe Group to total depth (Purtymun 1995, 45344, Table XXI-C, p. 273). No interval of coarse boulder conglomerate of the Totavi Lentil is reported between the Puye Formation and the Santa Fe Group. In older reports, the sediments of the Santa Fe Group are generally assigned to the Chamita and Tesuque Formations (Baltz et al. 1963, 08402; Manley 1979, 11714). Purtymun (1995, 45344), however, reassigned the sedimentary sequence partly to the “Chaquehui Formation” (38.7 to 369.2 m) and to the Tesuque Formation (405.5 m to total depth). An interval of interbedded basalt and/or breccia from 369.2 to 405.5 m forms a boundary between the two units.

The current interpretation of G-5 stratigraphy keeps most of Purtymun’s units but recognizes that the deposits from 38.7 m to 369.2 m are fanglomerates unrelated to the phreatomagmatic deposits of Chaquehui Canyon; this interval at G-5 represents deposits now referred to informally as “older fanglomerate” that is more similar to the overlying Puye Formation.

E.13 LAOI(A)-1.1 WELL (GUAJE PUMICE BED, OTOWI MEMBER, BANDELIER TUFF)

Location: Guaje Mountain 7.5 minute USGS topo quad (Latitude N35° 52' 31.6", Longitude W106°17' 13.5", Elevation 2084 m)

Ownership: U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752), Kempter and Kelley (2002, 88777)

Total Drilled Depth: 98.5 m

Description: Well LAOI(A)-1.1 is an observation well that was drilled in upper Los Alamos Canyon in 1994. It contains a 3-in.-diameter schedule-80 PVC casing and is screened to accept water from a perched zone in the Guaje Pumice Bed at the base of the Otowi Member of the Bandelier Tuff (Figure E.13-1). The Guaje Pumice Bed is about 6.7 m thick at this location. The well actually penetrated the top of the Puye Formation at 96 m depth, but the hole in the Puye section collapsed. Three wellbore volumes, or about 55 gal. of water, are withdrawn before each sampling round, using nitrogen gas and a bladder pump. Most water originates from an approximate depth of 94.5 m.

E.14 LAO-B WELL (VALLEY-FILL ALLUVIUM OF TSCHICOMA FORMATION AND TSHIREGE MEMBER, BANDELIER TUFF)

Location: Guaje Mountain 7.5 min USGS topo quad (Latitude N35°52’ 43.8", Longitude W106° 20' 7.1", Elevation 2233 m)

Ownership: U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752); Kempter and Kelley (2002, 88777)

Total Drilled Depth: 5.61 m

Description: Well LAO-B is an observation well drilled into valley-fill alluvium in upper Los Alamos Canyon. The casing diameter is about 4 in. (Figure E.14-1). Rocks penetrated consist of boulders, cobbles, and pebbles of porphyritic dacitic rocks of the Tschicoma Formation and nonwelded-to-welded rhyolitic tuff of the Tshirege Member of the Bandelier Tuff in a volcanic sand-to-silt matrix. Three wellbore volumes, or about 40 gal. of water, are withdrawn before each sampling round using an air compressor and bladder pump. The groundwater originates from the bottom of the well.

E.15 OTOWI #4 WELL (SANTA FE GROUP)

Location: Frijoles 7.5 min USGS topo quad (Latitude N35˚52'22", Longitude W106˚15'35", Elevation 2020 m)

Ownership: U.S. Department of Energy

Geologic Map: Smith et al. (1970, 09752), Goff et al. (2002, 88776)

Total Drilled Depth: 855.5 m

Description: Otowi-4 is a water supply well that was completed to a final depth of 788.1 m in March 1990 (Stoker et al. 1992, 12017). The well is one of several intended to replace less productive and much older water supply wells in Los Alamos and Guaje Canyons. The well contains a 16-in.-diameter screen from 340 to 785 m. The static water level is about 241 m below the surface, and the well produces about 5600 L/min when in use. In late 1999 and early 2000, Otowi-4 was temporarily out of service for repairs. The well is sampled from a faucet near the wellhead during pumping.

In earlier work, the stratigraphy of Otowi-4 has been described by Stoker et al. (1992, 12017, Table VIII), with stratigraphy later modified by Purtymun (1995, 45344). The current stratigraphic interpretation is shown in Figure E.15-1. In this figure “Tf” represents the older fanglomerate, as discussed in section E.12 (Well G-5). Aside from a section of Miocene Basalts, the screened interval at Otowi-4 is entirely within the older fanglomerates, from 340 m (1115 ft) to 785 m (2575 ft) depth.

Figure E.1-1. Photograph of Apache Spring taken April 27, 2000; the temperature is 18°C, and the flow rate is 0.45 L/min.

Figure E.1-2. Photograph of flow-banded dacite lava along trail about 10 m above Apache Spring.

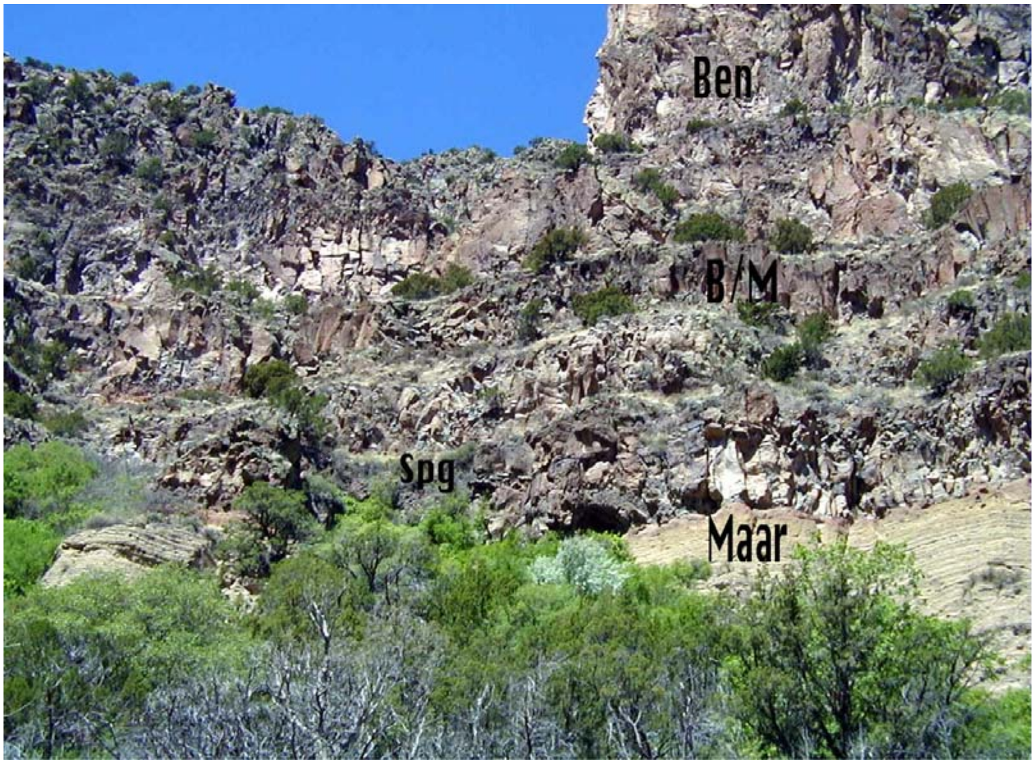


Figure E.2-1. **Photograph looking toward the northwest wall of White Rock Canyon showing the location of Spring 9B relative to the local geology. The spring issues from the approximate contact of basaltic hydromagmatic (maar) deposits and an overlying basalt flow. At least two more basalt lavas are interbedded with thin intervals of maar deposits (symbol B/M, located on uppermost basalt). The lava sequence is capped by a thick benmoreite flow (Ben).**

Figure E.2-2. Photograph of Spring 9B taken May 5, 2000; the temperature is 15°C, and the flow rate is <0.3 L/min. A hammer straddles the contact between the basal lava breccia and the underlying hydromagmatic deposits.

Figure E.2-3. Close-up photograph of hydromagmatic (maar) deposits about 5 m below and north of Spring 9B. Note large bomb sag (to the left of the hammer) in cross-bedded sandstone to mudstone, caused by the impact of the basalt bomb.

Figure E.3-1. Photograph of primary sampling point at Doe Spring taken May 5, 2000; the temperature is 17°C, and the flow rate is 0.2 L/min.

Figure E.4-1. Photograph looking east of landscape at La Mesita Spring. The Rio Grande is in the foreground. The basalt of Buckman Mesa appears in the right skyline.

Figure E.4-2. Photograph of La Mesita Spring taken May 4, 2000; the temperature is 19°C, and the flow rate is 0.5 L/min

Figure E.5-1. Photograph of sampling point at Pajarito Spring (Spring 4A) taken April 28, 2000; the temperature is 19°C, and the flow rate is 120 L/min (±25%).

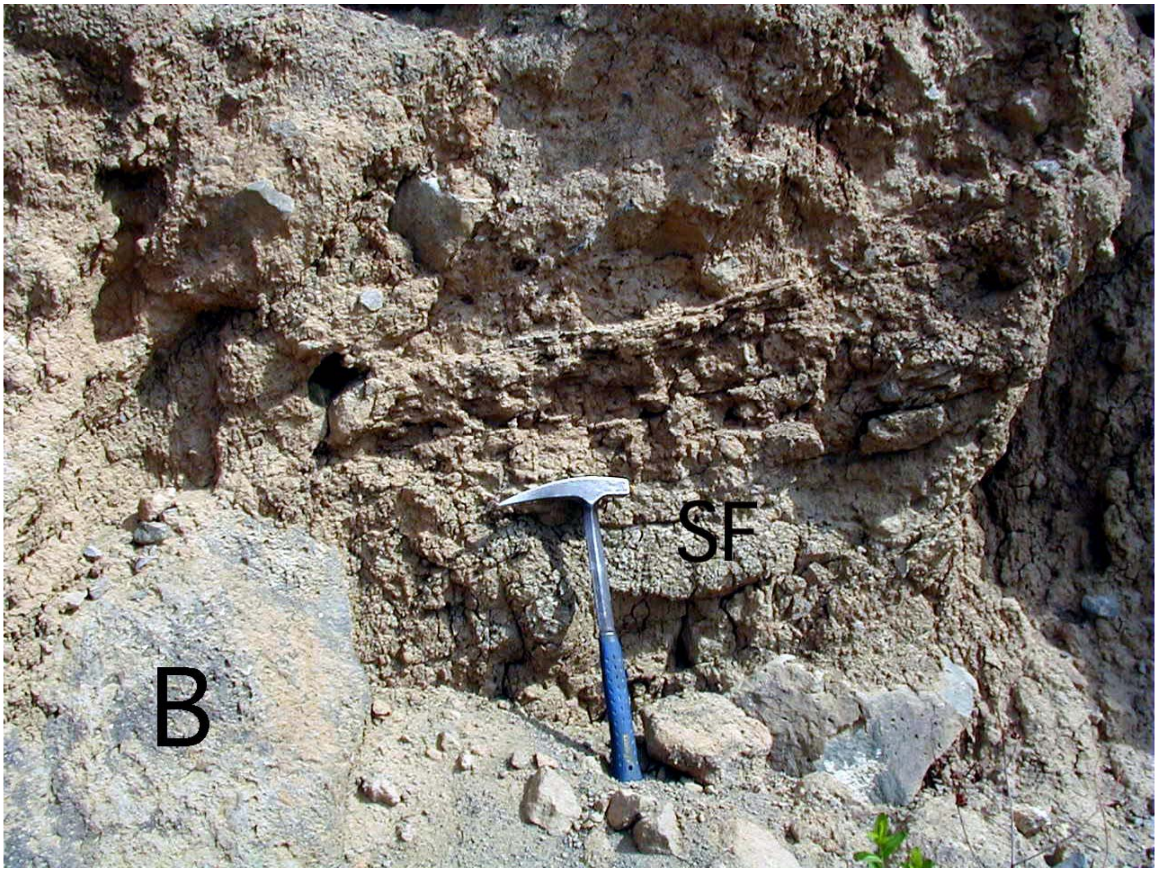


Figure E.5-2. Photograph of disturbed geology in the lower part of the landslide block hosting Pajarito Spring. Intact 1-m-wide chunk of bedded siltstone of the Santa Fe Group (SF) is incorporated into a jumbled mixture of sandstone and basalt blocks (B).

Figure E.5-3. Photograph of lithologies in the upper part of the landslide block hosting Pajarito Spring. A tilted layer of rounded cobbles resembling lithologies in the Totavi Lentil is sandwiched between layers of angular basalt rubble.

Figure E.6-1. Photograph of Pine Spring taken May 4, 2000; the temperature is 21°C, and the spring is not flowing

Figure E.6-2. Photograph of weathered, fractured andesite lava exposed in bluff downstream and east of Pine Spring.

Figure E.7-1. Photograph of Sacred Spring taken on May 4, 2000; the temperature is 20°C, and the flow rate is 2 L/min

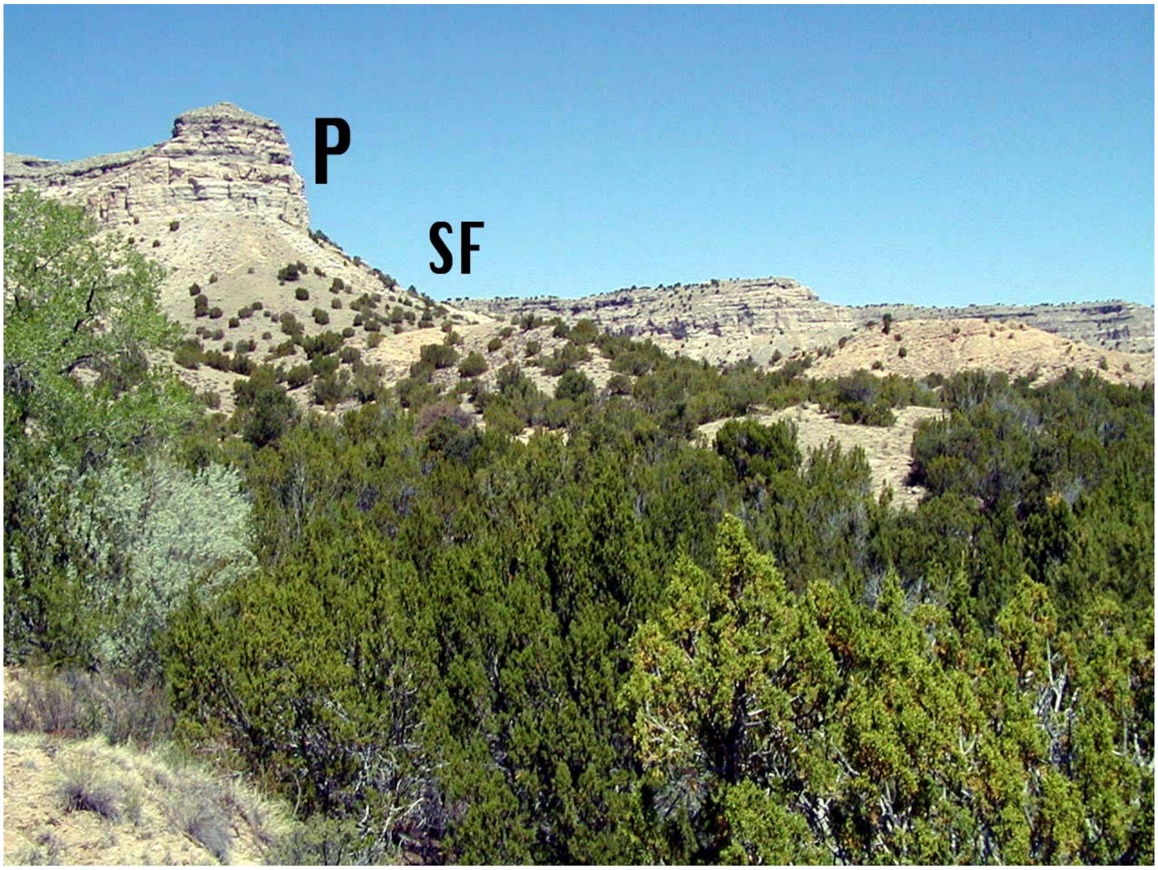


Figure E.7-2. Photograph of landscape northeast of Sacred Spring. Gray volcaniclastic rocks of the Puye Formation (P) form bluffs overlying pale-pink sedimentary rocks of the Santa Fe Group (SF).

Figure E.8-1. Photograph of the largest discharge point at Seven Springs taken April 27, 2000; the temperature is 15°C, and the flow rate is 6 L/min (±10%). The water issues from a vertical crack in a horizontally foliated and welded Otowi Member of the Bandelier Tuff.

Figure E.9-1. Photograph of Spring 1 taken May 4, 2000; the temperature is 10°C, and the flow rate is approximately 20 L/min

Figure E.9-2. Photograph of bedded sandstone and siltstone in the Santa Fe Group about 20 m above Spring 1. The sediments and overlying rubble of basalt are part of a landslide block from which the spring issues.

Figure E.10-1. Photograph of Upper Cañon de Valle Spring taken on April 29, 2000; the temperature is 15°C, and the flow rate is 0.8 L/min

Figure E.11-1. Photograph of the entrance to Water Canyon Gallery taken on April 27, 2000

Figure E.11-2. Photograph of disconnected discharge pipe from Water Canyon Gallery taken April 27, 2000; the temperature is 14°C, and the flow rate is 120 L/min (±25%)

Figure E.11-3. Photograph of vesicular cavities in a flow unit of densely welded Tshirege Member, Bandelier Tuff, about 10 m above the entrance to Water Canyon Gallery

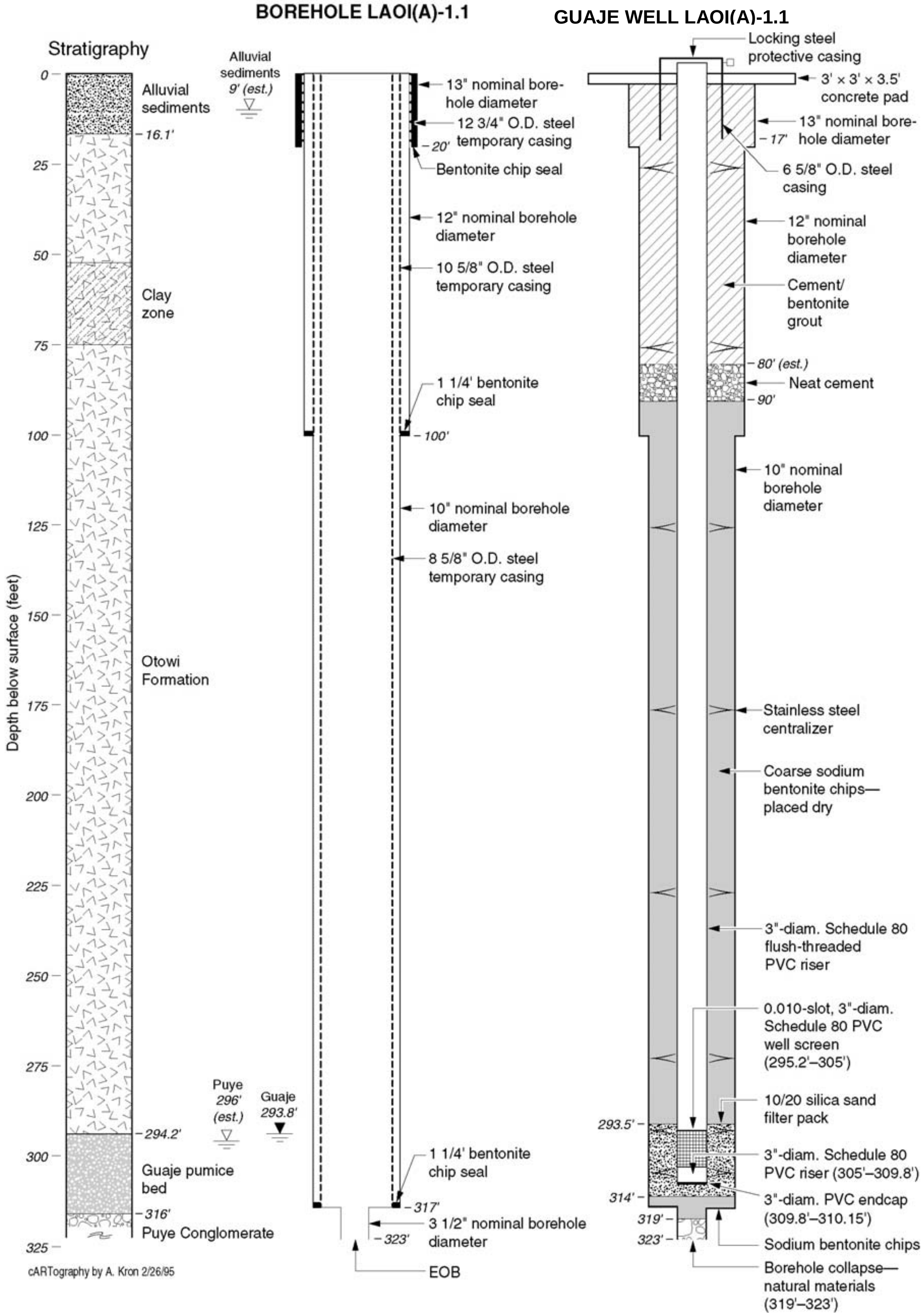


Figure E.13-1. Stratigraphy and completion diagram of LAOI(A)-1.1 well

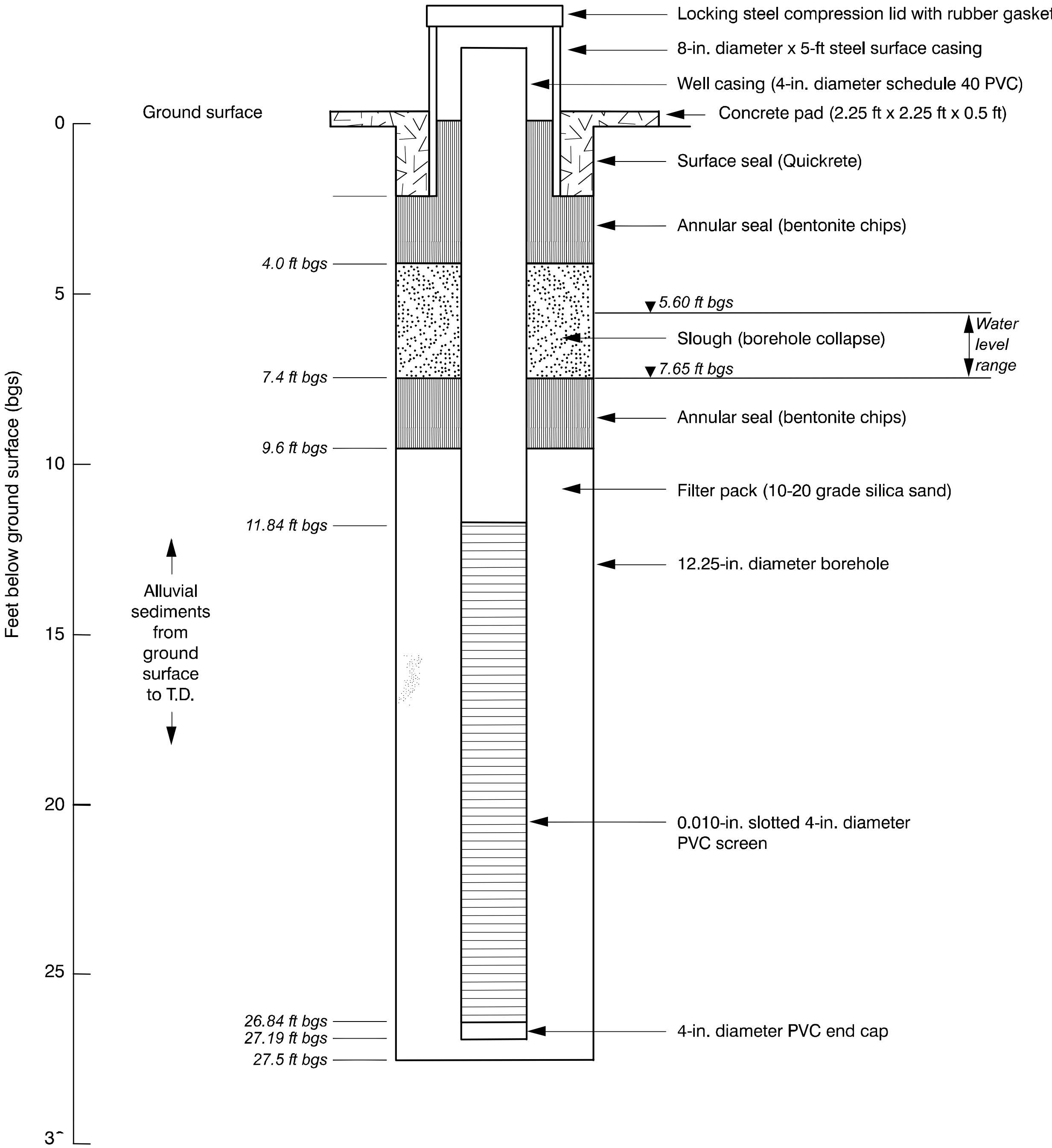


Figure E.14-1. Completion diagram of LAO-B well

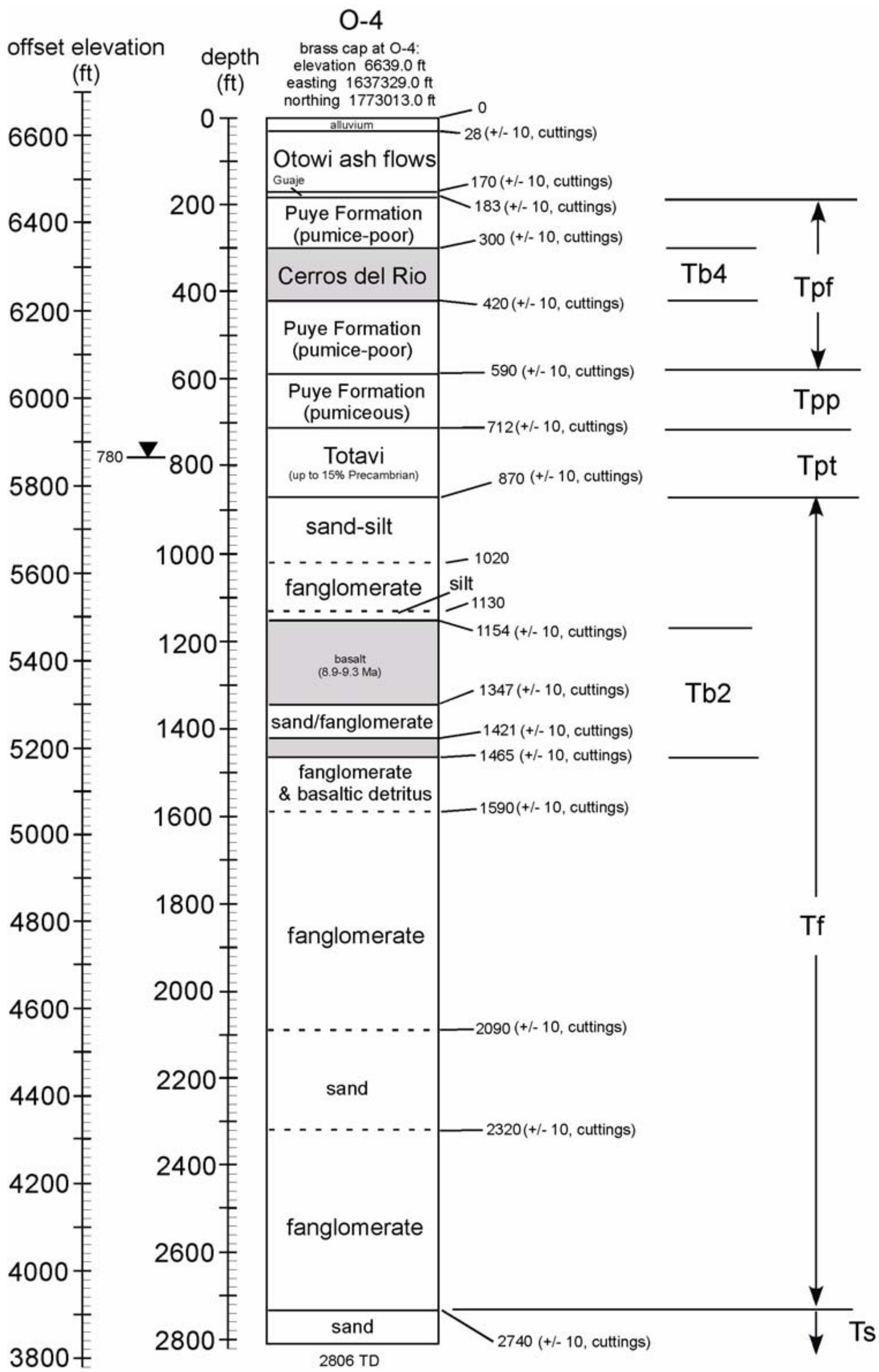


Figure E.15-1. Diagram showing the lithology of Otowi-4. Unit symbols are shown for the Puye Formation (Tpf), Cerros del Rio lavas (Tb4), pumiceous deposits (Tpp), river gravels related to the Totavi (Tpt), older fanglomerates (Tf), Miocene basalts (Tb2), and possible transition into sands of the Santa Fe Group (Ts) at depth. The screen depth is from 1115 ft to 2575 ft.

Appendix F

Interlaboratory Comparison Data

Figures

F.1 STANDARD OPERATING PROCEDURES

This section presents a summary of the SOPs used by EES-6. Analytical instruments and their application for sample characterization are listed to provide the basis of selecting EES-6 for screening analyses during this investigation. Analytical methods used during this investigation included ICPAES, GFAA, cold vapor atomic absorption (CVAA), IC, ISE, alkalinity titration, and gaseous hydride generation atomic absorption (GHAA) spectroscopy.

F.1.1 Elements by ICP Atomic Emission Spectroscopy

LANL-EES-1-SOP-01.1, R0 describes the procedure used in determining the following elements by ICPAES: aluminum, boron, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, potassium, lithium, magnesium, manganese, molybdenum, sodium, nickel, lead, silicon, silver, strontium, titanium, vanadium, and zinc. This method is comparable to SW-846 Method 6010A and EPA Method 200.7 (EPA 1987, 31732).

The following equipment may be used and will be controlled in accordance with LANL-EES6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- ICPAES: Leeman's Model PS1000UV ICP Emission Spectrophotometer (PN 738144) and the following accessories:
  - ♦ autosampler
  - ♦ integrated software for system control and data management
  - ♦ Questron Qwave 3000 microwave (PN 971309)
  - ♦ Mettler PE 1600 balance (PN 624733)
  - ♦ Mettler AE 240 balance (PN 656788)
  - ♦ pipettes and appropriate lab ware

This SOP applies to samples requiring ICPAES for work under the EES Quality Management Plan (QMP) by EES-6 personnel. Any sample that can be put into a solution and for which the element concentrations are within the instrument's detection range can be analyzed by ICPAES. Elements that have detection limits insufficient for the samples being analyzed must be determined using alternative methods, such as GFAA or GHAA.

F.1.2 Elements by Graphite Furnace Atomic Absorption Spectroscopy

LANL-EES-1-SOP-01.2, R0 describes the procedure used for analyzing the following trace elements by GFAA spectroscopy: antimony, arsenic, cadmium, cobalt, chromium, cesium, copper, molybdenum, nickel, lead, rubidium, selenium, silver, tin, and thallium. This SOP is comparable to EPA Method 200.9 (EPA 1987, 31732).

The following equipment may be used and will be controlled in accordance with LANL-EES6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- Perkin Elmer Model 5500 Atomic Absorption Spectrophotometer with continuum background corrector (PN 487640) and the following accessories:
  - ♦ Model HGA 500 furnace accessory (PN 487638)
  - ♦ AS40 autosampler (PN 733079)

- ♦ single or multielement hollow cathode lamps, or electrode discharge lamps (EDLs) (PN 834654) with Perkin Elmer system 2 power supply
- ♦ Perkin Elmer 7700 computer system (PN 656260) with HGA Graphics II data software
- ♦ Questron Qwave 3000 microwave (PN 971309)
- ♦ Mettler PE 1600 Balance (PN 624733)
- ♦ Mettler AE 240 Balance (PN 656788)
- ♦ pipettes and appropriate lab ware

This SOP applies to samples, with low-level concentrations of dissolved elements, requiring GFAA for work under the EES-QMP. Any sample that can be put into a solution and for which the sample matrix does not create an interference that cannot be compensated for by background correction or matrix modification can be analyzed by GFAA.

F.1.3 Elements by Gaseous Hydride Atomic Absorption Spectroscopy

LANL-EES-1-SOP-01.3, R0 describes the procedure used for analyzing the following elements by GHAA: antimony, arsenic, and selenium. This SOP is comparable to SW-846 Methods 7062 and 7742 (EPA 1986, 31732).

The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- Perkin Elmer Model 5500 Atomic Absorption Spectrophotometer (PN 487640) and the following accessories:
  - ♦ Single or multielement hollow cathode lamps, or EDL (PN 834654) with Perkin Elmer System 2 power supply
  - ♦ Perkin Elmer 7700 computer system (PN 656260) with HGA Graphics II data software
  - ♦ Cold-vapor/hydride generator, Perkin Elmer Model MHS-10 (PN 838904)
  - ♦ Argon, acetylene, and compressed air
  - ♦ Questron Qwave 3000 microwave (PN 971309)
  - ♦ Mettler PE 1600 balance (PN 624733)
  - ♦ Mettler AE 240 balance (PN 656788)
  - ♦ pipettes and appropriate lab ware

This SOP applies to liquid, solid, and slurry samples requiring GHAA for work under the EES-QMP.

F.1.4 Cold Vapor Atomic Absorption Spectroscopy

LANL-EES-1-SOP-01.4, R0 describes the equipment used for CVAA analysis of the organic and inorganic mercury in aqueous, solid, and semisolid samples. This SOP is comparable to SW-846 Methods 7470A and 7471A and EPA Method 245.1 (EPA 1987, 31732).

The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- Perkin Elmer Model 5500 Atomic Absorption Spectrophotometer (PN 487640) and the following accessories:

- ♦ single or multielement hollow cathode lamps, or EDLs (PN 834654) with Perkin Elmer System 2 power supply.
- ♦ Perkin Elmer 7700 computer system (PN 656260) with HGA Graphics II data software
- ♦ cold-vapor/hydride generator, Perkin Elmer Model MHS-10 (PN 838904)
- ♦ Questron Qwave 3000 microwave (PN 971309)
- ♦ Mettler PE 1600 balance (PN 624733)
- ♦ Mettler AE 240 balance (PN 656788)
- ♦ pipettes and appropriate lab ware
- ♦ argon gas

This SOP applies to liquid, solid, and slurry samples to be analyzed under the EES-QMP.

F.1.5 Alkalinity Titration

LANL-EES-1-SOP-01.8, R0 describes the procedure used for determining alkalinity in water samples and reporting this alkalinity as bicarbonate, carbonate, and hydroxide, or as total alkalinity, as applicable.

The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- Mettler DL25 Titrator (PN 843449) and the following accessories:
  - ♦ Mettler ST20 sample changer
  - ♦ printer
  - ♦ combination pH electrode
  - ♦ automatic temperature compensator probe
  - ♦ Mettler PE 1600 balance (PN 624733)
  - ♦ pipettes and appropriate lab ware

This SOP applies to aqueous solutions with a pH above the bicarbonate endpoint to be analyzed under the EES QMP.

F.1.6 Specific Conductance

LANL-EES-1-SOP-01.7, R0 describes the procedure used to determine the specific conductance of a solution using an Orion Model 160 Conductivity meter and an Orion Model 016010 Electrode conductivity cell.

The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- conductivity meter, Orion Model 160 (S/N 23637032)
- 4-electrode conductivity cell, Orion Model 016010

This SOP applies to aqueous samples requiring a conductivity measurement for work under the EES-QMP.

F.1.7 Ion Chromatography

LANL-EES-1-SOP-01.5, R0 describes the procedure used for preparing and analyzing the following analytes for IC, including: fluoride, chloride, nitrite, bromide, nitrate, phosphate, sulfate, iodide, chlorate, perchlorate, thiosulfate, and thiocyanate. Other analytes may be included if their characteristics make them amenable to this SOP. This SOP is comparable to SW-846 Method 9056 and EPA Method 300.0 (EPA 1987, 31732).

The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:

- Ion Chromatograph, Dionex Model 4000 and 4500i with conductivity and ultraviolet/visible (UV/Vis) detectors and the following accessories:
  - ♦ Dionex AutoIon 450 data system
  - ♦ automated sampler
  - ♦ suppressor system
  - ♦ ion exchange columns
  - ♦ pipettes and appropriate labware

This SOP applies to aqueous samples, or samples that through pretreatment can be made aqueous, requiring IC for work under the EES-QMP.

F.1.8 Ion-Selective Electrode Measurements

LANL-EES-1-SOP-01.10, R0 describes the procedure used for measuring the concentration of the following ions in solution using electrochemical sensors: ammonium, fluoride, and sulfide. The potential for the electrochemical sensors varies with the logarithm of the ion's activity in solution.

- The following equipment may be used in this SOP and will be controlled in accordance with LANL-EES-6-AP-01.11, Control of Measuring and Test Equipment and Standards:
  - ♦ Orion combination fluoride electrode, model 96-09
  - ♦ Orion ammonium electrode, model 95-12
  - ♦ Orion silver/sulfide electrode, model 94-16
  - ♦ Orion double junction reference electrode, model 90-02
  - ♦ magnetic stirrer

This SOP applies to solutions requiring ammonium, fluoride, and sulfide measurements for work under the EES-QMP.

F.2 EES AND PARAGON ANALYTICS, INC. COMPARISONS

Apache Spring was sampled six times during the course of this investigation. Analytical results (trace elements) for duplicate samples analyzed by both EES-6 and Paragon Analytics, Inc. during February 1998 are provided in Figure F.2-1. Method-detection limits are lower for those trace elements (arsenic, cadmium, cobalt, and nickel) analyzed by AA methods compared to the same elements analyzed by the ICPAES method, as shown in Figure F.2-1. The units of mg/L and ppm are equivalent in these low-ionic-strength waters. Sample results reported by Paragon Analytics, Inc. showed some inconsistencies in detection limits inherent from the ICPAES method (Figure F.2-1). Paragon Analytics, Inc. reported higher concentrations of aluminum, iron, manganese, and vanadium compared to EES-6 results for this sampling event, but there is good agreement between the two laboratories for barium, lead, and strontium.

Figure F.2-2 shows an excellent comparison between analytical results for major cations reported by EES-6 and Paragon Analytics, Inc. for alluvial well LAO-B sampled in February and October 1998. Concentrations of calcium, potassium, magnesium, and generally sodium are within analytical uncertainties measured by each laboratory and data plot on or close to the line characterized by a 1:1 slope (exact agreement). Both laboratories used the ICPAES method for the major ion analysis. There is some variation in solute concentrations for well LAO-B, reflecting both short residence time within alluvial groundwater and variation in surface water chemistry. During 1998, concentrations of calcium, magnesium, potassium, and sodium were lower in February than those reported for the October samples.

Figure F.2-3 also shows an excellent agreement between analytical results for major ions provided by NMED-OB, Paragon Analytics, Inc., and EES-6 for groundwater samples collected from La Mesita Spring during April and July 1998. There is very little variation in major ion chemistry at this spring, which is the result of long residence times for groundwater in the regional aquifer.

Figure F.2-4 is a plot of analytical results for major ions and TDS reported by both EES-6 and Paragon Analytics, Inc. for duplicate groundwater samples collected at Apache Spring during February 1998. For most of the major ions, there is an excellent agreement in analytical results reported by the two laboratories. The EES-6 analytical laboratory, however, reported a bicarbonate concentration of 65 ppm, but Paragon Analytics, Inc. reported a value of 54 mg/L for this sampling event. Discrepancy in the reported bicarbonate concentrations could be due to carbon dioxide gas diffusion from the sample bottle sent to Paragon Analytics, Inc. (analyzed one to two weeks later than EES-6), resulting in a lower bicarbonate concentration. The EES-6 laboratory also reported higher TDS of 175 ppm (or mg/L) as compared to Paragon's reported value of 160 mg/L, which is reflected by the higher bicarbonate concentration.

Figure F.2-5 shows an excellent comparison of analytical results between Paragon Analytics, Inc. and EES-6 for major ion concentrations at Doe Spring sampled in February and September 1998. Concentrations of calcium and sodium show some variation within one to two mg/L or ppm. Calcium concentrations were slightly higher in February 1998, but sodium concentrations were higher in September 1998. There is very little variation in analyte concentrations for chloride, magnesium, potassium, and sulfate measured during the two sampling events, suggesting a longer residence time for intermediate perched groundwater discharging at Doe Spring as compared to alluvial groundwater (LAO-B).

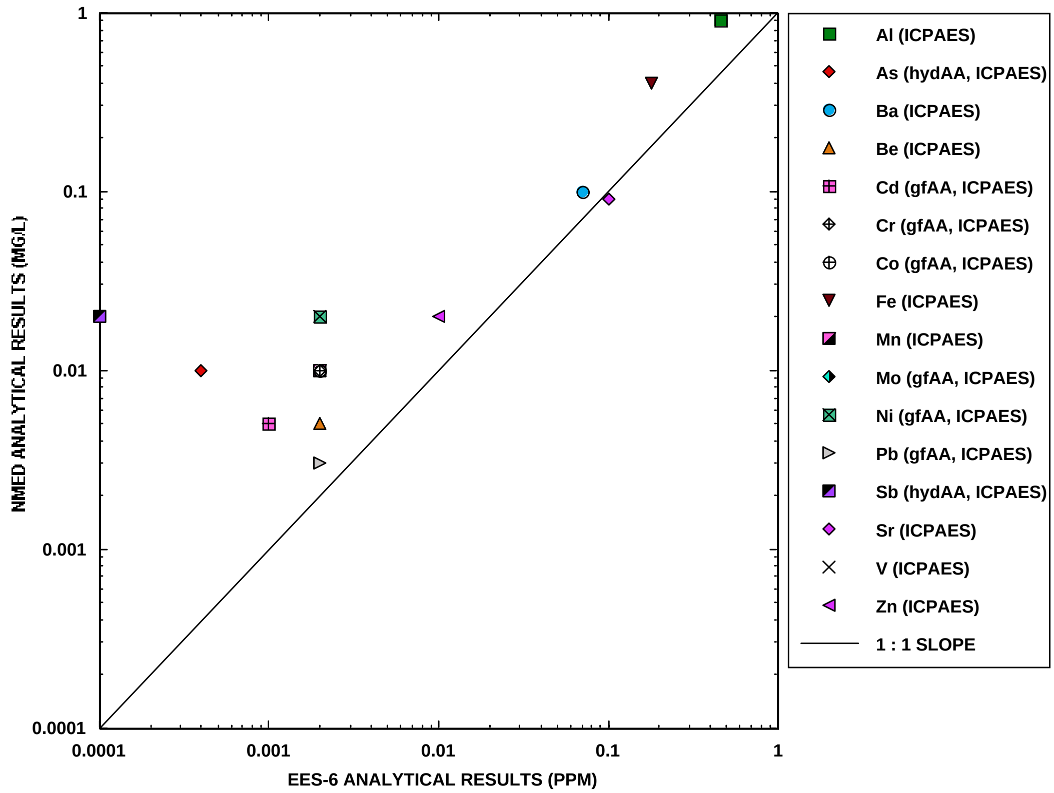


Figure F.2-1. Comparison of trace element chemistries reported by EES-6 and NMED for Apache Spring (Tschicoma Formation) sampled in February 1998

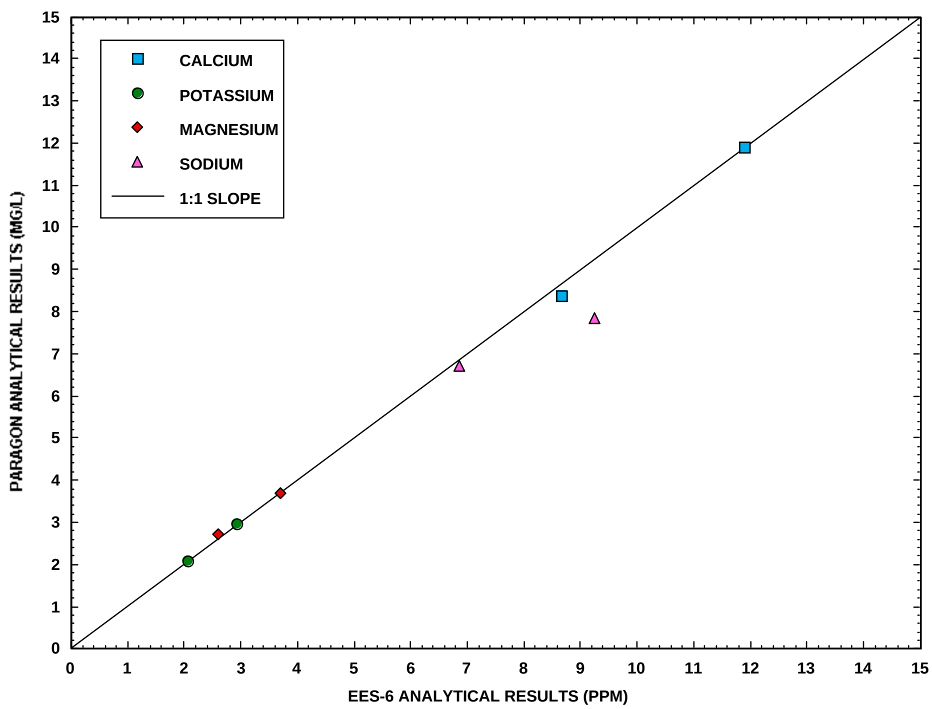


Figure F.2-2. Comparison of major ion chemistries reported by EES-6 and Paragon Analytics, Inc. for well LAO-B (alluvium) in February and October 1998

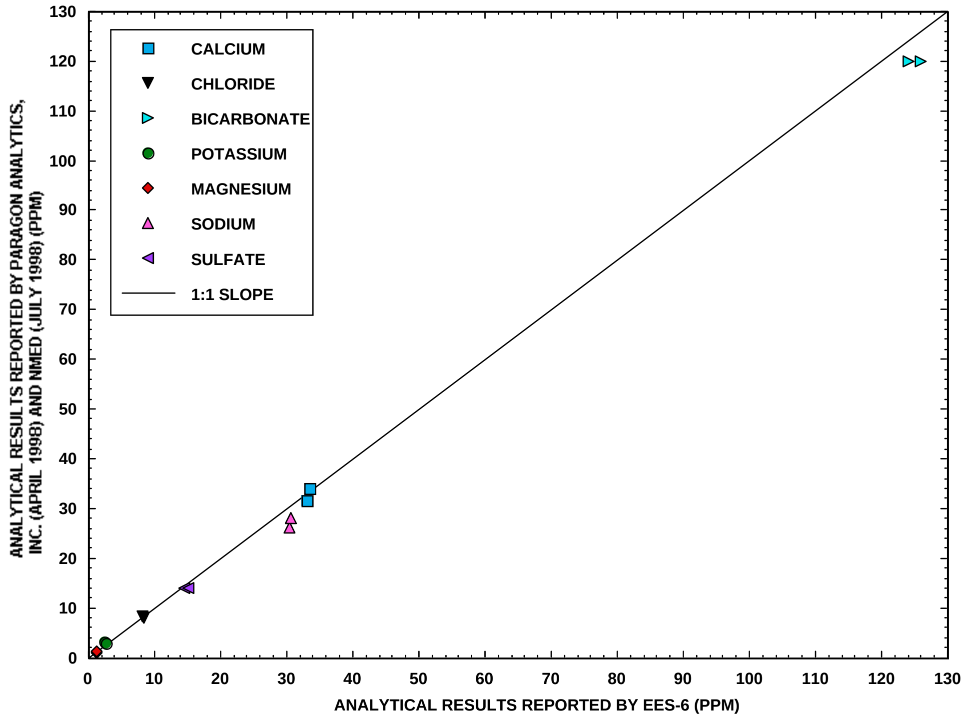


Figure F.2-3. Comparison of major ion chemistries reported by EES-6, Paragon Analytics, Inc., and NMED for La Mesita Spring (Santa Fe Group) sampled in April and July 1998

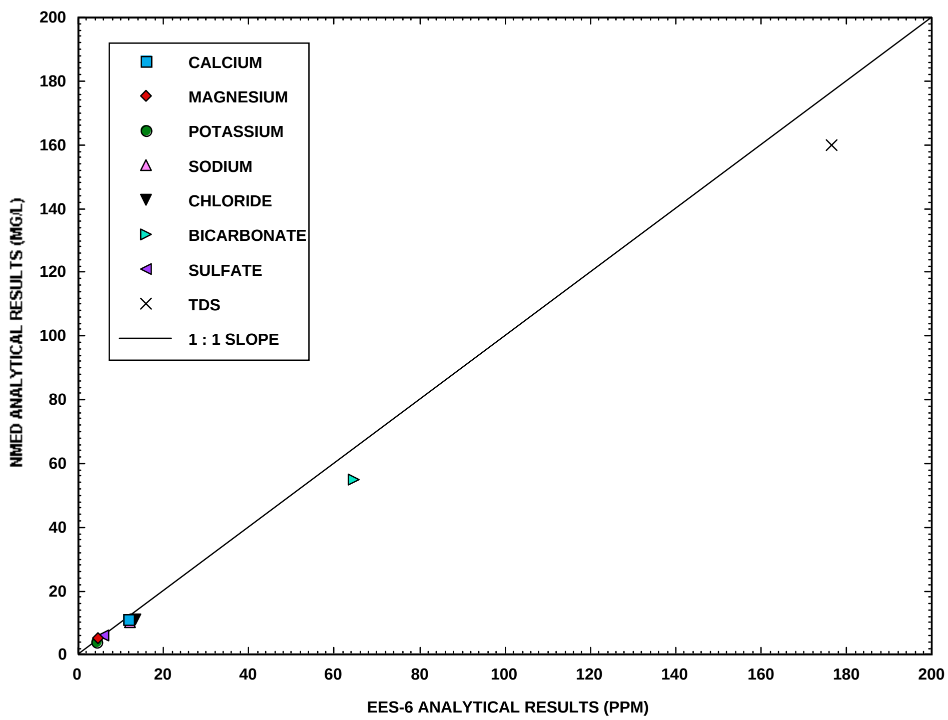


Figure F.2-4. Comparison of major ion chemistries and total dissolved solids reported by EES-6 and NMED for Apache Spring (Volcanics) sampled in February 1998

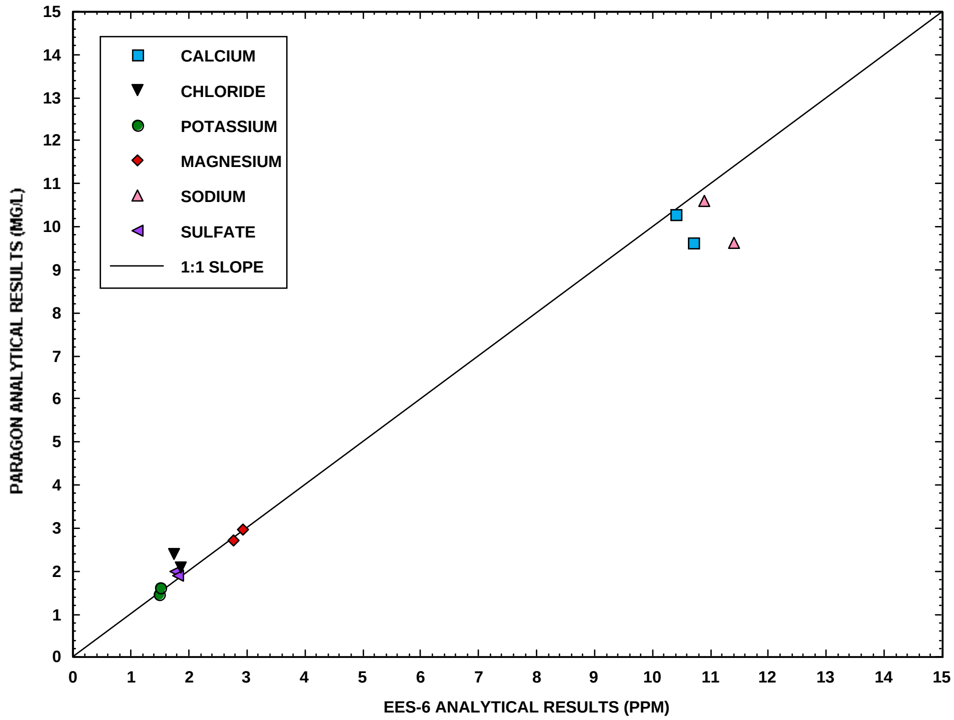


Figure F.2-5. Comparison of major ion chemistry (dissolved) reported by EES-6 and Paragon Analytics, Inc. for DOE Spring (Basalt) sampled in February and September 1998

Table A-1
Post-1997 Samples and Types of Analyses

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Apache Spring	filtered	sample	5/7/1997	1	PP97-07	PP97-7	PP97-7 filtered	[b]na	[c]o	[c]x	o	x	o	o	x	8.3	199	7.27	0
Apache Spring	filtered	original	8/6/1997	2	PP97-29	0816-97-1043	0816-97-1043 filtered	3513R, 3514R	o	x	x	o	o	x	x	8.6	[d]—	7.26	—
Apache Spring	filtered	duplicate[a]	8/6/1997	2	PP97-30	0816-97-1044	0816-97-1044 filtered	3513R, 3514R	o	x	x	o	o	x	x	8.6	—	7.26	—
Apache Spring	filtered	sample	8/6/1997	2	PP97-30	PP97-30	PP97-30 filtered	(lab sample #0816-97-1044)	o	x	o	x	o	o	x	8.6	—	7.26	—
Apache Spring	filtered	sample	2/9/1998	3	PP98-05	0816-98-0009	0816-98-0009 filtered	4094R, 4095R, 4097R	x	x	x	o	x	x	x	6.5	165	7.96	5
Apache Spring	filtered	sample	7/1/1998	5	PP98-20	RE16-98-9025	RE16-98-9025 filtered	4384, 4385R, 4387R	x	x	x	o	x	x	x	9.1	130	7.32	23.8
Apache Spring	filtered	duplicate	1/5/2000	7	PP00-1	CABG-00-0012	CABG-00-0012 filtered	6303R, 6304R, 6302R	x	x	o	o	o	o	x	6	135	9.15	3.1
Apache Spring	filtered	original	1/5/2000	7	PP00-2	CABG-00-0013	CABG-00-0013 filtered	6303R, 6304R, 6302R	x	x	o	o	o	o	x	6	135	9.15	3.1
Apache Spring	filtered	sample	3/29/2000	8	PP00-16	CABG-00-0047	CABG-00-0047 filtered	6635R, 6634R, 6637R, 6636R	x	o	o	o	o	o	x	7.6	280	7.33	7.3
Doe Spring	filtered	sample	4/22/1997	1	PP97-01	PP97-1	PP97-1 filtered	—	o	x	o	x	o	o	x	17.5	—	8.19	—
Doe Spring	filtered	sample	8/18/1997	2	PP97-36	0816-97-1051	0816-97-1051 filtered	3586R	o	x	x	o	o	x	x	20.2	51	8.27	0
Doe Spring	filtered	sample	2/3/1998	3	PP98-01	0816-98-0002	0816-98-0002 filtered	4079R,4082R	x	x	x	o	x	x	x	13.8	120	8.12	15.3
Doe Spring	filtered	sample	9/23/1998	6	PP98-31	RE16-98-9006	RE16-98-9006 filtered	4695R, 4696R	x	x	x	o	x	x	x	21	167	7.71	—
Doe Spring	filtered	duplicate	1/7/2000	7	PP00-7	CABG-00-0018	CABG-00-0018 filtered	6320R, 6319R, 6321R	x	x	o	o	o	o	x	12.2	135	8.54	3.5
Doe Spring	filtered	original	1/7/2000	7	PP00-8	CABG-00-0019	CABG-00-0019 filtered	6320R, 6319R, 6321R	x	x	o	o	o	o	x	12.2	135	8.54	3.5
Doe Spring	filtered	sample	4/6/2000	8	PP00-36	CABG-00-0059	CABG-00-0059 filtered	6700R, 6699R, 6698R, 6701R	x	o	o	o	o	o	x	15.7	80	6.89	7.4
Guaje #5	filtered	original	5/29/1997	1	PP97-18	PP97-18	PP97-18 filtered	—	o	x	o	x	o	o	x	26.8	186	7.86	—
Guaje #5	filtered	duplicate	5/29/1997	1	PP97-19	PP97-19	PP97-19 filtered	—	o	x	o	x	o	o	x	26.8	186	7.86	—
Guaje #5	filtered	sample	8/19/1997	2	PP97-37	0816-97-1100	0816-97-1100 filtered	3603R	o	x	x	o	o	x	x	26.4	216	6.81	0
Guaje #5	filtered	sample	9/28/1998	6	PP98-34	RE16-98-9010	RE16-98-9010 filtered	4714R, 4715R, 4716R	x	x	x	o	x	x	x	24.2	190	8.11	0.55
La Mesita Spring	filtered	sample	5/21/1997	1	PP97-15	PP97-15	PP97-15 filtered	—	o	x	o	x	o	o	x	15.2	285	7.17	0
La Mesita Spring	filtered	sample	8/5/1997	2	PP97-27	0816-97-1039	0816-97-1039 filtered	3489R, 3490R	o	x	x	o	o	x	x	16.6	—	6.5	—
La Mesita Spring	filtered	sample	4/7/1998	4	PP98-15	0816-98-0047	0816-98-0047 filtered	4204R, 4205R, 4207R	x	x	x	o	x	x	x	12.5	320	7.4	7.6
La Mesita Spring	filtered	sample	7/7/1998	5	PP98-26	PP98-26	PP98-26 filtered	(lab sample #RE16-98-9015 filtered)	o	o	o	x	o	o	x	15	230	7.48	9.3
La Mesita Spring	filtered	original	7/7/1998	5	PP98-25	RE16-98-9014	RE16-98-9014 filtered	4403R, 4404R, 4405R	x	x	x	o	x	x	x	15	230	7.48	9.3
La Mesita Spring	filtered	duplicate	7/7/1998	5	PP98-26	RE16-98-9015	RE16-98-9015 filtered	4403R, 4404R, 4405R	x	x	x	o	x	x	x	15	230	7.48	9.3
La Mesita Spring	filtered	sample	12/16/1999	7	PP99-4	CABG-99-0006	CABG-99-0006 filtered	6266R, 6265R, 6267R	x	x	o	o	o	o	x	12.5	330	8.13	10.4
La Mesita Spring	filtered	sample	4/10/2000	8	PP00-40	CABG-00-0056	CABG-00-0056 filtered	6707R, 6706R, 6708R, 6705R	x	o	o	o	o	o	x	15	220	6.37	4.3
LAO-B	filtered	sample	5/14/1997	1	PP97-13	PP97-13	PP97-13 filtered	—	o	x	o	x	o	o	x	4.8	105	6.64	0
LAO-B	filtered	original	8/1/1997	2	PP97-21	0816-97-1029	0816-97-1029 filtered	3481R, 3482R	o	x	x	o	o	x	x	9.6	98	6.79	1
LAO-B	filtered	duplicate	8/1/1997	2	PP97-22	0816-97-1030	0816-97-1030 filtered	3481R, 3482R	o	x	x	o	o	x	x	9.6	98	6.79	1

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
LAO-B	filtered	sample	8/1/1997	2	PP97-22	PP97-22	PP97-22 filtered	(lab sample #0816-97-1030 filtered)	o	o	o	x	o	o	x	9.6	98	6.79	1
LAO-B	filtered	sample	2/24/1998	3	PP98-11	0816-98-0049	0816-98-0049 filtered	4131R, 4132R, 4134R	x	x	x	o	x	x	x	4.4	90	6.91	4.1
LAO-B	filtered	sample	10/2/1998	6	PP98-35	RE16-98-9023	RE16-98-9023 filtered	4817R, 4818R	x	x	x	o	x	x	x	9.8	140	6.83	0.6
LAO-B	filtered	original	1/10/2000	7	PP00-10	CABG-00-0021	CABG-00-0021 filtered	6326R, 6325R, 6327R	x	x	o	o	o	o	x	5.7	105	7.59	4.8
LAO-B	filtered	duplicate	1/10/2000	7	PP00-11	CABG-00-0022	CABG-00-0022 filtered	6326R, 6325R, 6327R	x	o	o	o	o	o	x	5.7	105	7.59	4.8
LAO-B	filtered	sample	3/24/2000	8	PP00-14	CABG-00-0046	CABG-00-0046 filtered	6607R, 6609R, 6608R, 6606R	x	o	o	o	o	o	x	3.5	79	6.93	3
LAOI-1.1(A)	filtered	duplicate	5/9/1997	1	PP97-10	PP97-10	PP97-10 filtered	—	o	x	o	x	o	o	x	9.7	114	6.82	0
LAOI-1.1(A)	filtered	original	5/9/1997	1	PP97-09	PP97-9	PP97-9 filtered	—	o	x	o	x	o	o	x	9.7	114	6.82	0
LAOI-1.1(A)	filtered	sample	9/5/1997	2	PP97-39	0816-97-1096	0816-97-1096 filtered	3699R, 3700R	o	x	x	o	o	x	x	10.3	109	7.01	4
LAOI-1.1(A)	filtered	sample	2/25/1998	3	PP98-12	0816-98-0051	0816-98-0051 filtered	4136R, 4137R, 4139R	x	x	x	o	x	x	x	8.7	100	6.68	27.2
LAOI-1.1(A)	filtered	sample	10/14/1998	6	PP98-37	PP98-37	PP98-37 filtered	(lab sample #RE16-98-9021 filtered)	o	o	o	x	o	o	x	12.8	95	7.3	>30
LAOI-1.1(A)	filtered	original	10/14/1998	6	PP98-36	RE16-98-9020	RE16-98-9020 filtered	4886R, 4887R, 4888R	x	x	x	o	x	x	x	12.8	95	7.3	>30
LAOI-1.1(A)	filtered	duplicate	10/14/1998	6	PP98-37	RE16-98-9021	RE16-98-9021 filtered	4886R, 4887R, 4888R	x	x	x	o	x	x	x	12.8	95	7.3	>30
LAOI-1.1(A)	filtered	sample	1/20/2000	7	PP00-12	CABG-00-0025	CABG-00-0025 filtered	6368R, 6370R	x	x	o	o	o	o	x	9	120	7.4	19.6
LAOI-1.1(A)	filtered	sample	4/13/2000	8	PP00-44	CABG-00-0061	CABG-00-0061 filtered	6744R, 6743R, 6745R, 6742R	x	o	o	o	o	o	x	11.9	70	6.85	12.8
Otowi #4	filtered	original	5/29/1997	1	PP97-16	PP97-16	PP97-16 filtered	—	o	x	o	x	o	o	x	27.9	306	6.92	—
Otowi #4	filtered	duplicate	5/29/1997	1	PP97-17	PP97-17	PP97-17 filtered	—	o	x	o	x	o	o	x	27.9	306	6.92	—
Otowi #4	filtered	sample	8/19/1997	2	PP97-38	0816-97-1098	0816-97-1098 filtered	3603R	o	x	x	o	o	x	x	27.9	219	7.4	0
Otowi #4	filtered	sample	2/26/1998	3	PP98-13	0816-98-0041	0816-98-0041 filtered	4140R, 4143R	x	x	x	o	x	x	x	26.1	290	7.58	1.4
Otowi #4	filtered	sample	9/28/1998	6	PP98-33	RE16-98-9012	RE16-98-9012 filtered	4714R, 4715R, 4716R	x	x	x	o	x	x	x	27.5	285	7.45	0.6
Pajarito Spring	filtered	sample	4/27/1997	1	PP97-04	PP97-4	PP97-4 filtered	—	o	x	o	x	o	o	x	21.3	207	7.3	5
Pajarito Spring	filtered	sample	8/7/1997	2	PP97-31	0816-97-1046	0816-97-1046 filtered	3537R	o	x	x	o	o	x	x	21.6	--	7.96	—
Pajarito Spring	filtered	original	2/18/1998	3	PP98-08	0816-98-0053	0816-98-0053 filtered	4115R, 4116R, 4118R	x	x	x	o	x	x	x	18.8	200	7.83	1.6
Pajarito Spring	filtered	duplicate	2/18/1998	3	PP98-09	0816-98-0054	0816-98-0054 filtered	4115R, 4116R, 4118R	x	x	x	o	x	x	x	18.8	200	7.83	1.6
Pajarito Spring	filtered	sample	2/18/1998	3	PP98-09	PP98-9	PP98-9 filtered	—	o	o	o	x	o	o	x	18.8	200	7.83	1.6
Pajarito Spring	filtered	sample	7/6/1998	5	PP98-21	RE16-98-9031	RE16-98-9031 filtered	4395R, 4396R, 4397R	x	x	x	o	x	x	x	20.6	160	7.97	0.4
Pajarito Spring	filtered	sample	1/6/2000	7	PP00-5	CABG-00-0016	CABG-00-0016 filtered	6313R, 6312R, 6314R	x	x	o	o	o	o	x	20.7	225	8.32	0.4
Pajarito Spring	filtered	original	3/31/2000	8	PP00-29	CABG-00-0053	CABG-00-0053 filtered	6655R, 6656R, 6658R, 6657R	x	o	o	o	o	o	x	20.6	210	7.99	3
Pajarito Spring	filtered	duplicate	3/31/2000	8	PP00-30	CABG-00-0054	CABG-00-0054 filtered	6655R, 6656R, 6658R, 6657R	x	o	o	o	o	o	x	20.6	210	7.99	3
Pine Spring	filtered	sample	5/7/1997	1	PP97-06	PP97-6	PP97-6 filtered	—	o	x	o	x	o	o	x	6.8	100	5.81	0
Pine Spring	filtered	original	8/4/1997	2	PP97-24	0816-97-1034	0816-97-1034 filtered	3484R, 3485R	o	x	x	o	o	x	x	12.5	146	6.46	0
Pine Spring	filtered	duplicate	8/4/1997	2	PP97-25	PP97-25	PP97-25 filtered	(lab sample #0816-97-1034)	o	x	o	x	o	o	x	12.5	146	6.46	0
Pine Spring	filtered	sample	2/10/1998	3	PP98-06	0816-98-0039	0816-98-0039 filtered	4102R, 4103R, 4105R	x	x	x	o	x	x	x	3.6	70	6.78	41.7
Pine Spring	filtered	sample	7/14/1998	5	PP98-29	RE16-98-9033	RE16-98-9033 filtered	4435R, 4436R, 4437R	x	x	x	o	x	x	x	12.7	80	6.34	17.8

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Pine Spring	filtered	sample	1/6/2000	7	PP00-6	CABG-00-0017	CABG-00-0017 filtered	6313R, 6312R, 6314R	x	x	o	o	o	o	x	4.8	60	8.44	43.2
Pine Spring	filtered	sample	3/30/2000	8	PP00-23	CABG-00-0051	CABG-00-0051 filtered	6642R, 6641R, 6644R, 6643R	x	o	o	o	o	o	x	6.8	70	6.69	44.9
Pine Spring	filtered	sample	3/30/2000	8	PP00-26	CABG-00-0052	CABG-00-0052 filtered	6649R, 6648R, 6651R	x	o	o	o	o	o	x	6.8	70	6.69	44.9
Pine Spring NMED	filtered	NMED	7/14/1998	5	PP98-30	PP98-30	PP98-30 filtered	—	o	o	o	x	o	o	x	9.8	—	7.14	—
Rio Grande	filtered	sample	4/22/1997	1	PP97-03	PP97-3	PP97-3 filtered	—	o	x	o	x	o	o	x	12.6	—	8.34	—
Sacred Spring	filtered	sample	5/29/1997	1	PP97-20	PP97-20	PP97-20 filtered	—	o	x	o	x	o	o	x	14.3	225	7.53	0
Sacred Spring	filtered	sample	8/8/1997	2	PP97-34	0816-97-1055	0816-97-1055 filtered	3536R, 3537R	o	x	x	o	o	x	x	17	—	7.16	—
Sacred Spring NMED	filtered	NMED	4/14/1998	4	PP98-16	PP98-16	PP98-16 filtered	—	o	x	o	o	o	o	x	11.6	250	7.24	3.2
Sacred Spring	filtered	sample	4/14/1998	4	PP98-18	PP98-18	PP98-18 filtered	(lab sample #0816-98-9002)	o	o	o	x	o	o	x	9.3	180	7.36	2.2
Sacred Spring	filtered	original	4/14/1998	4	PP98-17	RE16-98-9001	RE16-98-9001 filtered	4225R, 4226R, 4228R	x	x	x	o	x	x	x	9.3	180	7.36	2.2
Sacred Spring	filtered	duplicate	4/14/1998	4	PP98-18	RE16-98-9002	RE16-98-9002 filtered	4225R, 4226R, 4228R	x	x	x	o	x	x	x	9.3	180	7.36	2.2
Sacred Spring	filtered	sample	7/7/1998	5	PP98-27	RE16-98-9035	RE16-98-9035 filtered	4403R, 4404R, 4405R	x	x	x	o	x	x	x	22.8	190	7.94	5.3
Sacred Spring	filtered	sample	12/16/1999	7	PP99-5	CABG-99-0007	CABG-99-0007 filtered	6266R, 6265R, 6267R	x	x	o	o	o	o	x	0.6	185	8.33	10.6
Sacred Spring	filtered	sample	4/10/2000	8	PP00-42	CABG-00-0057	CABG-00-0057 filtered	6707R, 6706R, 6708R, 6705R	x	o	o	o	o	o	x	16	150	6.56	2.5
Seven Springs	filtered	sample	4/27/1997	1	PP97-05	PP97-5	PP97-5 filtered	—	o	x	o	x	o	o	x	12.4	83	7.49	0
Seven Springs	filtered	original	8/7/1997	2	PP97-32	0816-97-1048	0816-97-1048 filtered	3536R, 3537R	o	x	x	o	o	x	x	11.7	—	7.33	—
Seven Springs	filtered	duplicate	8/7/1997	2	PP97-33	0816-97-1049	0816-97-1049 filtered	3536R, 3537R	o	x	x	o	o	x	x	11.7	—	7.33	—
Seven Springs	filtered	sample	8/7/1997	2	PP97-33	PP97-33	PP97-33 filtered	(lab sample #0816-97-1049)	o	o	o	x	o	o	x	11.7	—	7.33	—
Seven Springs	filtered	sample	2/10/1998	3	PP98-07	0816-98-0037	0816-98-0037 filtered	4102R, 4105R	x	x	x	o	x	x	x	10.5	120	7.5	1.1
Seven Springs	filtered	sample	7/6/1998	5	PP98-22	RE16-98-9037	RE16-98-9037 filtered	4395R, 4396R, 4397R	x	x	x	o	x	x	x	10.7	100	7.51	2.7
Seven Springs	filtered	sample	12/20/1999	7	PP99-6	CABG-99-0008	CABG-99-0008 filtered	6288R, 6287R, 6289R	x	x	o	o	o	o	x	11.1	105	8.39	1.4
Seven Springs	filtered	sample	3/29/2000	8	PP00-18	CABG-00-0048	CABG-00-0048 filtered	6635R, 6634R, 6637R, 6636R	x	o	o	o	o	o	x	10.8	110	7.22	3
Spring 1	filtered	sample	5/21/1997	1	PP97-14	PP97-14	PP97-14 filtered	—	o	x	o	x	o	o	x	16.8	218	7.43	0
Spring 1	filtered	sample	8/5/1997	2	PP97-26	0816-97-1037	0816-97-1037 filtered	3489R, 3490R	o	x	x	o	o	x	x	17.3	—	6.5	—
Spring 1	filtered	sample	4/7/1998	4	PP98-14	0816-98-0045	0816-98-0045 filtered	4204R, 4207R	x	x	x	o	x	x	x	15.6	215	7.99	5.4
Spring 1	filtered	sample	7/7/1998	5	PP98-24	PP98-24	PP98-24 filtered	(lab sample #RE16-98-9018 filtered)	o	o	o	x	o	o	x	17.6	190	7.81	2.6
Spring 1	filtered	original	7/7/1998	5	PP98-23	RE16-98-9017	RE16-98-9017 filtered	4403R, 4405R	x	x	x	o	x	x	x	17.6	190	7.81	2.6
Spring 1	filtered	duplicate	7/7/1998	5	PP98-24	RE16-98-9018	RE16-98-9018 filtered	4403R, 4405R	x	x	x	o	x	x	x	17.6	190	7.81	2.6
Spring 1	filtered	sample	12/16/1999	7	PP99-3	CABG-99-0005	CABG-99-0005 filtered	6266R, 6265R, 6267R	x	x	o	o	o	o	x	15.2	220	8.23	4.6
Spring 1	filtered	sample	4/4/2000	8	PP00-32	CABG-00-0055	CABG-00-0055 filtered	6678R, 6676R, 6677R, 6679R	x	o	o	o	o	o	x	18.5	150	7.26	10.3
Spring 9B	filtered	sample	4/22/1997	1	PP97-02	PP97-2	PP97-2 filtered	—	o	x	o	x	o	o	x	20.1	--	7.82	--
Spring 9B	filtered	sample	8/18/1997	2	PP97-35	0816-97-1053	0816-97-1053 filtered	3586R	o	x	x	o	o	x	x	20.5	225	7.85	--
Spring 9B	filtered	sample	2/3/1998	3	PP98-02	0816-98-0004	0816-98-0004 filtered	4079R, 4080R, 4082R	x	x	x	o	x	x	x	19.4	130	7.73	0.5
Spring 9B	filtered	sample	9/23/1998	6	PP98-32	RE16-98-9008	RE16-98-9008 filtered	4695R, 4696R	x	x	x	o	x	x	x	20.5	111	7.26	--

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Spring 9B	filtered	sample	1/7/2000	7	PP00-9	CABG-00-0020	CABG-00-0020 filtered	6320R, 6319R, 6321R	x	x	o	o	o	o	x	18.5	145	8.54	1.6
Spring 9B	filtered	sample	4/6/2000	8	PP00-38	CABG-00-0060	CABG-00-0060 filtered	6700R, 6699R, 6698R, 6701R	x	o	o	o	o	o	x	20	100	6.44	0.7
Upper Cañon de Valle Spring	filtered	original	5/13/1997	1	PP97-11	PP97-11	PP97-11 filtered	—	o	x	o	x	o	o	x	8.9	70	7.33	0
Upper Cañon de Valle Spring	filtered	duplicate	5/13/1997	1	PP97-12	PP97-12	PP97-12 filtered	—	o	x	o	x	o	o	x	8.9	70	7.33	0
Upper Cañon de Valle Spring	filtered	sample	8/4/1997	2	PP97-23	0816-97-1032	0816-97-1032 filtered	3484R, 3485R	o	x	x	o	o	x	x	8.2	94	7.3	0
Upper Cañon de Valle Spring	filtered	sample	2/23/1998	3	PP98-10	0816-98-0035	0816-98-0035 filtered	3979R, 4127R, 4128R, 4130R	x	x	x	o	x	x	x	6.7	80	8.04	1.4
Upper Cañon de Valle Spring	filtered	sample	7/1/1998	5	PP98-19	RE16-98-9029	RE16-98-9029 filtered	4384R, 4385R, 4387R	x	x	x	o	x	x	x	7.3	65	7.76	4.6
Upper Cañon de Valle Spring	filtered	sample	1/5/2000	7	PP00-4	CABG-00-0015	CABG-00-0015 filtered	6309R, 6308R, 6310R	x	x	o	o	o	o	x	6.8	90	8.74	2.2
Upper Cañon de Valle Spring	filtered	sample	4/5/2000	8	PP00-34	CABG-00-0058	CABG-00-0058 filtered	6694R, 6693R, 6692R, 6695R	x	o	o	o	o	o	x	7.2	70	6.41	4.8
Water Canyon Gallery	filtered	sample	5/7/1997	1	PP97-08	PP97-8	PP97-8 filtered	—	o	x	o	x	o	o	x	11.3	104	7.42	0
Water Canyon Gallery	filtered	sample	8/6/1997	2	PP97-28	0816-97-1041	0816-97-1041 filtered	3513R, 3514R	o	x	x	o	o	x	x	11.2	—	7.21	—
Water Canyon Gallery	filtered	original	2/9/1998	3	PP98-03	0816-98-0006	0816-98-0006 filtered	4094R, 4095R, 4097R	x	x	x	o	x	x	x	11.1	90	7.74	1.8
Water Canyon Gallery	filtered	duplicate	2/9/1998	3	PP98-04	0816-98-0007	0816-98-0007 filtered	4094R, 4095R, 4097R	x	x	x	o	x	x	x	11.1	90	7.74	1.8
Water Canyon Gallery	filtered	sample	2/9/1998	3	PP98-04	PP98-4	PP98-4 filtered	(lab sample #0816-98-0007 and -0054 filtered)	o	o	o	x	o	o	x	11.1	90	7.74	1.8
Water Canyon Gallery	filtered	sample	7/8/1998	5	PP98-28	RE16-98-9027	RE16-98-9027 filtered	4411R, 4412R, 4413R	x	x	x	o	x	x	x	10.8	65	7.23	1.7
Water Canyon Gallery	filtered	sample	1/5/2000	7	PP00-3	CABG-00-0014	CABG-00-0014 filtered	6309R, 6308R, 6310R	x	x	o	o	o	o	x	11.7	90	8.53	1.9
Water Canyon Gallery	filtered	original	3/30/2000	8	PP00-21	CABG-00-0049	CABG-00-0049 filtered	6642R, 6641R, 6644R, 6643R	x	o	o	o	o	o	x	11.3	70	7.4	1.2
Water Canyon Gallery	filtered	duplicate	3/30/2000	8	PP00-22	CABG-00-0050	CABG-00-0050 filtered	6642R, 6641R, 6644R, 6643R	x	o	o	o	o	o	x	11.3	70	7.4	1.2
Apache Spring	nonfiltered	sample	5/7/1997	1	PP97-07	PP97-7	PP97-7 nonfiltered	—	o	x	o	o	o	o	x	8.3	199	7.27	0
Apache Spring	nonfiltered	sample	8/6/1997	2	PP97-29	0816-97-1042	0816-97-1042 nonfiltered	3514R	o	x	x	o	o	x	x	8.6	—	7.26	—
Apache Spring	nonfiltered	sample	8/6/1997	2	PP97-29	PP97-29	PP97-29 nonfiltered	(lab sample #0816-97-1042 raw, -1043 filtered)	o	o	o	x	o	o	x	8.6	—	7.26	—
Apache Spring	nonfiltered	sample	2/9/1998	3	PP98-05	0816-98-0008	0816-98-0008 nonfiltered	4094R, 4096R, 4097R	x	x	x	x	x	x	x	6.5	165	7.96	5
Apache Spring	nonfiltered	sample	2/9/1998	3	PP98-05	PP98-5	PP98-5 nonfiltered	(lab sample #0816-98-0008 raw, -0009 filtered)	o	o	o	x	o	o	x	6.5	165	7.96	5
Apache Spring	nonfiltered	sample	7/1/1998	5	PP98-20	PP98-20	PP98-20 nonfiltered	(lab sample #RE16-98-9024 raw and 9025 filtered)	o	o	o	x	o	o	x	9.1	130	7.32	23.8
Apache Spring	nonfiltered	sample	7/1/1998	5	PP98-20	RE16-98-9024	RE16-98-9024 nonfiltered	4384R, 4387R	x	x	x	o	x	x	x	9.1	130	7.32	23.8
Apache Spring	nonfiltered	original	1/5/2000	7	PP00-1	CABG-00-0001	CABG-00-0001 nonfiltered	6307R, 6305R, 6306R	o	o	o	x	o	o	x	6	135	9.15	3.1

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Apache Spring	nonfiltered	duplicate	1/5/2000	7	PP00-2	CABG-00-0002	CABG-00-0002 nonfiltered	6307R, 6305R, 6306R	o	o	o	x	o	o	x	6	135	9.15	3.1
Apache Spring	nonfiltered	sample	3/29/2000	8	PP00-15	CABG-00-0029	CABG-00-0029 nonfiltered	6638R, 6640R	o	o	o	x	o	o	x	7.6	280	7.33	7.3
Doe Spring	nonfiltered	sample	4/22/1997	1	PP97-01	PP97-1	PP97-1 nonfiltered	—	o	x	o	o	o	o	x	17.5	--	8.19	--
Doe Spring	nonfiltered	sample	8/18/1997	2	PP97-36	0816-97-1050	0816-97-1050 nonfiltered	3586R	o	x	x	o	o	x	x	20.2	51	8.27	0
Doe Spring	nonfiltered	sample	8/18/1997	2	PP97-36	PP97-36	PP97-36 nonfiltered	(lab sample #0816-97-1050 raw, -1051 filtered)	o	o	o	x	o	o	x	20.2	51	8.27	0
Doe Spring	nonfiltered	sample	2/3/1998	3	PP98-01	0816-98-0001	0816-98-0001 nonfiltered	4079R,4081R, 4082R	x	x	x	x	x	x	x	13.8	120	8.12	15.3
Doe Spring	nonfiltered	sample	2/3/1998	3	PP98-01	PP98-1	PP98-1 nonfiltered	(lab sample #0816-98-0001 raw, -0002 filtered)	o	o	o	x	o	o	x	13.8	120	8.12	15.3
Doe Spring	nonfiltered	sample	9/23/1998	6	PP98-31	PP98-31	PP98-31 nonfiltered	(lab sample #RE16-98-9005 raw and -9006 filtered)	o	o	o	x	o	o	x	21	167	7.71	—
Doe Spring	nonfiltered	sample	9/23/1998	6	PP98-31	RE16-98-9005	RE16-98-9005 nonfiltered	4695R	x	x	x	x	x	x	x	21	167	7.71	—
Doe Spring	nonfiltered	original	1/7/2000	7	PP00-7	CABG-00-0008	CABG-00-0008 nonfiltered	6324R, 6322R, 6323R	o	o	o	x	o	o	x	12.2	135	8.54	3.5
Doe Spring	nonfiltered	duplicate	1/7/2000	7	PP00-8	CABG-00-0009	CABG-00-0009 nonfiltered	6324R, 6322R, 6323R	o	o	o	x	o	o	x	12.2	135	8.54	3.5
Doe Spring	nonfiltered	sample	1/11/2000	7	PP99-2	CABG-00-0026	CABG-00-0026 nonfiltered	6337R, 6336R	o	o	o	x	o	o	x	—	—	6.5	—
Doe Spring	nonfiltered	sample	4/6/2000	8	PP00-35	CABG-00-0041	CABG-00-0041 nonfiltered	6702R, 6732R	o	o	o	x	o	o	x	15.7	80	6.89	7.4
Guaje #5	nonfiltered	sample	5/29/1997	1	PP97-18	PP97-18	PP97-18 nonfiltered	—	o	x	o	o	o	o	x	26.8	186	7.86	--
Guaje #5	nonfiltered	sample	8/19/1997	2	PP97-37	0816-97-1099	0816-97-1099 nonfiltered	3603R	o	x	x	o	o	x	x	26.4	216	6.81	0
Guaje #5	nonfiltered	sample	8/19/1997	2	PP97-37	PP97-37	PP97-37 nonfiltered	(lab sample #0816-97-1099 raw, -1100 filtered)	o	o	o	x	o	o	x	26.4	216	6.81	0
Guaje #5	nonfiltered	sample	9/28/1998	6	PP98-34	PP98-34	PP98-34 nonfiltered	(lab sample #RE16-98-9009 raw and -9010 filtered)	o	o	o	x	o	o	x	24.2	190	8.11	0.55
Guaje #5	nonfiltered	sample	9/28/1998	6	PP98-34	RE16-98-9009	RE16-98-9009 nonfiltered	4714R, 4715R, 4717R, 4718R	x	x	x	x	x	x	x	24.2	190	8.11	0.55
La Mesita Spring	nonfiltered	sample	5/21/1997	1	PP97-15	PP97-15	PP97-15 nonfiltered	—	o	x	o	o	o	o	x	15.2	285	7.17	0
La Mesita Spring	nonfiltered	sample	8/5/1997	2	PP97-27	0816-97-1038	0816-97-1038 nonfiltered	3490R	o	x	x	o	o	x	x	16.6	—	6.5	—
La Mesita Spring	nonfiltered	sample	8/5/1997	2	PP97-27	PP97-27	PP97-27 nonfiltered	(lab sample #0816-97-1038 raw, -1039 filtered)	o	o	o	x	o	o	x	16.6	—	6.5	—
La Mesita Spring	nonfiltered	sample	4/7/1998	4	PP98-15	0816-98-0046	0816-98-0046 nonfiltered	4204R, 4206R, 4207R	x	x	x	x	x	x	x	12.5	320	7.4	7.6
La Mesita Spring	nonfiltered	sample	4/7/1998	4	PP98-15	PP98-15	PP98-15 nonfiltered	(lab sample #0816-98-0046 raw, -0047 filtered)	o	o	o	x	o	o	x	12.5	320	7.4	7.6
La Mesita Spring	nonfiltered	sample	7/7/1998	5	PP98-25	PP98-25	PP98-25 nonfiltered	(lab sample #RE16-98-9013 raw and -9014 filtered)	o	o	o	x	o	o	x	15	230	7.48	9.3
La Mesita Spring	nonfiltered	sample	7/7/1998	5	PP98-25	RE16-98-9013	RE16-98-9013 nonfiltered	4403R, 4405R	x	x	x	o	x	x	x	15	230	7.48	9.3
La Mesita Spring	nonfiltered	sample	12/16/1999	7	PP99-4	CABG-99-0002	CABG-99-0002 nonfiltered	6270R, 6268R, 6269R	o	o	o	x	o	o	x	12.5	330	8.13	10.4
La Mesita Spring	nonfiltered	sample	4/10/2000	8	PP00-39	CABG-00-0038	CABG-00-0038 nonfiltered	6733R, 6709R	o	o	o	x	o	o	x	15	220	6.37	4.3
LAO-B	nonfiltered	sample	5/14/1997	1	PP97-13	PP97-13	PP97-13 nonfiltered	—	o	x	o	o	o	o	x	4.8	105	6.64	0

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
LAO-B	nonfiltered	sample	8/1/1997	2	PP97-21	0816-97-1028	0816-97-1028 nonfiltered	3482R	o	x	x	o	o	x	x	9.6	98	6.79	1
LAO-B	nonfiltered	sample	8/1/1997	2	PP97-21	PP97-21	PP97-21 nonfiltered	(lab sample #0816-97-1028 raw, -1029 filtered)	o	o	o	x	o	o	x	9.6	98	6.79	1
LAO-B	nonfiltered	sample	2/24/1998	3	PP98-11	0816-98-0048	0816-98-0048 nonfiltered	4131R, 4133R, 4134R	x	x	x	x	x	x	x	4.4	90	6.91	4.1
LAO-B	nonfiltered	sample	2/24/1998	3	PP98-11	PP98-11	PP98-11 nonfiltered	(lab sample #0816-98-0048 raw, -0049 filtered)	o	o	o	x	o	o	x	4.4	90	6.91	4.1
LAO-B	nonfiltered	sample	10/2/1998	6	PP98-35	PP98-35	PP98-35 nonfiltered	(lab sample #RE16-98-9022 raw and -9023 filtered)	o	o	o	x	o	o	x	9.8	140	6.83	0.6
LAO-B	nonfiltered	sample	10/2/1998	6	PP98-35	RE16-98-9022	RE16-98-9022 nonfiltered	4815R, 4816R, 4817R	x	x	x	x	x	x	x	9.8	140	6.83	0.6
LAO-B	nonfiltered	sample	1/10/2000	7	PP00-10	CABG-00-0011	CABG-00-0011 nonfiltered	6330R, 6328R	o	o	o	x	o	o	x	5.7	105	7.59	4.8
LAO-B	nonfiltered	sample	1/10/2000	7	PP00-11	CABG-00-0022	CABG-00-0022 nonfiltered	—	o	x	o	o	o	o	x	5.7	105	7.59	4.8
LAO-B	nonfiltered	sample	1/10/2000	7	PP00-11	CABG-00-0023	CABG-00-0023 nonfiltered	6330R, 6328R	o	o	o	x	o	o	x	5.7	105	7.59	4.8
LAO-B	nonfiltered	sample	3/24/2000	8	PP00-13	CABG-00-0028	CABG-00-0028 nonfiltered	6610R, 6612R	o	o	o	x	o	o	x	3.5	79	6.93	3
LAOI-1.1(A)	nonfiltered	sample	5/9/1997	1	PP97-09	PP97-9	PP97-9 nonfiltered	—	o	x	o	o	o	o	x	9.7	114	6.82	0
LAOI-1.1(A)	nonfiltered	sample	9/5/1997	2	PP97-39	0816-97-1095	0816-97-1095 nonfiltered	3700R	o	x	x	o	o	x	x	10.3	109	7.01	4
LAOI-1.1(A)	nonfiltered	sample	9/5/1997	2	PP97-39	PP97-39	PP97-39 nonfiltered	(lab sample #0816-97-1095 raw, -1096 filtered)	o	o	o	x	o	o	x	10.3	109	7.01	4
LAOI-1.1(A)	nonfiltered	sample	2/25/1998	3	PP98-12	0816-98-0050	0816-98-0050 nonfiltered	4136R, 4138R, 4139R	x	x	x	x	x	x	x	8.7	100	6.68	27.2
LAOI-1.1(A)	nonfiltered	sample	2/25/1998	3	PP98-12	PP98-12	PP98-12 nonfiltered	(lab sample #0816-98-0050 raw, -0051 filtered)	o	o	o	x	o	o	x	8.7	100	6.68	27.2
LAOI-1.1(A)	nonfiltered	sample	10/14/1998	6	PP98-36	PP98-36	PP98-36 nonfiltered	(lab sample #RE16-98-9019 raw and -9020 filtered)	o	o	o	x	o	o	x	12.8	95	7.3	>30
LAOI-1.1(A)	nonfiltered	sample	10/14/1998	6	PP98-36	RE16-98-9019	RE16-98-9019 nonfiltered	4885R, 4886R, 4887R, 4889R, 4890R	x	x	x	x	x	x	x	12.8	95	7.3	>30
LAOI-1.1(A)	nonfiltered	sample	1/20/2000	7	PP00-12	CABG-00-0024	CABG-00-0024 nonfiltered	6373R, 6371R	o	o	o	x	o	o	x	9	120	7.4	19.6
LAOI-1.1(A)	nonfiltered	sample	4/13/2000	8	PP00-43	CABG-00-0043	CABG-00-0043 nonfiltered	6748R, 6746R	o	o	o	x	o	o	x	11.9	70	6.85	12.8
Otowi #4	nonfiltered	sample	5/29/1997	1	PP97-16	PP97-16	PP97-16 nonfiltered	—	o	x	o	o	o	o	x	27.9	306	6.92	--
Otowi #4	nonfiltered	sample	8/19/1997	2	PP97-38	0816-97-1097	0816-97-1097 nonfiltered	3603R	o	x	x	o	o	x	x	27.9	219	7.4	0
Otowi #4	nonfiltered	sample	8/19/1997	2	PP97-38	PP97-38	PP97-38 nonfiltered	(lab sample #0816-97-1097 raw, -1098 filtered)	o	o	o	x	o	o	x	27.9	219	7.4	0
Otowi #4	nonfiltered	sample	2/26/1998	3	PP98-13	0816-98-0040	0816-98-0040 nonfiltered	4140R,4142R, 4143R	x	x	x	x	x	x	x	26.1	290	7.58	1.4
Otowi #4	nonfiltered	sample	2/26/1998	3	PP98-13	PP98-13	PP98-13 nonfiltered	(lab sample #0816-98-0040 raw, -0041 filtered)	o	o	o	x	o	o	x	26.1	290	7.58	1.4
Otowi #4	nonfiltered	sample	9/28/1998	6	PP98-33	PP98-33	PP98-33 nonfiltered	(lab sample #RE16-98-9011 raw and -9012 filtered)	o	o	o	x	o	o	x	27.5	285	7.45	0.6
Otowi #4	nonfiltered	sample	9/28/1998	6	PP98-33	RE16-98-9011	RE16-98-9011 nonfiltered	4714R, 4715R, 4717R, 4718R	x	x	x	x	x	x	x	27.5	285	7.45	0.6
Pajarito Spring	nonfiltered	sample	4/27/1997	1	PP97-04	PP97-4	PP97-4 nonfiltered	—	o	x	o	o	o	o	x	21.3	207	7.3	5
Pajarito Spring	nonfiltered	sample	8/7/1997	2	PP97-31	0816-97-1045	0816-97-1045 nonfiltered	3537R	o	x	x	o	o	x	x	21.6	--	7.96	--

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Pajarito Spring	nonfiltered	sample	8/7/1997	2	PP97-31	PP97-31	PP97-31 nonfiltered	(lab sample #0816-97-1045 raw, -1046 filtered)	o	o	o	x	o	o	x	21.6	--	7.96	--
Pajarito Spring	nonfiltered	sample	2/18/1998	3	PP98-08	0816-98-0052	0816-98-0052 nonfiltered	4115R, 4117R, 4118R	x	x	x	x	x	x	x	18.8	200	7.83	1.6
Pajarito Spring	nonfiltered	sample	2/18/1998	3	PP98-08	PP98-8	PP98-8 nonfiltered	—	o	o	o	x	o	o	x	18.8	200	7.83	1.6
Pajarito Spring	nonfiltered	sample	7/6/1998	5	PP98-21	PP98-21	PP98-21 nonfiltered	(lab sample #RE16-98-9030 raw and -9031 filtered)	o	o	o	x	o	o	x	20.6	160	7.97	0.4
Pajarito Spring	nonfiltered	sample	7/6/1998	5	PP98-21	RE16-98-9030	RE16-98-9030 nonfiltered	4395R, 4397R	x	x	x	o	x	x	x	20.6	160	7.97	0.4
Pajarito Spring	nonfiltered	sample	1/6/2000	7	PP00-5	CABG-00-0005	CABG-00-0005 nonfiltered	6317R, 6315R, 6316R	o	o	o	x	o	o	x	20.7	225	8.32	0.4
Pajarito Spring	nonfiltered	original	3/31/2000	8	PP00-27	CABG-00-0035	CABG-00-0035 nonfiltered	6661R, 6659R	o	o	o	x	o	o	x	20.6	210	7.99	3
Pajarito Spring	nonfiltered	duplicate	3/31/2000	8	PP00-28	CABG-00-0036	CABG-00-0036 nonfiltered	6661R, 6659R	o	o	o	x	o	o	x	20.6	210	7.99	3
Pine Spring	nonfiltered	sample	5/7/1997	1	PP97-06	PP97-6	PP97-6 nonfiltered	—	o	x	o	o	o	o	x	6.8	100	5.81	0
Pine Spring	nonfiltered	sample	8/4/1997	2	PP97-24	0816-97-1033	0816-97-1033 nonfiltered	3485R	o	x	x	o	o	x	x	12.5	146	6.46	0
Pine Spring	nonfiltered	sample	8/4/1997	2	PP97-24	PP97-24	PP97-24 nonfiltered	(lab sample #0816-97-1033)	o	o	o	x	o	o	x	12.5	146	6.46	0
Pine Spring	nonfiltered	sample	2/10/1998	3	PP98-06	0816-98-0038	0816-98-0038 nonfiltered	4102R, 4104R, 4105R	x	x	x	x	x	x	x	3.6	70	6.78	41.7
Pine Spring	nonfiltered	sample	2/10/1998	3	PP98-06	PP98-6	PP98-6 nonfiltered	(lab sample #0816-98-0038 raw, -0039 filtered)	o	o	o	x	o	o	x	3.6	70	6.78	41.7
Pine Spring	nonfiltered	sample	7/14/1998	5	PP98-29	PP98-29	PP98-29 nonfiltered	(lab sample #RE16-98-9032 raw and -9033 filtered)	o	o	o	x	o	o	x	12.7	80	6.34	17.8
Pine Spring	nonfiltered	sample	7/14/1998	5	PP98-29	RE16-98-9032	RE16-98-9032 nonfiltered	4435R, 4437R	x	x	x	o	x	x	x	12.7	80	6.34	17.8
Pine Spring	nonfiltered	sample	1/6/2000	7	PP00-6	CABG-00-0006	CABG-00-0006 nonfiltered	6317R, 6315R, 6316R	o	o	o	x	o	o	x	4.8	60	8.44	43.2
Pine Spring	nonfiltered	sample	3/30/2000	8	PP00-24	CABG-00-0033	CABG-00-0033 nonfiltered	6645R, 6647R	o	o	o	x	o	o	x	6.8	70	6.69	44.9
Pine Spring	nonfiltered	sample	3/30/2000	8	PP00-25	CABG-00-0034	CABG-00-0034 nonfiltered	6652R, 6654R	o	o	o	x	o	o	x	6.8	70	6.69	44.9
Sacred Spring	nonfiltered	sample	5/29/1997	1	PP97-20	PP97-20	PP97-20 nonfiltered	—	o	x	o	o	o	o	x	14.3	225	7.53	0
Sacred Spring	nonfiltered	sample	8/8/1997	2	PP97-34	0816-97-1054	0816-97-1054 nonfiltered	3537R	o	x	x	o	o	x	x	17	—	7.16	—
Sacred Spring	nonfiltered	sample	8/8/1997	2	PP97-34	PP97-34	PP97-34 nonfiltered	(lab sample #0816-97-1054 raw, -1055 filtered)	o	o	o	x	o	o	x	17	—	7.16	—
Sacred Spring NMED	nonfiltered	NMED	4/14/1998	4	PP98-16	PP98-16	PP98-16 nonfiltered	—	o	x	o	x	o	o	x	11.6	250	7.24	3.2
Sacred Spring	nonfiltered	sample	4/14/1998	4	PP98-17	PP98-17	PP98-17 nonfiltered	(lab sample #0816-98-9000 raw, -9001 filtered)	o	o	o	x	o	o	x	9.3	180	7.36	2.2
Sacred Spring	nonfiltered	sample	4/14/1998	4	PP98-17	RE16-98-9000	RE16-98-9000 nonfiltered	4225R, 4227R, 4228R	x	x	x	x	x	x	x	9.3	180	7.36	2.2
Sacred Spring	nonfiltered	sample	7/7/1998	5	PP98-27	PP98-27	PP98-27 nonfiltered	(lab sample #RE16-98-9034 raw and -9035 filtered)	o	o	o	x	o	o	x	22.8	190	7.94	5.3
Sacred Spring	nonfiltered	sample	7/7/1998	5	PP98-27	RE16-98-9034	RE16-98-9034 nonfiltered	4403R, 4405R	x	x	x	o	x	x	x	22.8	190	7.94	5.3
Sacred Spring	nonfiltered	sample	12/16/1999	7	PP99-5	CABG-99-0003	CABG-99-0003 nonfiltered	6270R, 6268R, 6269R	o	o	o	x	o	o	x	0.6	185	8.33	10.6
Sacred Spring	nonfiltered	sample	4/10/2000	8	PP00-41	CABG-00-0039	CABG-00-0039 nonfiltered	6733R, 6709R	o	o	o	x	o	o	x	16	150	6.56	2.5
Seven Springs	nonfiltered	sample	4/27/1997	1	PP97-05	PP97-5	PP97-5 nonfiltered	—	o	x	o	o	o	o	x	12.4	83	7.49	0

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Seven Springs	nonfiltered	sample	8/7/1997	2	PP97-32	0816-97-1047	0816-97-1047 nonfiltered	3537R	o	x	x	o	o	x	x	11.7	—	7.33	—
Seven Springs	nonfiltered	sample	8/7/1997	2	PP97-32	PP97-32	PP97-32 nonfiltered	(lab sample #0816-97-1047 raw, -1048 filtered)	o	o	o	x	o	o	x	11.7	—	7.33	—
Seven Springs	nonfiltered	sample	2/10/1998	3	PP98-07	0816-98-0036	0816-98-0036 nonfiltered	4102R, 4105R	x	x	x	x	x	x	x	10.5	120	7.5	1.1
Seven Springs	nonfiltered	sample	2/10/1998	3	PP98-07	PP98-7	PP98-7 nonfiltered	(lab sample #0816-98-0036 raw, -0037 filtered)	o	o	o	x	o	o	x	10.5	120	7.5	1.1
Seven Springs	nonfiltered	sample	7/6/1998	5	PP98-22	PP98-22	PP98-22 nonfiltered	(lab sample #RE16-98-9036 raw and -9037 filtered)	o	o	o	x	o	o	x	10.7	100	7.51	2.7
Seven Springs	nonfiltered	sample	7/6/1998	5	PP98-22	RE16-98-9036	RE16-98-9036 nonfiltered	4395R, 4397R	x	x	x	o	x	x	x	10.7	100	7.51	2.7
Seven Springs	nonfiltered	sample	12/20/1999	7	PP99-6	CABG-99-0004	CABG-99-0004 nonfiltered	6292R, 6290R	o	o	o	x	o	o	x	11.1	105	8.39	1.4
Seven Springs	nonfiltered	sample	3/29/2000	8	PP00-17	CABG-00-0030	CABG-00-0030 nonfiltered	6638R, 6640R	o	o	o	x	o	o	x	10.8	110	7.22	3
Spring 1	nonfiltered	sample	5/21/1997	1	PP97-14	PP97-14	PP97-14 nonfiltered	—	o	x	o	o	o	o	x	16.8	218	7.43	0
Spring 1	nonfiltered	sample	8/5/1997	2	PP97-26	0816-97-1036	0816-97-1036 nonfiltered	3490R	o	x	x	o	o	x	x	17.3	—	6.5	—
Spring 1	nonfiltered	sample	8/5/1997	2	PP97-26	PP97-26	PP97-26 nonfiltered	(lab sample #0816-97-1036 raw, -1037 filtered)	o	o	o	x	o	o	x	17.3	—	6.5	—
Spring 1	nonfiltered	sample	4/7/1998	4	PP98-14	0816-98-0044	0816-98-0044 nonfiltered	4204R, 4206R, 4207R	x	x	x	x	x	x	x	15.6	215	7.99	5.4
Spring 1	nonfiltered	sample	4/7/1998	4	PP98-14	PP98-14	PP98-14 nonfiltered	(lab sample #0816-98-0044 raw, -0045 filtered)	o	o	o	x	o	o	x	15.6	215	7.99	5.4
Spring 1	nonfiltered	sample	7/7/1998	5	PP98-23	PP98-23	PP98-23 nonfiltered	(lab sample #RE16-98-9016 raw and -9017 filtered)	o	o	o	x	o	o	x	17.6	190	7.81	2.6
Spring 1	nonfiltered	sample	7/7/1998	5	PP98-23	RE16-98-9016	RE16-98-9016 nonfiltered	4403R, 4405R	x	x	x	o	x	x	x	17.6	190	7.81	2.6
Spring 1	nonfiltered	sample	12/16/1999	7	PP99-3	CABG-99-0001	CABG-99-0001 nonfiltered	6270R, 6268R, 6269R	o	o	o	x	o	o	x	15.2	220	8.23	4.6
Spring 1	nonfiltered	sample	4/4/2000	8	PP00-31	CABG-00-0037	CABG-00-0037 nonfiltered	6680R, 6730R	o	o	o	x	o	o	x	18.5	150	7.26	10.3
Spring 9B	nonfiltered	sample	4/22/1997	1	PP97-02	PP97-2	PP97-2 nonfiltered	—	o	x	o	o	o	o	x	20.1	—	7.82	—
Spring 9B	nonfiltered	sample	8/18/1997	2	PP97-35	0816-97-1052	0816-97-1052 nonfiltered	3586R	o	x	x	o	o	x	x	20.5	225	7.85	0
Spring 9B	nonfiltered	sample	8/18/1997	2	PP97-35	PP97-35	PP97-35 nonfiltered	(lab sample #0816-97-1052 raw, -1053 filtered)	o	o	o	x	o	o	x	20.5	225	7.85	0
Spring 9B	nonfiltered	sample	2/3/1998	3	PP98-02	0816-98-0003	0816-98-0003 nonfiltered	4079R,4081R, 4082R	x	x	x	x	x	x	x	19.4	130	7.73	0.5
Spring 9B	nonfiltered	sample	2/3/1998	3	PP98-02	PP98-2	PP98-2 nonfiltered	(lab sample #0816-98-0003 raw, -0004 filtered)	o	o	o	x	o	o	x	19.4	130	7.73	0.5
Spring 9B	nonfiltered	sample	9/23/1998	6	PP98-32	PP98-32	PP98-32 nonfiltered	(lab sample #RE16-98-9007 raw and -9008 filtered)	o	o	o	x	o	o	x	20.5	111	7.26	—
Spring 9B	nonfiltered	sample	9/23/1998	6	PP98-32	RE16-98-9007	RE16-98-9007 nonfiltered	4697R	o	x	o	o	o	o	x	20.5	111	7.26	—
Spring 9B	nonfiltered	sample	1/7/2000	7	PP00-9	CABG-00-0010	CABG-00-0010 nonfiltered	6324R, 6322R, 6323R	o	o	o	x	o	o	x	18.5	145	8.54	1.6
Spring 9B	nonfiltered	sample	1/11/2000	7	PP99-1	CABG-00-0027	CABG-00-0027 nonfiltered	6337R, 6336R	o	o	o	x	o	o	x	—	—	6	—
Spring 9B	nonfiltered	sample	4/6/2000	8	PP00-37	CABG-00-0042	CABG-00-0042 nonfiltered	6702R, 6732R	o	o	o	x	o	o	x	20	100	6.44	0.7

Table A-1 (continued)

Location	Prep	Type	Date MM/DD/YY	Event	Groundwater Sample ID	Sample ID	Sample ID and Method	Request Numbers	Inorganics	Inorganics EES	Rads	Tritium	Gross a, b, g	G-Scan Rads	Other	Temp (°C)	Average Specific Conductance (µS/cm)	pH	Turbidity (NTU)
Upper Cañon de Valle Spring	nonfiltered	sample	5/13/1997	1	PP97-12	PP97-12	PP97-12 nonfiltered	—	o	x	o	o	o	o	x	8.9	70	7.33	0
Upper Cañon de Valle Spring	nonfiltered	sample	8/4/1997	2	PP97-23	0816-97-1031	0816-97-1031 nonfiltered	3485R	o	x	x	o	o	x	x	8.2	94	7.3	0
Upper Cañon de Valle Spring	nonfiltered	sample	8/4/1997	2	PP97-23	PP97-23	PP97-23 nonfiltered	(lab sample #0816-97-1031 raw, -1032 filtered)	o	o	o	x	o	o	x	8.2	94	7.3	0
Upper Cañon de Valle Spring	nonfiltered	sample	2/23/1998	3	PP98-10	0816-98-0034	0816-98-0034 nonfiltered	4127R, 4129R, 4130R	x	x	x	x	x	x	x	6.7	80	8.04	1.4
Upper Cañon de Valle Spring	nonfiltered	sample	2/23/1998	3	PP98-10	PP98-10	PP98-10 nonfiltered	(lab sample #0816-98-0034 raw, -0035 filtered)	o	o	o	x	o	o	x	6.7	80	8.04	1.4
Upper Cañon de Valle Spring	nonfiltered	sample	7/1/1998	5	PP98-19	PP98-19	PP98-19 nonfiltered	(lab sample #RE16-98-9028 raw and -9029 filtered)	o	o	o	x	o	o	x	7.3	65	7.76	4.6
Upper Cañon de Valle Spring	nonfiltered	sample	7/1/1998	5	PP98-19	RE16-98-9028	RE16-98-9028 nonfiltered	4384R, 4387R	x	x	x	o	x	x	x	7.3	65	7.76	4.6
Upper Cañon de Valle Spring	nonfiltered	sample	1/5/2000	7	PP00-4	CABG-00-0004	CABG-00-0004 nonfiltered	6307R, 6305R, 6306R	o	o	o	x	o	o	x	6.8	90	8.74	2.2
Upper Cañon de Valle Spring	nonfiltered	sample	4/5/2000	8	PP00-33	CABG-00-0040	CABG-00-0040 nonfiltered	6696R, 6731R	o	o	o	x	o	o	x	7.2	70	6.41	4.8
Water Canyon Gallery	nonfiltered	sample	5/7/1997	1	PP97-08	PP97-8	PP97-8 nonfiltered	—	o	x	o	o	o	o	x	11.3	104	7.42	0
Water Canyon Gallery	nonfiltered	sample	8/6/1997	2	PP97-28	0816-97-1040	0816-97-1040 nonfiltered	3514R	o	x	x	o	o	x	x	11.2	—	7.21	—
Water Canyon Gallery	nonfiltered	sample	8/6/1997	2	PP97-28	PP97-28	PP97-28 nonfiltered	(lab sample #0816-97-1040 raw, -1041 filtered)	o	o	o	x	o	o	x	11.2	—	7.21	—
Water Canyon Gallery	nonfiltered	sample	2/9/1998	3	PP98-03	0816-98-0005	0816-98-0005 nonfiltered	4094R, 4096R, 4097R	x	x	x	x	x	x	x	11.1	90	7.74	1.8
Water Canyon Gallery	nonfiltered	sample	2/9/1998	3	PP98-03	PP98-3	PP98-3 nonfiltered	(lab sample #0816-98-0005 and -0052 raw, -0006 and -0053 filtered)	o	o	o	x	o	o	x	11.1	90	7.74	1.8
Water Canyon Gallery	nonfiltered	sample	7/8/1998	5	PP98-28	PP98-28	PP98-28 nonfiltered	(lab sample #RE16-98-9026 raw and -9027 filtered)	o	o	o	x	o	o	x	10.8	65	7.23	1.7
Water Canyon Gallery	nonfiltered	sample	7/8/1998	5	PP98-28	RE16-98-9026	RE16-98-9026 nonfiltered	4411R, 4413R	x	x	x	o	x	x	x	10.8	65	7.23	1.7
Water Canyon Gallery	nonfiltered	sample	1/5/2000	7	PP00-3	CABG-00-0003	CABG-00-0003 nonfiltered	6307R, 6305R, 6306R	o	o	o	x	o	o	x	11.7	90	8.53	1.9
Water Canyon Gallery	nonfiltered	sample	3/30/2000	8	PP00-19	CABG-00-0031	CABG-00-0031 nonfiltered	6645R, 6647R	o	o	o	x	o	o	x	11.3	70	7.4	1.2
Water Canyon Gallery	nonfiltered	sample	3/30/2000	8	PP00-20	CABG-00-0032	CABG-00-0032 nonfiltered	6645R, 6647R	o	o	o	x	o	o	x	11.3	70	7.4	1.2

Note: The LAO-B post Cerro Grande Fire samples are not included in this table.

[a] duplicate = field duplicate of the original sample; sample = sample not paired with another sample ID.

[b] na = not available

[c] x = analyzed; o = not analyzed

[d] — = not measured

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Location by Metals

Location by Other Analytes

Location by Radionuclides

Table B-1.1
Spring 1

Date Collected		4/4/94	4/4/94	9/27/94	3/30/95	6/5/95	5/21/97	5/21/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/4/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		VA-414	s1940404	PP94-75	s1950330	s1950605	PP97-14	PP97-14	0816-97-1036	0816-97-1037	0816-98-0044	0816-98-0044	0816-98-0045	0816-98-0045	RE16-98-9016	RE16-98-9016	RE16-98-9017	RE16-98-9017	RE16-98-9018	RE16-98-9018	CABG-99-0005	CABG-99-0005	CABG-00-0055
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	**Units**																						
Aluminum	μg/L	90	100 U[b]	90	900	200 U	50	550	359.18	5.2	564	750	17.4 U	20 U	100 U	50	26.2 U	20 U	17.2 U	20 U	24 U	8	52 U
Antimony	μg/L	0.2 U	5 U	0.03	12	5 U	0.2 U	0.2 U	0.2	0.1 U	5.2 U	0.2 U	5.2 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	1.41 U	0.1	0.68 U
Arsenic	μg/L	5.1	6	3.2	13	10 U	4.4	3.6	3.4	3.3	6.7	4.4	3.8	3.7	5	4	3	4	5	3.9	5.5	3.7	2.3 U
Barium	μg/L	20	100 U	50	100 U	300	22	26	40.09	35.45	26.5	27	20.8	23	23.2	20	21.9	20	21.9	19	23	21	21
Beryllium	μg/L	Na[c]	100 U	na	1 U	5 U	2 U	2 U	2 U	2 U	0.38 U	2 U	0.24 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.02	1 U	0.01 U
Boron	μg/L	30	100 U	37	40	30	41	39	38.31	37.79	41.6 U	37	40.8 U	31	na	39	na	38	na	33	25	43	38
Cadmium	μg/L	0.5 U	1 U	0.5 U	5 U	5 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U
Calcium	μg/L	15500	17000	20400	16000	14000	15000	15200	18445.7	18384.98	14500	15500	14100	15000	15500	14900	15400	14700	15600	15000	15000	14300	14000
Cesium	μg/L	0	na	0	na	na	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Chromium	μg/L	6	4	5	10 U	10 U	8	9	7	4	7.7 U	9	6.6 U	6	4 U	8	3.8 U	7	4 U	8	5.1	5	5.3
Cobalt	μg/L	2 U	50 U	2 U	10 U	10 U	2 U	2 U	2 U	2 U	0.77	2 U	0.7 U	2 U	0.72 U	2 U	0.5 U	2 U	0.5 U	2 U	0.43	1 U	0.39 U
Copper	μg/L	4	10 U	4	10 U	10 U	3	4	3	2	1.7	2 U	0.94	2 U	0.88 U	2 U	0.3 U	2 U	0.3 U	4	0.3	1 U	0.42 U
Iron	μg/L	30	100 U	30	2400	100 U	20	230	314.78	17.04	400	440	24.3 U	10 U	93 U	40	30.2 U	10 U	25.1 U	10 U	37 U	50	26 U
Lead	μg/L	50 U	na	50 U	430	180	2 U	4	2 U	2 U	1.3 U	2 U	1.3 U	2 U	1.1 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.1
Lithium	μg/L	30	na	50	40	40	40	40	30	30	na	30	na	40	na	40	na	30	na	40	na	37	na
Magnesium	μg/L	810	700	1270	1500	1000 U	990	1050	1239.61	1125.62	1260	1220	1030	960	957	930	909	910	920	920	990 U	980	860
Manganese	μg/L	10	50 U	10 U	30	10 U	15	45	10.08	2 U	16.3	13	0.49 U	2 U	3.2	2 U	0.05	2 U	0.05 U	2 U	0.64	1	2.1
Mercury	μg/L	0.2 U	0.5 U	0.2 U	0.2 U	0.2 U	0.1 U	0.04	0.01	0.1 U	0.02 U	0.05 U	0.02 U	0.05 U	0.02 U	0.12	0.02 U	0.06	0.02 U	0.1	0.01 U	0.05 U	0.01 U
Molybdenum	μg/L	3	3	4	10 U	10 U	3	3	2	2 U	na	3	na	2 U	na	8	na	3	na	2 U	na	3	na
Nickel	μg/L	20 U	na	20 U	na	na	2 U	2 U	2 U	2 U	1.2 U	2 U	0.5 U	2 U	0.92	2 U	1.2 U	2 U	0.93 U	2 U	0.9	1 U	0.54 U
Potassium	μg/L	1960	2000	2230	2000	2000	2100	2010	2220	2220	2580	2120	2390	2080	2590	1900	2580	2020	2610	2010	2400	2120	2300
Rubidium	μg/L	0.2 U	na	0.2 U	60 U	20 U	3	3	4	4	na	4	na	3	na	3	na	3	na	4	na	2	na
Selenium	μg/L	10 U	na	10 U	na	na	0.2 U	0.2 U	0.1	0.1 U	3.1 U	1.3	3.6	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	2.8 U	0.1 U	3.8 U
Silver	μg/L	0.5 U	100 U	0.5 U	10 U	10 U	1 U	1 U	1 U	1 U	1.2 U	1 U	1.2 U	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U	1	0.24 U	1 U	0.64 U
Sodium	μg/L	32300	31000	32000	27000	30000	30800	30300	29397.81	29112.38	27000	29100	26900	30900	27100	29900	27500	30100	27500	30200	27000	30000	28000
Strontium	μg/L	260	200	230	220	190	210	210	246.75	237.11	na	200	na	190	na	200	na	200	na	190	na	200	na
Thallium	μg/L	na	na	na	na	na	2 U	2 U	2 U	2 U	5.2 U	2 U	7.8 U	2 U	2.8 U	2 U	2.6 U	2 U	2.6 U	2 U	1.57	1 U	0.69
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	μg/L	na	na	na	na	na	5 U	5 U	5 U	5 U	na	5 U	na	5 U	na	5 U	na	5 U	na	5 U	na	1 U	na
Titanium	μg/L	na	na	na	10 U	10 U	2 U	14	11.34	2 U	na	22	na	2 U	na	2	na	2 U	na	2 U	na	2 U	na
Uranium	μg/L	na	100 U	na	40	10	na	na	na	na	2.92	na	2.83	na	na	na	na	na	na	na	2.61	2.6	2.2
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.61	na	2.2
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.56	na	2.44
Vanadium	μg/L	10 U	250	80	20 U	40	17	17	13.07	11.91	17.1	19	15.4	16	17.5	15	17	15	17.1	16	16	16	15
Zinc	μg/L	na	na	na	50 U	50 U	10 U	10 U	10 U	10 U	3.3 U	10 U	2 U	10 U	0.6 U	10 U	0.6 U	10 U	0.6 U	10 U	5.7 U	na	3.5

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] U = Not detected.
[c] na = Not analyzed.

Table B-1.2
Sacred Spring

Date Collected		8/1/78	5/16/91	7/12/94	5/29/97	5/29/97	8/8/97	8/8/97	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00
Field Prep		filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered
Sample ID		LA-4	VA-348	VA-442	PP97-20	PP97-20	0816-97-1054	0816-97-1055	PP98-16	PP98-16	RE16-98-9000	RE16-98-9000	RE16-98-9001	RE16-98-9001	RE16-98-9002	RE16-98-9002	RE16-98-9034	RE16-98-9034	RE16-98-9035	RE16-98-9035	CABG-99-0007	CABG-99-0007	CABG-00-0057
Lab[a]		Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																						
Aluminum	µg/L	na[b]	100 U[c]	40	60	280	1874.73	115.05	20 U	40	55.2 U	200	17.4 U	20 U	17.4 U	20 U	305 U	1660.4	32.4 U	20 U	21 U	15	3.2 U
Antimony	µg/L	na	100 U	0.2 U	0.2 U	0.2 U	0.2	0.1 U	0.1 U	0.2 U	5.2 U	0.3	5.2 U	0.3	5.2 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.72 U	0.1 U	0.68 U
Arsenic	µg/L	na	50 U	2.6	1.8	1.9	2.3	2.2	3.1	4.2	3.9	2.6	3.8	1.7	2.8	1.6	3.5	2.4	3.8	1.7	2.6 U	2.4	3.1
Barium	µg/L	120 U	50	110	104	112	109.47	98.55	86	85	105	110	101	100	101	100	111	100	102	94	110	110	110
Beryllium	µg/L	na	na	na	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.49 U	2 U	0.54 U	2 U	0.2 U	2 U	0.67 U	2 U	0.02	1 U	0.02
Boron	µg/L	50 U	10 U	25	32	31	33.37	29.8	27	29	38.4 U	31	51.1 U	37	36.8 U	36	na	35	na	33	18	35	42
Cadmium	µg/L	30	1	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U
Calcium	µg/L	22000	21800	20400	22700	22400	20935.11	21132.2	38100	37300	20300	21300	19900	21700	19900	21500	25800	24800	24400	24200	23000	23100	20000
Cesium	µg/L	na	10 U	2	2 U	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Chromium	µg/L	30 U	2	2 U	2 U	2 U	4	3	2	2	2.9 U	2 U	2.4 U	2 U	2.4 U	2 U	0.3 U	2	0.3 U	2 U	0.32 U	1 U	0.38 U
Cobalt	µg/L	60 U	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.7 U	2 U	0.7 U	2 U	0.7 U	2 U	0.56 U	2 U	0.51 U	2 U	0.38 U	1 U	0.58 U
Copper	µg/L	40 U	7	9	2 U	2	13	9	2 U	2	1	2 U	1.2	2	1.1	2	1.6 U	2 U	0.3 U	2 U	0.28 U	2	0.56 U
Iron	µg/L	40 U	20 U	80	80	250	1298.95	131.12	10 U	40	139 U	220	57.4 U	30	59.1 U	40	589	1240	112 U	80	87 U	120	110 U
Lead	µg/L	na	na	20 U	2 U	2 U	2 U	2 U	2 U	2 U	1.3 U	2 U	1.3 U	2 U	1.3 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.01 U
Lithium	µg/L	40	20	40	30	30	20	20	40	30	na	30	na	40	na	30	na	30	na	30	na	36	na
Magnesium	µg/L	500	290	470	430	480	1008.3	610.58	2090	2060	492 U	470	462 U	420	460 U	420	552	870	439	440	520 U	400	340
Manganese	µg/L	20 U	20 U	10 U	12	14	56.45	57.43	2 U	2 U	9	9	8	7	9.4	7	30.8	35	25	23	20	19	11
Mercury	µg/L	na	100 U	0.2 U	0.1 U	0.02	0.01 U	0.1 U	0.05 U	0.05 U	0.02 U	0.05 U	0.02 U	0.08	0.02 U	0.05R[d]	0.02 U	0.07	0.02 U	0.05 U	0.01 U	0.24	0.01 U
Molybdenum	µg/L	100 U	4	2	2 U	2 U	2	2 U	2 U	2 U	4.9 U	2 U	4.9 U	2 U	4.9 U	2 U	na	3	na	2 U	na	2	na
Nickel	µg/L	na	20 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	0.92 U	2 U	1.6 U	4	1.6 U	2	1.3 U	2 U	1.2 U	2 U	1.1	1 U	7.8
Potassium	µg/L	2500	3000	2540	2300	2260	5010	5070	2640	2430	2960	2500	2860	2720	2890	2700	3440	2980	3330	2830	3800	3170	3200
Rubidium	µg/L	na	50 U	0.2 U	2 U	2	3	2	2	2	na	2	na	2	na	2	na	6	na	2	na	2	na
Selenium	µg/L	na	10 U	10 U	0.2 U	0.2 U	0.1	0.1 U	0.1 U	0.1 U	3.1 U	0.1 U	3.1 U	0.1 U	3.1 U	0.1 U	2.9 U	0.2	2.9 U	0.1 U	2.8 U	0.1 U	3.5 U
Silver	µg/L	60 U	1 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	0.6 U	1 U	0.6 U	1 U	0.44 U	1 U	0.87 U
Sodium	µg/L	20000	23400	24200	23600	22800	18500	18400	21700	20800	19600	21700	19400	22700	19300	22800	21100	22700	21000	22900	22000	25200	22000
Strontium	µg/L	420	460	460	490	490	460.08	442.49	460	460	462	450	468	450	464	450	na	500	na	490	na	510	na
Thallium	µg/L	na	100 U	na	2 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	5.2 U	2 U	5.2 U	2 U	2.6 U	2 U	2.6 U	2 U	0.94	1 U	1.51
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	µg/L	na	na	na	5 U	5 U	5 U	5 U	5 U	5 U	12.8 U	5 U	12.8 U	5 U	12.8 U	5 U	na	5 U	na	5 U	na	1 U	na
Titanium	µg/L	na	na	na	2 U	5	41.57	5.43	2 U	4	1.8	6	1.8 U	2 U	1.8 U	2 U	na	44	na	2 U	na	2 U	na
Uranium	µg/L	na	na	na	na	na	na	na	na	na	0.55	na	0.57	na	0.56	na	na	na	na	na	0.77	0.7	0.4
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.77	na	0.4
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.65	na	0.43
Vanadium	µg/L	20	50	10 U	2 U	2	2.71	1.83	15	15	5 U	9	4 U	10	4.1 U	8	3.5	6	1.9	2 U	2.9	3	1.6
Zinc	µg/L	na	na	na	10 U	10 U	10 U	10 U	10 U	10 U	1.4 U	10 U	3.9 U	10	2.6 U	10	1.7	10 U	0.6 U	10 U	4.5 U	na	1 U

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CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis

[b] na = Not analyzed.

[c] U = Not detected.

Table B-1.3
Otowi #4

Date Collected		3/2/93	5/20/93	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	2/26/98	2/26/98	2/26/98	2/26/98	9/28/98	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		OT-4	PP93-22	PP97-16	PP97-16	PP97-17	0816-97-1097	0816-97-1098	0816-98-0040	0816-98-0040	0816-98-0041	0816-98-0041	RE16-98-9011	RE16-98-9011	RE16-98-9012	RE16-98-9012
Lab[a]		Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES
Analyte	**Units**															
Aluminum	µg/L	100 U[b]	100	30	50	50	3695.59	10 U	10.2R[c]	20 U	10.2R	20	13.8 U	20 U	14.4 U	20 U
Antimony	µg/L	na[d]	na	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	2.7 U	0.1 U	2.7 U	0.1 U
Arsenic	µg/L	50 U	50 U	1.9	1.8	1.8	1.6	1.5	2.8	1.9	2.7	1.6	3 U	1.9	3 U	1.8
Barium	µg/L	50	50	48	49	47	53.02	37.76	44.1	42	44.1	43	48.5	52	48.1	51
Beryllium	µg/L	na	na	2 U	2 U	2 U	2 U	2 U	0.2 U	2 U	0.27 U	2 U	0.3 U	2 U	0.3 U	2 U
Boron	µg/L	50 U	110	48	50	48	8.32	8	51 U	52	50.2 U	51	na	49	na	50
Cadmium	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U
Calcium	µg/L	21000	20700	21200	20800	21000	19831.78	20108.95	20700	21400	20700	21000	21500	21700	21500	21100
Cesium	µg/L	0	0	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U
Chromium	µg/L	7	7	6	7	6	4	4	2.2	7	2.2	5	3.2	8	44.7	6
Cobalt	µg/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U
Copper	µg/L	4	2 U	5	5	5	5	2 U	3.8	2	0.6 U	3	0.97 U	3	4.6 U	2
Iron	µg/L	10 U	10 U	10 U	10 U	10 U	2024.02	10 U	66.9 U	10 U	56.2 U	120	49.7 U	10 U	187 U	10 U
Lead	µg/L	na	40	2	2	2 U	4	2 U	1.4 U	2 U	1.4 U	2 U	1 U	2 U	1 U	2 U
Lithium	µg/L	50	50	40	40	40	30	30	na	40	na	40	na	50	na	40
Magnesium	µg/L	8060	7230	8230	8180	8290	7303.6	7413.46	8180	7920	8170	7740	8430	8330	8430	8210
Manganese	µg/L	10 U	10 U	2 U	2 U	2	142.8	2 U	0.65 U	2 U	0.37 U	2 U	0.75 U	2 U	2.2 U	2 U
Mercury	µg/L	na	na	0.1 U	0.03	0.03	0.01 U	0.1 U	0.02R	0.02 U	0.02R	0.05 U	0.02R	0.03	0.02R	0.02 U
Molybdenum	µg/L	na	na	2 U	2 U	2 U	2 U	2 U	2.9 U	2 U	2.9 U	2 U	na	2 U	na	2 U
Nickel	µg/L	20 U	10 U	2 U	2 U	2 U	2 U	2 U	1.7 U	2 U	1.6 U	2 U	1.8 U	2 U	19.8	2 U
Potassium	µg/L	3560	3490	3690	3540	3720	3170	3150	3500	3255.23	3520	3450	3930	3470	3920	3650
Rubidium	µg/L	100 U	100 U	6	7	7	9	8	na	8	na	8	na	7	na	7
Selenium	µg/L	na	na	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	3.1 U	0.6	3.1 U	0.1 U	2.6 U	0.3	2.6 U	0.1 U
Silver	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.8 U	1 U	0.8 U	1 U
Sodium	µg/L	21000	20400	22400	21700	22400	19000	19000	20500	19800	20500	20900	19600	21000	19600	21900
Strontium	µg/L	150	240	140	140	140	85.09	85	113	110	111	110	na	150	na	150
Thallium	µg/L	na	na	2 U	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	3.1 U	2 U	3.1 U	2 U
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tin	µg/L	na	na	5 U	5 U	5 U	5 U	5 U	14.1 U	5 U	19.6 U	5 U	na	5 U	na	5 U
Titanium	µg/L	na	na	2 U	2 U	2 U	78.94	5.54	1.3 U	2 U	1.3 U	2 U	na	2 U	na	2 U
Uranium	µg/L	na	na	na	na	na	na	na	0.75	na	0.78	na	na	na	na	na
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Vanadium	µg/L	150	20	15	14	14	4.25	13.45	14.8	14	14.3	12	14.6	15	15	16
Zinc	µg/L	na	na	60	60	80	28.07	57.25	66.8	50	78.9	60	46.3	70	42	70

[a] Pre-1997 = laboratory
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CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] U = Not detected.
[c] R = Rejected.
[d] na = Not analyzed.

Table B-1.4
La Mesita Spring

Date Collected		5/21/97	5/21/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		PP97-15	PP97-15	0816-97-1038	0816-97-1039	0816-98-0046	0816-98-0046	0816-98-0047	0816-98-0047	RE16-98-9013	RE16-98-9013	RE16-98-9014	RE16-98-9014	RE16-98-9015	RE16-98-9015	CABG-99-0006	CABG-99-0006	CABG-00-0056
Lab[a]		EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																	
Aluminum	µg/L	70	550	155.3	10 U[b]	36.1 U	20 U	35.1 U	20 U	30.9 U	520	28.6 U	20 U	26.2 U	20 U	28 U	29	4.2
Antimony	µg/L	0.2 U	0.2 U	0.1 U	0.1 U	11.7 U	0.5	9.7 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.9 U	1	0.68 U
Arsenic	µg/L	0.7	0.6	0.5	0.5	1.9	1.4	1.7 U	0.6	2.4 U	0.6	2.4 U	0.5	2.4 U	0.5	2.6 U	0.8	3 U
Barium	µg/L	94	102	132.65	129.15	94.2	95	98.8	95	104	96	105	94	105	94	100	110	100
Beryllium	µg/L	2 U	2 U	2 U	2 U	0.26 U	2 U	0.44 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.01	1 U	0.01 U
Boron	µg/L	46	45	54.09	55.56	53.3 U	48	63.4 U	47	na	51	na	51	na	50	28	57	45
Cadmium	µg/L	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U
Calcium	µg/L	34300	33400	42102.22	43385.95	31600	32600	31500	33000	35100	33400	34800	33400	35000	33600	31000	29400	31000
Cesium	µg/L	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Chromium	µg/L	4	4	3	3	3.9 U	3	4.2 U	3	0.86 U	3	0.87 U	2	0.79 U	2	1.6	1	1.4
Cobalt	µg/L	2 U	2 U	2 U	2 U	0.82	2 U	1	2 U	0.5 U	2 U	0.72 U	2 U	0.5 U	2 U	1	1 U	0.58 U
Copper	µg/L	2 U	3	3	2	1.2	2 U	3.2	2 U	0.62 U	2	0.3 U	2 U	0.3 U	2 U	0.28 U	1 U	0.75
Iron	µg/L	10 U	330	134.07	6.48	70.9 U	20	39 U	20	43.4 U	360	27.3 U	10 U	28 U	10 U	29 U	120	47 U
Lead	µg/L	2 U	2 U	2 U	2 U	1.3 U	2 U	1.3 U	2 U	1.1 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.01 U
Lithium	µg/L	30	30	40	30	na	30	na	30	na	30	na	30	na	30	na	35	na
Magnesium	µg/L	1370	1400	1728.43	1743.51	1310	1220	1290	1240	1240	1380	1210	1230	1220	1220	1300	1340	1000
Manganese	µg/L	2 U	14	4.19	1.62	2.4	2 U	1.3 U	2 U	1.6	8	0.93	2 U	1.6	2 U	12	18	2
Mercury	µg/L	0.1 U	0.01 U	0.01 U	0.1 U	0.02 U	0.05 U	0.02 U	0.05 U	0.02 U	0.13	0.02 U	0.15	0.02 U	0.13	0.01 U	0.05 U	0.01 U
Molybdenum	µg/L	2 U	2 U	2	2	na	2 U	na	2 U	na	4	na	3	na	3	na	1	na
Nickel	µg/L	2 U	2 U	2 U	2 U	0.56 U	3	1.1 U	2 U	1.1 U	2 U	1.2 U	2 U	1.2 U	2 U	0.91	1 U	1.4 U
Potassium	µg/L	2630	2530	2880	2890	2970	2500	2960	2660	3240	2560	3220	2560	3250	2630	3100	2780	5500
Rubidium	µg/L	2	2	3	4	na	2	na	2	na	3	na	2	na	2	na	2	na
Selenium	µg/L	0.2 U	0.2 U	0.2	0.1 U	3.1 U	0.2	3.1 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	2.8 U	0.8	3.5 U
Silver	µg/L	1 U	1 U	1 U	1 U	1.2 U	1 U	1.2 U	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U	1 U	0.28 U	1 U	0.87 U
Sodium	µg/L	31500	30200	35473.35	35054.67	26500	29100	26300	30400	27900	30500	27800	30700	28100	31000	28000	30500	29000
Strontium	µg/L	760	760	1050.29	1030.01	na	710	na	720	na	720	na	730	na	720	na	710	na
Thallium	µg/L	2 U	2 U	2 U	2 U	5.2 U	2 U	5.4 U	2 U	2.6 U	2 U	2.6 U	2 U	2.6 U	2 U	2.91	1 U	1.36
Thorium	µg/L	na[c]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	µg/L	5 U	5 U	5 U	5 U	na	5 U	na	5 U	na	5 U	na	5 U	na	5 U	na	1 U	na
Titanium	µg/L	2 U	18	6	2 U	na	2 U	na	2 U	na	24	na	2 U	na	2 U	na	2 U	na
Uranium	µg/L	na	na	na	na	8.6	na	9.1	na	na	na	na	na	na	na	9.1	10.7	8.73
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	9.1	na	8.73
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	8.8	na	9
Vanadium	µg/L	4	3	3.78	3.13	4.2 U	9	3.6 U	5	3.5	6	3.1	3	3.5	3	4.4	3	2.8
Zinc	µg/L	10 U	10 U	10 U	11.78	2.6 U	10 U	2.6 U	10 U	0.6 U	10 U	0.6 U	10 U	0.6 U	10 U	3.5 U	na	2.2 U

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CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] U = Not detected.
[c] na = Not analyzed.

Table B-1.5
Guaje #5

Date Collected		10/22/91	8/18/92	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	9/28/98	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		VA-370	G-5	PP97-18	PP97-18	PP97-19	0816-97-1099	0816-97-1100	RE16-98-9009	RE16-98-9009	RE16-98-9010	RE16-98-9010
Lab[a]		Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES
Analyte	Units											
Aluminum	μg/L	na[b]	na	40	90	60	36.13	10.18	14.1 U[c]	20 U	23.1 U	20 U
Antimony	μg/L	100 U	100 U	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	2.7 U	0.1 U	2.7 U	0.1 U
Arsenic	μg/L	50 U	50 U	2.8	2.3	2.2	2.2	2.3	3 U	2.2	3 U	2.2
Barium	μg/L	10 U	10 U	11	11	11	15.03	16.19	12.8	14	12.8	14
Beryllium	μg/L	na	na	2 U	2 U	2 U	2 U	2 U	0.3 U	2 U	0.3 U	2 U
Boron	μg/L	20 U	50 U	13	15	15	16.02	16.21	na	20	na	16
Cadmium	μg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U	1 U	0.2 U	1 U
Calcium	μg/L	17000	17200	17000	17200	17400	16944.22	17060.44	17700	17200	17800	18100
Cesium	μg/L	0	0	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U
Chromium	μg/L	5	6	3	3	3	4	4	1.9	4	1.8	4
Cobalt	μg/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U
Copper	μg/L	5	2 U	2 U	6	2 U	8	2 U	13	23	2.4 U	3
Iron	μg/L	20 U	10 U	10 U	10	10 U	9.43	10 U	46.9 U	10	44 U	10 U
Lead	μg/L	2	2	2 U	2 U	2 U	2 U	2 U	1 U	2 U	1 U	2 U
Lithium	μg/L	10 U	10	20	20	20	10	20	na	20	na	20
Magnesium	μg/L	4040	3770	3720	3720	3840	3645.95	3699.42	4010	3890	4030	4000
Manganese	μg/L	10 U	10 U	2 U	2 U	2 U	2 U	2 U	0.26 U	2 U	0.24 U	2 U
Mercury	μg/L	na	na	0.1 U	0.01 U	0.01 U	0.01 U	0.1 U	0.02R[d]	0.04	0.02R	0.04
Molybdenum	μg/L	na	na	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U
Nickel	μg/L	2	2 U	2 U	2 U	2 U	2 U	2 U	1.3 U	2 U	1.8 U	2 U
Potassium	μg/L	2150	2140	2110	1960	2100	1980	1990	2190	1980	2220	2050
Rubidium	μg/L	6	4	4	4	5	3	4	na	5	na	5
Selenium	μg/L	na	na	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	2.6 U	0.1 U	2.6 U	0.1 U
Silver	μg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.8 U	1 U	0.8 U	1 U
Sodium	μg/L	12000	12300	12600	12000	12500	12100	12100	10400	11800	10400	12100
Strontium	μg/L	60	140	100	100	100	117.06	118.48	na	110	na	110
Thallium	μg/L	na	na	2 U	2 U	2 U	2 U	2 U	3.1 U	2 U	3.4 U	2 U
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na
Tin	μg/L	na	na	5 U	5 U	5 U	5 U	5 U	na	5 U	na	5 U
Titanium	μg/L	na	na	2 U	2 U	2 U	6.88	5.87	na	2 U	na	2 U
Uranium	μg/L	na	na	na	na	na	na	na	na	na	na	na
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na
Vanadium	μg/L	na	na	12	12	11	9.64	13.02	11.4	4	11.2	12
Zinc	μg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15.5	10 U	4.2 U	10 U

[a] Pre-1997 = laboratory
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NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis

[b] na = Not analyzed.

[c] U = Not detected

[d] R = Rejected.

Table B-1.6
Water Canyon Gallery

Date Collected		8/1/78	8/18/92	5/20/93	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	2/9/98	2/9/98	2/9/98	7/8/98	7/8/98	7/8/98	7/8/98	1/5/00	1/5/00	3/30/00	3/30/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		LA-1	WCG	PP93-27	SSite96-14	PP97-8	PP97-8	0816-97-1040	0816-97-1041	0816-98-0005	0816-98-0005	0816-98-0006	0816-98-0006	0816-98-0007	0816-98-0007	RE16-98-9026	RE16-98-9026	RE16-98-9027	RE16-98-9027	CABG-00-0014	CABG-00-0014	CABG-00-0049	CABG-00-0050
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	CL
Analyte	Units																						
Aluminum	µg/L	na[b]	na	200	150	1830	2740	3733.27	1930.42	510	390	125 U[c]	50	115 U	100	98.7 U	274.38	28 U	64.24	86 U	59	110	110
Antimony	µg/L	na	na	na	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.68 U	0.1 U	0.68 U	0.68 U
Arsenic	µg/L	na	50 U	50 U	0.4	0.2 U	0.2 U	0.5	0.3	2.5 U	0.9	2.5 U	0.4	2.5 U	0.4	2.4 U	0.2	2.4 U	0.3	2.3 U	0.4	2.3 U	2.3 U
Barium	µg/L	120 U	10	20	10	20	23	24.54	17.59	19.5	13	11.3	12	10.9	12	13.5	13	12.5	12	11	10	11	11
Beryllium	µg/L	na	na	na	2 U	2 U	2 U	2 U	2 U	0.66 U	2 U	0.64R[d]	2 U	0.59 U	2 U	0.51 U	2 U	0.66 U	2 U	0.01 U	1 U	0.01 U	0.01 U
Boron	µg/L	50 U	50 U	10 U	4	2 U	2 U	8.67	8.37	7.9 U	5	7.9 U	5	7.9 U	5	na	7	na	7	17 U	5	17 U	17 U
Cadmium	µg/L	30 U	1 U	1	0.2 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U	0.13 U
Calcium	µg/L	7000	7200	6940	6180	7480	7910	7175.3	7411.24	6240	7050	6170	7130	6170	7040	6530	6790	6550	6850	6400	6740	6300	6200
Cesium	µg/L	na	0	0	0	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na	na
Chromium	µg/L	30 U	3	2 U	2 U	2	3	4	2 U	0.9 U	2	0.9 U	2 U	0.9 U	2 U	0.36 U	2 U	0.35 U	2 U	1.4 U	1	1.2	0.99
Cobalt	µg/L	60 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U	0.44	1 U	0.64	0.39 U
Copper	µg/L	40 U	2 U	2	2 U	2 U	2	6	3	0.6R	10	0.6R	6	0.6R	4	0.57 U	2 U	0.3 U	2 U	0.42 U	1 U	0.58	0.42 U
Iron	µg/L	40 U	10 U	50	50	700	1050	1782.16	922.45	221 U	130	85 U	20	80.6 U	40	66.5 U	100	30.3 U	20	7.3 U	30	60	49
Lead	µg/L	na	na	70	50 U	2 U	2 U	2 U	2 U	1.4 U	4	1.4 U	2 U	1.4 U	2 U	1.1 U	2	1.1 U	2 U	0.01 U	1 U	0.01 U	0.01 U
Lithium	µg/L	20	10 U	10	20	10 U	10 U	10	10 U	na	10 U	na	10	na	10 U	na	10 U	na	10 U	na	8	na	na
Magnesium	µg/L	3300	3050	2790	3150	3190	3380	3079.85	2891.88	3020	3050	2950	3070	2950	3040	3200	3070	3210	3070	3100	2990	3100	3000
Manganese	µg/L	20 U	10 U	10 U	10 U	6	7	8.37	5.31	5.4	2 U	0.31	2 U	0.25	2 U	0.37R	2 U	0.05R	2 U	0.25 U	1 U	0.19	0.06
Mercury	µg/L	na	na	na	0.2 U	0.2 U	0.03	0.01 U	0.1 U	0.02 U	0.09	0.02 U	0.05 U	0.03	0.05 U	0.02 U	0.07	0.02 U	0.06	0.01 U	0.05 U	0.01 U	0.01 U
Molybdenum	µg/L	100 U	9	na	2 U	2 U	2 U	2 U	2 U	2.9 U	2 U	2.9 U	2 U	2.9 U	2 U	na	2	na	2 U	na	1 U	na	na
Nickel	µg/L	na	20 U	10 U	20	2 U	2 U	2 U	2 U	0.96	2 U	1	2 U	0.82	2 U	1.2 U	2 U	0.82 U	2 U	0.76	1 U	0.54 U	0.54 U
Potassium	µg/L	1400	1720	1790	1750	2180	2090	2030	1840	1590	1544.29	1570	1640	1570	1650	1820	1420	1840	1510	1600	1500	1500	1500
Rubidium	µg/L	na	100 U	100 U	0.1 U	5	5	6	5	na	4	na	4	na	4	na	4	na	4	na	3	na	na
Selenium	µg/L	na	20 U	na	10 U	0.5 U	0.5 U	0.1	0.1 U	3.1 U	0.2 U	3.1 U	0.1 U	3.1 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	3.8 U	0.1 U	3.8 U	3.8 U
Silver	µg/L	30 U	1 U	1 U	0.2 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	4	0.6 U	1 U	0.64 U	1 U	0.81	1.1
Sodium	µg/L	5800	6300	4900	5990	5350	5080	4770	4780	5640	5660	5600	5880	5570	5930	5270	5540	5230	5750	5200	5540	5300	5300
Strontium	µg/L	50	70	70	50	65	67	69.13	69.8	47.6	50	46.2	49	46.5	49	na	50	na	52	na	42	na	na
Thallium	µg/L	na	na	na	na	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	3.8 U	2 U	2.6 U	2 U	3.8 U	2 U	0.03 U	1 U	0.66 U	0.79
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na	na
Tin	µg/L	na	na	na	5	5 U	5 U	5 U	5 U	14.1 U	5 U	14.1 U	5 U	14.1 U	5 U	na	5 U	na	5 U	na	1 U	na	na
Titanium	µg/L	na	na	na	0	34	47	63.3	10.79	10.6	9	3.3	2 U	2.7 U	2 U	na	6	na	2 U	na	2 U	na	na
Uranium	µg/L	na	na	na	5	na	na	na	na	0.25	na	0.22	na	0.22	na	na	na	na	na	0.2	0.2	0.2	0.2
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.2	na	0.2	0.2
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.23	na	0.21	0.21
Vanadium	µg/L	10 U	20	50	10 U	6	6	4.02	2.98	3.8	2	3.8	2	3.8	4	3.7	3	3.7	2 U	4.5	4	4.6	4.3
Zinc	µg/L	na	na	na	na	10	10 U	10 U	7.46	0.8 U	10 U	0.8 U	10 U	0.8 U	10 U	0.6 U	10 U	0.6 U	10 U	1.9	na	0.51 U	0.51 U

[a] Pre-1997 = laboratory
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NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-1.7
Upper Cañon de Valle Spring

Date Collected		7/18/96	5/13/97	5/13/97	5/13/97	8/4/97	8/4/97	2/23/98	2/23/98	2/23/98	2/23/98	7/1/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	4/5/00
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered
Sample ID		CDV-5.0	PP97-11	PP97-12	PP97-12	0816-97-1031	0816-97-1032	0816-98-0034	0816-98-0034	0816-98-0035	0816-98-0035	RE16-98-9028	RE16-98-9028	RE16-98-9029	RE16-98-9029	CABG-00-0015	CABG-00-0015	CABG-00-0058
Lab[a]		Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	**Units**																	
Aluminum	µg/L	500	4140	4580	4800	1105.74	777.59	79.8	270	16.9	130	1050	1562.15	46 U[b]	20 U	170 U	100	5
Antimony	µg/L	6 U	0.5 U	0.5 U	0.5 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.68 U	0.1 U	0.68 U
Arsenic	µg/L	10 U	0.3	0.3	0.3	0.2	0.2	2.5 U	0.8	2.5 U	0.3	2.4 U	1.2	2.4 U	0.2	2.3 U	0.4	3 U
Barium	µg/L	100 U	43	43	47	27.88	24.15	22.4	22	21.6	21	29.9	27	48.9	18	24	20	22
Beryllium	µg/L	5 U	2 U	2 U	2 U	2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.02	1 U	0.01 U
Boron	µg/L	100 U	7	7	8	6.08	7.33	7.9 U	6	7.9 U	8	na[c]	8	na	8	17 U	5	13
Cadmium	µg/L	5 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U
Calcium	µg/L	10000	7330	7320	7300	8301.72	8351.98	8240	8410	8270	8470	8110	7760	8470	7590	8500	8710	7900
Cesium	µg/L	na	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Chromium	µg/L	10 U	2 U	2 U	2 U	2	2 U	0.9 U	2 U	0.9 U	2 U	0.3 U	5	0.3 U	2 U	0.37 U	1 U	0.7
Cobalt	µg/L	10 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.53 U	2 U	0.39 U	1 U	0.58 U
Copper	µg/L	10 U	5	2	8	7	4	1.2 U	6	0.95 U	3	1.3 U	6	2.1 U	3	0.42 U	1 U	1.2
Iron	µg/L	100 U	1470	1560	1740	394.62	265.02	118 U	100	91 U	50	374	550	33.4 U	10 U	36 U	50	58 U
Lead	µg/L	150	2	2	2	2 U	2 U	1.4 U	2	1.4 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	2.81
Lithium	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	na	10 U	na	10 U	na	10 U	na	10 U	na	2	na
Magnesium	µg/L	4000	2600	2600	2630	3148.02	3042.1	3140	2930	3120	2950	2970	2800	3010	2750	3200	2940	2900
Manganese	µg/L	10 U	9	9	11	3.28	2.73	1.2 U	2 U	0.44 U	2 U	3	4	0.05R	2 U	2.5 U	1 U	1.8
Mercury	µg/L	0.2 U	0.2 U	0.2 U	0.02	0.01 U	0.1 U	0.02R[d]	0.02 U	0.02R	0.05 U	0.02R	0.13	0.02R	0.08	0.01	0.05 U	0.01 U
Molybdenum	µg/L	10 U	2 U	2 U	2 U	2 U	2 U	2.9 U	13	2.9 U	2 U	na	2	na	2	na	1 U	na
Nickel	µg/L	na	2 U	2 U	2 U	2 U	2 U	1.4 U	2 U	1.4 U	2 U	1.7 U	3	1.6 U	2 U	2.6	1 U	1.7 U
Potassium	µg/L	3000	2740	2700	2640	2470	2550	2450	2299.77	2430	2440	2480	2260	2470	2280	2400	2380	2500
Rubidium	µg/L	20 U	8	8	12	6	7	na	8	na	7	na	9	na	6	na	5	na
Selenium	µg/L	na	0.5 U	0.5 U	0.5 U	0.1 U	0.1 U	3.1 U	1	3.1 U	0.1 U	2.9 U	0.1	2.9 U	0.1 U	3.8 U	0.1 U	3.5 U
Silver	µg/L	10 U	1 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	1 U	0.6 U	1 U	0.64 U	1 U	0.87 U
Sodium	µg/L	5000	4430	4420	4280	4920	4940	4880	4780	4800	5000	4140	4130	4110	4310	4600	4670	4800
Strontium	µg/L	90	69	70	72	90.42	90.33	69.4	71	69	72	na	66	na	64	na	76	na
Thallium	µg/L	na	2 U	2 U	2 U	2 U	2 U	9 U	2 U	9.8 U	2 U	2.6 U	2 U	2.8 U	2 U	0.03 U	1 U	0.03 U
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	µg/L	na	5 U	5 U	5 U	5 U	5 U	14.1 U	5 U	14.1 U	5 U	na	14	na	5 U	na	1 U	na
Titanium	µg/L	10 U	94	96	80	17.47	4.06	2.2	4	1.3 U	2 U	na	29	na	2 U	na	3	na
Uranium	µg/L	10 U	na	na	na	na	na	0.15	na	0.13	na	na	na	na	na	0.14	0.2 U	0.11
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.14	na	0.11
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.17	na	0.14
Vanadium	µg/L	20 U	4	4	6	3.51	2.88	4.3	2	4.5	3	4.2	5	3.6	3	4.1	4	3.9
Zinc	µg/L	130	20	10	20	10 U	17.09	3.2 U	10 U	1.4 U	10 U	1.2	10 U	1.4	10 U	2.3	na	3.6

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NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] U = Not detected.
[c] na = Not analyzed.
[d] R = Rejected.

Table B-1.8
Spring 9b

Date Collected		4/12/95	4/12/95	4/22/97	4/22/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	4/6/00
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	filtered	filtered	filtered	filtered
Sample ID		PP95-129	s9b950412	PP97-2	PP97-2	0816-97-1052	0816-97-1053	0816-98-0003	0816-98-0003	0816-98-0004	0816-98-0004	RE16-98-9007	RE16-98-9008	RE16-98-9008	CABG-00-0020	CABG-00-0020	CABG-00-0060
Lab[a]		Pre-1997	Pre-1997	EES	EES	EES	EES	CL	EES	CL	EES	EES	CL	EES	CL	EES	CL
Analyte	Units																
Aluminum	μg/L	30	200 U[b]	40	60	35.32	31.6	11 U	40	10.2 U	20	20 U	16.8 U	20 U	61 U	3	3.2 U
Antimony	μg/L	2 U	5 U	0.1 U	0.1 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	0.1 U	2.5 U	0.1 U	0.68 U	0.2	0.68 U
Arsenic	μg/L	2	100 U	1.6	1.6	1.4	1.4	2.5 U	2.2	2.5 U	1.9	1.4	2.4 U	1.5	2.3 U	1.3	3 U
Barium	μg/L	10 U	10 U	4	4	4.82	5.61	3.6	5	3.6	4	4	3.8 U	4	4.3	4	3.5
Beryllium	μg/L	2 U	5 U	2 U	2 U	2 U	2 U	0.7 U	2 U	0.65 U	2 U	2 U	0.2 U	2 U	0.01 U	1 U	0.01 U
Boron	μg/L	12	10	12	9	9.65	9.49	10.4 U	14	9.2 U	9	9	na	12	17 U	12	12
Cadmium	μg/L	0.2 U	5 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U
Calcium	μg/L	10100	9000	10100	9550	9502.9	9546.38	9050	10300	9090	10100	9550	9740	9680	9500	9820	9100
Cesium	μg/L	0	na[c]	2 U	2 U	2 U	2 U	na	2 U	na	2 U	2 U	na	2 U	na	1 U	na
Chromium	μg/L	4	10 U	6	7	8	6	1.4	16	1.4	4	7	3	7	3.9	3	3.4
Cobalt	μg/L	2 U	10 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	2 U	0.5 U	2 U	0.39 U	1 U	0.58 U
Copper	μg/L	3	10 U	3	3	2	2 U	0.9 U	8	0.9 U	3	2	0.86 U	2	0.42 U	1	0.56 U
Iron	μg/L	10 U	100 U	10 U	30	28.53	10 U	41.1 U	20	37.4 U	10 U	10 U	44.7 U	10 U	7.3 U	20	50 U
Lead	μg/L	50 U	na	2 U	2 U	2 U	2 U	1.4 U	2 U	1.4 U	2 U	2 U	1.1 U	2 U	0.01 U	1 U	0.01 U
Lithium	μg/L	20	30	30	20	20	20	na	20	na	30	30	na	30	na	25	na
Magnesium	μg/L	3020	3000	3480	2990	2871.32	2826.07	2760	2900	2770	2870	2970	3040	3010	3000	2830	2800
Manganese	μg/L	10 U	10 U	2 U	2 U	2 U	2 U	0.2 U	2 U	0.2 U	2 U	2 U	0.44 U	2 U	0.07 U	1 U	0.1 U
Mercury	μg/L	0.2 U	0.2 U	0.02 U	0.01 U	0.01 U	0.1 U	0.05 U	0.02 U	0.04 U	0.05 U	0.05	0.02 U	0.02 U	0.01 U	0.08	0.01 U
Molybdenum	μg/L	2 U	10 U	2 U	2	2	2 U	2.9 U	2 U	2.9 U	2 U	2 U	na	2 U	na	1	na
Nickel	μg/L	20 U	na	2 U	2 U	2 U	2 U	0.98	17	1.6	2 U	2 U	1.7 U	2 U	1.2	1 U	0.52 U
Potassium	μg/L	1560	2000	1600	1560	1470	1480	1540	1533.18	1550	1640	1520	1640	1630	1700	1500	1700
Rubidium	μg/L	2 U	20 U	2	2	2	2	na	3	na	3	2	na	2	na	2	na
Selenium	μg/L	10 U	na	0.1 U	0.1 U	0.1	0.1 U	3.3	0.2 U	3.1 U	0.1 U	0.1 U	2.9 U	0.1 U	3.8 U	0.2	3.5 U
Silver	μg/L	0.5 U	10 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	1 U	0.6 U	1 U	0.64 U	1 U	0.87 U
Sodium	μg/L	11000	9000	11000	10600	11200	11300	10500	10200	10600	10900	10900	9400	11400	9700	10300	10000
Strontium	μg/L	50	50	51	50	70.79	70.1	48.2	51	48.7	52	62	na	63	na	47	na
Thallium	μg/L	na	na	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	2 U	2.6 U	2 U	0.03 U	1 U	0.18
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	μg/L	na	na	5 U	5 U	5 U	5 U	14.6	5 U	14.1 U	5 U	5 U	na	5 U	na	1 U	na
Titanium	μg/L	0	10 U	2 U	2 U	4.43	2.72	1.3 U	2 U	1.3 U	2 U	2 U	na	2 U	na	2 U	na
Uranium	μg/L	na	10	na	na	na	na	0.25	na	0.26	na	na	na	na	0.22	0.3	0.2
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	0.22	na	0.2
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	0.28	na	0.23
Vanadium	μg/L	10 U	20 U	13	12	10.78	10.16	9.9	11	10	10	10	10.8	12	11	10	11
Zinc	μg/L	na	na	10 U	10 U	10 U	10 U	0.8 U	10 U	0.8 U	10 U	10 U	0.72 U	10 U	1	na	1.5 U

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis

[b] U = Not detected.

[c] na = Not analyzed.

Table B-1.9
Seven Springs

Date Collected		6/22/78	10/1/79	5/1/83	5/1/83	6/29/88	5/10/91	4/3/96	4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	2/10/98	2/10/98	2/10/98	2/10/98	7/6/98	7/6/98	7/6/98	7/6/98	12/20/99	12/20/99	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered
Sample ID		N10841	VA-47	VA-134	VA-138	VC2B-28	VA-333	SSite96-12	PP97-5	PP97-5	0816-97-1047	0816-97-1048	0816-97-1049	0816-98-0036	0816-98-0036	0816-98-0037	0816-98-0037	RE16-98-9036	RE16-98-9036	RE16-98-9037	RE16-98-9037	CABG-99-0008	CABG-99-0008	CABG-00-0048
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																							
Aluminum	µg/L	na[b]	na	200	200	na	100 U[c]	120	640	1070	312.4	122.75	111.64	137 U	240	88.8 U	120	342 U	437.8	21.3 U	117.8	54	91	270
Antimony	µg/L	na	na	na	na	na	100 U	0.3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	1.42	0.1 U	0.68 U
Arsenic	µg/L	na	na	na	na	50 U	50 U	0.4	0.4	0.4	0.3	0.3	0.3	2.5 U	0.3	2.5 U	0.4	2.4 U	0.4	2.4 U	0.3	2.6 U	0.4	2.3 U
Barium	µg/L	na	36	20	20	10	10	20	19	19	20.54	19.36	19.84	17.6	20	17.5	19	21.4	19	19.8	18	19	17	20
Beryllium	µg/L	na	na	na	na	na	na	2 U	2 U	2 U	2 U	2 U	2 U	0.66 U	2 U	0.65 U	2 U	0.35 U	2 U	0.21 U	2 U	0.14	1 U	0.24
Boron	µg/L	na	3 U	730	na	50 U	20 U	13	11	8	9.99	9.73	8.74	na	11	na	12	na	12	na	10	8 U	12	17 U
Cadmium	µg/L	na	30 U	3	3	0	1 U	0.2 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	1.99	1	0.13 U
Calcium	µg/L	11457	12300	12000	11000	15100	12900	12500	12500	12400	13200.25	13173.46	13093.88	12500	13600	12500	13500	14400	14000	14100	14000	13000	14100	13000
Cesium	µg/L	na	na	na	na	10 U	10 U	0	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Chromium	µg/L	25 U	1	na	na	0	11	2 U	2	2	2 U	2 U	2 U	0.9 U	2 U	0.9 U	2 U	0.3 U	2 U	0.3 U	2 U	0.32 U	1 U	0.37 U
Cobalt	µg/L	55 U	60 U	na	na	0	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U	0.38 U	1 U	0.39 U
Copper	µg/L	4 U	40 U	na	na	0	2 U	2	3	8	2 U	2 U	2 U	0.6R	8	0.6R[d]	3	0.3 U	2 U	0.3 U	2	0.28 U	1 U	0.42 U
Iron	µg/L	80	36	200	200	60	520	20	250	470	154.73	57.67	53.87	95.3 U	110	77.3 U	60	146 U	180	30.7 U	50	39	70	150 U
Lead	µg/L	na	na	na	na	na	na	50 U	2 U	3	2 U	2 U	2 U	1.4R	2 U	1.4 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.11
Lithium	µg/L	na	18	30	50	20 U	10 U	10 U	10 U	10 U	10 U	10	10 U	na	10 U	na	10	na	10 U	na	10 U	na	7	na
Magnesium	µg/L	1617	1540	1500	1400	1810	1710	1630	1610	1610	1631.24	1585.44	1602.34	1540	1620	1540	1620	1730	1690	1680	1700	1700	1660	1600
Manganese	µg/L	3 U	1	na	na	10 U	20 U	10 U	2	4	1.69	2 U	8.19	0.44	2 U	0.2 U	2 U	0.9R[d]	2 U	0.05R	2 U	1.8	1 U	1.5
Mercury	µg/L	na	na	na	na	na	100 U	0.2 U	0.02 U	0.01	0.01 U	0.1 U	0.01 U	0.02 U	0.02 U	0.02 U	0.05 U	0.02R	0.09	0.02R	0.09	0.01 U	0.17	0.01 U
Molybdenum	µg/L	25 U	1	na	na	0	na	2 U	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na
Nickel	µg/L	na	na	na	na	na	20 U	10 U	2 U	2 U	2 U	2 U	2 U	0.83	2 U	0.91	2 U	1.1 U	2 U	0.82 U	2 U	1.3	1 U	0.54 U
Potassium	µg/L	na	2100	3000	4000	2200	2400	2130	2120	2180	1980	1980	1980	1940	1944.25	1940	2040	2240	1855.37	2190	2040	2000	2060	1900
Rubidium	µg/L	na	na	na	na	50 U	100 U	0.1 U	17	17	17	17	17	na	13	na	12	na	14	na	14	na	11	na
Selenium	µg/L	na	na	na	na	na	na	10 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	3.1 U	0.2 U	3.1 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	2.8 U	0.1 U	3.8 U
Silver	µg/L	na	30 U	na	na	1 U	1 U	0.2 U	1	1	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	2	0.6 U	1 U	0.24 U	1 U	0.64 U
Sodium	µg/L	na	7230	8000	8000	6800	6300	7260	6660	6670	6480	6490	6480	6800	6850	6780	7140	5810	5350	5780	6320	6100	7010	6100
Strontium	µg/L	na	71	60	50	50	60	60	80	75	90.83	87.59	90.97	61.2	66	62.3	65	na	63	na	63	na	59	na
Thallium	µg/L	1	na	na	na	na	100 U	na	2 U	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	2.6 U	2 U	2.6 U	2 U	0.15	1 U	0.03 U
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	µg/L	4 U	na	na	na	na	na	0	5 U	5 U	5 U	5 U	5 U	14.2 U	5 U	14.1 U	5 U	na	5 U	na	5 U	na	1 U	na
Titanium	µg/L	na	na	na	na	na	na	0	12	16	7.75	3.71	3.66	na	5	na	2 U	na	7	na	2	na	2	na
Uranium	µg/L	na	na	na	na	na	na	2 U	na	na	na	na	na	0.82	na	0.82	na	na	na	na	na	0.84	0.9	0.76
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.84	na	0.76
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.92	na	0.81
Vanadium	µg/L	58	10 U	na	na	20 U	10	10	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U	0.66	1 U	0.43 U
Zinc	µg/L	na	na	na	na	na	na	na	10	10 U	10 U	10 U	10 U	0.8 U	10 U	0.8 U	10 U	1.2	10 U	0.6 U	10 U	33	na	0.58

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NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-1.10
Pine Spring

Date Collected		6/12/78	5/24/91	6/17/94	12/27/94	12/27/94	3/26/95	10/16/95	10/16/95	5/7/97	5/7/97	8/4/97	8/4/97	8/4/97	2/10/98	2/10/98	2/10/98	2/10/98	7/14/98	7/14/98	7/14/98	7/14/98	7/14/98	1/6/00	1/6/00	3/30/00	3/30/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		N10666	VA-356	VA-434	ps941227	ps941217b	ps950326	ps951016	ps951016	PP97-6	PP97-6	0816-97-1033	0816-97-1034	PP97-25	0816-98-0038	0816-98-0038	0816-98-0039	0816-98-0039	PP98-30	RE16-98-9032	RE16-98-9032	RE16-98-9033	RE16-98-9033	CABG-00-0017	CABG-00-0017	CABG-00-0051	CABG-00-0052
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	EES	CL	EES	CL	EES	CL	EES	CL	CL
Analyte	Units																										
Aluminum	μg/L	na[b]	1400	820	na	1100	1000	200 U[c]	200 U	740	10300	3749.5	2416.38	1838.65	14900	17400	8760	2350	1060	3840	4140	7.9R[d]	20 U	8700	5050	3400	870
Antimony	μg/L	na	100 U	0.2 U	na	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.68 U	0.1	0.68 U	0.68 U
Arsenic	μg/L	na	50 U	0.3	na	5 U	5 U	10 U	10 U	0.7	0.7	0.7	0.5	0.8	2.7	1.7	2.5 U	0.9	0.6	2.4 U	0.8	2.4 U	0.5	2.3 U	1.1	2.3 U	3 U
Barium	μg/L	na	50	60	na	100	100	100 U	100 U	58	72	64.35	57.05	55.9	69	76	51.6	54	43	58.9	55	45.2	42	64	59	42	29
Beryllium	μg/L	na	na	na	na	10 U	1 U	5 U	5 U	2 U	2 U	2 U	2 U	2 U	1.2 U	2 U	0.98 U	2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.01 U	1 U	0.47	0.08
Boron	μg/L	na	10 U	10	na	20	20	100 U	100 U	10	17	20.07	15.03	14.43	na	20	na	10	10	na	17	na	11	17 U	10	17 U	15
Cadmium	μg/L	na	1 U	1 U	na	5 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U	0.13 U
Calcium	μg/L	14294	10700	13400	11000	21000	11000	14000	10000	12400	12200	13630.3	13622.36	13902.9	8580	9560	8270	8960	9550	12500	13300	12500	13300	8200	8530	7300	6800
Cesium	μg/L	na	6	0	na	na	na	na	na	3	3	2 U	2 U	2 U	na	3	na	2 U	2 U	na	2 U	na	2 U	na	1 U	na	na
Chromium	μg/L	25 U	4	2 U	na	10 U	10 U	10 U	10 U	2 U	6	3	2 U	2 U	4.8	12	2.4	3	2 U	0.75 U	2	0.3 U	2 U	5	5	1.8	0.38 U
Cobalt	μg/L	59	2 U	2 U	na	10 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	1.7	2 U	1	2 U	2 U	0.5 U	2 U	0.5 U	2 U	1.4	1 U	0.51	0.58 U
Copper	μg/L	4 U	4	4	na	30	10 U	10 U	10 U	8	8	10	5	6	2.4	11	1.6	8	2	2.2 U	2	0.82 U	2 U	2.6	3	1.7	0.78
Iron	μg/L	664	4170	490	na	500	500	100 U	100 U	360	4780	1780.1	1061.51	799.71	6660	7650	3900	1280	440	1510	1680	8.8 U	10 U	4600	1910	2100	510
Lead	μg/L	na	na	70	460	na	460	460	280	2 U	2 U	2 U	2 U	2 U	1.4 U	6	1.4 U	2	2	1.1 U	2	1.1 U	2 U	0.01 U	3	1.88	0.23
Lithium	μg/L	na	10 U	10 U	na	na	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	na	10 U	na	10 U	10 U	na	10 U	na	10 U	na	4	na	na
Magnesium	μg/L	664	3550	4160	3300	4800	3600	4000	3000	4020	4150	4585.1	4450.54	4431.22	3710	3950	3190	2840	3110	4300	3980	3970	3670	2900	2760	2600	2200
Manganese	μg/L	3 U	20 U	10 U	na	70	10 U	10 U	10 U	6	21	14.42	10.42	10.22	27.1	31	15.4	9	4	9.9 U	10	3.1 U	2	21	20	10	3.5
Mercury	μg/L	na	100 U	0.2 U	na	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.02	0.01 U	0.1 U	0.01 U	0.02	0.07	0.03	0.07	0.11	0.02 U	0.07	0.02 U	0.05 U	0.01 U	0.05 U	0.01 U	0.01 U
Molybdenum	μg/L	25 U	na	2 U	na	10 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	2 U	na	2 U	na	2 U	na	1 U	na	na
Nickel	μg/L	na	20 U	20 U	na	na	na	na	na	3	2	2 U	2 U	2 U	6.2	3	5.2	3	2	3.4	2 U	1.4 U	2 U	5.6	4	1.8	1.7 U
Potassium	μg/L	na	3600	2990	4000	9000	3000	4000	3000	4420	4460	4520	4370	4210	3920	4010.71	3400	3980	3220	3980	3760	3650	3710	2900	3080	2700	2500
Rubidium	μg/L	na	50 U	0.2 U	na	60 U	60 U	20 U	20 U	4	10	7	6	5	na	22	na	5	5	na	9	na	4	na	7	na	na
Selenium	μg/L	na	10 U	10 U	na	na	na	na	na	0.5 U	0.5 U	0.1	0.1 U	0.1 U	3.1 U	0.2 U	3.1 U	0.1 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	3.8 U	0.1 U	3.8 U	3.5 U
Silver	μg/L	na	3 U	1 U	na	10 U	10 U	10 U	10 U	1 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	2	0.6 U	1 U	0.6 U	1 U	0.64 U	1 U	0.64 U	0.87 U
Sodium	μg/L	na	6400	6820	6900	14000	5100	7000	6000	6260	6070	7110	7140	7060	4700	4720	4790	4980	5610	6030	6121.61	5800	6330	4400	4620	4300	4400
Strontium	μg/L	na	80	110	na	110	90	100	70	100	100	128.89	126.66	126.32	66.5	69	62.3 U	65	69	na	85	na	83	na	63	na	na
Thallium	μg/L	na	100 U	na	na	na	na	na	na	2 U	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	2 U	9.9 U	2 U	5.5 U	2 U	0.03 U	1 U	0.34 U	0.03 U
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na	na
Tin	μg/L	11	na	na	na	na	na	na	na	5 U	5 U	5 U	5 U	5 U	14.1 U	5 U	14.1 U	5 U	5 U	na	5 U	na	5 U	na	1 U	na	na
Titanium	μg/L	na	na	na	na	10 U	10 U	10 U	10 U	100	220	62.38	19.76	15.32	na	270	na	15	9	na	81	na	2 U	na	68	na	na
Uranium	μg/L	na	na	na	na	10 U	10 U	10 U	10 U	na	na	na	na	na	0.41	na	0.25	na	na	na	na	na	na	0.96	0.4	0.25	0.07
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.96	na	0.25	0.07
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.32	na	0.26	0.08
Vanadium	μg/L	50 U	70	10 U	na	20 U	20 U	20 U	20 U	2	10	4.66	3.83	2.58	12	11	7.3	6	3	5.3	6	2.4	2	9.4	9	5	2.5
Zinc	μg/L	na	na	na	50 U	na	50 U	500 U	50 U	10 U	20	7.42	10.95	8.69	15.3	20	10	10 U	10	5 U	10 U	1.8 U	10 U	14	na	5.5	1.9 U

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis

[b] na = Not analyzed.

[c] U = Not detected.

[d] R = Rejected.

Table B-1.11
Pajarito Spring

Date Collected		7/1/79	5/9/91	11/1/91	11/1/91	3/22/94	4/5/94	9/28/94	12/15/94	3/24/95	4/27/97	4/27/97	8/7/97	8/7/97
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		VA-29	VA-330	Spring 4a	Pajarito Spring	VA-403	paj940405	PP94-83	PP94-121	paj950324	PP97-4	PP97-4	0816-97-1045	0816-97-1046
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES
Analyte	Units													
Aluminum	μg/L	na[b]	100 U[c]	na	100 U	120	100 U	50	30	200 U	60	80	37.71	30.72
Antimony	μg/L	na	100 U	na	na	1 U	5 U	0.02 U	0.2 U	5 U	0.1 U	0.1 U	0.1 U	0.1 U
Arsenic	μg/L	na	50 U	50 U	50 U	1	1	1.2	1.2	5 U	1.5	1.5	1.3	1.2
Barium	μg/L	10	40	40	40	40	100 U	40	40	100 U	41	39	42.13	39.64
Beryllium	μg/L	na	na	na	na	na	100 U	na	2 U	1 U	2 U	2 U	2 U	2 U
Boron	μg/L	50	40	50 U	50 U	20	100 U	21	20	20	22	19	22.58	19.62
Cadmium	μg/L	30 U	0	1 U	1 U	0.5 U	1 U	0.5 U	0.5 U	5 U	1 U	1 U	1 U	1 U
Calcium	μg/L	19600	19600	19600	19600	20100	20000	19500	20000	19000	20200	20700	18792.79	18668.89
Cesium	μg/L	na	10 U	0	0	0	na	0	0	na	2 U	2 U	2 U	2 U
Chromium	μg/L	18	5	4	4	5	3	4	4	10 U	5	7	7	4
Cobalt	μg/L	60 U	2 U	2 U	2 U	2 U	50 U	2 U	2 U	10 U	2 U	2 U	2 U	2 U
Copper	μg/L	40 U	2 U	3	3	6	10 U	2	2	10 U	2 U	2 U	3	2 U
Iron	μg/L	44	20 U	130	130	10 U	100 U	10 U	10 U	100 U	10 U	10 U	21.31	10 U
Lead	μg/L	na	na	na	20 U	50 U	na	50 U	50 U	150 U	2 U	2 U	2 U	2 U
Lithium	μg/L	80	30	10	10	20	na	30	30	30	40	70	30	20
Magnesium	μg/L	5300	4850	4480	4480	4420	4400	3740	4650	4500	4540	4560	4187.04	4141.97
Manganese	μg/L	2	20 U	10 U	10 U	10 U	50 U	10 U	10 U	10 U	2 U	2 U	2 U	2.06
Mercury	μg/L	na	100 U	na	na	0.2 U	0.5 U	0.4	0.2 U	0.2 U	0.02 U	0.01 U	0.01 U	0.1 U
Molybdenum	μg/L	100 U	na	na	2 U	2 U	1	2 U	2 U	10 U	2 U	2 U	2	2 U
Nickel	μg/L	na	20 U	10 U	10 U	20 U	na	20 U	20 U	na	2 U	2 U	2 U	2 U
Potassium	μg/L	2080	3100	2170	2170	2190	2000	2230	2340	2000	2270	2270	2150	2090
Rubidium	μg/L	na	100 U	na	na	0.5 U	60 U	0.2 U	0.2 U	60 U	3	3	3	4
Selenium	μg/L	na	na	na	20 U	10 U	na	10 U	10 U	na	0.1 U	0.1 U	0.1 U	0.1 U
Silver	μg/L	30 U	1 U	1 U	1 U	0.5 U	100 U	0.5 U	0.5 U	10 U	1 U	1 U	1 U	1 U
Sodium	μg/L	11800	13700	12000	12000	12400	12000	12800	12600	9700	12700	12500	12700	12600
Strontium	μg/L	132	110	130	130	130	100 U	100	100	100	130	120	133.43	129.75
Thallium	μg/L	na	100 U	na	na	na	na	na	na	na	2 U	2 U	2 U	2 U
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Tin	μg/L	na	na	na	na	na	na	na	na	na	5 U	5 U	5 U	5 U
Titanium	μg/L	na	na	na	na	na	na	na	na	10 U	2 U	2 U	4.11	3.37
Uranium	μg/L	na	na	na	na	na	100 U	na	21	10 U	na	na	na	na
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Vanadium	μg/L	1	10 U	20	20	10 U	10 U	10	10 U	20 U	6	7	6.07	5.91
Zinc	μg/L	na	na	na	na	na	na	na	na	50 U	10 U	10 U	10 U	10 U

Date Collected		2/18/98	2/18/98	2/18/98	2/18/98	2/18/98	2/18/98	7/6/98	7/6/98	7/6/98	7/6/98	1/6/00	1/6/00	3/31/00	3/31/00
Field Prep		nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		0816-98-0052	0816-98-0052	0816-98-0053	0816-98-0053	0816-98-0054	0816-98-0054	RE16-98-9030	RE16-98-9030	RE16-98-9031	RE16-98-9031	CABG-00-0016	CABG-00-0016	CABG-00-0053	CABG-00-0054
Lab[a]		CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	CL
Analyte	Units														
Aluminum	μg/L	10.2R[d]	270	10.2R	20 U	10.2R	40	7.9 U	15.15	17.5 U	24.92	60 U	2	54 U	49 U
Antimony	μg/L	3.4 U	0.1 U	3.4 U	0.1 U	3.4 U	0.4	2.5 U	0.1 U	2.5 U	0.1 U	0.68 U	0.1 U	0.68 U	0.68 U
Arsenic	μg/L	2.7 U	1.3	2.5 U	1.5	2.5 U	1.2	2.4 U	1.2	2.4 U	1.3	2.3 U	1.2	2.3 U	2.3 U
Barium	μg/L	41.7	42	41.2	39	41.1	39	41.3	36	41.6	39	40	34	39	39
Beryllium	μg/L	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.2 U	2 U	0.66	1 U	0.01 U	0.01 U
Boron	μg/L	15.5 U	22	22.4 U	22	14.1 U	22	na	22	na	22	23 U	21	28	32
Cadmium	μg/L	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.34	1 U	0.13 U	0.13 U
Calcium	μg/L	20900	21100	20700	20900	20700	21200	20800	19500	20000	19600	19000	19500	19000	19000
Cesium	μg/L	na	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na	na
Chromium	μg/L	2.4	7	2.2	6	2.4	6	2.4 U	5	2.7 U	5	4.1	4	4.1	4.2
Cobalt	μg/L	0.8 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.59 U	2 U	0.39 U	1 U	0.39 U	0.39 U
Copper	μg/L	0.6 U	3	0.6 U	3	0.6 U	3	1.3 U	2 U	0.48 U	2 U	0.42 U	1 U	0.42 U	0.42 U
Iron	μg/L	82.3 U	80	56.8 U	10 U	60 U	20	26.9 U	20	30.2 U	10 U	7.3 U	40	29 U	22 U
Lead	μg/L	1.4 U	2	1.4 U	2 U	1.4 U	2 U	1.1 U	2 U	1.1 U	2 U	2.58	1 U	0.01 U	0.01 U
Lithium	μg/L	na	30	na	30	na	30	na	30	na	30	na	28	na	na
Magnesium	μg/L	4770	4520	4710	4540	4720	4580	4680	4410	4430	4370	4400	4010	4300	4200
Manganese	μg/L	1.1	2 U	0.2 U	2 U	0.2 U	2 U	0.05R	2 U	0.05R	2 U	0.13 U	1 U	0.05 U	0.05 U
Mercury	μg/L	0.02 U	0.02 U	0.02 U	0.05 U	0.02 U	0.05 U	0.02R	0.09	0.02R	0.11	0.01 U	0.05	0.01 U	0.01 U
Molybdenum	μg/L	2.9 U	2 U	2.9 U	2 U	2.9 U	2 U	na	2	na	2 U	na	1	na	na
Nickel	μg/L	1.6 U	2 U	1.4 U	2 U	1.4 U	2 U	1.8 U	2 U	1.6 U	2 U	1.6	1 U	0.54 U	0.54 U
Potassium	μg/L	2180	2022.02	2130	2140	2150	2150	2440	1990	2440	2130	2300	1980	2200	2200
Rubidium	μg/L	na	4	na	4	na	4	na	4	na	4	na	3	na	na
Selenium	μg/L	3.1 U	0.2 U	3.1 U	0.1 U	3.1 U	0.1 U	2.9 U	0.2	2.9 U	0.1 U	3.8 U	0.1 U	3.8 U	3.8 U
Silver	μg/L	0.9 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	1 U	0.6 U	1 U	0.64 U	1 U	0.64 U	0.64 U
Sodium	μg/L	12000	11700	12000	12200	11900	12200	11200	11400	11200	12100	11000	10900	11000	11000
Strontium	μg/L	97.2	100	95.7	98	96.2	97	na	93	na	99	na	100	na	na
Thallium	μg/L	5.2 U	2 U	4.4 U	2 U	5.9 U	2 U	2.6 U	2 U	2.6 U	2 U	0.03 U	1 U	0.03 U	0.03 U
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	1 U	na	na
Tin	μg/L	14.1 U	5 U	14.1 U	5 U	14.1 U	5 U	na	5 U	na	5 U	na	1 U	na	na
Titanium	μg/L	1.3 U	9	1.3 U	2 U	1.3 U	2 U	na	2 U	na	2 U	na	2 U	na	na
Uranium	μg/L	1.17	na	1.19	na	1.18	na	na	na	na	na	0.37	1.1	0.87	0.89
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	1	0.98
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	0.37	na	0.87	0.89
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	0.98	na	1	0.98
Vanadium	μg/L	6.5	6	6.1	4	6.4	3	7.5	8	7.6	8	7.2	7	7.3	6.7
Zinc	μg/L	0.96 U	10 U	0.8 U	10 U	0.93 U	10 U	0.6 U	10	0.83	10 U	1.1	na	0.51 U	0.51 U

[a] Pre-1997 = laboratory
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NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-1.12
LAOI-1.1(A)

Date Collected		10/25/94	10/25/94	10/28/94	10/28/94	10/28/94	10/28/94	10/31/94	11/17/94	5/9/97	5/9/97	5/9/97	9/5/97	9/5/97	2/25/98	2/25/98	2/25/98	2/25/98	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	1/20/00	1/20/00	4/13/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		AAB8494D	AAB8511D	AAB8498D	AAB8512	AAB8512D	PP94-113	PP94-115	PP94-119	PP97-10	PP97-9	PP97-9	0816-97-1095	0816-97-1096	0816-98-0050	0816-98-0050	0816-98-0051	0816-98-0051	RE16-98-9019	RE16-98-9019	RE16-98-9020	RE16-98-9020	RE16-98-9021	RE16-98-9021	CABG-00-0025	CABG-00-0025	CABG-00-0061
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																										
Aluminum	µg/L	na[b]	na	na	200	170	160	690	310	50	60	2530	1950	30	529	2660	10.2R[c]	40	2420	1839.5	10.9 U[d]	20.72	99.2 U	30.72	56 U	22	26 U
Antimony	µg/L	na	na	na	2 U	2 U	0.02 U	0.02 U	0.02 U	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	3.4 U	0.1 U	3.4 U	0.1 U	2.7 U	0.1 U	2.7 U	0.1 U	2.7 U	0.1 U	0.68 U	0.1	0.68 U
Arsenic	µg/L	na	na	na	na	3 U	1	0.3	0.3	0.7	0.6	0.6	0.7	0.5	3	1.1	2.5 U	0.6	3 U	0.5	3 U	0.4	3 U	0.4	3.9	0.4	3 U
Barium	µg/L	na	na	na	350	350	20	20	10 U	10	13	20	16	5	16	15	8.2	7	22.4	17	10.6	10	10.3	9	11 U	10	8.4
Beryllium	µg/L	na	na	na	10	9	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.81 U	2 U	0.2 U	2 U	0.56 U	2 U	0.3 U	2 U	0.3 U	2 U	0.07	1 U	0.01 U
Boron	µg/L	na	na	na	87	82	71	230	14	9	10	10	8	5	7.9 U	10	7.9 U	8	na	7	na	7	na	6	17 U	9	9.6 U
Cadmium	µg/L	na	na	na	3 U	3 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.2 U	1 U	0.16 U	1 U	0.13 U
Calcium	µg/L	na	na	na	67000	67000	10900	5510	1630	5800	6220	6500	6650	5980	6750	6920	5900	6080	6970	7070	6290	6650	6300	6650	7000	7580	6900
Cesium	µg/L	na	na	na	na	na	0	0	0	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2	na	2	na	2	na	1 U	na
Chromium	µg/L	na	na	na	4 U	4 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.9 U	3	0.9 U	2 U	0.4 U	2 U	0.4 U	2 U	0.4 U	2 U	0.4	1 U	0.38 U
Cobalt	µg/L	na	na	na	79	81	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	2 U	0.39 U	1 U	0.58 U
Copper	µg/L	na	na	na	60	59	20	12	5	4	3	5	8	2	0.64 U	5	1.5 U	5	1.2 U	3	0.5 U	2	0.61 U	2	0.42 U	3	0.56 U
Iron	µg/L	na	na	na	940	900	30	190	110	20	20	860	800	10	377	870	82 U	10 U	856	630	9.6 U	10 U	47.2 U	10 U	45 U	20	49 U
Lead	µg/L	na	na	na	13	9	50 U	50 U	50 U	2 U	2	2	2	2 U	1.4 U	3	1.4 U	2 U	1 U	2	1 U	2 U	1 U	2 U	0.01 U	1 U	0.04
Lithium	µg/L	na	na	na	59	60	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	na	10 U	na	10 U	na	10 U	na	10 U	na	10 U	na	5	na
Magnesium	µg/L	na	na	na	16000	16000	2900	1590	370	1180	1260	1590	2080	1500	1750	1930	1490	1410	1850	1800	1400	1450	1420	1440	1600	1840	1600
Manganese	µg/L	na	na	na	8800	8800	580	270	60	2	2	7	9	4	8.5	9	3.3	3	9.3	6	1.9	3	2.4	2	4.6	4	3.2
Mercury	µg/L	200 U	200 U	1	200 U	na	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.03	0.05	0.05	0.02R	0.02 U	0.02R	0.05 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.01 U	0.05 U	0.01 U
Molybdenum	µg/L	na	na	na	8 U	8 U	27	18	6	2	3	7	5	4	3.8	4	3.8	2	na	2	na	2	na	2	na	4	na
Nickel	µg/L	na	na	na	160	160	20 U	20 U	20 U	2 U	2 U	2 U	2 U	2 U	2.2 U	2 U	2.5 U	2 U	1.4 U	2 U	0.93 U	2 U	0.88 U	2 U	1.4 U	1 U	0.51 U
Potassium	µg/L	na	na	na	21000	21000	9850	10100	3620	7380	7470	7280	6730	6650	6670	6577.12	6720	6890	7060	6840	6740	6910	6640	6830	5100	5040	5100
Rubidium	µg/L	na	na	na	na	na	0.4	0.4	0.2 U	40	40	42	25	27	na	28	na	32	na	39	na	36	na	37	na	19	na
Selenium	µg/L	na	na	na	2 U	2 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.3	0.2 U	3.1 U	1.1	3.1 U	0.1 U	2.6 U	0.1	2.6 U	0.1 U	2.6 U	0.1 U	3.8 U	0.1 U	3.5 U
Silver	µg/L	na	na	na	10 U	10 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	1 U	0.64 U	1 U	0.87 U
Sodium	µg/L	na	na	na	47000	48000	51300	15200	18600	15500	15600	15100	13300	13400	11200	10900	11500	11600	9790	10800	9550	11000	9560	11100	8700	8910	8900
Strontium	µg/L	na	na	na	450	450	60	40	20	66	69	78	74	61	64.4	65	54.1	55	na	83	na	73	na	73	na	56	na
Thallium	µg/L	na	na	na	2 U	2 U	na	na	na	2 U	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	3.1 U	2 U	3.1 U	2 U	3.1 U	2 U	0.57	1 U	0.95
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na
Tin	µg/L	na	na	na	na	na	na	na	na	5 U	5 U	5 U	5 U	5 U	14.1 U	5 U	14.1 U	5 U	na	5 U	na	5 U	na	5 U	na	1 U	na
Titanium	µg/L	na	na	na	na	na	na	na	na	2	3	18	16	2 U	10.6	19	1.3 U	2 U	na	15	na	2 U	na	2 U	na	2 U	na
Uranium	µg/L	na	na	na	2 U	2 U	8	5	3	na	na	na	na	na	0.67	na	0.25	na	na	na	na	na	na	na	0.33	0.4	0.33
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.33	na	0.33
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.35	na	0.35
Vanadium	µg/L	na	na	na	4 U	4 U	40	30	130	2 U	2 U	2 U	2 U	2 U	0.91	2 U	0.96	2 U	0.89	2 U	0.7 U	2 U	0.7 U	2 U	1.1	1 U	0.45 U
Zinc	µg/L	na	na	na	1300	1400	na	na	na	10	20	20	20	10 U	16.2	20	4.6	10 U	13.4	10	1.5	10 U	1.4	10 U	5.7 U	na	6.3

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] R = Rejected.
[d] U = Not detected.

Table B-1.13
Doe Spring

Date Collected		9/25/90	4/6/94	4/6/94	4/6/94	9/29/94	4/12/95	4/12/95	11/1/95	4/22/97	4/22/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	1/7/00	1/7/00	4/6/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		PP-11	VA-423	VA-430	ds940406	PP94-96	PP95-130	ds940412	PP95-139	PP97-1	PP97-1	0816-97-1050	0816-97-1051	0816-98-0001	0816-98-0001	0816-98-0002	0816-98-0002	RE16-98-9005	RE16-98-9005	RE16-98-9006	RE16-98-9006	CABG-00-0018	CABG-00-0018	CABG-00-0019	CABG-00-0019	CABG-00-0059
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																									
Aluminum	µg/L	na[b]	60	80	100 U	60	40	200 U[c]	50	40	60	74.74	32.25	131 U	360	16.7 U	40	339	688.68	38.1 U	20 U	73 U	7	67 U	10	3.2 U
Antimony	µg/L	100 U	0.2 U	0.2 U	na	0.2 U	2 U	20 U	1 U	0.1 U	0.1 U	0.1 U	0.1 U	3.4 U	0.2	3.4 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.88 U	0.1 U	0.68 U	0.1 U	1.63
Arsenic	µg/L	50 U	1.2	1.1	1	1	2	10 U	1.7	1.3	1.4	1	1.1	3.6	1.1	2.5 U	1.2	2.4 U	1.1	2.4 U	1	2.3 U	1.1	2.3 U	1.2	3 U
Barium	µg/L	30	10	10 U	100 U	10	10	100 U	20	11	11	12.06	11.92	11.4	13	9.7	9	12.7	19	10.4	11	10	9	11	9	10
Beryllium	µg/L	na	na	na	100 U	na	2 U	5 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.67 U	2 U	0.2 U	2 U	0.2 U	2 U	0.01 U	1 U	0.01 U	1 U	0.01 U
Boron	µg/L	40	10 U	10 U	100 U	11	12	10	10	13	7	12.09	10.07	12.4 U	13	10 U	9	na	11	na	10	17 U	11	17 U	11	15
Cadmium	µg/L	1 U	0.5 U	0.5 U	1 U	0.5 U	0.2 U	5 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.39	1 U	0.44	1 U	0.13 U
Calcium	µg/L	12700	11100	9800	11000	11100	10300	9000	11300	10700	10300	10805.02	10665.02	9720	10900	9640	10700	10600	10800	10300	10400	10000	10300	10000	10300	9400
Cesium	µg/L	0	0	0	na	0	0	na	0	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na	1 U	na
Chromium	µg/L	2 U	5	3	2	2	4	10 U	2	4	4	4	4	1.7	6	0.9 U	4	3.2	8	1.6	4	2.7	2	2.3	2	2.1
Cobalt	µg/L	2 U	2 U	2 U	50 U	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	0.8	2 U	0.8 U	2 U	0.5 U	2 U	0.5 U	2 U	0.39 U	1 U	0.39 U	1 U	0.58 U
Copper	µg/L	2 U	2 U	4	10 U	2	2	10	8	4	4	2	2 U	0.9 U	3	0.9 U	3	1.2 U	3	1.2 U	2	0.42 U	1 U	0.42 U	1	0.56 U
Iron	µg/L	10 U	10 U	10	100 U	20	10	100 U	60	10 U	30	43.37	9.06	216 U	290	45.4 U	20	425	850	75.3 U	20	7.3 U	30	7.3 U	30	45 U
Lead	µg/L	2 U	3	2 U	1 U	2 U	8	3 U	2 U	2 U	2 U	2 U	2 U	1.4 U	2 U	1.4 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.01	1 U	0.01 U
Lithium	µg/L	20	20	10 U	na	10	20	20	60	30	30	20	20	na	30	na	20	na	20	na	20	na	25	na	26	na
Magnesium	µg/L	3370	2720	2350	2900	2720	2890	3000	3530	3050	2980	2983.01	2955.83	2790	2860	2710	2770	3110	3200	2970	2930	2800	2550	2800	2550	2600
Manganese	µg/L	10 U	10 U	10 U	50 U	10 U	10 U	10 U	10 U	2 U	2 U	3.37	2 U	11.2	11	1.8	2	17.8	41	5.1	4	0.43 U	1 U	0.42 U	1 U	1.6
Mercury	µg/L	100 U	0.2 U	0.2 U	0.5 U	0.6	0.2 U	0.2 U	0.2 U	0.02 U	0.01	0.01 U	0.1 U	0.03 U	0.02 U	0.04 U	0.05 U	0.02 U	0.06	0.02 U	0.02 U	0.01 U	0.05 U	0.01 U	0.05 U	0.01 U
Molybdenum	µg/L	2	2 U	2 U	1	2	2 U	10 U	2 U	2 U	2	2	2 U	4.7	2 U	2.9	2 U	na	2 U	na	2 U	na	1	na	1	na
Nickel	µg/L	2	2 U	2 U	100 U	2 U	2 U	20 U	2 U	2 U	2 U	2 U	2 U	1.5	2 U	1.4	2 U	1.8 U	2	2.1 U	2 U	1.1	1 U	0.82	1 U	1.1 U
Potassium	µg/L	1800	1500	1770	2000	1580	1530	2000	1790	1620	1470	1490	1480	1480	1488.74	1470	1480	1630	1560	1620	1500	1600	1370	1800	1440	1600
Rubidium	µg/L	5	3	4	na	3	3	na	2	3	3	3	3	na	3	na	3	na	3	na	3	na	2	na	2	na
Selenium	µg/L	100 U	0.2 U	0.2 U	5 U	0.02 U	2 U	5 U	1 U	0.1 U	0.1 U	0.1 U	0.1 U	3.1 U	0.2 U	3.1 U	0.1 U	2.9 U	0.7	2.9 U	0.1 U	3.8 U	0.1 U	3.8 U	0.1 U	3.5 U
Silver	µg/L	1 U	0.5 U	0.5 U	100 U	0.5 U	0.5 U	10 U	0.5 U	1 U	1	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	1 U	0.6 U	1 U	0.64 U	1 U	0.64 U	1 U	0.87 U
Sodium	µg/L	13900	11000	11300	11000	11800	11100	9000	11900	11200	10800	11600	11600	10500	10500	10600	10900	9500	11200	9630	11400	9700	9820	9700	9920	10000
Strontium	µg/L	90	70	60	100 U	50	50	50	70	49	49	77.17	74.67	47.8	52	46.8	49	na	67	na	61	na	42	na	43	na
Thallium	µg/L	na	na	na	na	na	2 U	10 U	2 U	2 U	2 U	2 U	2 U	4.3	2 U	3.8 U	2 U	2.6 U	2 U	2.6 U	2 U	0.03 U	1 U	0.03 U	1 U	0.5
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na	1 U	na
Tin	µg/L	na	na	na	100 U	na	na	20	10 U	5 U	5 U	5 U	5 U	14.1 U	5 U	14.1 U	5 U	na	5 U	na	5 U	na	1 U	na	1 U	na
Titanium	µg/L	na	na	na	na	na	na	na	0	2 U	2	5.99	3.37	11.3 U	15	1.3 U	2 U	na	36	na	2 U	na	2 U	na	2 U	na
Uranium	µg/L	100 U	na	na	na	na	na	na	na	na	na	na	na	0.55	na	0.46	na	0.71	na	na	na	0.52	0.5	0.56	0.5	0.31
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.52	na	0.56	na	0.31
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.49	na	0.47	na	0.35
Vanadium	µg/L	na	na	na	100 U	na	na	10 U	8	10	10	7.21	8.23	8.5	6	7.8	8	8.5	11	7.3	9	9.6	10	9.6	9	7.5
Zinc	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	20	60	60	10 U	10 U	10 U	0.8 U	10 U	0.8 U	10 U	2 U	20	8.9	10 U	2.6	na	0.51 U	na	3.8

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] U = Not detected.

Table B-1.14
Apache Spring

Date Collected		7/1/80	5/20/91	7/18/94	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	2/9/98	7/1/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	1/5/00	1/5/00	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	filtered	filtered	filtered
Sample ID		VA-57	VA-350	VA-443	SSite96-13	PP97-7	PP97-7	0816-97-1042	0816-97-1043	0816-97-1044	0816-98-0008	0816-98-0008	0816-98-0009	0816-98-0009	RE16-98-9024	RE16-98-9024	RE16-98-9025	RE16-98-9025	CABG-00-0012	CABG-00-0012	CABG-00-0013	CABG-00-0013	CABG-00-0047
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL	EES	CL
Analyte	Units																						
Aluminum	µg/L	na[b]	200	730	280	240	2230	4952.61	1746.93	2259.05	994 U	1270	874	460	1220	2213.32	7.9 U	1443.32	460	180	470	180	52 U
Antimony	µg/L	na	50 U[c]	0.2 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	3.4 U	0.1 U	3.4 U	0.1 U	2.5 U	0.1 U	2.5 U	0.1 U	0.68 U	0.1 U	0.68 U	0.1 U	0.68 U
Arsenic	µg/L	na	50 U	0.5 U	0.2 U	0.2	0.2	0.5	0.3	0.5	2.5 U	0.3	2.5 U	0.4	4.7	0.3	2.4 U	0.3	2.3 U	0.4	2.3 U	0.3	2.3 U
Barium	µg/L	66	60	70	70	72	79	124.83	104.37	102.74	68	72	66	71	74.1	66	66.6	66	64	63	65	62	110
Beryllium	µg/L	na	na	na	2 U	2 U	2 U	2 U	2 U	2 U	0.63 U	2 U	0.57 U	2 U	0.2 U	2 U	0.2 U	2 U	0.05	1 U	0.05	1 U	0.01 U
Boron	µg/L	10 U	10 U	8	5	10	12	11.61	9.49	9.43	7.9 U	8	7.9 U	7	na	10	na	7	17 U	5	17 U	5	17 U
Cadmium	µg/L	0	1 U	0.5 U	0.2 U	1 U	1 U	1 U	1 U	1 U	0.3 U	1 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	0.13 U	1 U	0.13 U
Calcium	µg/L	10800	11000	11300	10900	13700	13800	15154.1	15057.33	15458.41	11000	12000	11000	11800	12100	11600	12500	11600	11000	11600	11000	11600	16000
Cesium	µg/L	na	10 U	5	0	2 U	2 U	2 U	2 U	2 U	na	2 U	na	2 U	na	2 U	na	2 U	na	1 U	na	1 U	na
Chromium	µg/L	0	2 U	2 U	2 U	2 U	3	4	2 U	2 U	0.9 U	2 U	0.9 U	2 U	0.33 U	2	0.3 U	2 U	0.66 U	1 U	0.79 U	1 U	0.5
Cobalt	µg/L	0	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U	2 U	0.8 U	2 U	0.62 U	2 U	0.5 U	2 U	0.39 U	1 U	0.65	1 U	0.66
Copper	µg/L	0	3	3	2 U	2 U	3	3	2	2	0.6R	6	0.6R	2	2.8 U	2 U	1.4 U	2	0.42 U	2	0.42 U	1	0.64
Iron	µg/L	420	160	260	100	90	910	2052.1	685.12	872.81	384	460	340	180	504	790	30 U	520	140	80	140	80	30 U
Lead	µg/L	0	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	1.4 U	2 U	1.4 U	2 U	1.1 U	2 U	1.1 U	2 U	0.01 U	1 U	0.03	1 U	0.01 U
Lithium	µg/L	6	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	na	10 U	na	10 U	na	10 U	na	10 U	na	3	na	3	na
Magnesium	µg/L	4600	4700	4030	4860	4720	4820	5906.4	5644.6	5747.6	4570	4730	4600	4650	5200	4950	5230	4920	4800	4330	4900	4240	6100
Manganese	µg/L	3	20 U	10 U	10 U	2	7	15.25	6.06	7.33	2.8	4	2.2	2	5.6	6	0.1 U	4	1.7 U	2	2.1 U	2	5
Mercury	µg/L	na	100 U	0.2 U	0.2 U	0.2 U	0.03	0.01 U	0.1 U	0.01 U	0.03	0.02 U	0.03	0.05 U	0.02R[d]	0.11	0.02R	0.11	0.01 U	0.06	0.01 U	0.05 U	0.01 U
Molybdenum	µg/L	0	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2.9 U	2 U	2.9 U	2 U	na	2 U	na	2 U	na	na	na	1 U	na
Nickel	µg/L	0	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	1.5	2 U	1.6	2 U	2.2 U	2 U	2 U	2 U	1.3	1 U	1.6	1 U	0.54 U
Potassium	µg/L	3500	4400	4480	4750	4730	4580	5340	5080	5170	4210	4321.79	4230	4460	4230	4030	4250	4260	4200	4180	4300	4130	5500
Rubidium	µg/L	na	7	8	10	6	6	10	11	10	na	8	na	6	na	9	na	9	na	6	na	6	na
Selenium	µg/L	na	100 U	0.2 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	3.1 U	0.2 U	3.1 U	0.1 U	2.9 U	0.1 U	2.9 U	0.1 U	3.8 U	0.2	3.8 U	0.2	3.8 U
Silver	µg/L	30 U	1 U	0.5 U	0.2 U	1 U	1 U	1 U	1 U	1 U	0.9 U	1 U	0.9 U	1 U	0.6 U	1 U	0.6 U	1 U	0.64 U	1 U	0.64 U	1 U	0.81
Sodium	µg/L	6700	9200	8780	9770	21900	21200	34943.21	35388.28	35456.82	11700	11400	11800	12100	7090	7110	7280	7600	8500	8160	8600	8080	36000
Strontium	µg/L	64	90	100	100	120	120	168.63	162.66	163.51	94.5	100	96.4	100	na	97	na	98	na	100	na	100	na
Thallium	µg/L	na	na	na	2 U	2 U	2 U	2 U	2 U	2 U	3.8 U	2 U	3.8 U	2 U	4.9 U	2 U	3.2 U	2 U	0.03 U	1 U	0.03 U	1 U	0.03 U
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1 U	na	1 U	na
Tin	µg/L	na	na	na	0	5 U	5 U	5 U	5 U	5 U	14.1 U	5 U	15	5 U	na	5 U	na	5 U	na	1 U	na	1 U	na
Titanium	µg/L	na	na	na	14	15	32	82.65	9.6	11.67	22.5	24	20.4	7	na	46	na	32	na	9	na	9	na
Uranium	µg/L	na	100 U	na	na	na	na	na	na	na	0.22	na	0.21	na	na	na	na	na	0.18	0.2	0.2	0.2	0.15
Uranium by NATU[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.18	na	0.2	na	0.15
Uranium by TULIKPA[a]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.22	na	0.21	na	0.18
Vanadium	µg/L	na	na	na	4	5	3	4.4	3.18	3.34	3.5	2	3.7	3	4.5	4	3.5	3	3.6	3	4	3	3.1
Zinc	µg/L	20	30	10 U	10 U	10 U	10 U	8.03	10 U	10 U	0.8 U	10 U	1.2 U	10 U	1.8	10 U	1.4	10 U	2	na	2	na	1

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis

[b] na = Not analyzed.

[c] U = Not detected.

[d] R = Rejected.

Table B-1.15
LAO-B

Date Collected		6/13/94	6/13/94	6/13/94	6/13/94	6/14/94	10/19/94	10/19/94	10/19/94	1/15/95	1/17/95	5/9/95	5/9/95	5/9/95	5/9/95	5/14/97	5/14/97	8/1/97	8/1/97	8/1/97
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		AAB1336	AAB1336D	AAB1380	AAB1380D	AAB1341	AAB3592	AAB8495	AAB8509	AAB8559	AAB8403	0441-95-0033	0441-95-0013	0441-95-0013D	0441-95-0014	PP97-13	PP97-13	0816-97-1028	0816-97-1029	0816-97-1030
Lab[a]		Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	Pre-1997	EES	EES	EES	EES	EES
Analyte	Units																			
Aluminum	μg/L	1100	920	100 U[b]	na[c]	460	240	580	100 U	na	530	1190	2710	2710	345	540	1850	220.14	142.95	130.87
Antimony	μg/L	2 U	na	2 U	na	0.2 U	0.2 U	1 U	1 U	na	2 U	2 U	2 U	2 U	2 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U
Arsenic	μg/L	2 U	na	2 U	na	0.2 U	0.2	2 U	3 U	na	2 U	2 U	2.2 U	2.2 U	2.2 U	0.2 U	0.2 U	0.1	0.1	0.1
Barium	μg/L	28	110	19	na	20	30	31	25	na	20	20	33 U	32	26 U	22	25	27.93	26.81	27.31
Beryllium	μg/L	1 U	1 U	1 U	na	na	2 U	3 U	3 U	na	2 U	2 U	3.3 U	3.3 U	3.3 U	2 U	2 U	2 U	2 U	2 U
Boron	μg/L	10 U	16	10 U	na	5	10	19	10 U	na	3	10	11 U	11 U	11 U	5	8	9.96	8.79	8.07
Cadmium	μg/L	3 U	3 U	3 U	na	0.5 U	1.8	3 U	3 U	na	2 U	0.2 U	3.3 U	3.3 U	3.3 U	1 U	1 U	1 U	1 U	1 U
Calcium	μg/L	9300	28000	9300	na	8850	9700	11000	11000	na	8460	7660	9740	9250	9130	8110	8180	10700.42	11049.62	11007.25
Cesium	μg/L	na	na	na	na	8	0	na	na	na	0	0	na	na	na	2 U	2 U	2 U	2 U	2 U
Chromium	μg/L	66	4 U	4 U	na	2 U	2 U	4 U	4 U	na	2 U	2 U	7 U	7	6 U	2 U	2	2	2	2 U
Cobalt	μg/L	4 U	4 U	4 U	na	2 U	2 U	4 U	4 U	na	2 U	2 U	4.4 U	4.4 U	4.4 U	2 U	2 U	2 U	2 U	2 U
Copper	μg/L	17	4 U	4 U	na	2	2	4 U	37	na	2 U	2 U	4.4 U	4.4 U	4.4 U	4	6	2 U	2 U	2 U
Iron	μg/L	1000	670	100 U	na	200	60	480	100 U	na	220	460	1150	1110	148	260	760	82.42	52.4	51.55
Lead	μg/L	3	na	2 U	na	2 U	2 U	1 U	51	na	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Lithium	μg/L	na	na	na	na	10 U	10 U	6	8	na	10 U	10 U	6 U	5	4 U	10 U	10 U	10 U	10 U	10 U
Magnesium	μg/L	3000	5200	3000	na	2670	3400	3500	3300	na	2470	2370	3080 U	2960	2840 U	2370	2440	3249.8	3334.05	3315.4
Manganese	μg/L	320	740	2 U	na	10 U	10 U	18	3 U	na	10 U	10 U	9 U	9	3 U	3	5	2 U	2 U	2 U
Mercury	μg/L	100 U	100 U	100 U	100 U	0.2 U	0.2 U	200	200	na	0.2 U	0.2 U	200 U	200 U	200 U	0.2 U	0.03	0.01 U	0.1 U	0.01 U
Molybdenum	μg/L	2 U	8 U	8 U	na	2 U	2 U	8 U	8 U	na	2 U	2 U	9 U	9 U	9 U	2 U	2 U	2	2 U	2
Nickel	μg/L	10 U	10 U	10 U	na	2 U	2 U	10 U	20 U	na	2 U	2 U	11 U	12	17 U	2 U	2 U	2 U	2 U	2 U
Potassium	μg/L	2400	5400	2700	na	2350	3150	6000	5600	na	2240	2100	2600 U	2500	2200 U	2350	2220	2710	2730	2710
Rubidium	μg/L	na	na	na	na	6	7	na	na	na	6	6	na	na	na	5	7	7	7	6
Selenium	μg/L	2 U	na	2 U	na	0.2 U	0.02 U	2 U	2 U	na	2 U	2 U	1 U	1 U	1 U	0.5 U	0.5 U	1	0.1 U	0.1 U
Silver	μg/L	10 U	10 U	10 U	na	0.5 U	0.5 U	10 U	10 U	na	0.5 U	0.5 U	11 U	14	11 U	1 U	1 U	1 U	1 U	1 U
Sodium	μg/L	6300	58000	6300	na	7000	7860	6000	5600	na	6890	6560	7650	7400	7150	7120	6780	8510	8490	8430
Strontium	μg/L	60	na	59	na	70	70	3500	3300	na	60	50	70.3	66.7	65.3	62	67	94.64	93.54	95.23
Thallium	μg/L	2 U	na	2 U	na	na	na	1 U	1 U	na	na	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Thorium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tin	μg/L	na	na	na	na	na	na	na	na	na	na	0	na	na	na	5 U	5 U	5 U	5 U	5 U
Titanium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	8	22	2.76	1.62	2 U
Uranium	μg/L	2 U	na	2 U	na	na	na	1200 U	1 U	na	na	na	2 U	2 U	2 U	na	na	na	na	na
Uranium by NATU[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TULIKPA[a]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Vanadium	μg/L	4 U	na	4 U	na	na	10	4 U	4 U	na	7	2 U	4 U	4 U	4 U	2 U	2 U	2 U	2 U	2 U
Zinc	μg/L	20 U	20 U	20 U	na	10	20	20 U	20 U	na	10 U	10 U	20 U	20 U	20 U	10	10 U	10 U	10 U	10 U

Table B-1.15 — LAO-B (continued)

Date Collected		2/24/98	2/24/98	2/24/98	10/2/98	10/2/98	10/2/98	10/2/98	1/10/00	1/10/00	1/10/00	1/10/00	3/24/00	6/21/00	6/21/00	7/24/00	7/24/00	9/5/00	9/5/00	6/21/00
Field Prep		nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	filtered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		0816-98-0048	0816-98-0049	0816-98-0049	RE16-98-9022	RE16-98-9022	RE16-98-9023	RE16-98-9023	CABG-00-0021	CABG-00-0021	CABG-00-0022	CABG-00-0022	CABG-00-0046	CALA-00-0030	CALA-00-0029	CALA-00-0080	CALA-00-0079	CALA-00-0132	CALA-00-0131	CALA-00-0030
Lab		CL	CL	EES	CL	EES	CL	EES	CL	EES	EES	CL	CL	CL	CL	CL	CL	CL	CL	CL
Analyte	Units																			
Aluminum	μg/L	501	383	220	135	105.49	10.1 U	20 U	400	210	210	440	500	100 U	190	25 U	51 U	7.9 U	7.9 U	100 U
Antimony	μg/L	3.4 U	3.4 U	0.1 U	2.7 U	0.1 U	2.7 U	0.1 U	0.68 U	0.1 U	0.1 U	0.68 U	0.68 U	0.683 U	0.683 U	2.8 U	2.8 U	2.8 U	2.8 U	0.683 U
Arsenic	μg/L	2.5 U	2.5 U	0.2 U	3 U	0.1 U	3 U	0.1 U	2.3 U	0.2	0.2	2.3 U	2.3 U	0.2	0.3	3.4 U	3.4 U	3.4 U	3.4 U	0.2
Barium	μg/L	22.3	21.8	20	31.2	31	30	30	22	19	20	22	20	22	24	44	45	48	48	22
Beryllium	μg/L	0.35 U	0.33 U	2 U	0.3 U	2 U	0.3 U	2 U	0.06	1 U	1 U	0.07	0.07	0.01 U	0.02	0.46 U	0.53 U	0.064 U	0.064 U	0.01 U
Boron	μg/L	7.9 U	7.9 U	5	na	6	na	6	17 U	5	5	17 U	17 U	na	na	na	na	na	na	na
Cadmium	μg/L	0.3 U	0.3 U	1 U	0.2 U	1 U	0.2 U	1 U	0.13 U	1 U	1 U	0.13 U	0.13 U	0.13 U	0.13 U	0.17 U	0.17 U	0.17 U	0.17 U	0.13 U
Calcium	μg/L	8420	8390	8860	12000	11900	11900	11900	8300	8710	8540	8300	6800	8900	9300	20000	20000	20000	20000	8900
Cesium	μg/L	na	na	2 U	na	2 U	na	2 U	na	1 U	1 U	na	na	na	na	na	na	na	na	na
Chromium	μg/L	0.9 U	0.9 U	2 U	0.4 U	2 U	0.4 U	2 U	0.41 U	1 U	1 U	0.41 U	0.37 U	0.64 U	0.73 U	0.33 U	0.4 U	0.33 U	0.57 U	0.64 U
Cobalt	μg/L	0.8 U	0.86	2 U	0.5 U	2 U	0.5 U	2 U	0.46	1 U	1 U	0.48	0.39 U	0.27 U	0.32 U	0.3 U	0.3 U	0.3 U	0.3 U	0.27 U
Copper	μg/L	0.6 U	0.6 U	4	0.86 U	2	0.74 U	2	0.42 U	1 U	1	0.42 U	0.42 U	0.57 U	0.54 U	0.3 U	0.3 U	0.3 U	0.48 U	0.57 U
Iron	μg/L	352	284	110	55.6 U	70	9.3 U	10 U	160	100	100	140	290	9.5	120	48 U	68 U	8.3 U	13 U	9.5
Lead	μg/L	1.4 U	1.4 U	4	1 U	2 U	1 U	2 U	0.11	1 U	1 U	0.14	0.01 U	0.01 U	0.01 U	1.6 U	1.6 U	1.6 U	1.6 U	0.01 U
Lithium	μg/L	na	na	10 U	na	10 U	na	10 U	na	4	4	na	na	na	na	na	na	na	na	na
Magnesium	μg/L	2730	2700	2600	3740	3700	3700	3690	2700	2760	2700	2700	2200	2700	2700	6000	6000	6400	6400	2700
Manganese	μg/L	2.2	1.8 U	2 U	0.09	2	0.07R	2 U	1.4 U	1	1	1.2 U	2.2	0.72 U	2.11	0.45 U	1.2	0.96	2.3	0.72 U
Mercury	μg/L	0.02R[d]	0.02R	0.05 U	0.02 U	0.04	0.02 U	0.05	0.01 U	0.05 U	0.05 U	0.01 U	0.01 U	0.2 U	0.2 U	0.0092 U	0.0092 U	0.02 U	0.02 U	0.2 U
Molybdenum	μg/L	2.9 U	2.9 U	2 U	na	2 U	na	2 U	na	1 U	1 U	na	na	na	na	na	na	na	na	na
Nickel	μg/L	1.6 U	2.3 U	2 U	0.6 U	2 U	0.91 U	2 U	0.82	1 U	1 U	0.99	0.54 U	0.64 U	0.73 U	0.69	0.74	0.63 U	1.3 U	0.64 U
Potassium	μg/L	2090	2080	2050	3000	2740	2980	2930	2100	2230	2190	2200	1800	2200	2300	3300	3400	3400	3400	2200
Rubidium	μg/L	na	na	5	na	7	na	7	na	4	4	na	na	na	na	na	na	na	na	na
Selenium	μg/L	3.1 U	3.1 U	0.1 U	2.6 U	0.1	2.6 U	0.1 U	3.8 U	0.1 U	0.1 U	3.8 U	3.8 U	0.2	1 U	2.6 U	2.6 U	2.6 U	2.6 U	0.2
Silver	μg/L	0.9 U	0.9 U	1 U	0.8 U	1 U	0.8 U	1 U	0.64 U	1 U	1 U	0.64 U	0.64 U	2 U	0.05	0.45 U	0.45 U	0.45 U	0.47 U	2 U
Sodium	μg/L	6690	6710	6870	8210	9030	7830	9240	6400	7110	7160	6400	6200	7900	8100	9900	10000	9400	9400	7900
Strontium	μg/L	55.4	54.4 U	57	na	100	na	100	na	54	54	na	na	na	na	na	na	na	na	na
Thallium	μg/L	3.8 U	3.8 U	2 U	3.1 U	2 U	3.1 U	2 U	0.03 U	1 U	1 U	0.03 U	0.59	0.43	0.427	3.7 U	3.7 U	3.7 U	3.7 U	0.43
Thorium	μg/L	na	na	na	na	na	na	na	na	1 U	1 U	na	na	na	na	na	na	na	na	na
Tin	μg/L	14.1 U	14.1 U	5 U	na	5 U	na	5 U	na	1 U	1 U	na	na	na	na	na	na	na	na	na
Titanium	μg/L	10.6	8.1	6	na	2	na	2 U	na	7	8	na	na	na	na	na	na	na	na	na
Uranium	μg/L	0.07	0.07	na	na	na	na	na	0.03	0.2 U	0.2 U	0.03	0.02	0.0e0 U	0.0e0 U	na	na	na	na	0.0e0 U
Uranium by NATU	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS	μg/L	na	na	na	na	na	na	na	0.03	na	na	0.03	0.02	na	na	na	na	na	na	na
Uranium by TULIKPA	μg/L	na	na	na	na	na	na	na	1 U	na	na	1 U	0.07	na	na	na	na	na	na	na
Vanadium	μg/L	1.5	1.1	2 U	0.79	2 U	0.79	2 U	0.95	1 U	1 U	1.2	0.43 U	0.74	0.96	0.39	0.39	0.33 U	0.33 U	0.74
Zinc	μg/L	1.9 U	2.4 U	10 U	0.7R	10 U	0.7R	10 U	1.8	na	na	1.8	2.3	21	15 U	1.2	3.4	1.6 U	1.7 U	21

Table B.1-15 LAO-B (continued)

Date Collected		7/24/00	9/5/00	9/5/00	10/5/00	10/5/00	3/29/01	3/29/01	6/18/01	6/18/01	11/7/01	11/7/01	11/7/01	3/26/02	3/26/02	5/30/02	5/30/02	5/30/02
Field Prep		filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered
Sample ID		CALA-00-0080	CALA-00-0132	CALA-00-0131	CALA-00-0176	CALA-00-0175	CALA-01-0049	CALA-01-0050	CALA-01-0215	CALA-01-0216	CALA-01-0471	CALA-01-0497	CALA-01-0472	CALA-02-45277	CALA-02-45278	CALA-02-45029	CALA-02-45041	CALA-02-45030
Lab		CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Analyte	Units																	
Aluminum	µg/L	25 U	7.9 U	7.9 U	4 U	4 U	34 U	190	56 U	82 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Antimony	µg/L	2.8 U	2.8 U	2.8 U	2.5 U	2.5 U	2.4 U	2.4 U	2.1 U	2.1 U	0.09 U	0.09 U	0.06 U	2 U	0.29 U	2 U	2 U	2 U
Arsenic	µg/L	3.4 U	3.4 U	3.4 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.36	4.03	0.44	0.28 U	2.27 U	5 U	5 U	5 U
Barium	µg/L	44	48	48	52	51	28	29	31	34	54.2	54.9	55.3	36.3	37.6	41.4	41.9	42.9
Beryllium	µg/L	0.46 U	0.064 U	0.064 U	0.032 U	0.032 U	0.11 U	0.11 U	0.074 U	0.1	0.02	0.02	0.01	0.2 U	0.2 U	1 U	1 U	1 U
Boron	µg/L	na	na	na	na	na	na	na	na	na	14.4	6.52	6.4	na	na	na	na	na
Cadmium	µg/L	0.17 U	0.17 U	0.17 U	0.15 U	0.15 U	0.2 U	0.2 U	0.084 U	0.084 U	1 U	1 U	1 U	0.07	0.07	1 U	1 U	1 U
Calcium	µg/L	20000	20000	20000	23000	23000	13000	13000	14000	15000	23000	23000	22800	19200	19400	20600	21900	22400
Cesium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Chromium	µg/L	0.33 U	0.33 U	0.57 U	0.52 U	0.52 U	0.59 U	0.34 U	0.21 U	0.21 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cobalt	µg/L	0.3 U	0.3 U	0.3 U	0.52 U	0.52 U	0.4 U	0.4 U	0.68	1.3	1 U	1 U	1 U	0.02	0.02	5 U	5 U	5 U
Copper	µg/L	0.3 U	0.3 U	0.48 U	0.45 U	0.45 U	0.34 U	0.34 U	0.27 U	0.27 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Iron	µg/L	48 U	8.3 U	13 U	10 U	11 U	26 U	68 U	44 U	49 U	50 U	50 U	50 U	50 U	28.3	50 U	50 U	19.2
Lead	µg/L	1.6 U	1.6 U	1.6 U	1.1 U	1.1 U	0.65 U	0.65 U	1.1 U	1.1 U	5 U	5 U	5 U	5 U	5 U	0.05	0.06	0.054
Lithium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Magnesium	µg/L	6000	6400	6400	7300	7200	4100	4100	4600	4700	7080	6980	6920	5960	6000	6330	6410	6570
Manganese	µg/L	0.45 U	0.96	2.3	1.8	2.2	13	0.75 U	0.044 U	0.73	10 U	10 U	10 U	10 U	10 U	25 U	25 U	25 U
Mercury	µg/L	0.0092 U	0.02 U	0.02 U	0.014 U	0.014 U	0.016 U	0.016 U	0.033 U	0.033 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Molybdenum	µg/L	na	na	na	na	na	4.5 U	4.5 U	3.8 U	3.8 U	10 U	10 U	10 U	1.97 U	1.55 U	0.742	0.735	0.722
Nickel	µg/L	0.69	0.63 U	1.3 U	0.41 U	0.41 U	0.6 U	0.6 U	0.3 U	0.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	µg/L	3300	3400	3400	3900	3800	2400	2400	2800	2900	4150	4100	4080	2900	2950	3270	3330	3430
Rubidium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Selenium	µg/L	2.6 U	2.6 U	2.6 U	1.7 U	1.7 U	2.5 U	2.5 U	1.9 U	1.9 U	5 U	5 U	5 U	0.71	0.34	5 U	5 U	5 U
Silver	µg/L	0.45 U	0.45 U	0.47 U	0.78 U	0.78 U	0.48 U	0.48 U	0.57 U	0.57 U	1 U	1 U	1 U	0.55	0.8	5 U	5 U	5 U
Sodium	µg/L	9900	9400	9400	9700	9600	6900	6900	7000	7100	9360	9320	9190	8780	8900	8980	9070	9230
Strontium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Thallium	µg/L	3.7 U	3.7 U	3.7 U	2 U	2 U	2.8 U	2.8 U	1.8 U	1.8 U	0.5 U	0.5 U	0.5 U	0.239	0.057	0.5 U	0.5 U	0.5 U
Thorium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tin	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Titanium	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium	µg/L	na	na	na	na	na	0.00001247	0.0e0 U	0.0e0 U	0.0e0 U	0.00001122	0.1673	0.00001162	na	na	0.1518	0.1382	0.1168
Uranium by NATU	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TUICPMS	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Uranium by TULIKPA	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Vanadium	µg/L	0.39	0.33 U	0.33 U	0.67	0.57	0.38 U	0.38 U	0.38 U	0.58	0.54	5 U	0.498	5 U	5 U	0.852	0.87	0.784
Zinc	µg/L	1.2	1.6 U	1.7 U	0.86 U	0.37 U	0.41 U	0.41 U	0.31 U	0.31 U	2.21 U	1.79 U	1.4 U	5 U	2.85	2.67 U	1.99 U	2.01 U

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
TUICPMS = Total uranium inductively-coupled plasma mass spectrometry
TULIKPA = Total uranium kinetic phosphorimetric analysis
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.1
Spring 1

Date Collected		4/4/94	4/4/94	9/27/94	3/30/95	6/5/95	5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/4/00	4/4/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		VA-414	s1940404	PP94-75	s1950330	s1950605	PP97-14	PP97-14	0816-97-1036	0816-97-1037	PP97-26	0816-98-0044	0816-98-0045	PP98-14	PP98-23	PP98-24	RE16-98-9016	RE16-98-9017	RE16-98-9018	CABG-99-0005	CABG-99-0001	CABG-00-0037	CABG-00-0055
Analyte (Lab[a])	Units																						
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	97700	95000	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	95900	95900	110000	110000	na	96700	96700	na	na	na	98400	97700	97800	97500	na	na	na
Ammonia	µg/L	50	na	380	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	4	100 U[c]	18	20 U	20 U	60	50	30	30	na	52.4	54.3	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Ammonium [as N]	µg/L	na	na	na	na	na	46.7	38.9	23.3	23.3	na	40.8	42.2	na	na	na	15.6 U	15.6 U	15.6 U	15.6 U	na	na	na
Anion Sum	µg/L	2237	na	2594	na	na	2210	2210	2450	2460	na	2230	2220	na	na	na	2260	2220	2240	na	na	na	na
Balance	µg/L	36.5	na	9.6	na	na	14.9	41.5	-27.4	-48.4	na	0.588	10.1	na	na	na	-33.6	-17.6	-18	na	na	na	na
Bicarbonate	µg/L	118000	116000	126000	na	97000	117000	117000	134000	134000	na	118000	118000	na	na	na	120000	110000	110000	119000	na	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	50	na	20	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	na	200 U	na	na	0.05 U
Bromide (EES)	µg/L	na	na	na	na	na	30	30	26.5	28.6	na	30	40	na	na	na	20	30	20	50	na	na	na
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	na	1500	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	370	na	na	na	na	600	560	na	na	na	na
Carbonate	µg/L	0	na	6600	na	8000	0	0	0	0	na	0	0	na	na	na	0	4500	4600	0	na	na	na
Cation Sum	µg/L	2320	na	2619	na	na	2240	2300	2390	2350	na	2230	2240	na	na	na	2180	2180	2200	na	na	na	na
Chlorate	µg/L	0	na	0	na	na	20 U	20 U	20 U	20 U	na	20 U	20 U	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Chloride (CL)	µg/L	3190	5000 U	3300	5000 U	5000 U	na	na	na	na	na	3300	3200	na	na	na	na	na	na	3100	na	na	3030
Chloride (EES)	µg/L	na	na	na	na	na	3240	3240	2970	3030	na	3160	3010	na	na	na	3050	3040	3060	2760	na	na	na
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	227	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	na	na	na	215	215	na	na	na	190	190	190	na	na	na	na
Conductivity (EES)	µS/cm	na	na	na	na	na	214	214	234	231	na	215	212	na	na	na	214	211	213	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	560	600	530	600	500	na	na	na	na	na	500	500	na	na	na	na	na	na	560	na	na	530
Fluoride (EES)	µg/L	na	na	na	na	na	470	470	476	485	na	540	510	na	na	na	550	560	540	500	na	na	na
Hardness	µg/L	na	na	na	na	na	41500	42300	51200	50500	na	43700	41400	na	na	na	41000	40500	41200	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	500	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	100	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	600	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	600	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	300	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	900	na	na	na	na	na	na	na	na	na	na	na	na	na
Iodide	µg/L	0	na	0	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	10 U	na	na	na
Nitrate	µg/L	0	0	0	0	0	1800	1730	629	726	na	1450	1620	na	na	na	1240	1500	1620	1260	na	na	na
Nitrate [as N]	µg/L	na	na	na	na	na	406	391	142	164	na	327	366	na	na	na	280	339	366	285	na	na	na
Nitrite	µg/L	1380	na	2390	na	na	10 U	10 U	10 U	10 U	na	20 U	20 U	na	na	na	20 U	20 U	20 U	20	na	na	na
Nitrite [as N]	µg/L	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	3.59 U	3.59 U	na	na	na	3.59 U	3.59 U	3.59 U	3.59	na	na	na
Nitrogen ammonia [as N]	µg/L	na	na	na	190	300	na	na	na	na	na	na	na	na	na	na	na	na	na	510 U	na	na	500 U
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	400	400	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	910	na	na	380
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	100	100	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	150	na	na	100 U
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6 U
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Phosphate	µg/L	3	na	6	na	na	50 U	50 U	20 U	16	na	50 U	50 U	na	na	na	50 U	50 U	50 U	6.52 U	na	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	na	50 U	na	na	50 U
Silica (CL)	µg/L	30800	32000	33200	32000	32000	na	na	na	na	na	na	na	na	na	na	na	na	na	32100	na	na	30000
Silica (EES)	µg/L	na	na	na	na	na	33000	38300	36400	33600	na	39200	31000	na	na	na	32700	32300	32500	34900	na	na	na
Silicon	µg/L	na	na	na	na	na	15400	17900	17000	15700	na	18300	14500	na	na	na	15300	15100	15200	na	na	na	na
Sulfate (CL)	µg/L	7620	8000	7080	11000	9000	na	na	na	na	na	6800	6800	na	na	na	na	na	na	6500	na	na	6410
Sulfate (EES)	µg/L	na	na	na	na	na	6990	6950	6500	6720	na	7110	7060	na	na	na	7080	7020	7020	6480	na	na	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	10 U	na	na	na

Table B-2.1 — Spring 1 (continued)

Date Collected		4/4/94	4/4/94	9/27/94	3/30/95	6/5/95	5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/4/00	4/4/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		VA-414	s1940404	PP94-75	s1950330	s1950605	PP97-14	PP97-14	0816-97-1036	0816-97-1037	PP97-26	0816-98-0044	0816-98-0045	PP98-14	PP98-23	PP98-24	RE16-98-9016	RE16-98-9017	RE16-98-9018	CABG-99-0005	CABG-99-0001	CABG-00-0037	CABG-00-0055
Analyte (Lab)	Units																						
Total dissolved solids (CL)	μg/L	212700	142000	236000	210000	130000	na	na	na	na	na	150000	150000	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	na	na	na	212000	218000	234000	231000	na	219000	211000	na	na	na	213000	207000	208000	213000	na	na	na
Total suspended solids	μg/L	na	na	na	na	na	na	13800	12300	na	na	40000	na	na	na	na	2380	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	5.4	5.4	na	na	na	2.6	2.6	2.6	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	na	7.43	7.43	6.5	6.5	na	7.99	7.99	na	na	na	7.81	7.81	7.81	na	na	na	na
pH (EES)	SU	na	na	na	na	na	8.1	8.03	8.08	8.14	na	7.88	7.88	na	na	na	7.97	8.11	8.13	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	0.00926	0.00926	0.00894	0.00943	na	0.00949	0.0133	na	na	na	0.00656	0.00987	0.00654	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	0.0127	0.012	0.0129	0.0125	na	0.0117	0.0103	na	na	na	0.0128	0.0125	0.0108	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	0	0	0	0	na	0	0	na	na	na	0	0	0	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	0.145	0.145	0.16	0.16	na	0.171	0.169	na	na	na	0.18	0.184	0.176	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	36.1	36.1	45.1	44.2	na	37.3	39.2	na	na	na	39.3	36.2	35.9	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	0.648	0.62	0.747	0.733	na	0.671	0.691	na	na	na	0.623	0.664	0.657	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	0.0123	0.0123	0.0101	0.0099	na	0.00949	0.0133	na	na	na	0.0131	0.00987	0.0131	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	9.51	9.35	9.9	9.61	na	9.21	10.3	na	na	na	9.8	9.9	9.87	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	2.16	2.15	2.19	2.22	na	2.25	2.35	na	na	na	2.32	2.31	2.29	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-84	-82	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-1.3	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	-77	na	na	na	-73	na	na	-76	-76	-72	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	-11.9	na	na	na	-11.6	na	na	-11.9	-11.3	-11.3	na	na	na	na	-11.6	-11.3	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.2
Sacred Spring

Date Collected		8/1/78	5/16/91	7/12/94	5/29/97	5/29/97	8/8/97	8/8/97	8/8/97	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		LA-4	VA-348	VA-442	PP97-20	PP97-20	0816-97-1054	0816-97-1055	PP97-34	PP98-16	PP98-16	PP98-17	PP98-18	RE16-98-9000	RE16-98-9001	RE16-98-9002	PP98-27	RE16-98-9034	RE16-98-9035	CABG-99-0003	CABG-99-0007	CABG-00-0039	CABG-00-0057
Analyte (Lab[a])	Units																						
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	100000	94000	99000	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	na	99200	99200	88500	92600	na	128000	129000	na	na	97500	96700	96700	na	107000	108000	na	107000	na	na
Ammonia	μg/L	na	170	350	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	50 U[c]	0	0	60	40	40	20 U	na	20 U	20 U	na	na	21.1	60.4	46.1	na	68	20 U	na	20 U	na	na
Ammonium [as N]	μg/L	na	na	na	46.7	31.1	31.1	15.6 U	na	15.6 U	15.6 U	na	na	16.4	47	35.9	na	52.9	15.6 U	na	15.6 U	na	na
Anion Sum	μg/L	2100	2258	2226	2190	2190	1970	2040	na	3220	3090	na	na	2190	2170	2160	na	2300	2470	na	na	na	na
Balance	μg/L	na	12 U	2.6 U	42.3	38.4	87.3	8.13	na	-37.4	-23	na	na	-23.1	13.1	15.6	na	68.2	-55.7	na	na	na	na
Bicarbonate	μg/L	114000	126000	121000	121000	121000	108000	113000	na	142000	157000	na	na	119000	118000	118000	na	130000	125000	na	130000	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	30	30	na	na	na	na	na	na	na	na	na	200 U	200 U	200 U	na	na	na	na	200 U	na	0.05 U
Bromide (EES)	μg/L	na	na	na	20	20	18.4	19.6	na	20	50	na	na	50	20	40	na	20 U	20 U	na	40	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	na	1000	na	na	na	na	na	na	2900	2900	na	na	8100	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	μg/L	na	0	0	0	0	0	0	na	7100	0	na	na	0	0	0	na	0	3300	na	0	na	na
Cation Sum	μg/L	2070	2231	2220	2280	2270	2150	2060	na	3100	3020	na	na	2140	2200	2190	na	2460	2330	na	na	na	na
Chlorate	μg/L	na	na	0	20 U	20 U	20 U	20 U	na	20 U	20 U	na	na	20 U	20 U	20 U	na	20 U	20 U	na	20 U	na	na
Chloride (CL)	μg/L	2000	1850	2060	na	na	na	na	na	na	na	na	na	2300	2400	2300	na	na	na	na	3000	na	2250
Chloride (EES)	μg/L	na	na	na	2040	1960	2140	2150	na	4070	4040	na	na	2220	2240	2090	na	1820	1790	na	2570	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	100	na	na	na	na	na	na	196	199	na	na	237	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	na	na	na	250	250	na	na	180	180	180	na	190	190	na	na	na	na
Conductivity (EES)	μS/cm	na	na	na	211	213	193	196	na	292	296	na	na	209	208	209	na	218	219	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	460	440	470	na	na	na	na	na	na	na	na	na	450	500	500	na	na	na	na	580	na	429
Fluoride (EES)	μg/L	na	na	na	450	430	349	336	na	460	450	na	na	500	490	470	na	510	520	na	490	na	na
Hardness	μg/L	na	na	na	58500	57900	56400	55300	na	104000	102000	na	na	55100	55900	55400	na	65500	62200	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	300	na	na	na	na	na	na	1500	1300	na	na	4300	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	200	na	na	na	na	na	na	na	100	na	na	400	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	200	200	na	na	500	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	400	na	na	na	na	na	na	1700	1600	na	na	5200	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	200	na	na	na	na	na	na	400	300	na	na	1500	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	400	na	na	na	na	na	na	800	900	na	na	1300	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	700	na	na	na	na	na	na	1200	1200	na	na	2900	na	na	na	na
Iodide	μg/L	na	0	0	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	10 U	na	10 U	10 U	na	10 U	na	na
Nitrate	μg/L	140 U	2 U	0	110	10	10 U	235	na	600	460	na	na	20 U	320	590	na	20 U	20 U	na	10 U	na	na
Nitrate [as N]	μg/L	na	na	na	24.8	2.26	2.26 U	53.1	na	135	104	na	na	4.52 U	72.3	133	na	4.52 U	4.52 U	na	2.26 U	na	na
Nitrite	μg/L	na	80	80	10 U	10 U	10 U	10 U	na	20 U	20 U	na	na	20 U	20 U	20 U	na	20 U	20 U	na	20	na	na
Nitrite [as N]	μg/L	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	3.59 U	3.59 U	na	na	3.59 U	3.59 U	3.59 U	na	3.59 U	3.59 U	na	3.59	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	510 U	na	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	200	200	200	na	na	na	na	200	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	4000	58000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	50 U	na	50 U
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	100	100	100	na	na	na	na	100	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	190	na	350
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	20 U	20 U	na	na	20 U	20 U	20 U	na	20 U	20 U	na	20 U	na	na
Phosphate	μg/L	na	3	2	50 U	50 U	20 U	20 U	na	50 U	50 U	na	na	50 U	50 U	50 U	na	50 U	50 U	na	6.52 U	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	200 U	250	200 U	na	na	na	na	50 U	na	50 U
Silica (CL)	μg/L	34000	14000	20200	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	36400	na	32100
Silica (EES)	μg/L	na	na	na	30800	32100	34000	23000	na	43000	46400	na	na	36600	30000	29500	na	26500	18600	na	35700	na	na
Silicon	μg/L	na	na	na	14400	15000	15900	10800	na	20100	21700	na	na	17100	14000	13800	na	12400	8700	na	na	na	na
Sulfate (CL)	μg/L	7000	5500	7510	na	na	na	na	na	na	na	na	na	6100	6100	6100	na	na	na	na	7100	na	4910
Sulfate (EES)	μg/L	na	na	na	5840	5840	5680	5040	na	17200	17400	na	na	6790	6510	6480	na	4210	4050	na	7310	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	10 U	na	10 U	10 U	na	10 U	na	na

Table B-2.2 — Sacred Spring (continued)

Date Collected		8/1/78	5/16/91	7/12/94	5/29/97	5/29/97	8/8/97	8/8/97	8/8/97	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		LA-4	VA-348	VA-442	PP97-20	PP97-20	0816-97-1054	0816-97-1055	PP97-34	PP98-16	PP98-16	PP98-17	PP98-18	RE16-98-9000	RE16-98-9001	RE16-98-9002	PP98-27	RE16-98-9034	RE16-98-9035	CABG-99-0003	CABG-99-0007	CABG-00-0039	CABG-00-0057
Analyte (Lab[a])	Units																						
pH (CL)	SU	na	na	na	na	na	na	7.3	na	na	na	na	na	na	6.8	7.2	na	na	7.4	na	na	na	na
pH (field)	SU	na	na	na	7.53	7.53	7.16	7.16	na	7.24	7.24	na	na	7.36	7.36	7.36	na	7.94	7.94	na	na	na	na
pH (EES)	SU	na	na	na	7.41	7.19	7.17	7.36	na	7.99	7.75	na	na	7.34	7.55	7.57	na	7.54	8.01	na	na	na	na
Br/Cl by wt	ratio	na	na	na	0.0098	0.0102	0.00861	0.00911	na	0.00491	0.0124	na	na	0.0225	0.00893	0.0191	na	0	0	na	na	na	na
B/Cl by wt	ratio	na	na	na	0.0157	0.0158	0.0156	0.0138	na	0.00663	0.00718	na	na	0.014	0.0165	0.0172	na	0.0192	0.0184	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	0	0	0	0	na	0	0	na	na	0	0	0	na	0	0	na	na	na	na
F/Cl by wt	ratio	na	na	na	0.221	0.219	0.163	0.156	na	0.113	0.111	na	na	0.225	0.219	0.225	na	0.28	0.291	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	59.3	61.7	50.5	52.5	na	34.9	38.9	na	na	53.6	52.7	56.5	na	71.4	69.8	na	na	na	na
K/Cl by wt	ratio	na	na	na	1.13	1.15	2.34	2.36	na	0.649	0.601	na	na	1.13	1.21	1.29	na	1.64	1.58	na	na	na	na
Li/Cl by wt	ratio	na	na	na	0.0147	0.0153	0.00935	0.00929	na	0.00983	0.00743	na	na	0.0135	0.0179	0.0144	na	0.0165	0.0168	na	na	na	na
Na/Cl by wt	ratio	na	na	na	11.6	11.6	8.65	8.55	na	5.33	5.15	na	na	9.77	10.1	10.9	na	12.5	12.8	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	2.86	2.98	2.66	2.34	na	4.23	4.31	na	na	3.06	2.91	3.1	na	2.31	2.26	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-87	na	-80	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	-75	na	na	na	-67	na	-76	-77	-80	na	na	na	-73	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	-11.3	na	na	na	-10.6	na	-11.6	-11.4	-11.4	na	na	na	-10.1	na	na	-11.7	na	-10.7	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.3
Otowi #4

Date Collected		3/2/93	5/20/93	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	2/26/98	2/26/98	2/26/98	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		OT-4	PP93-22	PP97-16	PP97-16	PP97-17	0816-97-1097	0816-97-1098	PP97-38	0816-98-0040	0816-98-0041	PP98-13	PP98-33	RE16-98-9011	RE16-98-9012
Analyte (Lab[a])	Units														
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	117000	117000	118000	111000	111000	na	116000	116000	na	na	120000	123000
Ammonia	μg/L	80	20	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	0	0	40	30	30	20	20	na	37	37.7	na	na	20 U[c]	20 U
Ammonium [as N]	μg/L	na	na	31.1	23.3	23.3	15.6	15.6	na	28.8	29.3	na	na	15.6 U	15.6 U
Anion Sum	μg/L	2564	2596	2760	2760	2780	2580	2580	na	2720	2710	na	na	2830	2880
Balance	μg/L	64.6	13	20.3	0.834	12.4	16.7	-19.6	na	-14.7	-4.81	na	na	-16	-33.1
Bicarbonate	μg/L	137000	136000	143000	143000	144000	135000	135000	na	142000	142000	na	na	147000	150000
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	120000	120000	na	na	na	na
Bromide (CL)	μg/L	50	50	na	na	na	na	na	na	100 U	100 U	na	na	na	na
Bromide (EES)	μg/L	na	na	40	40	40	53.3	59.8	na	60	60	na	na	40	40
Carbon dissolved organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	290
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	270	na	na	na	na
Carbonate	μg/L	0	0	0	0	0	0	0	na	0	0	na	na	0	0
Cation Sum	μg/L	2735	2630	2820	2760	2820	2620	2530	na	2680	2700	na	na	2780	2790
Chlorate	μg/L	na	na	20 U	20 U	20 U	20 U	20 U	na	10 U	10 U	na	na	20 U	20 U
Chloride (CL)	μg/L	7030	7490	na	na	na	na	na	na	7800	8200	na	na	na	na
Chloride (EES)	μg/L	na	na	9010	9050	9140	7390	7330	na	8170	8170	na	na	8820	8990
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	219	219	na	290	290	na	na	285	285
Conductivity (EES)	μS/cm	na	na	266	266	268	244	241	na	261	257	na	na	266	265
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	280	300	na	na	na	na	na	na	200	200	na	na	na	na
Fluoride (EES)	μg/L	na	na	260	260	260	231	236	na	280	270	na	na	310	310
Hardness	μg/L	na	na	86800	85600	86600	79600	80700	na	86100	84300	na	na	88500	86500
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Iodide	μg/L	0	0	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U
Nitrate	μg/L	5	6	1730	1680	1730	1470	1670	na	1240	1630	na	na	1670	1700
Nitrate [as N]	μg/L	na	na	391	379	391	333	376	na	280	368	na	na	377	384
Nitrite	μg/L	na	1580	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U
Nitrite [as N]	μg/L	na	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	na	na	1.79 U	1.79 U
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	400 R[d]	400 R	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	39000	39000	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U
Phosphate	μg/L	8	10	50 U	50 U	50 U	20 U	28.2	na	20 U	20 U	na	na	80	80
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na
Silica (CL)	μg/L	105000	95900	na	na	na	na	na	na	na	na	na	na	na	na
Silica (EES)	μg/L	na	na	92000	89700	92900	89300	92600	na	89200	90300	na	na	99700	100000
Silicon	μg/L	na	na	43000	41900	43400	41700	43300	na	41700	42200	na	na	46600	46800
Sulfate (CL)	μg/L	5050	5180	na	na	na	na	na	na	5900	5900	na	na	na	na
Sulfate (EES)	μg/L	na	na	5810	5680	5810	5700	5700	na	5440	5450	na	na	5860	5920
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U

Table B-2.3 — Otowi #4 (continued)

Date Collected		3/2/93	5/20/93	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	2/26/98	2/26/98	2/26/98	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		OT-4	PP93-22	PP97-16	PP97-16	PP97-17	0816-97-1097	0816-97-1098	PP97-38	0816-98-0040	0816-98-0041	PP98-13	PP98-33	RE16-98-9011	RE16-98-9012
Analyte (Lab[a])	Units														
Total dissolved solids (CL)	μg/L	308200	298900	na	na	na	na	na	na	216000	230000	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	308000	304000	310000	295000	293000	na	299000	301000	na	na	318000	322000
Total suspended solids	μg/L	na	na	na	200	100	100 U	na	na	200	187	na	na	865	865
Turbidity (field)	NTU	na	na	na	na	na	0	0	na	1.4	1.4	na	na	0.6	0.6
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	6.92	6.92	6.92	7.4	7.4	na	7.58	7.58	na	na	7.45	7.45
pH (EES)	SU	na	na	7.5	7.35	7.51	7.57	7.74	na	7.58	7.68	na	na	7.4	7.51
Br/Cl by wt	ratio	na	na	0.00444	0.00442	0.00438	0.00722	0.00816	na	0.00734	0.00734	na	na	0.00454	0.00445
B/Cl by wt	ratio	na	na	0.00533	0.00552	0.00525	0.00113	0.00109	na	0.00636	0.00624	na	na	0.00556	0.00556
Cs/Cl by wt	ratio	na	na	0	0	0	0	0	na	0	0	na	na	0	0
F/Cl by wt	ratio	na	na	0.0289	0.0287	0.0284	0.0312	0.0322	na	0.0343	0.033	na	na	0.0351	0.0345
HCO_3/CL by wt	ratio	na	na	15.9	15.8	15.8	18.3	18.4	na	17.4	17.4	na	na	16.7	16.7
K/Cl by wt	ratio	na	na	0.41	0.391	0.407	0.429	0.43	na	0.398	0.422	na	na	0.393	0.406
Li/Cl by wt	ratio	na	na	0.00444	0.00442	0.00438	0.00406	0.00409	na	0.0049	0.0049	na	na	0.00567	0.00445
Na/Cl by wt	ratio	na	na	2.49	2.4	2.45	2.57	2.59	na	2.42	2.56	na	na	2.38	2.44
SO_4/Cl by wt	ratio	na	na	0.645	0.628	0.636	0.771	0.778	na	0.666	0.667	na	na	0.664	0.659
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	-7.6	na
Deuterium/hydrogen ratio	ratio	na	na	-70	na	-72	na	na	-72	na	na	-75	-68	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	-11.2	na	-11.2	na	na	-11.2	na	na	-11.4	-10.7	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
NATU = Natural uranium
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.4
La Mesita Spring

Date Collected		5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-15	PP97-15	0816-97-1038	0816-97-1039	PP97-27	0816-98-0046	0816-98-0047	PP98-15	PP98-25	PP98-26	RE16-98-9013	RE16-98-9014	RE16-98-9015	CABG-99-0006	CABG-99-0002	CABG-00-0038	CABG-00-0056
Analyte (Lab[a])	Units																	
Alkalinity total	μg/L	na[b]	na	na	na	na	120000	120000	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	125000	125000	150000	150000	na	123000	124000	na	na	na	126000	126000	125000	124000	na	na	na
Ammonia	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	40	40	40	40	na	20 U[c]	22.1	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Ammonium [as N]	μg/L	31.1	31.1	31.1	31.1	na	15.6 U	17.2	na	na	na	15.6 U	15.6 U	15.6 U	15.6 U	na	na	na
Anion Sum	μg/L	3200	3210	4060	4090	na	3180	3050	na	na	na	3240	3120	3210	na	na	na	na
Balance	μg/L	28.1	15.6	-40.5	-38.4	na	-31.4	35	na	na	na	-9.64	21.1	1.02	na	na	na	na
Bicarbonate	μg/L	152000	153000	183000	183000	na	150000	151000	na	na	na	154000	141000	137000	151000	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	na	na	na	na	200 U	200 U	na	na	na	na	na	na	200 U	na	na	123
Bromide (EES)	μg/L	130	130	130	136	na	120	130	na	na	na	130	110	160	140	na	na	na
Carbon dissolved organic	μg/L	na	na	na	1400	na	na	na	na	na	na	na	1000	na	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	620	na	na	na	na	na	580	na	na	na	na
Carbonate	μg/L	0	0	0	0	na	0	0	na	na	na	0	6400	7700	0	na	na	na
Cation Sum	μg/L	3290	3260	3900	3940	na	3080	3160	na	na	na	3210	3190	3210	na	na	na	na
Chlorate	μg/L	20 U	20 U	20 U	20 U	na	20 U	20 U	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Chloride (CL)	μg/L	na	na	na	na	na	8200	8200	na	na	na	na	na	na	9700	na	na	9980
Chloride (EES)	μg/L	8690	8620	11800	12000	na	8250	8240	na	na	na	8210	8490	8360	7980	na	na	na
Conductivity (CL)	μS/cm	na	na	na	381	na	na	na	na	na	na	na	333	na	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	320	320	na	na	na	230	230	230	na	na	na	na
Conductivity (EES)	μS/cm	310	312	394	392	na	308	307	na	na	na	314	310	310	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	na	na	na	na	na	200	300	na	na	na	na	na	na	370	na	na	271
Fluoride (EES)	μg/L	240	230	215	222	na	280	290	na	na	na	280	300	290	270	na	na	na
Hardness	μg/L	91300	89200	112000	116000	na	86400	87500	na	na	na	89100	88500	88900	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	600	na	na	na	na	na	na	na	300	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	na	na	na	na	100	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	100	na	na	na	na	na	na	na	100	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	700	na	na	na	na	na	na	na	600	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	500	na	na	na	na	na	na	na	300	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	200	na	na	na	na	na	na	na	100	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	700	na	na	na	na	na	na	na	400	na	na	na	na	na
Iodide	μg/L	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	10 U	na	na	na
Nitrate	μg/L	8380	8460	7360	7710	na	9730	9880	na	na	na	8440	9770	8960	9400	na	na	na
Nitrate [as N]	μg/L	1890	1910	1660	1740	na	2200	2230	na	na	na	1910	2210	2020	2120	na	na	na
Nitrite	μg/L	10 U	10 U	10 U	10 U	na	20 U	20 U	na	na	na	20 U	20 U	40	30	na	na	na
Nitrite [as N]	μg/L	1.79 U	1.79 U	1.79 U	1.79 U	na	3.59 U	3.59 U	na	na	na	3.59 U	3.59 U	7.18	5.38	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	510 U	na	na	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	2200	2200	na	na	na	na	na	na	2500	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	1800	na	na	2000
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	100	100	na	na	na	na	na	na	100	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	140	na	na	100 U
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	20 U	20 U	na	na	na	20 U	20 U	20 U	20 U	na	na	na
Phosphate	μg/L	50 U	50 U	33.8	20 U	na	50 U	50 U	na	na	na	50 U	50 U	50 U	6.52 U	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	200 U	200 U	na	na	na	na	na	na	50 U	na	na	50 U
Silica (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	27800	na	na	27800
Silica (EES)	μg/L	28900	30400	31800	31200	na	29500	26800	na	na	na	31900	28500	28900	32300	na	na	na
Silicon	μg/L	13500	14200	14800	14600	na	13800	12500	na	na	na	14900	13300	13500	na	na	na	na
Sulfate (CL)	μg/L	na	na	na	na	na	14000	14000	na	na	na	na	na	na	16000	na	na	13200
Sulfate (EES)	μg/L	15100	14900	28500	29500	na	14800	14600	na	na	na	15000	15100	15200	14400	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	10 U	na	na	na
Total dissolved solids (CL)	μg/L	na	na	na	na	na	210000	200000	na	na	na	na	na	na	na	na	na	na

Table B-2.4 — La Mesita Spring (continued)

Date Collected		5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-15	PP97-15	0816-97-1038	0816-97-1039	PP97-27	0816-98-0046	0816-98-0047	PP98-15	PP98-25	PP98-26	RE16-98-9013	RE16-98-9014	RE16-98-9015	CABG-99-0006	CABG-99-0002	CABG-00-0038	CABG-00-0056
Analyte (Lab[a])	Units																	
Total dissolved solids (EES)	μg/L	284000	285000	348000	349000	na	279000	279000	na	na	na	288000	278000	276000	281000	na	na	na
Total suspended solids	μg/L	na	4900	1900	na	na	100 U	na	na	na	na	583	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	7.6	7.6	na	na	na	9.3	9.3	9.3	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	7.2	na	na	na	na	na
pH (field)	SU	7.17	7.17	6.5	6.5	na	7.4	7.4	na	na	na	7.48	7.48	7.48	na	na	na	na
pH (EES)	SU	7.65	7.58	7.88	7.92	na	7.88	7.77	na	na	na	7.85	8.13	8.15	na	na	na	na
Br/Cl by wt	ratio	0.015	0.0151	0.011	0.0113	na	0.0145	0.0158	na	na	na	0.0158	0.013	0.0191	na	na	na	na
B/Cl by wt	ratio	0.00529	0.00522	0.00457	0.00462	na	0.00582	0.0057	na	na	na	0.00621	0.00601	0.00598	na	na	na	na
Cs/Cl by wt	ratio	0	0	0	0	na	0	0	na	na	na	0	0	0	na	na	na	na
F/Cl by wt	ratio	0.0276	0.0267	0.0181	0.0184	na	0.0339	0.0352	na	na	na	0.0341	0.0353	0.0347	na	na	na	na
HCO_3/CL by wt	ratio	17.5	17.7	15.5	15.2	na	18.2	18.3	na	na	na	18.8	16.6	16.4	na	na	na	na
K/Cl by wt	ratio	0.303	0.294	0.243	0.24	na	0.303	0.323	na	na	na	0.312	0.302	0.315	na	na	na	na
Li/Cl by wt	ratio	0.00345	0.00348	0.00338	0.00249	na	0.00364	0.00364	na	na	na	0.00365	0.00353	0.00359	na	na	na	na
Na/Cl by wt	ratio	3.62	3.5	3	2.91	na	3.53	3.69	na	na	na	3.71	3.62	3.71	na	na	na	na
SO_4/Cl by wt	ratio	1.74	1.73	2.41	2.45	na	1.79	1.77	na	na	na	1.83	1.78	1.82	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-81	-80	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-1.9	na	na
Deuterium/hydrogen ratio	ratio	-74	na	na	na	-69	na	na	-76	-74	-69	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	-11	na	na	na	-11.1	na	na	-11	-10.5	-10.5	na	na	na	na	-10.4	-10.5	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.5
Guaje #5

Date Collected		10/22/91	8/18/92	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		VA-370	G-5	PP97-18	PP97-18	PP97-19	0816-97-1099	0816-97-1100	PP97-37	PP98-34	RE16-98-9009	RE16-98-9010
Analyte (Lab[a])	Units											
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	74800	75000	74900	76100	76400	na	na	76600	76800
Ammonia	µg/L	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	100	50 U[c]	40	30	30	30	30	na	na	20 U	20 U
Ammonium [as N]	µg/L	na	na	31.1	23.3	23.3	23.3	23.3	na	na	15.6 U	15.6 U
Anion Sum	µg/L	1690	1702	1720	1720	1720	1750	1750	na	na	1780	1750
Balance	µg/L	43	35.2	26.6	16.8	40.1	-12.2	-7.94	na	na	-16	34.6
Bicarbonate	µg/L	90100	91900	91200	91500	91400	92900	93200	na	na	82700	93700
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	30	20 U	na	na	na	na	na	na	na	na	na
Bromide (EES)	µg/L	na	na	30	30	30	47.5	41.7	na	na	30	40
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	na	na	na	430
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na
Carbonate	µg/L	0	0	0	0	0	0	0	na	na	5300	0
Cation Sum	µg/L	1765	1763	1770	1750	1800	1730	1740	na	na	1750	1820
Chlorate	µg/L	na	na	20 U	20 U	20 U	20 U	20 U	na	na	20 U	20 U
Chloride (CL)	µg/L	2860	2390	na	na	na	na	na	na	na	na	na
Chloride (EES)	µg/L	na	na	3120	3060	3100	2850	2880	na	na	3090	3080
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	216	216	na	na	190	190
Conductivity (EES)	µS/cm	na	na	169	169	170	170	168	na	na	171	171
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	270	260	na	na	na	na	na	na	na	na	na
Fluoride (EES)	µg/L	na	na	280	280	280	234	231	na	na	250	260
Hardness	µg/L	na	na	57800	58300	59300	57300	57800	na	na	59000	61700
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	na
Iodide	µg/L	0	0	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U
Nitrate	µg/L	2760	2680	2850	2860	2870	2950	2820	na	na	3220	3250
Nitrate [as N]	µg/L	na	na	644	646	648	665	636	na	na	727	734
Nitrite	µg/L	20 U	20 U	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U
Nitrite [as N]	µg/L	na	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	na	1.79 U	1.79 U
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate [as NO3]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	20 U	20 U
Phosphate	µg/L	na	na	50 U	50 U	50 U	20 U	20 U	na	na	20 U	20 U
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na
Silica (CL)	µg/L	58000	58900	na	na	na	na	na	na	na	na	na
Silica (EES)	µg/L	na	na	58400	58400	58600	60600	61600	na	na	66800	67200
Silicon	µg/L	na	na	27300	27300	27400	28300	28800	na	na	31200	31400
Sulfate (CL)	µg/L	3510	3390	na	na	na	na	na	na	na	na	na
Sulfate (EES)	µg/L	na	na	3690	3660	3670	4100	4120	na	na	4320	4310
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U

Table B-2.5 — Guaje #5 (continued)

Date Collected		10/22/91	8/18/92	5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	9/28/98	9/28/98	9/28/98
Field Prep		filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		VA-370	G-5	PP97-18	PP97-18	PP97-19	0816-97-1099	0816-97-1100	PP97-37	PP98-34	RE16-98-9009	RE16-98-9010
Analyte (Lab)	**Units**											
Total dissolved solids (CL)	μg/L	193300	195000	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	195000	195000	196000	199000	200000	na	na	201000	208000
Total suspended solids	μg/L	na	na	na	100	100	100 U	na	na	na	100 U	100 U
Turbidity (field)	NTU	na	na	na	na	na	0	0	na	na	1.1	1.1
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	7.86	7.86	7.86	6.81	6.81	na	na	8.11	8.11
pH (EES)	SU	na	na	8.12	8.14	8.17	8.17	8.11	na	na	8.13	7.77
Br/Cl by wt	ratio	na	na	0.00962	0.0098	0.00968	0.0167	0.0145	na	na	0.00971	0.013
B/Cl by wt	ratio	na	na	0.00417	0.0049	0.00484	0.00562	0.00562	na	na	0.00647	0.00519
Cs/Cl by wt	ratio	na	na	0	0	0	0	0	na	na	0	0
F/Cl by wt	ratio	na	na	0.0897	0.0915	0.0903	0.0821	0.0803	na	na	0.0809	0.0844
HCO_3/CL by wt	ratio	na	na	29.2	29.9	29.5	32.6	32.3	na	na	26.8	30.4
K/Cl by wt	ratio	na	na	0.676	0.641	0.677	0.695	0.69	na	na	0.641	0.666
Li/Cl by wt	ratio	na	na	0.00641	0.00654	0.00645	0.00351	0.00693	na	na	0.00647	0.00649
Na/Cl by wt	ratio	na	na	4.04	3.92	4.03	4.25	4.2	na	na	3.82	3.93
SO_4/Cl by wt	ratio	na	na	1.18	1.2	1.18	1.44	1.43	na	na	1.4	1.4
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	-6.1	na
Deuterium/hydrogen ratio	ratio	na	na	-72	na	-71	na	na	-72	-69	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	-11.2	na	-11.2	na	na	-11.3	-10.7	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.6
Water Canyon Gallery

Date Collected		8/1/78	8/18/92	5/20/93	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	2/9/98	2/9/98	7/8/98	7/8/98	7/8/98	1/5/00	1/5/00	3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		LA-1	WCG	PP93-27	SSite96-14	PP97-8	PP97-8	0816-97-1040	0816-97-1041	PP97-28	0816-98-0005	0816-98-0006	0816-98-0007	PP98-3	PP98-4	PP98-28	RE16-98-9026	RE16-98-9027	CABG-00-0003	CABG-00-0014	CABG-00-0031	CABG-00-0032	CABG-00-0049	CABG-00-0050
Analyte (Lab[a])	Units																							
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	na	na	36600	36600	33900	34000	na	40700	40400	40400	na	na	na	42100	41400	na	40600	na	na	na	na
Ammonia	μg/L	na	50 U[c]	20 U	60	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	50 U	0	0	0	40	30	40	60	na	36.4	40.6	35.6	na	na	na	20 U	20 U	na	20 U	na	na	na	na
Ammonium [as N]	μg/L	na	na	na	na	31.1	23.3	31.1	46.7	na	28.3	31.6	27.7	na	na	na	15.6 U	15.6 U	na	15.6 U	na	na	na	na
Anion Sum	μg/L	990	916	832	865	843	839	760	765	na	873	864	859	na	na	na	899	873	na	na	na	na	na	na
Balance	μg/L	na	15.8	38.9	39	325	440	245	182	na	28.7	54.5	54.4	na	na	na	-26.4	14.1	na	na	na	na	na	na
Bicarbonate	μg/L	52000	52800	44600	48900	44700	44600	41300	41500	na	49600	49300	49300	na	na	na	51400	50500	na	49500	na	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	41000	43000	42000	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	20 U	10	10 U	na	na	na	na	na	100	100	100	na	na	na	na	na	na	200 U	na	na	0.05 U	0.05 U
Bromide (EES)	μg/L	na	na	na	na	10	10 U	12.7	7.28	na	10	20	20	na	na	na	20 U	20 U	na	10	na	na	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	na	na	8700	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	na	480	470	na	na	na	na	690	na	na	na	na	na	na
Carbonate	μg/L	na	0	0	0	0	0	0	0	na	0	0	0	na	na	na	0	0	na	0	na	na	na	na
Cation Sum	μg/L	910	931	865	900	1170	1310	973	918	na	899	912	907	na	na	na	875	886	na	na	na	na	na	na
Chlorate	μg/L	na	na	na	0	20 U	20 U	20 U	20 U	na	10 U	10 U	10 U	na	na	na	20 U	20 U	na	20 U	na	na	na	na
Chloride (CL)	μg/L	1000 U	640	690	770	na	na	na	na	na	700	700	700	na	na	na	na	na	na	830	na	na	761	748
Chloride (EES)	μg/L	na	na	na	na	730	690	593	606	na	540	530	540	na	na	na	600	620	na	600	na	na	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	71	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	na	na	na	na	90	90	90	na	na	na	65	65	na	na	na	na	na	na
Conductivity (EES)	μS/cm	na	na	na	na	86.6	86.3	79.3	78.7	na	86.6	86.2	86.3	na	na	na	87.6	87.2	na	na	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	120	50	60	30	na	na	na	na	na	90	90	90	na	na	na	na	na	na	100 U	na	na	103	88
Fluoride (EES)	μg/L	na	na	na	na	60	50	56.9	57.7	na	60	50	60	na	na	na	70	60	na	80	na	na	na	na
Hardness	μg/L	na	na	na	na	31800	33700	30600	30400	na	30200	30400	30100	na	na	na	29600	29700	na	na	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	na	3100	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	200	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	na	3700	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	na	4600	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	na	400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	na	5000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Iodide	μg/L	na	0	0	0	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	na	10 U	10 U	na	10 U	na	na	na	na
Nitrate	μg/L	140 U	4	5	0	760	740	821	906	na	690	1280	1310	na	na	na	230	690	na	620	na	na	na	na
Nitrate [as N]	μg/L	na	na	na	na	172	167	185	205	na	156	289	296	na	na	na	51.9	156	na	140	na	na	na	na
Nitrite	μg/L	na	480	980	910	10 U	10 U	10 U	10 U	na	30	10 U	10 U	na	na	na	20	20	na	20	na	na	na	na
Nitrite [as N]	μg/L	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	5.38	1.79 U	1.79 U	na	na	na	3.59	3.59	na	3.59	na	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	na	na	500 U	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	300 R[d]	300 R	300 R	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	1000	25000	25000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	350	na	na	250	na
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	100 R	100 R	100 R	na	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	320	na	na	100 U	110
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	20 U	na	na	na	na
Phosphate	μg/L	na	4	6	6	70	80	41.2	42.6	na	20 U	30	20 U	na	na	na	50 U	50 U	na	9.78	na	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	200	200	200	na	na	na	na	na	na	50 U	na	na	55	54
Sulfate (CL)	μg/L	5000 U	1050	2850	1200	na	na	na	na	na	1100	1100	1200	na	na	na	na	na	na	1200	na	na	1140	1160
Sulfate (EES)	μg/L	na	na	na	na	3500	3480	2350	2340	na	960	970	990	na	na	na	1130	1140	na	950	na	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	na	10 U	10 U	na	10 U	na	na	na	na
Total dissolved solids (CL)	μg/L	119000	117100	105900	113600	na	na	na	na	na	104000	100000	100000	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	na	na	116000	120000	118000	107000	na	116000	115000	115000	na	na	na	115000	114000	na	118000	na	na	na	na
Total suspended solids	μg/L	na	na	na	na	na	na	21600	na	na	1200	1190	3680	na	na	na	2040	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	1.8	1.8	1.8	na	na	na	1.7	1.7	na	na	na	na	na	na

Table B-2.6 — Water Canyon Gallery (continued)

Date Collected		8/1/78	8/18/92	5/20/93	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	2/9/98	2/9/98	7/8/98	7/8/98	7/8/98	1/5/00	1/5/00	3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		LA-1	WCG	PP93-27	SSite96-14	PP97-8	PP97-8	0816-97-1040	0816-97-1041	PP97-28	0816-98-0005	0816-98-0006	0816-98-0007	PP98-3	PP98-4	PP98-28	RE16-98-9026	RE16-98-9027	CABG-00-0003	CABG-00-0014	CABG-00-0031	CABG-00-0032	CABG-00-0049	CABG-00-0050
Analyte (Lab)	**Units**																							
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	7.42	7.42	7.21	7.21	na	7.74	7.74	7.74	na	na	na	7.23	7.23	na	na	na	na	na	na
pH (EES)	SU	na	na	na	na	7.42	7.39	7.05	7.12	na	7.28	7.61	7.61	na	na	na	7.43	7.7	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	0.0137	0	0.0214	0.012	na	0.0185	0.0377	0.037	na	na	na	0	0	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	0	0	0.0146	0.0138	na	0.00926	0.00943	0.00926	na	na	na	0.0117	0.0113	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	0	0	0	0	na	0	0	0	na	na	na	0	0	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	0.0822	0.0725	0.096	0.0953	na	0.111	0.0943	0.111	na	na	na	0.117	0.0968	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	61.2	64.6	69.6	68.5	na	91.9	93	91.3	na	na	na	85.7	81.5	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	2.99	3.03	3.42	3.04	na	2.86	3.09	3.06	na	na	na	2.37	2.44	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	0	0	0.0169	0	na	0	0.0189	0	na	na	na	0	0	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	7.33	7.36	8.04	7.89	na	10.5	11.1	11	na	na	na	9.23	9.27	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	4.79	5.04	3.96	3.86	na	1.78	1.83	1.83	na	na	na	1.88	1.84	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-86	na	-88	-85	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-1.3	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	-76	na	na	na	-67	na	na	na	-79	-79	-74	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	-12.2	na	na	na	-10.5	na	na	na	-12.7	-12.6	-11.9	na	na	-11.9	na	-12	-12	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.7
Upper Cañon de Valle Spring

Date Collected		7/18/96	5/13/97	5/13/97	5/13/97	8/4/97	8/4/97	8/4/97	2/23/98	2/23/98	2/23/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	4/5/00	4/5/00
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		CDV-5.0	PP97-11	PP97-12	PP97-12	0816-97-1031	0816-97-1032	PP97-23	0816-98-0034	0816-98-0035	PP98-10	PP98-19	RE16-98-9028	RE16-98-9029	CABG-00-0004	CABG-00-0015	CABG-00-0040	CABG-00-0058
Analyte (Lab[a])	Units																	
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	27700	27700	27700	38300	38200	na	39300	39100	na	na	34900	34500	na	41800	na	na
Ammonia	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	20 U[c]	40	40	30	40	40	na	37.7	40.4	na	na	39.1	52.4	na	20 U	na	na
Ammonium [as N]	μg/L	na	31.1	31.1	23.3	31.1	31.1	na	29.3	31.5	na	na	30.4	40.8	na	15.6 U	na	na
Anion Sum	μg/L	na	743	732	730	906	922	na	918	963	na	na	831	822	na	na	na	na
Balance	μg/L	na	604	651	670	74.8	47	na	20.2	-11.3	na	na	67.7	39.8	na	na	na	na
Bicarbonate	μg/L	44800	33800	33800	33800	46700	46600	na	48000	47700	na	na	42600	42100	na	51000	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	35600	38000	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	na	na	na	na	na	na	100 U	100 U	na	na	na	na	na	200 U	na	0.05 U
Bromide (EES)	μg/L	na	10 U	10 U	10 U	12.1	10 U	na	10	10	na	na	20 U	20 U	na	20	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	4100	na	na	1800	na	na	na	3600	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	μg/L	na	0	0	0	0	0	na	0	0	na	na	0	0	na	0	na	na
Cation Sum	μg/L	na	1390	1440	1470	977	967	na	937	952	na	na	889	856	na	na	na	na
Chlorate	μg/L	na	20 U	20 U	20 U	20 U	20 U	na	10 U	10 U	na	na	20 U	20 U	na	20 U	na	na
Chloride (CL)	μg/L	1400	na	na	na	na	na	na	1500	1500	na	na	na	na	na	1400	na	1350
Chloride (EES)	μg/L	na	1050	1030	1030	999	1080	na	1030	1000	na	na	1020	1020	na	1110	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	93	na	na	80	na	na	na	77	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	94	94	na	80	80	na	na	65	65	na	na	na	na
Conductivity (EES)	μS/cm	na	79.7	79.8	79.5	93	94.2	na	94.4	93.6	na	na	85.8	85.3	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	500 U	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	500 U	na	na	na	na	na	na	50 U	50 U	na	na	na	na	na	100 U	na	145
Fluoride (EES)	μg/L	na	60	50	60	62.7	52.2	na	90	90	na	na	90	80	na	80	na	na
Hardness	μg/L	na	29000	29000	29100	33700	33400	na	33100	33300	na	na	30900	30300	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	1800	na	na	700	na	na	na	1300	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	200	na	na	na	na	na	na	200	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	300	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	1900	na	na	700	na	na	na	1800	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	1700	na	na	600	na	na	na	1600	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	500	na	na	500	na	na	na	200	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	2200	na	na	1100	na	na	na	1800	na	na	na	na
Iodide	μg/L	na	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na
Nitrate	μg/L	0	20	930	850	632	1360	na	1040	1450	na	na	380	520	na	340	na	na
Nitrate [as N]	μg/L	na	4.52	210	192	143	306	na	235	327	na	na	85.8	117	na	76.8	na	na
Nitrite	μg/L	na	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	20 U	90	na	10 U	na	na
Nitrite [as N]	μg/L	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	na	na	3.59 U	16.2	na	1.79 U	na	na
Nitrogen ammonia [as N]	μg/L	320	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	na	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	400 R[d]	400 R	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	390	na	370
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	430	na	100 U
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	20 U	na	na
Phosphate	μg/L	na	50 U	100	90	87.5	143	na	70	70	na	na	50 U	50 U	na	16.3	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	70	na	64
Silica (CL)	μg/L	49000	na	na	na	na	na	na	na	na	na	na	na	na	na	42800	na	42800
Silica (EES)	μg/L	na	55200	54100	55600	47800	44400	na	43700	43200	na	na	46200	46200	na	48200	na	na
Silicon	μg/L	na	25800	25300	26000	22300	20700	na	20400	20200	na	na	21600	21600	na	na	na	na
Sulfate (CL)	μg/L	4000	na	na	na	na	na	na	3900	3800	na	na	na	na	na	3200	na	3270
Sulfate (EES)	μg/L	na	7490	6210	6160	4660	4810	na	3480	3200	na	na	4320	4180	na	2980	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	40100 U	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na
Total dissolved solids (CL)	μg/L	130000	na	na	na	na	na	na	114000	110000	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	121000	120000	121000	122000	119000	na	116000	116000	na	na	114000	111000	na	123000	na	na

Table B-2.7 — Upper Cañon de Valle Spring (continued)

Date Collected		7/18/96	5/13/97	5/13/97	5/13/97	8/4/97	8/4/97	8/4/97	2/23/98	2/23/98	2/23/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	4/5/00	4/5/00
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		CDV-5.0	PP97-11	PP97-12	PP97-12	0816-97-1031	0816-97-1032	PP97-23	0816-98-0034	0816-98-0035	PP98-10	PP98-19	RE16-98-9028	RE16-98-9029	CABG-00-0004	CABG-00-0015	CABG-00-0040	CABG-00-0058
Analyte (Lab[a])	**Units**																	
Total suspended solids	µg/L	na	26900	na	20500	5900	na	na	700	654	na	na	5180	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	0	0	na	1.4	1.4	na	na	4.6	4.6	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	7.5	na	na	na	7.3	na	na	na	na
pH (field)	SU	na	7.33	7.33	7.33	7.3	7.3	na	8.04	8.04	na	na	7.76	7.76	na	na	na	na
pH (EES)	SU	na	7.39	7.33	7.3	7.36	7.7	na	7.49	7.52	na	na	7.23	7.67	na	na	na	na
Br/Cl by wt	ratio	na	0	0	0	0.0121	0	na	0.00971	0.01	na	na	0	0	na	na	na	na
B/Cl by wt	ratio	na	0.00667	0.0068	0.00777	0.00608	0.00678	na	0.00583	0.008	na	na	0.00784	0.00784	na	na	na	na
Cs/Cl by wt	ratio	na	0	0	0	0	0	na	0	0	na	na	0	0	na	na	na	na
F/Cl by wt	ratio	na	0.0571	0.0485	0.0583	0.0628	0.0483	na	0.0874	0.09	na	na	0.0882	0.0784	na	na	na	na
HCO_3/CL by wt	ratio	na	32.2	32.8	32.8	46.7	43.1	na	46.6	47.7	na	na	41.8	41.3	na	na	na	na
K/Cl by wt	ratio	na	2.61	2.62	2.56	2.47	2.36	na	2.23	2.44	na	na	2.22	2.24	na	na	na	na
Li/Cl by wt	ratio	na	0	0	0	0	0	na	0	0	na	na	0	0	na	na	na	na
Na/Cl by wt	ratio	na	4.22	4.29	4.16	4.92	4.57	na	4.64	5	na	na	4.05	4.23	na	na	na	na
SO_4/Cl by wt	ratio	na	7.13	6.03	5.98	4.66	4.45	na	3.38	3.2	na	na	4.24	4.1	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	-89	na	-85	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	-3.8	na	na	na
Deuterium/hydrogen ratio	ratio	na	-78	-80	na	na	na	-78	na	na	-79	-75	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	-12.6	-12.6	na	na	na	-12.5	na	na	-12.7	-11.9	na	na	-11.9	na	-12.2	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.8
Spring 9b

Date Collected		4/12/1995	4/12/1995	4/22/1997	4/22/1997	8/18/1997	8/18/1997	8/18/1997	2/3/1998	2/3/1998	2/3/1998	9/23/1998	9/23/1998	9/23/1998	1/7/2000	1/7/2000	1/11/2000	4/6/2000	4/6/2000
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP95-129	s9b950412	PP97-2	PP97-2	0816-97-1052	0816-97-1053	PP97-35	0816-98-0003	0816-98-0004	PP98-2	PP98-32	RE16-98-9007	RE16-98-9008	CABG-00-0010	CABG-00-0020	CABG-00-0027	CABG-00-0042	CABG-00-0060
Analyte (Lab[a])	Units																		
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	53900	54000	54300	54400	na	54300	53700	na	na	54600	55000	na	54100	na	na	na
Ammonia	μg/L	70	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	0	20 U[c]	40	40	30	40	na	37.3	42	na	na	20 U	20 U	na	20 U	na	na	na
Ammonium [as N]	μg/L	na	na	31.1	31.1	23.3	31.1	na	29	32.7	na	na	15.6 U	15.6 U	na	15.6 U	na	na	na
Anion Sum	μg/L	1243	na	1240	1240	1230	1240	na	1230	1200	na	na	1240	1230	na	na	na	na	na
Balance	μg/L	31.3	na	66.1	1.03	10.7	6.16	na	12.9	54	na	na	1.85	32.6	na	na	na	na	na
Bicarbonate	μg/L	66500	60000	65800	65900	66200	66400	na	66200	65500	na	na	66600	67100	na	66000	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	60	na	na	na	na	na	na	na	na	na	na	na	200 U	na	200 U	na	na	0.05 U
Bromide (EES)	μg/L	na	na	30	40	32.9	34.4	na	40	30	na	na	20	20	na	40	na	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	280	na	na	na	na	na	na	na	na	na
Carbonate	μg/L	0	5000 U	0	0	0	0	na	0	0	na	na	0	0	na	0	na	na	na
Cation Sum	μg/L	1282	na	1320	1240	1240	1240	na	1240	1260	na	na	1240	1270	na	na	na	na	na
Chlorate	μg/L	0	na	20 U	20 U	20 U	20 U	na	10 U	10 U	na	na	20 U	20 U	na	20 U	na	na	na
Chloride (CL)	μg/L	1960	5000 U	na	na	na	na	na	na	na	na	na	na	2300	na	2200	na	na	2060
Chloride (EES)	μg/L	na	na	2060	2040	1970	1930	na	1820	1840	na	na	1980	2030	na	1950	na	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	150	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	225	225	na	na	na	na	na	111	111	na	na	na	na	na
Conductivity (EES)	μS/cm	na	na	122	122	121	120	na	122	121	na	na	120	120	na	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	450	500 U	na	na	na	na	na	na	na	na	na	na	410	na	540	na	na	454
Fluoride (EES)	μg/L	na	na	440	430	386	389	na	420	420	na	na	430	450	na	440	na	na	na
Hardness	μg/L	na	na	39600	36200	35600	35500	na	37700	37000	na	na	36100	36600	na	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Iodide	μg/L	0	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na	na
Nitrate	μg/L	0	0	1940	1890	1390	1660	na	1030	1780	na	na	1450	1470	na	990	na	na	na
Nitrate [as N]	μg/L	na	na	438	427	315	374	na	233	402	na	na	327	332	na	224	na	na	na
Nitrite	μg/L	1850	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na	na
Nitrite [as N]	μg/L	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	na	na	1.79 U	1.79 U	na	1.79 U	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	na	na	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	360	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	340	na	na	400
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	100	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	340	na	na	190
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	20 U	na	na	na
Phosphate	μg/L	3	na	40	60	20 U	48.6	na	20 U	20 U	na	na	20 U	20 U	na	6.52 U	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	200 U	na	50 U	na	na	50 U
Silica (CL)	μg/L	74300	75000	na	na	na	na	na	na	na	na	na	na	na	na	70600	na	na	70600
Silica (EES)	μg/L	na	na	81500	75100	72400	72200	na	71300	72300	na	na	80500	81700	na	76800	na	na	na
Silicon	μg/L	na	na	38100	35100	33800	33700	na	33300	33800	na	na	37600	38200	na	na	na	na	na
Sulfate (CL)	μg/L	2020	5000	na	na	na	na	na	na	na	na	na	na	2100	na	2200	na	na	2030
Sulfate (EES)	μg/L	na	na	2120	2090	2160	2160	na	1820	1840	na	na	2040	2040	na	1950	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na	na
Total dissolved solids (CL)	μg/L	173000	120000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	180000	173000	170000	170000	na	168000	169000	na	na	178000	181000	na	173000	na	na	na

Table B-2.8 — Spring 9b (continued)

Date Collected		4/12/1995	4/12/1995	4/22/1997	4/22/1997	8/18/1997	8/18/1997	8/18/1997	2/3/1998	2/3/1998	2/3/1998	9/23/1998	9/23/1998	9/23/1998	1/7/2000	1/7/2000	1/11/2000	4/6/2000	4/6/2000
Field Prep		filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP95-129	s9b950412	PP97-2	PP97-2	0816-97-1052	0816-97-1053	PP97-35	0816-98-0003	0816-98-0004	PP98-2	PP98-32	RE16-98-9007	RE16-98-9008	CABG-00-0010	CABG-00-0020	CABG-00-0027	CABG-00-0042	CABG-00-0060
Analyte (Lab[a])	**Units**																		
Total suspended solids	μg/L	na	na	na	na	6100	na	na	196	196	na	na	500 U	500 U	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	0	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	7.82	7.82	7.85	7.85	na	7.73	7.73	na	na	7.26	7.26	na	na	na	na	na
pH (EES)	SU	na	na	7.91	7.9	7.79	7.87	na	7.31	7.85	na	na	7.74	7.87	na	na	na	na	na
Br/Cl by wt	ratio	na	na	0.0146	0.0196	0.0167	0.0178	na	0.022	0.0163	na	na	0.0101	0.00985	na	na	na	na	na
B/Cl by wt	ratio	na	na	0.00583	0.00441	0.0049	0.00491	na	0.00769	0.00489	na	na	0.00455	0.00591	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	0	0	0	0	na	0	0	na	na	0	0	na	na	na	na	na
F/Cl by wt	ratio	na	na	0.214	0.211	0.196	0.201	na	0.231	0.228	na	na	0.217	0.222	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	31.9	32.3	33.6	34.3	na	36.4	35.6	na	na	33.6	33.1	na	na	na	na	na
K/Cl by wt	ratio	na	na	0.777	0.765	0.746	0.765	na	0.842	0.891	na	na	0.768	0.803	na	na	na	na	na
Li/Cl by wt	ratio	na	na	0.0146	0.0098	0.0102	0.0103	na	0.011	0.0163	na	na	0.0152	0.0148	na	na	na	na	na
Na/Cl by wt	ratio	na	na	5.34	5.2	5.69	5.84	na	5.6	5.92	na	na	5.51	5.62	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	1.03	1.02	1.1	1.12	na	1	1	na	na	1.03	1	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	-79	na	-82	-78	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	-0.2	0	-0.9	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	-74	na	na	na	-74	na	na	-74	-70	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	-11.6	na	na	na	-11.6	na	na	-11.8	-11	na	na	-10.9	na	-11	-11.1	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.9
Seven Springs

Date Collected		6/22/78	10/1/79	5/1/83	5/1/83	6/29/88	5/10/91	4/3/96	4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	8/7/97	8/7/97	2/10/98	2/10/98	2/10/98	7/6/98	7/6/98	7/6/98	12/20/99	12/20/99	3/29/00	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		N10841	VA-47	VA-134	VA-138	VC2B-28	VA-333	SSite96-12	PP97-5	PP97-5	0816-97-1047	0816-97-1048	0816-97-1049	PP97-32	PP97-33	0816-98-0036	0816-98-0037	PP98-7	PP98-22	RE16-98-9036	RE16-98-9037	CABG-99-0004	CABG-99-0008	CABG-00-0030	CABG-00-0048
Analyte (Lab[a])	Units																								
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	43000	43100	47900	49800	47800	na	na	50200	49800	na	na	50200	49900	na	51000	na	na
Ammonia	µg/L	na	na	na	na	50 U[c]	40	60	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	25 U	50 U	na	na	12	0	0	30	30	20	30	30	na	na	37.3	36.3	na	na	15.4	19.8	na	20 U	na	na
Ammonium [as N]	µg/L	na	na	na	na	na	na	na	23.3	23.3	15.6	23.3	23.3	na	na	29	28.2	na	na	11.9	15.4	na	15.6 U	na	na
Anion Sum	µg/L	na	1100	1060	1070	1435	1132	1137	1020	1020	1120	1150	1110	na	na	1150	1120	na	na	1160	1200	na	na	na	na
Balance	µg/L	na	na	na	na	na	17.9	9.4	89.8	200	17	-16.1	13.7	na	na	16.6	46.7	na	na	-25.4	-24.2	na	na	na	na
Bicarbonate	µg/L	na	49000	53700	53700	79300	61000	59500	52500	52600	58400	60700	58300	na	na	61300	60700	na	na	61200	60900	na	62200	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	50000	50000	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	na	na	60	270	100 U	20	10 U	na	na	na	na	na	na	na	100 U	100 U	na	na	na	na	na	200 U	na	0.05 U
Bromide (EES)	µg/L	na	na	na	na	na	na	na	20	20	17.3	23.8	19.3	na	na	30	20	na	na	20 U	20 U	na	20	na	na
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	na	na	na	1000	7400	na	na	na	na	na	na	na	1100	na	na	na	na
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	550	na	na	na	na	na	na	na	na
Carbonate	µg/L	na	na	na	na	0	0	0	0	0	0	0	0	na	na	0	0	na	na	0	0	na	0	na	na
Cation Sum	µg/L	na	1110	1150	1120	1259	1152	1148	1120	1250	1140	1130	1130	na	na	1170	1180	na	na	1130	1170	na	na	na	na
Chlorate	µg/L	na	na	na	na	na	na	na	20 U	20 U	20 U	20 U	20 U	na	na	10 U	10 U	na	na	20 U	20 U	na	20 U	na	na
Chloride (CL)	µg/L	na	3600	1900	1900	1300	1220	1850	na	na	na	na	na	na	na	2100	2100	na	na	na	na	na	1800	na	1800
Chloride (EES)	µg/L	na	na	na	na	na	na	na	1530	1510	1380	1400	1440	na	na	1550	1600	na	na	1530	1530	na	1590	na	na
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	100	179	na	na	na	na	na	na	na	101	na	na	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	83	83	na	na	na	na	na	120	120	na	na	100	100	na	na	na	na
Conductivity (EES)	µS/cm	na	na	na	na	na	na	na	105	105	113	112	114	na	na	116	116	na	na	114	114	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	10700	10700	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	na	210	250	250	200	160	120	na	na	na	na	na	na	na	100	80	na	na	na	na	na	170	na	202
Fluoride (EES)	µg/L	na	na	na	na	na	na	na	190	190	154	148	146	na	na	180	170	na	na	210	210	na	170	na	na
Hardness	µg/L	na	na	na	na	na	na	na	37800	37600	39700	39400	39300	na	na	40600	40400	na	na	41900	42000	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	400	2200	na	na	na	na	na	na	na	300	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	100	300	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	300	na	na	na	na	na	na	na	200	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	300	2900	na	na	na	na	na	na	na	500	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	200	1500	na	na	na	na	na	na	na	300	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	500	3100	na	na	na	na	na	na	na	200	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	700	4600	na	na	na	na	na	na	na	500	na	na	na	na
Iodide	µg/L	na	na	na	na	na	0	0	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	10 U	na	na
Nitrate	µg/L	200 U	140 U	na	na	0	2 U	0	1010	790	1160	575	574	na	na	530	1020	na	na	20 U	510	na	10 U	na	na
Nitrate [as N]	µg/L	na	na	na	na	na	na	na	228	178	262	130	130	na	na	120	230	na	na	4.52 U	115	na	2.26 U	na	na
Nitrite	µg/L	na	na	90	na	900	470	1160	10 U	10 U	10 U	10 U	10 U	na	na	20	10 U	na	na	20 U	20	na	30	na	na
Nitrite [as N]	µg/L	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	na	3.59	1.79 U	na	na	3.59 U	3.59	na	5.38	na	na
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	510 U	na	500 U
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	300 R[d]	300 R	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	44000	na	44000	na	76000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200	na	220
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	240	na	100
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	20 U	na	na
Phosphate	µg/L	na	na	na	na	10	20	19	20 U	20 U	20 U	20 U	20 U	na	na	20 U	20 U	na	na	50 U	50 U	na	6.52 U	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	50 U	na	50 U
Silica (CL)	µg/L	na	41000	30000	30000	31000	31000	31000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	30000	na	30000
Silica (EES)	µg/L	na	na	na	na	na	na	na	32300	34000	32300	30800	31200	na	na	31900	31900	na	na	33400	30200	na	33400	na	na
Silicon	µg/L	na	na	na	na	na	na	na	15100	15900	15100	14400	14600	na	na	14900	14900	na	na	15600	14100	na	na	na	na
Sulfate (CL)	µg/L	na	8700	5500	5900	3500	3850	4030	na	na	na	na	na	na	na	4000	3900	na	na	na	na	na	4000	na	3970
Sulfate (EES)	µg/L	na	na	na	na	na	na	na	4350	4350	4530	4580	4600	na	na	3560	3570	na	na	4460	4460	na	3780	na	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	50 U	na	na
Total dissolved solids (CL)	µg/L	na	126000	117000	117000	142300	121700	121500	na	na	na	na	na	na	na	86000	82000	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	µg/L	na	na	na	na	na	na	na	127000	129000	122000	122000	120000	na	na	124000	124000	na	na	124000	122000	na	126000	na	na

Table B-2.9 — Seven Springs (continued)

Date Collected		6/22/78	10/1/79	5/1/83	5/1/83	6/29/88	5/10/91	4/3/96	4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	8/7/97	8/7/97	2/10/98	2/10/98	2/10/98	7/6/98	7/6/98	7/6/98	12/20/99	12/20/99	3/29/00	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		N10841	VA-47	VA-134	VA-138	VC2B-28	VA-333	SSite96-12	PP97-5	PP97-5	0816-97-1047	0816-97-1048	0816-97-1049	PP97-32	PP97-33	0816-98-0036	0816-98-0037	PP98-7	PP98-22	RE16-98-9036	RE16-98-9037	CABG-99-0004	CABG-99-0008	CABG-00-0030	CABG-00-0048
Analyte (Lab)	Units																								
Total suspended solids	μg/L	na	na	na	na	na	na	na	na	na	2100	na	2300	na	na	100 U	100 U	na	na	1730	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	0	0	na	na	na	na	na	2.2	2.2	na	na	2.7	2.7	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	7.3	7.4	na	na	na	na	na	na	na	6.6	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	7.49	7.49	7.33	7.33	7.33	na	na	7.5	7.5	na	na	7.51	7.51	na	na	na	na
pH (EES)	SU	na	na	na	na	na	na	na	7.35	7.31	7.35	7.58	7.32	na	na	7.38	7.71	na	na	7.58	7.69	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	0.0131	0.0132	0.0126	0.017	0.0134	na	na	0.0194	0.0125	na	na	0	0	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	0.00719	0.0053	0.00724	0.00696	0.00608	na	na	0.0071	0.0075	na	na	0.00784	0.00654	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	0	0	0	0	0	na	na	0	0	na	na	0	0	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	0.124	0.126	0.111	0.106	0.101	na	na	0.116	0.106	na	na	0.137	0.137	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	34.3	34.8	42.3	43.5	40.5	na	na	39.5	37.9	na	na	40	39.8	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	1.39	1.44	1.44	1.42	1.38	na	na	1.25	1.27	na	na	1.21	1.33	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	0	0	0	0.00716	0	na	na	0	0.00625	na	na	0	0	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	4.35	4.42	4.7	4.65	4.51	na	na	4.42	4.46	na	na	3.5	4.13	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	2.84	2.88	3.28	3.28	3.2	na	na	2.3	2.23	na	na	2.92	2.92	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-99	na	-96	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	-89	na	na	na	na	-91	-91	na	na	-95	-85	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	-13.9	na	na	na	na	-13.8	-13.8	na	na	-13.8	-13.1	na	na	-13	na	-13	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.10
Pine Spring

Date Collected		6/12/78	5/24/91	6/17/94	12/27/94	12/27/94	3/26/95	10/16/95	10/16/95	5/7/97	5/7/97	8/4/97	8/4/97	8/4/97	8/4/97	2/10/98	2/10/98	2/10/98	7/14/98	7/14/98	7/14/98	7/14/98	1/6/00	1/6/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered
Sample ID		N10666	VA-356	VA-434	ps941227	ps941217b	ps950326	ps951016	ps951016	PP97-6	PP97-6	0816-97-1033	0816-97-1034	PP97-24	PP97-25	0816-98-0038	0816-98-0039	PP98-6	PP98-29	PP98-30	RE16-98-9032	RE16-98-9033	CABG-00-0017	CABG-00-0006
Analyte (Lab)	Units																							
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	42000	41800	60900	61100	na	60800	34000	33600	na	na	40700	53000	53400	31100	na
Ammonia	µg/L	na	240	420	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	25 U[c]	0	0	na	20 U	20 U	20 U	20 U	40	40	30	20	na	30	50.7	65.1	na	na	29.8	18.9	20 U	20 U	na
Ammonium [as N]	µg/L	na	na	na	na	na	na	na	na	31.1	31.1	23.3	15.6	na	23.3	39.4	50.6	na	na	23.2	14.7	15.6 U	15.6 U	na
Anion Sum	µg/L	na	1208	1340	na	na	na	na	na	1100	1090	1410	1420	na	1410	863	864	na	na	970	1230	1240	na	na
Balance	µg/L	na	275.7	130.9	na	na	na	na	na	271	859	114	73.2	na	79.9	556	217	na	na	114	164	77.1	na	na
Bicarbonate	µg/L	na	61000	65600	41000	77000	na	61000	48000	51200	51000	74300	74600	na	74200	41500	41000	na	na	49700	64700	65100	38000	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	36000	35000	na	na	na	na	na	na	na
Bromide (CL)	µg/L	na	20 U	20 U	na	na	na	na	na	na	na	na	na	na	na	100 U	100 U	na	na	na	na	na	200 U	na
Bromide (EES)	µg/L	na	na	na	na	na	na	na	na	10	10 U	16.6	20.3	na	14.7	10	10	na	na	20 U	20 U	20 U	20	na
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	6100	na	na	na	5500	na	na	na	na	4700	na	na
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	µg/L	na	0	0	1000 U	1000 U	na	1000 U	1000 U	0	0	0	0	na	0	0	0	na	na	0	0	0	0	na
Cation Sum	µg/L	na	1594	1528	na	na	na	na	na	1440	2740	1580	1530	na	1520	1530	1070	na	na	1090	1450	1340	na	na
Chlorate	µg/L	na	na	0	na	na	na	na	na	20 U	20 U	20 U	20 U	na	20 U	10 U	10 U	na	na	20 U	20 U	20 U	20 U	na
Chloride (CL)	µg/L	na	1470	1710	2000 U	4000	5000 U	2000	2000	na	na	na	na	na	na	2000	2000	na	na	na	na	na	1500	na
Chloride (EES)	µg/L	na	na	na	na	na	na	na	na	1640	1620	1140	1160	na	1100	1390	1420	na	na	1170	1130	1130	1120	na
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	139	na	na	na	67	na	na	na	na	115	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	na	na	na	146	146	na	146	70	70	na	na	na	80	80	na	na
Conductivity (EES)	µS/cm	na	na	na	na	na	na	na	na	116	116	140	140	na	141	90.2	91.6	na	na	102	124	124	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	na	80	100	200 U	300	500 U	200 U	200 U	na	na	na	na	na	na	50 U	50 U	na	na	na	na	na	100 U	na
Fluoride (EES)	µg/L	na	na	na	na	na	na	na	na	100	100	94.2	94	na	87.7	110	90	na	na	120	120	110	120	na
Hardness	µg/L	na	na	na	na	na	na	na	na	47500	47600	52900	52300	na	53000	40100	34100	na	na	36700	49600	48300	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	2600	na	na	na	1500	na	na	na	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na	300	na	na	na	100	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	na	na	na	na	2200	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	2800	na	na	na	1700	na	na	na	na	2200	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	2400	na	na	na	1500	na	na	na	na	1700	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	900	na	na	na	2300	na	na	na	na	800	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	3300	na	na	na	3800	na	na	na	na	2500	na	na
Iodide	µg/L	na	0	0	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	10 U	10 U	10 U	10 U	na
Nitrate	µg/L	200 U	3	0	na	0	0	0	0	80	50	10 U	17	na	46.1	10 U	530	na	na	960	20 U	20 U	10 U	na
Nitrate [as N]	µg/L	na	na	na	na	na	na	na	na	18.1	11.3	2.26 U	3.84	na	10.4	2.26 U	120	na	na	217	4.52 U	4.52 U	2.26 U	na
Nitrite	µg/L	na	40	120	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	20 U	20 U	20 U	20	na
Nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	1.79 U	na	na	3.59 U	3.59 U	3.59 U	3.59	na
Nitrogen ammonia [as N]	µg/L	na	na	na	200	na	200	100 U	100	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	na
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R[d]	100 R	na	na	na	na	na	200	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	66000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	na
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na	na	100	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	460	na
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	20 U	20 U	na
Phosphate	µg/L	na	7	5	na	na	na	na	na	240	220	65.6	70.9	na	64.1	100	100	na	na	130	50 U	130	48.9	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	160	na
Silica (CL)	µg/L	na	25000	51100	na	na	98000	53000	51000	na	na	na	na	na	na	na	na	na	na	na	na	na	94200	na
Silica (EES)	µg/L	na	na	na	na	na	na	na	na	80500	88400	62700	56600	na	54000	108000	51400	na	na	57100	62500	49600	59700	na
Silicon	µg/L	na	na	na	na	na	na	na	na	37600	41300	29300	26500	na	25200	50600	24000	na	na	26700	29200	23200	na	na
Sulfate (CL)	µg/L	na	7700	10000	25000 U	50000 U	66000	11000	10000 U	na	na	na	na	na	na	6400	6400	na	na	na	na	na	6200	na
Sulfate (EES)	µg/L	na	na	na	na	na	na	na	na	9720	9670	7500	7670	na	7220	6080	6120	na	na	5420	6180	6130	6100	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table B-2.10 — Pine Spring (continued)

Date Collected		6/12/78	5/24/91	6/17/94	12/27/94	12/27/94	3/26/95	10/16/95	10/16/95	5/7/97	5/7/97	8/4/97	8/4/97	8/4/97	8/4/97	2/10/98	2/10/98	2/10/98	7/14/98	7/14/98	7/14/98	7/14/98	1/6/00	1/6/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered
Sample ID		N10666	VA-356	VA-434	ps941227	ps941217b	ps950326	ps951016	ps951016	PP97-6	PP97-6	0816-97-1033	0816-97-1034	PP97-24	PP97-25	0816-98-0038	0816-98-0039	PP98-6	PP98-29	PP98-30	RE16-98-9032	RE16-98-9033	CABG-00-0017	CABG-00-0006
Analyte (Lab)	Units																							
Sulfite	µg/L	na	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	10 U	10 U	10 U	10 U	na
Total dissolved solids (CL)	µg/L	na	126000	158000	na	na	151000	170000	130000	na	na	na	na	na	na	220000	190000	na	na	na	na	na	na	na
Total dissolved solids (EES)	µg/L	na	na	na	na	na	na	na	na	172000	194000	182000	174000	na	169000	205000	125000	na	na	138000	168000	149000	131000	na
Total suspended solids	µg/L	na	na	na	na	na	na	na	na	na	na	27900	na	na	33200	14200	14200	na	na	na	17700	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	0	0	na	0	41.7	41.7	na	na	na	17.8	17.8	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6.9	na	na	na	na	6.4	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	5.81	5.81	6.46	6.46	na	6.46	6.78	6.78	na	na	7.14	6.34	6.34	na	na
pH (EES)	SU	na	na	na	na	na	na	na	na	6.81	6.68	7.13	7.26	na	7.2	6.94	6.95	na	na	7.56	7.52	7.55	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.0061	0	0.0146	0.0176	na	0.0133	0.00719	0.00704	na	na	0	0	0	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.0061	0.0105	0.0176	0.013	na	0.0131	0.0144	0.00704	na	na	0.00855	0.015	0.00973	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.00183	0.00185	0	0	na	0	0.00216	0	na	na	0	0	0	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.061	0.0617	0.0824	0.0811	na	0.0795	0.0791	0.0634	na	na	0.103	0.106	0.0973	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	31.2	31.5	65	64.4	na	67.2	29.9	28.9	na	na	42.5	57.3	57.6	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	2.7	2.75	3.95	3.77	na	3.82	2.89	2.8	na	na	2.75	3.33	3.28	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	0	0	0	0	na	0	0	0	na	na	0	0	0	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	3.82	3.75	6.22	6.16	na	6.4	3.4	3.51	na	na	4.79	5.42	5.6	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	5.93	5.97	6.56	6.62	na	6.54	4.37	4.31	na	na	4.63	5.47	5.42	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-79
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.5
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	-74	na	na	na	-70	-69	na	na	-74	-68	-71	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	-11.4	na	na	na	-11.1	-11.1	na	na	-11.5	-10.9	-11.2	na	na	na	-11

Table B-2.10 — Pine Spring (continued)

Date Collected		3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		nonfiltered	nonfiltered	filtered	filtered
Sample ID		CABG-00-0033	CABG-00-0034	CABG-00-0051	CABG-00-0052
Analyte (Lab)	Units				
Alkalinity total	µg/L	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na
Ammonia	µg/L	na	na	na	na
Ammonium	µg/L	na	na	na	na
Ammonium [as N]	µg/L	na	na	na	na
Anion Sum	µg/L	na	na	na	na
Balance	µg/L	na	na	na	na
Bicarbonate	µg/L	na	na	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na
Bromide (CL)	µg/L	na	na	0.05 U	0.05 U
Bromide (EES)	µg/L	na	na	na	na
Carbon dissolved organic	µg/L	na	na	na	na
Carbon total organic	µg/L	na	na	na	na
Carbonate	µg/L	na	na	na	na
Cation Sum	µg/L	na	na	na	na
Chlorate	µg/L	na	na	na	na
Chloride (CL)	µg/L	na	na	1530	1730
Chloride (EES)	µg/L	na	na	na	na
Conductivity (CL)	µS/cm	na	na	na	na
Conductivity (field)	µS/cm	na	na	na	na
Conductivity (EES)	µS/cm	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na
Fluoride (CL)	µg/L	na	na	101	167
Fluoride (EES)	µg/L	na	na	na	na
Hardness	µg/L	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na
Iodide	µg/L	na	na	na	na
Nitrate	µg/L	na	na	na	na
Nitrate [as N]	µg/L	na	na	na	na
Nitrite	µg/L	na	na	na	na
Nitrite [as N]	µg/L	na	na	na	na
Nitrogen ammonia [as N]	µg/L	na	na	500 U	500 U
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	95	80
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	100 U	220
Oxalate (CL)	µg/L	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na
Phosphate	µg/L	na	na	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	120	110
Silica (CL)	µg/L	na	na	55600	47100
Silica (EES)	µg/L	na	na	na	na
Silicon	µg/L	na	na	na	na
Sulfate (CL)	µg/L	na	na	6320	6870
Sulfate (EES)	µg/L	na	na	na	na
Sulfide reactive	µg/L	na	na	na	na
Sulfite	µg/L	na	na	na	na
Total dissolved solids (CL)	µg/L	na	na	na	na

Table B-2.10 — Pine Spring (continued)

Date Collected		3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		nonfiltered	nonfiltered	filtered	filtered
Sample ID		CABG-00-0033	CABG-00-0034	CABG-00-0051	CABG-00-0052
Analyte (Lab)	Units				
Total dissolved solids (EES)	μg/L	na	na	na	na
Total suspended solids	μg/L	na	na	na	na
Turbidity (field)	NTU	na	na	na	na
pH (CL)	SU	na	na	na	na
pH (field)	SU	na	na	na	na
pH (EES)	SU	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na
B/Cl by wt	ratio	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na
F/Cl by wt	ratio	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na
K/Cl by wt	ratio	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	-78	-79	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	-11	-11	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.11
Pajarito Spring

Date Collected		7/1/79	5/9/91	11/1/91	11/1/91	3/22/94	4/5/94	9/28/94	12/15/94	3/24/95	4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	2/18/98	2/18/98	2/18/98	2/18/98	2/18/98	7/6/98	7/6/98	7/6/98	1/6/00	1/6/00	3/31/00	3/31/00	3/31/00	3/31/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		VA-29	VA-330	Spring	Pajarito	VA-403	paj940405	PP94-83	PP94-121	paj950324	PP97-4	PP97-4	0816-97-1045	0816-97-1046	PP97-31	0816-98-0052	0816-98-0053	0816-98-0054	PP98-8	PP98-9	PP98-21	RE16-98-9030	RE16-98-9031	CABG-00-0016	CABG-00-0005	CABG-00-0035	CABG-00-0036	CABG-00-0053	CABG-00-0054
Analyte (Lab[a])	Units																												
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	78800	78900	78800	79500	na	81000	81000	80500	na	na	na	79900	79600	78500	na	na	na	na	na
Ammonia	μg/L	na	40	40	40	110	na	70	80	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	50 U[c]	0	0	0	4	100 U	5	0	20 U	40	30	20	30	na	34.7	34.7	52.3	na	na	na	16.9	24.4	20 U	na	na	na	na	na
Ammonium [as N]	μg/L	na	na	na	na	na	na	na	na	na	31.1	23.3	15.6	23.3	na	27	27	40.7	na	na	na	13.2	19	15.6 U	na	na	na	na	na
Anion Sum	μg/L	2000	2053	1767	1767	1922	na	1918	1913	na	1920	1920	1910	1910	na	1990	1930	1980	na	na	na	1940	1890	na	na	na	na	na	na
Balance	μg/L	na	4.6	92.7	92.9	33.8	na	3.2 U	44.5	na	44.6	58.9	-2.84	-17.4	na	2.41	41.1	23.9	na	na	na	-26.5	20.3	na	na	na	na	na	na
Bicarbonate	μg/L	100000	107000	89200	89200	95900	91200	82000	84100	90000	96100	96300	96100	97000	na	98800	98800	98200	na	na	na	97500	97100	95800	na	na	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	80100	81000	81000	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	50	50	50	60	na	50	50	na	na	na	na	na	na	100 U	100 U	100 U	na	na	na	na	na	200 U	na	na	na	0.05 U	0.05 U
Bromide (EES)	μg/L	na	na	na	na	na	na	na	na	na	60	50	57.3	56	na	60	60	60	na	na	na	30	30	60	na	na	na	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	370	na	na	230	210	na	na	na	na	280	na	na	na	na	na	na
Carbonate	μg/L	na	0	0	0	0	na	6400	5900	5000 U	0	0	0	0	na	0	0	0	na	na	na	0	0	0	na	na	na	na	na
Cation Sum	μg/L	1990	2062	1939	1939	1988	na	1911	2000	na	2010	2030	1900	1880	na	2000	2010	2030	na	na	na	1890	1930	na	na	na	na	na	na
Chlorate	μg/L	na	na	na	na	0	na	0	0	na	20 U	20 U	20 U	20 U	na	10 U	10 U	10 U	na	na	na	20 U	20 U	20 U	na	na	na	na	na
Chloride (CL)	μg/L	6400	4690	4130	4130	5080	5000	5180	4880	5000 U	na	na	na	na	na	5700	5400	5500	na	na	na	na	na	5100	na	na	na	4270	4190
Chloride (EES)	μg/L	na	na	na	na	na	na	na	na	na	5030	4930	4660	4650	na	5180	5190	5170	na	na	na	4860	4870	4670	na	na	na	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	230	na	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	na	na	na	na	207	207	na	na	na	200	200	200	na	na	na	160	160	na	na	na	na	na	na
Conductivity (EES)	μS/cm	na	na	na	na	na	na	na	na	na	189	189	187	187	na	198	197	199	na	na	na	189	187	na	na	na	na	na	na
Cyanide reactive	ug/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	8600	8600	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	460	330	390	390	400	500	350	330	500 U	na	na	na	na	na	400	400	400	na	na	na	na	na	400	na	na	na	389	388
Fluoride (EES)	μg/L	na	na	na	na	na	na	na	na	na	430	420	373	374	na	460	460	460	na	na	na	500	510	450	na	na	na	na	na
Hardness	μg/L	na	na	na	na	na	na	na	na	na	69100	70500	64200	63700	na	71300	70900	71800	na	na	na	66900	66900	na	na	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Iodide	μg/L	na	0	0	0	0	na	0	0	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	na	10 U	10 U	10 U	na	na	na	na	na
Nitrate	μg/L	140 U	2 U	3	3	0	0	0	0	0	3980	3830	3600	3390	na	4370	4610	4940	na	na	na	3310	3590	3290	na	na	na	na	na
Nitrate [as N]	μg/L	na	na	na	na	na	na	na	na	na	899	865	814	765	na	987	1040	1120	na	na	na	747	811	743	na	na	na	na	na
Nitrite	μg/L	na	2950	3430	3430	3860	na	4320	4120	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	na	20 U	20 U	30	na	na	na	na	na
Nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	1.79 U	na	na	na	3.59 U	3.59 U	5.38	na	na	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	1340	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	na	na	na	500 U	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1100 R[d]	1200 R	1200 R	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	32000	54000	6000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	350	na	na	na	810	800
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R	100 R	na	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	130	na	na	na	260	140
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	20 U	na	na	na	na	na
Phosphate	μg/L	na	40	6	6	4	na	5	5	na	20 U	20 U	20 U	20 U	na	20 U	20 U	20 U	na	na	na	50 U	50 U	6.52 U	na	na	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U	200 U	na	na	na	na	na	50 U	na	na	na	50 U	50 U
Silica (CL)	μg/L	67000	70000	67000	67000	68300	75000	66100	69800	66000	na	na	na	na	na	na	na	na	na	na	na	na	na	68500	na	na	na	68500	68500
Silica (EES)	μg/L	na	na	na	na	na	na	na	na	na	68900	68300	69900	68600	na	67800	66800	67000	na	na	na	67400	67800	74500	na	na	na	na	na
Silicon	μg/L	na	na	na	na	na	na	na	na	na	32200	31900	32700	32000	na	31700	31200	31300	na	na	na	31500	31700	na	na	na	na	na	na
Sulfate (CL)	μg/L	7500	4740	5350	5350	5820	6000	5970	5510	7000	na	na	na	na	na	7100	6600	6700	na	na	na	na	na	5500	na	na	na	4900	4690
Sulfate (EES)	μg/L	na	na	na	na	na	na	na	na	na	5590	5480	5700	5640	na	6130	6200	6290	na	na	na	5830	5760	5450	na	na	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table B-2.11 — Pajarito Spring (continued)

Date Collected		7/1/79	5/9/91	11/1/91	11/1/91	3/22/94	4/5/94	9/28/94	12/15/94	3/24/95	4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	2/18/98	2/18/98	2/18/98	2/18/98	2/18/98	7/6/98	7/6/98	7/6/98	1/6/00	1/6/00	3/31/00	3/31/00	3/31/00	3/31/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		VA-29	VA-330	Spring	Pajarito	VA-403	paj940405	PP94-83	PP94-121	paj950324	PP97-4	PP97-4	0816-97-1045	0816-97-1046	PP97-31	0816-98-0052	0816-98-0053	0816-98-0054	PP98-8	PP98-9	PP98-21	RE16-98-9030	RE16-98-9031	CABG-00-0016	CABG-00-0005	CABG-00-0035	CABG-00-0036	CABG-00-0053	CABG-00-0054
Analyte (Lab)	Units																												
Sulfite	µg/L	na	na	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	10 U	na	na	na	10 U	10 U	50 U	na	na	na	na	na
Total dissolved solids (CL)	µg/L	220000	231300	208600	208600	219000	148000	209000	214600	135000	na	na	na	na	na	172000	170000	170000	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	ug/L	na	na	na	na	na	na	na	na	na	229000	228000	219000	218000	na	223000	222000	223000	na	na	na	217000	218000	221000	na	na	na	na	na
Total suspended solids	µg/L	na	na	na	na	na	na	na	na	na	na	na	600	na	na	1300	1320	841	na	na	na	100 U	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	5	5	na	na	na	1.6	1.6	1.6	na	na	na	0.4	0.4	na	na	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	na	7.3	7.3	7.96	7.96	na	7.83	7.83	7.83	na	na	na	7.97	7.97	na	na	na	na	na	na
pH (EES)	SU	na	na	na	na	na	na	na	na	na	8.05	8.01	8.05	8.02	na	7.9	7.82	7.75	na	na	na	7.74	8.06	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0.0119	0.0101	0.0123	0.012	na	0.0116	0.0116	0.0116	na	na	na	0.00617	0.00616	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0.00437	0.00385	0.00485	0.00422	na	0.00425	0.00424	0.00426	na	na	na	0.00453	0.00452	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0	0	0	0	na	0	0	0	na	na	na	0	0	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0.0855	0.0852	0.0801	0.0805	na	0.0888	0.0886	0.089	na	na	na	0.103	0.105	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	na	19.1	19.5	20.6	20.9	na	19.1	19	19	na	na	na	20.1	19.9	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0.451	0.46	0.462	0.449	na	0.39	0.412	0.416	na	na	na	0.409	0.437	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	0.00795	0.0142	0.00644	0.0043	na	0.00579	0.00578	0.0058	na	na	na	0.00617	0.00616	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	2.52	2.54	2.73	2.71	na	2.26	2.35	2.36	na	na	na	2.35	2.48	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	1.11	1.11	1.22	1.21	na	1.18	1.19	1.22	na	na	na	1.2	1.18	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-78	-75	-76	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-1.2	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	na	-70	na	na	na	-74	na	na	na	-73	-72	-67	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	na	-11.2	na	na	na	-11.3	na	na	na	-11.2	-11.1	-10.7	na	na	na	-10.6	-10.6	-10.7	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.12
LAOI-1.1(A)

Date Collected		10/25/94	10/25/94	10/28/94	10/28/94	10/28/94	10/28/94	10/31/94	11/17/94	5/9/97	5/9/97	5/9/97	9/5/97	9/5/97	9/5/97	2/25/98	2/25/98	2/25/98	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	1/20/00	1/20/00	4/13/00	4/13/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		AAB8494D	AAB8511D	AAB8498D	AAB8512	AAB8512D	PP94-113	PP94-115	PP94-119	PP97-10	PP97-9	PP97-9	0816-97-1095	0816-97-1096	PP97-39	0816-98-0050	0816-98-0051	PP98-12	PP98-36	PP98-37	RE16-98-9019	RE16-98-9020	RE16-98-9021	CABG-00-0024	CABG-00-0025	CABG-00-0043	CABG-00-0061
Analyte (Lab[a])	Units																										
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	46200	45900	46400	44500	44500	na	44400	44400	na	na	na	47200	47300	46200	na	44300	na	na
Ammonia	µg/L	na	na	na	na	na	90	450	390	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	na	na	na	na	na	32	8	2	70	100	30	20	160	na	39.7	83.9	na	na	na	20 U[c]	20 U	20 U	na	na	na	na
Ammonium [as N]	µg/L	na	na	na	na	na	na	na	na	54.4	77.8	23.3	15.6	124	na	30.8	65.3	na	na	na	15.6 U	15.6 U	15.6 U	na	na	na	na
Anion Sum	µg/L	na	na	na	na	na	2850	1294	991	1220	1240	1220	1150	1150	na	1070	1040	na	na	na	1110	1090	1090	na	na	na	na
Balance	µg/L	na	na	na	na	na	145.7	59.6	55.8	31	48.7	289	126	31.6	na	109	58.1	na	na	na	66.3	20.9	20.8	na	na	na	na
Bicarbonate	µg/L	na	na	na	na	na	130000	67000	51000	56400	56000	56600	54300	54300	na	54200	54200	na	na	na	57600	57700	56400	na	54100	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	43000	43000	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	na	na	na	1000 U	na	40	20 U	20 U	na	na	na	na	na	na	100 U	100 U	na	na	na	na	na	na	na	200 U	na	0.05 U
Bromide (EES)	µg/L	na	na	na	na	na	na	na	na	10	10	10	20 U	20 U	na	10	10 U	na	na	na	20	20	20	na	10	na	na
Carbon dissolved organic	µg/L	na	na	na	5800	na	na	na	na	na	na	na	na	1700	na	na	1200	na	na	na	na	600	1000	na	na	na	na
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	3000	na	na	na	na	na	na
Carbonate	µg/L	na	na	na	na	na	0	0	0	0	0	0	0	0	na	0	0	na	na	na	0	0	0	na	0	na	na
Cation Sum	µg/L	na	na	na	na	na	3298	1373	1048	1260	1300	1630	1300	1190	na	1200	1110	na	na	na	1180	1110	1110	na	na	na	na
Chlorate	µg/L	na	na	na	500 U	na	0	0	0	20 U	20 U	20 U	20 U	20 U	na	10 U	10 U	na	na	na	20 U	20 U	20 U	na	20 U	na	na
Chloride (CL)	µg/L	na	na	na	4400	na	7000	2620	1490	na	na	na	na	na	na	1400	1400	na	na	na	na	na	na	na	1400	na	1220
Chloride (EES)	µg/L	na	na	na	na	na	na	na	na	1480	1450	1370	1100	1310	na	970	1090	na	na	na	1020	1050	1020	na	1010	na	na
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	108	na	na	99	na	na	na	na	na	106	na	na	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	100	na	na	na	95	95	95	na	na	na	na
Conductivity (EES)	µS/cm	na	na	na	na	na	na	na	na	127	127	127	117	118	na	111	110	na	na	na	112	108	111	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	13800	13800	13800	na	na	na	na
Fluoride (CL)	µg/L	na	na	na	450	na	980	830	180	na	na	na	na	na	na	60	70	na	na	na	na	na	na	na	160	na	163
Fluoride (EES)	µg/L	na	na	na	na	na	na	na	na	120	110	110	120	150	na	130	130	na	na	na	130	140	140	na	110	na	na
Hardness	µg/L	na	na	na	na	na	na	na	na	19300	20700	22800	25200	21100	na	25200	21000	na	na	na	25100	22600	22500	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	500	na	na	400	na	na	na	na	na	200	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	200	na	na	200	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	300	na	na	na	na	na	na	na	na	200	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	1000	na	na	600	na	na	na	na	na	400	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	100	na	na	200	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	600	na	na	400	na	na	na	na	na	500	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	700	na	na	600	na	na	na	na	na	500	na	na	na	na
Iodide	µg/L	na	na	na	na	na	0	0	0	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	na	10 U	na	na
Nitrate	µg/L	na	na	na	510	na	0	2	0	2400	2330	1940	900	2010	na	1540	1960	na	na	na	1550	1520	1510	na	1280	na	na
Nitrate [as N]	µg/L	na	na	na	na	na	na	na	na	542	526	438	203	454	na	348	443	na	na	na	350	343	341	na	289	na	na
Nitrite	µg/L	na	na	na	70	na	20 U	540	960	10 U	10 U	10 U	20 U	20 U	na	10 U	20	na	na	na	10 U	10 U	10 U	na	10 U	na	na
Nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	3.59 U	3.59 U	na	1.79 U	3.59	na	na	na	1.79 U	1.79 U	1.79 U	na	1.79 U	na	na
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	530 U	na	500 U
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	400 R[d]	400 R	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	270	na	300
Nitrogen nitrite [as NO2]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 U	na	100 U
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6 U
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	20 U	na	20 U	na	na
Phosphate	µg/L	na	na	na	130	na	39	42	10	50 U	50 U	50 U	50 U	50 U	na	20 U	20 U	na	na	na	20 U	20 U	20 U	na	16.3	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	na	na	na	na	na	50 U	na	50 U
Silica (CL)	µg/L	na	na	na	31000	31000	42600	58000	64400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	68500	na	68500
Silica (EES)	µg/L	na	na	na	na	na	na	na	na	68300	68100	79800	73800	65500	na	83700	66600	na	na	na	77700	69100	69300	na	72500	na	na
Silicon	µg/L	na	na	na	31000	31000	na	na	na	31900	31800	37300	34500	30600	na	39100	31100	na	na	na	36300	32300	32400	na	na	na	na
Sulfate (CL)	µg/L	na	na	na	22000	na	22400	2790	4180	na	na	na	na	na	na	5700	5800	na	na	na	na	na	na	na	4200	na	3650
Sulfate (EES)	µg/L	na	na	na	na	na	na	na	na	10200	11300	10300	8940	8720	na	5740	5630	na	na	na	4880	4910	4850	na	3830	na	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	na	10 U	10 U	10 U	na	10 U	na	na
Total dissolved solids (CL)	µg/L	na	na	na	na	na	279100	166200	147500	na	na	na	na	na	na	160000	140000	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	µg/L	na	na	na	na	na	na	na	na	169000	170000	184000	171000	160000	na	176000	156000	na	na	na	186000	174000	173000	na	156000	na	na

Table B-2.12 — LAOI-1.1(A) (continued)

Date Collected		10/25/94	10/25/94	10/28/94	10/28/94	10/28/94	10/28/94	10/31/94	11/17/94	5/9/97	5/9/97	5/9/97	9/5/97	9/5/97	9/5/97	2/25/98	2/25/98	2/25/98	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	1/20/00	1/20/00	4/13/00	4/13/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		AAB8494D	AAB8511D	AAB8498D	AAB8512	AAB8512D	PP94-113	PP94-115	PP94-119	PP97-10	PP97-9	PP97-9	0816-97-1095	0816-97-1096	PP97-39	0816-98-0050	0816-98-0051	PP98-12	PP98-36	PP98-37	RE16-98-9019	RE16-98-9020	RE16-98-9021	CABG-00-0024	CABG-00-0025	CABG-00-0043	CABG-00-0061
Analyte (Lab)	Units																										
Total suspended solids	µg/L	na	na	na	na	na	na	na	na	na	na	na	75500	na	na	63000	63000	na	na	na	58100	58100	58100	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	27.2	27.2	na	na	na	30 U	30 U	30 U	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6.7	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	6.82	6.82	6.82	na	na	na	6.68	6.68	na	na	na	7.3	7.3	7.3	na	na	na	na
pH (EES)	SU	na	na	na	na	na	na	na	na	7.32	7.31	7.15	6.91	7.38	na	7.2	7.23	na	na	na	7.33	7.39	7.39	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.00676	0.0069	0.0073	0	0	na	0.0103	0	na	na	na	0.0196	0.019	0.0196	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.00608	0.0069	0.0073	0.00727	0.00382	na	0.0103	0.00734	na	na	na	0.00686	0.00667	0.00588	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	0	0	0	0	0	na	0	0	na	na	na	0.00196	0.0019	0.00196	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.0811	0.0759	0.0803	0.109	0.115	na	0.134	0.119	na	na	na	0.127	0.133	0.137	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	38.1	38.6	41.3	49.4	41.5	na	55.9	49.7	na	na	na	56.5	55	55.3	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	4.99	5.15	5.31	6.12	5.08	na	6.78	6.32	na	na	na	6.71	6.58	6.7	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	0	0	0	0	0	na	0	0	na	na	na	0	0	0	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	10.5	10.8	11	12.1	10.2	na	11.2	10.6	na	na	na	10.6	10.5	10.9	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	6.89	7.79	7.52	8.13	6.66	na	5.92	5.17	na	na	na	4.78	4.68	4.75	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-84	na	-81	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-6	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	-75	-79	na	na	na	-76	na	na	-76	-69	-71	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	-11.8	-11.8	na	na	na	-11.8	na	na	-12	-11.3	-11.3	na	na	na	-11.3	na	-11.1	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.13
Doe Spring

Date Collected		9/25/90	4/6/94	4/6/94	4/6/94	9/29/94	4/12/95	4/12/95	11/1/95	4/22/97	4/22/97	8/18/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	1/7/00	1/7/00	1/11/00	4/6/00	4/6/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP-11	VA-423	VA-430	ds940406	PP94-96	PP95-130	ds940412	PP95-139	PP97-1	PP97-1	0816-97-1050	0816-97-1051	PP97-36	0816-98-0001	0816-98-0002	PP98-1	PP98-31	RE16-98-9005	RE16-98-9006	CABG-00-0008	CABG-00-0009	CABG-00-0018	CABG-00-0019	CABG-00-0026	CABG-00-0041	CABG-00-0059
Analyte (Lab[a])	Units																										
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	55700	55800	59900	59300	na	55700	55500	na	na	58300	57800	na	na	55500	55900	na	na	na
Ammonia	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	50	50	90	na	100	60	na	70	40	40	20	30	na	56.8	74	na	na	20 U	20.9	na	na	20 U[c]	20 U	na	na	na
Ammonium [as N]	µg/L	na	na	na	na	na	na	na	na	31.1	31.1	15.6	23.3	na	44.2	57.6	na	na	15.6 U	16.3	na	na	15.6 U	15.6 U	na	na	na
Anion Sum	µg/L	1576	1271	1210	na	1330	1269	na	1369	1260	1260	1330	1320	na	1240	1230	na	na	1290	1290	na	na	na	na	na	na	na
Balance	µg/L	4.1 U	29.1	20.1	na	13	13.4	na	52.6	49.7	20.1	6.41	4.2	na	50.3	39.2	na	na	68.3	10.4	na	na	na	na	na	na	na
Bicarbonate	µg/L	85400	69000	64500	68000	73200	68900	65000	76000	67900	68100	73100	72400	na	67900	67700	na	na	71100	70500	na	na	67700	68200	na	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	50 U	20 U	40	na	20 U	20 U	na	20 U	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	200 U	200 U	na	na	0.05 U
Bromide (EES)	µg/L	na	na	na	na	na	na	na	na	30	20	42.5	30.5	na	30	20	na	na	40	40	na	na	20	30	na	na	na
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1100	na	na	na	na	na	na	na
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	µg/L	0	0	0	na	0	0	5000 U	0	0	0	0	0	na	0	0	na	na	0	0	na	na	0	0	na	na	na
Cation Sum	µg/L	1570	1309	1235	na	1347	1286	na	1443	1330	1280	1340	1320	na	1300	1280	na	na	1380	1300	na	na	na	na	na	na	na
Chlorate	µg/L	na	0	0	na	0	0	na	0	20 U	20 U	20 U	20 U	na	10 U	10 U	na	na	20 U	20 U	na	na	20 U	20 U	na	na	na
Chloride (CL)	µg/L	2190	2020	2130	5000 U	2040	1880	5000 U	2060	na	na	na	na	na	na	na	na	na	2100	2100	na	na	2100	2200	na	na	1950
Chloride (EES)	µg/L	na	na	na	na	na	na	na	na	2110	1890	1840	1790	na	1700	1740	na	na	1740	1860	na	na	1870	1870	na	na	na
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	118	na	na	140	140	na	na	na
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	na	na	na	51	51	na	na	na	na	na	167	167	na	na	na	na	na	na	na
Conductivity (EES)	µS/cm	na	na	na	na	na	na	na	na	125	124	129	126	na	124	124	na	na	122	122	na	na	na	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	400	480	580	500	430	430	500 U	440	na	na	na	na	na	na	na	na	na	420	430	na	na	560	580	na	na	474
Fluoride (EES)	µg/L	na	na	na	na	na	na	na	na	490	440	387	375	na	440	430	na	na	450	470	na	na	480	470	na	na	na
Hardness	µg/L	na	na	na	na	na	na	na	na	39300	38000	39300	38800	na	39000	38100	na	na	40100	38000	na	na	na	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	500	na	na	na	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200	na	na	na	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	800	na	na	na	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	300	na	na	na	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	400	na	na	na	na	na	na	na
Iodide	µg/L	0	0	0	na	0	0	na	0	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	na	na
Nitrate	µg/L	840	670	790	na	460	1470	na	20 U	1370	1380	652	1040	na	650	880	na	na	540	840	na	na	220	20	na	na	na
Nitrate [as N]	µg/L	na	na	na	na	na	na	na	na	309	312	147	234	na	147	199	na	na	122	190	na	na	49.7	4.52	na	na	na
Nitrite	µg/L	na	20 U	20 U	na	20 U	20 U	na	20 U	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10	na	na	30	20	na	na	na
Nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	na	1.79 U	1.79 U	na	na	1.79 U	1.79	na	na	5.38	3.59	na	na	na
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1100	500 U	na	na	500 U
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200	210	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	270	270	na	na	300
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	100	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	190	250	na	na	100 U
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	na	20 U	20 U	na	na	na
Phosphate	µg/L	na	50 U	50 U	na	50 U	50 U	na	50 U	30	30	20 U	55.2	na	20 U	20 U	na	na	20 U	20 U	na	na	6.52 U	6.52 U	na	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U	na	na	240	50 U	na	na	50 U
Silica (CL)	µg/L	83000	74300	77000	79000	70000	73600	73000	70000	na	na	na	na	na	na	na	na	na	na	na	na	na	70600	70600	na	na	68500
Silica (EES)	µg/L	na	na	na	na	na	na	na	na	79400	85200	72900	73000	na	73800	70600	na	na	84700	78800	na	na	75100	75500	na	na	na
Silicon	µg/L	na	na	na	na	na	na	na	na	37100	39800	34100	34100	na	34500	33000	na	na	39600	36800	na	na	na	na	na	na	na
Sulfate (CL)	µg/L	3720	2240	2350	13000	2000	1890	5000 U	1960	na	na	na	na	na	na	na	na	na	1900	1900	na	na	2100	2000	na	na	1960
Sulfate (EES)	µg/L	na	na	na	na	na	na	na	na	1960	1950	2140	2070	na	1700	1770	na	na	1790	1810	na	na	1820	1790	na	na	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	na	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	na	na
Total dissolved solids (CL)	µg/L	207800	175200	172900	126000	175600	174200	120000	179400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	µg/L	na	na	na	na	na	na	na	na	180000	185000	178000	178000	na	173000	169000	na	na	189000	181000	na	na	171000	172000	na	na	na

Table B-2.13 — Doe Spring (continued)

Date Collected		9/25/90	4/6/94	4/6/94	4/6/94	9/29/94	4/12/95	4/12/95	11/1/95	4/22/97	4/22/97	8/18/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	1/7/00	1/7/00	1/11/00	4/6/00	4/6/00
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP-11	VA-423	VA-430	ds940406	PP94-96	PP95-130	ds940412	PP95-139	PP97-1	PP97-1	0816-97-1050	0816-97-1051	PP97-36	0816-98-0001	0816-98-0002	PP98-1	PP98-31	RE16-98-9005	RE16-98-9006	CABG-00-0008	CABG-00-0009	CABG-00-0018	CABG-00-0019	CABG-00-0026	CABG-00-0041	CABG-00-0059
Analyte (Lab)	Units																										
Total suspended solids	μg/L	na	na	na	na	na	na	na	na	na	na	1900	na	na	43800	43800	na	na	82600	82600	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	0	0	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	7.2	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	8.19	8.19	8.27	8.27	na	8.12	8.12	na	na	7.71	7.71	na	na	na	na	na	na	na
pH (EES)	SU	na	na	na	na	na	na	na	na	8.06	7.98	7.84	8.03	na	7.23	7.46	na	na	7.8	7.93	na	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.0142	0.0106	0.0231	0.0171	na	0.0176	0.0115	na	na	0.023	0.0215	na	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.00616	0.0037	0.00657	0.00563	na	0.00765	0.00517	na	na	0.00632	0.00538	na	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	0	0	0	0	na	0	0	na	na	0	0	na	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.232	0.233	0.211	0.21	na	0.259	0.247	na	na	0.259	0.253	na	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	32.2	36	39.7	40.5	na	39.9	38.9	na	na	40.9	37.9	na	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.768	0.778	0.81	0.828	na	0.876	0.851	na	na	0.897	0.806	na	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.0142	0.0159	0.0109	0.0112	na	0.0176	0.0115	na	na	0.0115	0.0108	na	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	5.31	5.71	6.3	6.49	na	6.18	6.26	na	na	6.44	6.13	na	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	0.929	1.03	1.16	1.16	na	1	1.02	na	na	1.03	0.973	na	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-80	-80	na	na	-81	-79	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.9	na	2.6	0.9	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	-72	na	na	na	-75	na	na	-73	-70	na	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	-11.6	na	na	na	-11.6	na	na	-11.6	-11	na	na	-10.9	-10.9	na	na	-10.9	-11	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.

Table B-2.14
Apache Spring

Date Collected		7/1/80	5/20/91	7/18/94	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	1/5/00	1/5/00	3/29/00	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered
Sample ID		VA-57	VA-350	VA-443	SSite96-13	PP97-7	PP97-7	0816-97-1042	0816-97-1043	0816-97-1044	PP97-29	PP97-30	0816-98-0008	0816-98-0009	PP98-5	PP98-20	RE16-98-9024	RE16-98-9025	CABG-00-0001	CABG-00-0002	CABG-00-0012	CABG-00-0013	CABG-00-0029	CABG-00-0047
Analyte (Lab[a])	Units																							
Alkalinity total	μg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	na	na	52900	52900	50200	49900	50000	na	na	53300	53000	na	na	53400	52600	na	na	53100	na	na	na
Ammonia	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium	μg/L	na	90	170	40	40	40	40	50	40	na	na	48.6	48	na	na	27.3	37.3	na	na	20 U[c]	20 U	na	na
Ammonium [as N]	μg/L	na	na	na	na	31.1	31.1	31.1	38.9	31.1	na	na	37.8	37.3	na	na	21.2	29	na	na	15.6 U	15.6 U	na	na
Anion Sum	μg/L	1350	1455	1459	1498	2060	2060	3000	2990	3010	na	na	1600	1590	na	na	1430	1400	na	na	na	na	na	na
Balance	μg/L	na	22.4	27.5	22.7	56.9	166	7.12	-19.9	-13	na	na	16.5	24.8	na	na	13.1	43	na	na	na	na	na	na
Bicarbonate	μg/L	57000	69500	66900	69000	64500	64500	61200	60900	61000	na	na	65000	64600	na	na	65200	64200	na	na	64800	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	56000	56000	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	200 U	30	30	10	na	na	na	na	na	na	na	100	100	na	na	na	na	na	na	200 U	200 U	na	0.05 U
Bromide (EES)	μg/L	na	na	na	na	20	20	10.6	15.7	12.4	na	na	10	10	na	na	20 U	20 U	na	na	10	na	na	na
Carbon dissolved organic	μg/L	na	na	na	na	na	na	na	6600	6500	na	na	na	2500	na	na	na	2500	na	na	na	na	na	na
Carbon total organic	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	μg/L	na	0	0	0	0	0	0	0	0	na	na	0	0	na	na	0	0	na	na	0	na	na	na
Cation Sum	μg/L	1300	1488	1500	1532	2180	2430	3020	2930	2970	na	na	1630	1630	na	na	1450	1460	na	na	na	na	na	na
Chlorate	μg/L	na	na	0	na	20 U	20 U	20 U	20 U	20 U	na	na	10 U	10 U	na	na	20 U	20 U	na	na	20 U	20 U	na	na
Chloride (CL)	μg/L	8000	6020	7120	7720	na	na	na	na	na	na	na	13100	13000	na	na	na	na	na	na	11000	11000	na	71300
Chloride (EES)	μg/L	na	na	na	na	29100	28900	64300	64100	64900	na	na	13400	13400	na	na	7030	7110	na	na	9630	na	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	320	327	na	na	na	147	na	na	na	127	na	na	140	142	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	165	165	na	na	130	130	na	na	na	na	na	na
Conductivity (EES)	μS/cm	na	na	na	na	222	223	334	330	337	na	na	167	168	na	na	143	144	na	na	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	270	70	70	40	na	na	na	na	na	na	na	90	100	na	na	na	na	na	na	100 U	100 U	na	127
Fluoride (EES)	μg/L	na	na	na	na	110	110	81	78.1	78.5	na	na	90	90	na	na	150	100	na	na	90	na	na	na
Hardness	μg/L	na	na	na	na	53600	54300	62200	60800	62300	na	na	49400	48600	na	na	49300	49200	na	na	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	na	na	na	na	2100	2100	na	na	na	900	na	na	na	800	na	na	na	na	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	na	na	na	na	200	200	na	na	na	100	na	na	na	100	na	na	na	na	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	na	na	na	na	200	300	na	na	na	100	na	na	na	200	na	na	na	na	na	na
Humic substances hydrophilic total	μg/L	na	na	na	na	na	na	na	2500	2600	na	na	na	1000	na	na	na	1100	na	na	na	na	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	na	na	na	na	4600	2700	na	na	na	1000	na	na	na	1300	na	na	na	na	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	na	na	na	na	1600	1300	na	na	na	500	na	na	na	100	na	na	na	na	na	na
Humic substances hydrophobic total	μg/L	na	na	na	na	na	na	na	4100	3900	na	na	na	1500	na	na	na	1400	na	na	na	na	na	na
Iodide	μg/L	na	0	0	0	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	na	10 U	na	na	na
Nitrate	μg/L	1400	1550	10	1330	1190	1190	1270	1410	1410	na	na	1080	1620	na	na	650	1510	na	na	590	na	na	na
Nitrate [as N]	μg/L	na	na	na	na	269	269	288	318	317	na	na	244	366	na	na	147	341	na	na	133	na	na	na
Nitrite	μg/L	na	20 U	10 U	20	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U	na	na	20 U	20	na	na	20	na	na	na
Nitrite [as N]	μg/L	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	na	1.79 U	1.79 U	na	na	3.59 U	3.59	na	na	3.59	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	500 U	500 U	na	500 U
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	na	na	400 R[d]	400 R	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	390	400	na	320
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	260	200	na	320
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	μg/L	na	na	na	na	5570	na	na	na	na	na	na	na	na	na	na	20 U	20 U	na	na	20 U	na	na	na
Phosphate	μg/L	200 U	100	20 U	70	140	120	102	103	65.8	na	na	60	40	na	na	50 U	50 U	na	na	22.8	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	na	na	200	200	na	na	na	na	na	na	69	67	na	66
Silica (CL)	μg/L	58000	28000	54800	56100	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	55600	55600	na	53500
Silica (EES)	μg/L	na	na	na	na	56900	60300	64600	53500	54800	na	na	58200	56900	na	na	63600	60600	na	na	58400	59500	na	na
Silicon	μg/L	na	na	na	na	26600	28200	30200	25000	25600	na	na	27200	26600	na	na	29700	28300	na	na	na	na	na	na
Sulfate (CL)	μg/L	8300	5470	7550	5930	na	na	na	na	na	na	na	6200	6000	na	na	na	na	na	na	5600	5600	na	5540
Sulfate (EES)	μg/L	na	na	na	na	7510	7500	7330	7400	7380	na	na	5900	5940	na	na	6110	6250	na	na	5080	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	na	na	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U	na	na	10 U	10 U	na	na	50 U	na	na	na
Total dissolved solids (CL)	μg/L	158000	140900	166400	171100	na	na	na	na	na	na	na	160000	160000	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	na	na	205000	211000	268000	252000	255000	na	na	178000	177000	na	na	174000	170000	na	na	167000	na	na	na

Table B-2.14 — Apache Spring (continued)

Date Collected		7/1/80	5/20/91	7/18/94	4/3/96	5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	1/5/00	1/5/00	3/29/00	3/29/00
Field Prep		filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered
Sample ID		VA-57	VA-350	VA-443	SSite96-13	PP97-7	PP97-7	0816-97-1042	0816-97-1043	0816-97-1044	PP97-29	PP97-30	0816-98-0008	0816-98-0009	PP98-5	PP98-20	RE16-98-9024	RE16-98-9025	CABG-00-0001	CABG-00-0002	CABG-00-0012	CABG-00-0013	CABG-00-0029	CABG-00-0047
Analyte (Lab)	Units																							
Total suspended solids	μg/L	na	na	na	na	na	na	40300	na	36800	na	na	2400	2410	na	na	12000	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	na	5	5	na	na	23.8	23.8	na	na	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	7.4	na	na	na	7.1	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	7.27	7.27	7.26	7.26	7.26	na	na	7.96	7.96	na	na	7.32	7.32	na	na	na	na	na	na
pH (EES)	SU	na	na	na	na	7.51	7.43	7.35	7.44	7.49	na	na	7.43	7.49	na	na	7.41	7.71	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	0.000687	0.000692	0.000165	0.000244	0.000191	na	na	0.000746	0.000746	na	na	0	0	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	0.000344	0.000415	0.000181	0.000148	0.000145	na	na	0.000597	0.000522	na	na	0.00142	0.000985	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	0	0	0	0	0	na	na	0	0	na	na	0	0	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	0.00378	0.00381	0.00126	0.00122	0.00121	na	na	0.00672	0.00672	na	na	0.0213	0.0141	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	2.22	2.23	0.952	0.95	0.94	na	na	4.85	4.82	na	na	9.27	9.03	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	0.163	0.158	0.083	0.0793	0.0797	na	na	0.323	0.333	na	na	0.573	0.599	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	0	0	0	0	0	na	na	0	0	na	na	0	0	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	0.753	0.734	0.543	0.552	0.546	na	na	0.851	0.903	na	na	1.01	1.07	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	0.258	0.26	0.114	0.115	0.114	na	na	0.44	0.443	na	na	0.869	0.879	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-88	-88	na	na	-89	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-1.4	0.2	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	-79	na	na	na	na	-75	-72	na	na	-81	-76	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	-12.5	na	na	na	na	-11.8	-11.8	na	na	-12.8	-12.2	na	na	-11.9	-11.9	na	na	-12.2	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-2.15
LAO-B Spring

Date Collected		6/13/94	6/13/94	6/13/94	6/13/94	6/14/94	10/19/94	10/19/94	10/19/94	1/15/95	1/17/95	5/9/95	5/9/95	5/9/95	5/9/95	5/14/97	5/14/97	8/1/97	8/1/97	8/1/97	8/1/97	8/1/97	2/24/98	2/24/98
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		AAB1336	AAB1336D	AAB1380	AAB1380D	AAB1341	AAB3592	AAB8495	AAB8509	AAB8559	AAB8403	0441-95-0033	0441-95-0013	0441-95-0013D	0441-95-0014	PP97-13	PP97-13	0816-97-1028	0816-97-1029	0816-97-1030	PP97-21	PP97-22	0816-98-0048	0816-98-0049
Analyte (Lab[a])	Units																							
Alkalinity total	µg/L	na[b]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Alkalinity [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	27300	28700	41300	41100	40200	na	na	30800	30500
Ammonia	µg/L	10 U[c]	na	10 U	na	na	na	20	30	na	na	na	40 U	na	40 U	na	na	na	na	na	na	na	na	na
Ammonium	µg/L	na	na	na	na	180	70	na	na	na	50	80	na	na	na	30	30	30	50	30	na	na	37.7	37.4
Ammonium [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	23.3	23.3	23.3	38.9	23.3	na	na	29.3	29.1
Anion Sum	µg/L	na	na	na	na	997	1185	na	na	na	969	900	na	na	na	905	928	1250	1240	1220	na	na	963	974
Balance	µg/L	na	na	na	na	97.9	9.6	na	na	na	30.4	50.7	na	na	na	145	264	1.77	25.7	32.8	na	na	54.1	42.7
Bicarbonate	µg/L	na	na	na	na	38800	51500	na	na	na	36000	33500	na	na	na	33300	35000	50400	50100	49000	na	na	37600	37200
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	29000	30000
Bromide (CL)	µg/L	1000 U	na	1000 U	na	20 U	20 U	na	na	na	20 U	50 U	na	na	na	na	na	na	na	na	na	na	100 U	100 U
Bromide (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	10 U	10 U	13.6	12.6	8.76	na	na	10	20
Carbon dissolved organic	µg/L	na	na	na	na	na	na	na	2500	2400	na	na	na	na	na	na	na	na	2000	2100	na	na	na	2100
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbonate	µg/L	na	na	na	na	0	0	na	na	na	0	0	na	na	na	0	0	0	0	0	na	na	0	0
Cation Sum	µg/L	na	na	na	na	1100	1196	na	na	na	999	946	na	na	na	1050	1210	1250	1270	1270	na	na	1020	1020
Chlorate	µg/L	500 U	na	1500	na	0	0	na	na	na	0	0	na	na	na	20 U	20 U	20 U	20 U	20 U	na	na	10 U	10 U
Chloride (CL)	µg/L	8000	na	7000	na	8810	9600	8400	8200	na	9850	8750	na	na	na	na	na	na	na	na	na	na	8900	9100
Chloride (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	9080	8980	11900	11800	11900	na	na	9110	9190
Conductivity (CL)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	13	130	na	na	na	91
Conductivity (field)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	98	98	98	na	na	90	90
Conductivity (EES)	µS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na	na	101	100	132	133	130	na	na	105	104
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	160	na	110	na	110	50	100	110	na	50	70	10 U	na	10 U	na	na	na	na	na	na	na	50 U	50 U
Fluoride (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	60	60	77.8	71.7	70	na	na	70	60
Hardness	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	30000	30500	40100	41300	41100	na	na	32600	32800
Humic substances hydrophilic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	800	900	na	na	na	600
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	100	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	100	na	na	na	200
Humic substances hydrophilic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1000	1100	na	na	na	800
Humic substances hydrophobic acids	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	900	1000	na	na	na	800
Humic substances hydrophobic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100	0	na	na	na	400
Humic substances hydrophobic total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1100	1100	na	na	na	1300
Iodide	µg/L	na	na	na	na	0	0	na	na	na	0	0	na	na	na	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U
Nitrate	µg/L	40 U	na	40 U	na	220	20 U	520	70	na	20 U	50 U	na	na	na	70	20 U	10 U	10 U	22.9	na	na	10 U	70
Nitrate [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	15.8	4.52 U	2.26 U	2.26 U	5.17	na	na	2.26 U	15.8
Nitrite	µg/L	20 U	na	20 U	na	20 U	20 U	20 U	20 U	na	20 U	20 U	40 U	na	40 U	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U
Nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.79 U	1.79 U	1.79 U	1.79 U	1.79 U	na	na	1.79 U	1.79 U
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R[d]	100 R
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	100 R	100 R
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Phosphate	µg/L	80	na	20 U	na	50 U	50 U	40	20 U	na	50 U	100 U	20 U	na	20 U	50 U	50 U	57	34.1	33.2	na	na	20 U	20 U
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	200 U	200 U
Silica (CL)	µg/L	15000	16000	14000	na	35100	35500	17000	17000	na	30800	35100	36300	33670	28500	na	na	na	na	na	na	na	na	na
Silica (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	37200	38700	37800	39200	37900	na	na	34500	31200
Silicon	µg/L	15000	16000	14000	na	na	na	17000	17000	na	na	na	na	na	na	17400	18100	17700	18300	17700	na	na	16100	14600
Sulfate (CL)	µg/L	5000	na	5000	na	4960	3190	4200	4200	na	4710	4790	1000 U	na	1000 U	na	na	na	na	na	na	na	4400	4300
Sulfate (EES)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	4750	4700	3880	3880	3910	na	na	4040	4080
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	10 U	10 U	10 U	10 U	10 U	na	na	10 U	10 U

Table B-2.15 LAO-B Spring (continued)

Date Collected		6/13/94	6/13/94	6/13/94	6/13/94	6/14/94	10/19/94	10/19/94	10/19/94	1/15/95	1/17/95	5/9/95	5/9/95	5/9/95	5/9/95	5/14/97	5/14/97	8/1/97	8/1/97	8/1/97	8/1/97	8/1/97	2/24/98	2/24/98
Field Prep		filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		AAB1336	AAB1336D	AAB1380	AAB1380D	AAB1341	AAB3592	AAB8495	AAB8509	AAB8559	AAB8403	0441-95-0033	0441-95-0013	0441-95-0013D	0441-95-0014	PP97-13	PP97-13	0816-97-1028	0816-97-1029	0816-97-1030	PP97-21	PP97-22	0816-98-0048	0816-98-0049
Analyte (Lab)	**Units**																							
Total dissolved solids (CL)	µg/L	na	na	na	na	109800	124500	na	na	na	102385	102700	na	na	na	na	na	na	na	na	na	na	100000	100000
Total dissolved solids (EES)	ug/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	105000	110000	130000	131000	129000	na	na	107000	103000
Total suspended solids	ug/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6900	na	na	na	na	na	600	571
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1	1	1	na	na	4.1	4.1
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6.64	6.64	6.79	6.79	6.79	na	na	6.91	6.91
pH (EES)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6.68	6.63	7.08	7.3	7.16	na	na	6.89	6.99
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0	0	0.00114	0.00107	0.000739	na	na	0.0011	0.00218
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.000551	0.000891	0.000839	0.000743	0.00068	na	na	0.000768	0.000544
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0	na	na	0	0
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.00661	0.00668	0.00655	0.00606	0.0059	na	na	0.00768	0.00653
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	3.67	3.9	4.25	4.23	4.13	na	na	4.13	4.05
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.259	0.247	0.228	0.231	0.228	na	na	0.215	0.223
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0	na	na	0.0011	0
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.784	0.755	0.717	0.718	0.711	na	na	0.718	0.748
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.523	0.523	0.327	0.328	0.329	na	na	0.443	0.444
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-76	na	na	na	na	-73	-74	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na	na	-11.6	na	na	na	na	-11.6	-11.6	na	na

Table B-2.15 — LAO-B Spring (continued)

Date Collected		2/24/98	10/2/98	10/2/98	10/2/98	1/10/00	1/10/00	1/10/00	1/10/00	1/10/00	3/24/00	3/24/00	6/21/00	6/21/00	7/24/00	7/24/00	9/5/00	9/5/00	10/5/00	10/5/00	3/29/01
Field Prep		nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP98-11	PP98-35	RE16-98-9022	RE16-98-9023	CABG-00-0011	CABG-00-0021	CABG-00-0022	CABG-00-0023	CABG-00-0022	CABG-00-0028	CABG-00-0046	CALA-00-0030	CALA-00-0029	CALA-00-0080	CALA-00-0079	CALA-00-0132	CALA-00-0131	CALA-00-0176	CALA-00-0175	CALA-01-0049
Analyte (Lab)	Units																				
Alkalinity total	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	82000	na	87000	na	na	na	47000
Alkalinity [as $CaCO_3$]	µg/L	na	na	49100	49100	na	36300	36400	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonia	µg/L	na	na	na	na	na	na	na	na	na	na	na	100 U	130	na	na	na	na	na	na	500 U
Ammonium	µg/L	na	na	20 U	20 U	na	20 U	20 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium [as N]	µg/L	na	na	15.6 U	15.6 U	na	15.6 U	15.6 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Anion Sum	µg/L	na	na	1380	1430	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Balance	µg/L	na	na	-8.28	-40.8	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bicarbonate	µg/L	na	na	59900	59900	na	44300	44400	na	na	na	na	42000	na	na	na	na	na	100000	na	na
Bicarbonate [as $CaCO_3$]	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	µg/L	na	na	na	na	na	200 U	na	na	200 U	na	0.05 U	na	na	na	na	na	na	na	na	na
Bromide (EES)	µg/L	na	na	10	10	na	10	10	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon dissolved organic	µg/L	na	na	na	2200	na	na	na	na	na	na	na	1700	na	12000	na	7000	na	5900	na	7900
Carbon total organic	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	4000	na	3100	na	2000	na
Carbonate	µg/L	na	na	0	0	na	0	0	na	na	na	na	na	na	na	na	na	na	na	na	na
Cation Sum	µg/L	na	na	1370	1380	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Chlorate	µg/L	na	na	20 U	20 U	na	20 U	20 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Chloride (CL)	µg/L	na	na	na	na	na	6900	na	na	6700	na	5380	6200	na	5700	na	5800	na	5400	na	7100
Chloride (EES)	µg/L	na	na	11500	11700	na	5990	6010	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (CL)	µS/cm	na	na	na	134	110	110	110	111	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	µS/cm	na	na	140	140	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (EES)	µS/cm	na	na	141	140	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Cyanide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	µg/L	na	na	10900	10900	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	µg/L	na	na	na	na	na	100 U	na	na	100 U	na	104	100 U	na	na	na	na	na	na	na	140
Fluoride (EES)	µg/L	na	na	70	70	na	70	70	na	na	na	na	na	na	na	na	na	na	na	na	na
Hardness	µg/L	na	na	45000	44900	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic acids	µg/L	na	na	na	1000	na	na	na	na	na	na	na	900	na	na	na	na	na	na	na	na
Humic substances hydrophilic bases	µg/L	na	na	na	na	na	na	na	na	na	na	na	0 U	na	na	na	na	na	na	na	na
Humic substances hydrophilic neutrals	µg/L	na	na	na	na	na	na	na	na	na	na	na	0 U	na	na	na	na	na	na	na	na
Humic substances hydrophilic total	µg/L	na	na	na	1000	na	na	na	na	na	na	na	900	na	na	na	na	na	na	na	na
Humic substances hydrophobic acids	µg/L	na	na	na	400	na	na	na	na	na	na	na	400	na	na	na	na	na	na	na	na
Humic substances hydrophobic neutrals	µg/L	na	na	na	700	na	na	na	na	na	na	na	400	na	na	na	na	na	na	na	na
Humic substances hydrophobic total	µg/L	na	na	na	1200	na	na	na	na	na	na	na	800	na	na	na	na	na	na	na	na
Iodide	µg/L	na	na	10 U	10 U	na	10 U	10 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrate	µg/L	na	na	10 U	10 U	na	10 U	30	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrate [as N]	µg/L	na	na	2.26 U	2.26 U	na	2.26 U	6.77	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrite	µg/L	na	na	10 U	10 U	na	10 U	10	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrite [as N]	µg/L	na	na	1.79 U	1.79 U	na	1.79 U	1.79	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen ammonia [as N]	µg/L	na	na	na	na	na	500 U	na	na	500 U	na	500 U	na	na	na	na	na	na	na	na	na
Nitrogen nitrate [as NO_3]	µg/L	na	na	na	na	na	200	na	na	200	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	µg/L	na	na	na	na	na	na	na	na	na	na	50 U	50 U	50 U	na	na	na	na	na	na	na
Nitrogen nitrite [as NO_2]	µg/L	na	na	na	na	na	100	na	na	100	na	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	µg/L	na	na	na	na	na	460	na	na	170	na	210	na	na	na	na	na	na	na	na	na
Oxalate (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (EES)	µg/L	na	na	20 U	20 U	na	20 U	20 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Phosphate	µg/L	na	na	70	20 U	na	6.52 U	16.3	na	na	na	na	na	na	na	na	na	na	na	na	na
Phosphorus orthophosphate [as PO_4]	µg/L	na	na	na	na	na	50 U	na	na	50 U	na	50 U	na	na	na	na	na	na	na	na	na
Silica (CL)	µg/L	na	na	na	na	na	32100 U	na	na	32100 U	na	30000	na	na	na	na	na	na	na	na	na
Silica (EES)	µg/L	na	na	48400	45200	na	36800	36400	na	na	na	na	na	na	na	na	na	na	na	na	na
Silicon	µg/L	na	na	22600	21100	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfate (CL)	µg/L	na	na	na	na	na	3800	na	na	3600	na	4010	4300	na	15000	na	13000	na	11000	na	17000
Sulfate (EES)	µg/L	na	na	3250	3190	na	3360	3360	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfide reactive	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	µg/L	na	na	10 U	10 U	na	10 U	10 U	na	na	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (CL)	µg/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table B-2.15 — LAO-B Spring (continued)

Date Collected		2/24/98	10/2/98	10/2/98	10/2/98	1/10/00	1/10/00	1/10/00	1/10/00	1/10/00	3/24/00	3/24/00	6/21/00	6/21/00	7/24/00	7/24/00	9/5/00	9/5/00	10/5/00	10/5/00	3/29/01
Field Prep		nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP98-11	PP98-35	RE16-98-9022	RE16-98-9023	CABG-00-0011	CABG-00-0021	CABG-00-0022	CABG-00-0023	CABG-00-0022	CABG-00-0028	CABG-00-0046	CALA-00-0030	CALA-00-0029	CALA-00-0080	CALA-00-0079	CALA-00-0132	CALA-00-0131	CALA-00-0176	CALA-00-0175	CALA-01-0049
Analyte (Lab)	Units																				
Total dissolved solids (EES)	μg/L	na	na	162000	159000	na	112000	111000	na	na	na	na	na	na	na	na	na	na	na	na	na
Total suspended solids	μg/L	na	na	500	500	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	0.6	0.6	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (CL)	SU	na	na	na	6.3	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	6.83	6.83	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (EES)	SU	na	na	6.84	6.89	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	0.00087	0.000855	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	0.000522	0.000513	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	0	0	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	0.00609	0.00598	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	5.21	5.12	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	0.238	0.25	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	0	0	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	0.785	0.79	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	0.283	0.273	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	-74	na	na	-75	na	-12	na	na	na	na	na	na	na	na	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	0.1	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	-69	-63	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	-10.7	-10	na	na	-10.2	na	na	-10.3	na	-10.4	na	na	na	na	na	na	na	na	na	na

Table B-2.15 — LAO-B Spring (continued)

Date Collected		3/29/01	6/18/01	6/28/01	11/7/01	11/7/01	11/7/01	11/7/01	3/26/02	3/26/02	5/30/02	5/30/02	5/30/02	5/30/02
Field Prep		nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered
Sample ID		CALA-01-0050	CALA-01-0215	CALA-01-0257	CALA-01-0471	CALA-01-0471	CALA-01-0497	CALA-01-0472	CALA-02-45277	CALA-02-45278	CALA-02-45029	CALA-02-45029	CALA-02-45041	CALA-02-45030
Analyte (Lab)	Units													
Alkalinity total	μg/L	na	56000	na	91800	91800	89300	na	82800	na	78700	78700	86400	na
Alkalinity [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonia	μg/L	na	100 U	na	50 U	na	50 U	na	50 U	na	50 U	na	50 U	na
Ammonium	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Ammonium [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Anion Sum	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Balance	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Bicarbonate	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Bicarbonate [as $CaCO_3$]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Bromide (CL)	μg/L	na	na	na	50 U	50 U	50 U	na	200 U	na	200 U	200 U	200 U	na
Bromide (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Carbon dissolved organic	μg/L	na	5000	na	3430	2900	3280	na	3320	na	2100	2030	2080	na
Carbon total organic	μg/L	5.7	na	3	na	na	na	3440	na	2210	na	na	na	1990
Carbonate	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Cation Sum	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Chlorate	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Chloride (CL)	μg/L	na	8800	na	6030	6030	6060	na	6720	na	7630	7630	7630	na
Chloride (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (CL)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (field)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na
Conductivity (EES)	μS/cm	na	na	na	na	na	na	na	na	na	na	na	na	na
Cyanide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Dissolved oxygen (field)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoride (CL)	μg/L	na	130	na	213	213	168	na	188	na	123	123	116	na
Fluoride (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Hardness	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Humic substances hydrophilic acids	μg/L	na	na	na	1200	1200	na	na	na	na	1000	1000	na	na
Humic substances hydrophilic bases	μg/L	na	na	na	100	100	na	na	na	na	0 U	0 U	na	na
Humic substances hydrophilic neutrals	μg/L	na	na	na	0 U	0 U	na	na	na	na	0 U	0 U	na	na
Humic substances hydrophilic total	μg/L	na	na	na	1300	1300	na	na	na	na	1000	1000	na	na
Humic substances hydrophobic acids	μg/L	na	na	na	1100	1100	na	na	na	na	700	700	na	na
Humic substances hydrophobic neutrals	μg/L	na	na	na	500	500	na	na	na	na	400	400	na	na
Humic substances hydrophobic total	μg/L	na	na	na	1600	1600	na	na	na	na	1100	1100	na	na
Iodide	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrate	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrate [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrite	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrite [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen ammonia [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate [as NO_3]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen nitrate + nitrite [as N]	μg/L	na	na	na	260	260	260	na	170	na	140	140	130	na
Nitrogen nitrite [as NO_2]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen total Kjeldahl [as N]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxalate (CL)	μg/L	na	na	na	na	na	na	na	na	na	1000 U	1000 U	1000 U	na
Oxalate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Phosphate	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Phosphorus orthophosphate [as PO_4]	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Silica (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Silica (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Silicon	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfate (CL)	μg/L	na	11000	na	17700	17700	7690	na	8340	na	7540	7540	7580	na
Sulfate (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfide reactive	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Sulfite	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (CL)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Total dissolved solids (EES)	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na

Table B-2.15 — LAO-B Spring (continued)

Date Collected		3/29/01	6/18/01	6/28/01	11/7/01	11/7/01	11/7/01	11/7/01	3/26/02	3/26/02	5/30/02	5/30/02	5/30/02	5/30/02
Field Prep		nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered
Sample ID		CALA-01-0050	CALA-01-0215	CALA-01-0257	CALA-01-0471	CALA-01-0471	CALA-01-0497	CALA-01-0472	CALA-02-45277	CALA-02-45278	CALA-02-45029	CALA-02-45029	CALA-02-45041	CALA-02-45030
Analyte (Lab)	Units													
Total suspended solids	μg/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Turbidity (field)	NTU	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (CL)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (field)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na
pH (EES)	SU	na	na	na	na	na	na	na	na	na	na	na	na	na
Br/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
B/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Cs/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
F/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
HCO_3/CL by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
K/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Li/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Na/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
SO_4/Cl by wt	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Delta deuterium vs std. mean ocean water	n/a	na	na	na	na	na	na	na	na	na	na	na	na	na
Nitrogen-15/nitrogen-14 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Deuterium/hydrogen ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na
Oxygen-18/oxygen-16 ratio	ratio	na	na	na	na	na	na	na	na	na	na	na	na	na

[a] Pre-1997 = laboratory
EES = Earth and Environmental Science Division
CL= contract laboratory (Paragon Analytics Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, Coastal Science Laboratories, and the University of Miami)
[b] na = Not analyzed.
[c] U = Not detected.
[d] R = Rejected.

Table B-3.1
Spring 1

Date Collected		5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/4/00	4/4/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-14	PP97-14	0816-97-1036	0816-97-1037	PP97-26	0816-98-0044	0816-98-0045	PP98-14	PP98-23	PP98-24	RE16-98-9016	RE16-98-9017	RE16-98-9018	CABG-99-0005	CABG-99-0001	CABG-00-0037	CABG-00-0055
Analyte (Lab[a])	Units																	
Americium-241	pCi/L	na[b]	na	0.193	0.24	na	0.006 U	0.01 U	na	na	na	0.006 U	0.049 U	0.049 U	na	na	na	na
Cesium-137	pCi/L	na	na	1.73 U[c]	0.113 U	na	1.18 U	-0.25 U	na	na	na	-1 U	-0.5 U	-2.5 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	1.6	1.21 U	na	na	na	1.58	1.75	1.59	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	3.2	1.6 U	na	na	na	4	2.5	1.3 U	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	397	318	na	na	na	149	158	218	na	na	na	na
Plutonium-238	pCi/L	na	na	0.03 U	-0.003 U	na	0.0029 U	0.0051 U	na	na	na	0.015 U	-0.0075 U	0.006 U	na	na	na	na
Plutonium-239	pCi/L	na	na	0.0113 U	0.0043 U	na	0.0069 U	-0.0006 U	na	na	na	0.0068 U	0.0117 U	0.019 U	na	na	na	na
Uranium-234	pCi/L	na	na	0.912	1.029	na	1.64	1.56	na	na	na	1.28	1.27	1.4	na	na	na	na
Uranium-235	pCi/L	na	na	0.017 U	0.0106 U	na	0.057	0.0197 U	na	na	na	0.051	0.025 U	0.065	na	na	na	na
Uranium-238	pCi/L	na	na	0.483	0.654	na	0.814	0.822	na	na	na	0.548	0.649	0.663	na	na	na	na
Strontium-90	pCi/L	na	na	-0.25 U	-0.13 U	na	0.17 U	0.09 U	na	na	na	0.11 U	0.46 U	0 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	0.03192	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	0.01	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	0.5107	na	na	na	2.362	na	na	-0.1596	0.2554	0.3192	na	na	na	na	0.5747	0.06386	na
Tritium-TU (UM)	TU	0.16	na	na	na	0.74	na	na	-0.05	0.08	0.1	na	na	na	na	na	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories), UM = University of Miami.

[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.2
Sacred Spring

Date Collected		5/29/97	5/29/97	8/8/97	8/8/97	8/8/97	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	4/14/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP97-20	PP97-20	0816-97-1054	0816-97-1055	PP97-34	PP98-16	PP98-16	PP98-17	PP98-18	RE16-98-9000	RE16-98-9001	RE16-98-9002	PP98-27	RE16-98-9034	RE16-98-9035	CABG-99-0003	CABG-99-0007	CABG-00-0039	CABG-00-0057
Analyte (Lab[a])	Units																			
Americium-241	pCi/L	na[b]	na	0.0097 U[c]	0.022 U	na	na	na	na	na	0.026 U	0.0062 U	0.042	na	0.006 U	0.026 U	na	na	na	na
Cesium-137	pCi/L	na	na	0.73 U	-1.5 U	na	na	na	na	na	0.573 U	-2.28 U	1.09 U	na	-1.4 U	-0.3 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	na	na	0.7784 U	0.623	0.0245	na	0.85 U	0.55 U	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	na	na	2 U	2.1 U	2.2 U	na	2.1 U	1.7 U	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	na	na	180	167	177	na	208	153	na	na	na	na
Plutonium-238	pCi/L	na	na	0.001 U	0.049	na	na	na	na	na	-0.002 U	0.034 U	0.0122 U	na	0.034 U	0.011 U	na	na	na	na
Plutonium-239	pCi/L	na	na	-0.0021 U	0.0059 U	na	na	na	na	na	0.011 U	0.023 U	0.042	na	0.016 U	0.031 U	na	na	na	na
Uranium-234	pCi/L	na	na	0.202	0.239	na	na	na	na	na	0.426	0.392	0.481	na	0.195	0.196	na	na	na	na
Uranium-235	pCi/L	na	na	0.029	0.026 U	na	na	na	na	na	0.026	0.021 U	0.01 U	na	0.0103 U	0.02 U	na	na	na	na
Uranium-238	pCi/L	na	na	0.114	0.087	na	na	na	na	na	0.249	0.257	0.205	na	0.099	0.108	na	na	na	na
Strontium-90	pCi/L	na	na	-0.08 U	0.25 U	na	na	na	na	na	0.37 U	0.01 U	-0.15 U	na	-0.01 U	0.46 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	na	na	1.3	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	3.798	na	na	na	12.9	na	3.192	1.66	1.851	na	na	na	4.533	na	na	1.501	na	9.834	na
Tritium-TU (UM)	TU	1.19	na	na	na	4.04	na	1	0.52	0.58	na	na	na	1.42	na	na	na	na	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories), UM = University of Miami.
[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.3
Otowi #4

Date Collected		5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	2/26/98	2/26/98	2/26/98	9/28/98	9/28/98	9/28/98
Field Prep		filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-16	PP97-16	PP97-17	0816-97-1097	0816-97-1098	PP97-38	0816-98-0040	0816-98-0041	PP98-13	PP98-33	RE16-98-9011	RE16-98-9012
Analyte (Lab[a])	Units												
Americium-241	pCi/L	na[b]	na	na	0.0069 U[c]	0.004 U	na	0.094	0 U	na	na	0.029 U	0.0099 U
Cesium-137	pCi/L	na	na	na	-0.736 U	-1.2 U	na	0.322 U	0.4 U	na	na	0.3 U	0.3 U
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	-0.1	-0.53	na	na	-0.02	-0.04
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	3.1	2.4 U	na	na	3.19	2.5
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	207	132	na	na	176	265
Plutonium-238	pCi/L	na	na	na	0.045 U	0.004 U	na	-0.001 U	-0.0011 U	na	na	0.0009 U	-0.0406 U
Plutonium-239	pCi/L	na	na	na	0.022 U	0.0088 U	na	0.048 U	0.048	na	na	0.0087 U	-0.0112 U
Uranium-234	pCi/L	na	na	na	0.596	0.475	na	0.574	0.59	na	na	0.666	0.65
Uranium-235	pCi/L	na	na	na	0.043	0.012 U	na	0.031 U	0.0055 U	na	na	0.023 U	0.054
Uranium-238	pCi/L	na	na	na	0.283	0.264	na	0.255	0.216	na	na	0.312	0.259
Strontium-90	pCi/L	na	na	na	0.0297 U	-0.2 U	na	-0.07 U	-0.05 U	na	na	0 U	0.05 U
Tritium (CL)	pCi/L	na	na	na	na	na	na	1.17	na	na	na	-0.1915	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	0.37	na	na	na	-0.06	na
Tritium (UM)	pCi/L	0.3511	na	0.5107	na	na	2.139	na	na	0.3511	0.09576	na	na
Tritium-TU (UM)	TU	0.11	na	0.16	na	na	0.67	na	na	0.11	0.03	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories), UM = University of Miami.
[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.4
La Mesita Spring

Date Collected		5/21/97	5/21/97	8/5/97	8/5/97	8/5/97	4/7/98	4/7/98	4/7/98	7/7/98	7/7/98	7/7/98	7/7/98	7/7/98	12/16/99	12/16/99	4/10/00	4/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-15	PP97-15	0816-97-1038	0816-97-1039	PP97-27	0816-98-0046	0816-98-0047	PP98-15	PP98-25	PP98-26	RE16-98-9013	RE16-98-9014	RE16-98-9015	CABG-99-0006	CABG-99-0002	CABG-00-0038	CABG-00-0056
Analyte (Lab[a])	Units																	
Americium-241	pCi/L	na[b]	na	0.172	0.087	na	0.021 U	0.006 U	na	na	na	0.067	0.009 U	0.011 U	na	na	na	na
Cesium-137	pCi/L	na	na	1.38 U[c]	0.346 U	na	-1.7 U	0.433 U	na	na	na	-1.5 U	-0.3 U	-1.5 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	4.4	6.3	na	na	na	6.8	7.2	6	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	2.2	3.4	na	na	na	4.5	5.1	3.8	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	227	149	na	na	na	183	189	165	na	na	na	na
Plutonium-238	pCi/L	na	na	0.015 U	-0.014 U	na	0.0017 U	-0.0012 U	na	na	na	-0.0043 U	-0.001 U	0.016 U	na	na	na	na
Plutonium-239	pCi/L	na	na	0.0054 U	0.029 U	na	-0.0017 U	-0.0111 U	na	na	na	0.0032 U	-0.0032 U	-0.0011 U	na	na	na	na
Uranium-234	pCi/L	na	na	8.02	7.79	na	4.94	4.89	na	na	na	4.64	4.69	4.56	na	na	na	na
Uranium-235	pCi/L	na	na	0.327	0.263	na	0.179	0.126	na	na	na	0.161	0.175	0.169	na	na	na	na
Uranium-238	pCi/L	na	na	4.98	4.7	na	2.92	2.97	na	na	na	3.1	3.01	2.77	na	na	na	na
Strontium-90	pCi/L	na	na	-0.02 U	0.31 U	na	0.25 U	0 U	na	na	na	0.22 U	0.18 U	0.02 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	-0.06384	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	-0.02	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	0.415	na	na	na	3.735	na	na	0.5107	0.8938	0.7661	na	na	na	na	0.1277	0.1916	na
Tritium-TU (UM)	TU	0.13	na	na	na	1.17	na	na	0.16	0.28	0.24	na	na	na	na	na	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories),
UM = University of Miami.

[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.5
Guaje #5

Date Collected		5/29/97	5/29/97	5/29/97	8/19/97	8/19/97	8/19/97	9/28/98	9/28/98	9/28/98
Field Prep		filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-18	PP97-18	PP97-19	0816-97-1099	0816-97-1100	PP97-37	PP98-34	RE16-98-9009	RE16-98-9010
Analyte (Lab[a])	Units									
Americium-241	pCi/L	na[b]	na	na	0.0146 U[c]	0.016 U	na	na	0.023 U	0.036 U
Cesium-137	pCi/L	na	na	na	-1.04 U	0.127 U	na	na	-1.4 U	2.2 U
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	0.59	0.18
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	2.06	1.43
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	245	262
Plutonium-238	pCi/L	na	na	na	0.02 U	0.012 U	na	na	0.0025 U	0.008 U
Plutonium-239	pCi/L	na	na	na	-0.0044 U	0.0071 U	na	na	0.0025 U	-0.0017 U
Uranium-234	pCi/L	na	na	na	0.777	0.684	na	na	0.717	0.723
Uranium-235	pCi/L	na	na	na	0.041	0.02 U	na	na	0.063	0.021 U
Uranium-238	pCi/L	na	na	na	0.367	0.259	na	na	0.273	0.351
Strontium-90	pCi/L	na	na	na	-0.02 U	0.137 U	na	na	-0.12 U	0.01 U
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	-0.1915	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	-0.06	na
Tritium (UM)	pCi/L	0.2554	na	0.1277	na	na	0.2554	-0.1277 U	na	na
Tritium-TU (UM)	TU	0.08	na	0.04	na	na	0.08	-0.04 U	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories),
UM = University of Miami.

[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.6
Water Canyon Gallery

Date Collected		5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	2/9/98	2/9/98	7/8/98	7/8/98	7/8/98	1/5/00	1/5/00	3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		PP97-8	PP97-8	0816-97-1040	0816-97-1041	PP97-28	0816-98-0005	0816-98-0006	0816-98-0007	PP98-3	PP98-4	PP98-28	RE16-98-9026	RE16-98-9027	CABG-00-0003	CABG-00-0014	CABG-00-0031	CABG-00-0032	CABG-00-0049	CABG-00-0050
Analyte (Lab[a])	Units																			
Americium-241	pCi/L	na[b]	na	0.136	0.192	na	0.018 U[c]	0.011 U	0.02 U	na	na	na	0.053	0.024 U	na	na	na	na	na	na
Cesium-137	pCi/L	na	na	0.76 U	-1.35 U	na	-0.483 U	0.179 U	0.563 U	na	na	na	1 U	-0.3 U	na	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	0.28	-0.23	-0.15	na	na	na	0.17	0.18	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	-0.02	0.53	1.6 U	na	na	na	0.6	2.1 U	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	265 U	278 U	300 U	na	na	na	161	174	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	0.051 U	0.01 U	na	0.012 U	0.012 U	-0.008 U	na	na	na	0.009 U	-0.001 U	na	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.019 U	0.011 U	na	0.003 U	0.013 U	-0.009 U	na	na	na	0.041	0.014 U	na	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.298	0.182	na	0.154	0.142	0.094	na	na	na	0.12	0.136	na	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.039	0.011 U	na	0.0115 U	-0.0049 U	-0.0032 U	na	na	na	0.005 U	0.0086 U	na	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.125	0.071	na	0.098	0.082	0.102	na	na	na	0.038 U	0.041	na	na	na	na	na	na
Strontium-90	pCi/L	na	na	-0.02 U	0.04 U	na	-0.28 U	-0.12 U	-0.11 U	na	na	na	0.06 U	-0.03 U	na	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	44	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	30	na	na	na	24.87	na	na	na	8.267	7.948	7.852	na	na	4.406	na	5.428	5.715	na	na
Tritium-TU (UM)	TU	9.4	na	na	na	7.79	na	na	na	2.59	2.49	2.46	na	na	na	na	na	na	na	na

[a] CL = Contract laboratory (Paragon Analytics, Inc., General Engineering Laboratory, Huffman, Western Michigan University, Geochron Laboratories, and Coastal Science Laboratories), UM = University of Miami.
[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.7
Upper Cañon de Valle Spring

Date Collected		5/13/97	5/13/97	5/13/97	8/4/97	8/4/97	8/4/97	2/23/98	2/23/98	2/23/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	4/5/00	4/5/00
Field Prep		filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP97-11	PP97-12	PP97-12	0816-97-1031	0816-97-1032	PP97-23	0816-98-0034	0816-98-0035	PP98-10	PP98-19	RE16-98-9028	RE16-98-9029	CABG-00-0004	CABG-00-0015	CABG-00-0040	CABG-00-0058
Analyte (Lab[a])	Units																
Americium-241	pCi/L	na[b]	na	na	0.042 U[c]	0.047 U	na	0.0256	0.0101 U	na	na	0.023	0.029 U	na	na	na	na
Cesium-137	pCi/L	na	na	na	-0.425 U	-0.258 U	na	1.21 U	-0.544 U	na	na	0.6 U	-0.6 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	-0.1	0.77	na	na	0.68 U	-0.04	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	0.36	0.93	na	na	1.9 U	0.45	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	103	153	na	na	196	201	na	na	na	na
Plutonium-238	pCi/L	na	na	na	0.03 U	0.109	na	0.001 U	0.046 U	na	na	0.026	0.047 U	na	na	na	na
Plutonium-239	pCi/L	na	na	na	0.016 U	0.041	na	0.0095 U	0.013 U	na	na	0.005 U	-0.006 U	na	na	na	na
Uranium-234	pCi/L	na	na	na	0.113	0.129	na	0.188	0.188	na	na	0.098 U	0.058 U	na	na	na	na
Uranium-235	pCi/L	na	na	na	0.013 U	0.0205 U	na	0.0136 U	0.0048 U	na	na	-0.0009 U	0.022 U	na	na	na	na
Uranium-238	pCi/L	na	na	na	0.045	0.066	na	0.056	0.073	na	na	0.039	0.042	na	na	na	na
Strontium-90	pCi/L	na	na	na	0.36 U	0.55 U	na	0.03 U	-0.16 U	na	na	0.16 U	0.11 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	3.4	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	60.33	56.5	na	na	na	50.43	na	na	39.58	45.01	na	na	32.25	na	30.33	na
Tritium-TU (UM)	TU	18.9	17.7	na	na	na	15.8	na	na	12.4	14.1	na	na	na	na	na	na

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[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.8
Spring 9b

Date Collected		4/22/97	4/22/97	8/18/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	1/11/00	4/6/00	4/6/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-2	PP97-2	0816-97-1052	0816-97-1053	PP97-35	0816-98-0003	0816-98-0004	PP98-2	PP98-32	RE16-98-9007	RE16-98-9008	CABG-00-0010	CABG-00-0020	CABG-00-0027	CABG-00-0042	CABG-00-0060
Analyte (Lab[a])	Units																
Americium-241	pCi/L	na[b]	na	0.07 U[c]	0.048 U	na	0.012 U	0.004 U	na	na	na	0.024 U	na	na	na	na	na
Cesium-137	pCi/L	na	na	-2.09 U	0.115 U	na	-0.485 U	-0.762 U	na	na	na	0.2 U	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	-0.4	-0.42	na	na	na	0.17 U	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	0.2	0.18	na	na	na	0.7 U	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	210 U	276 U	na	na	na	229	na	na	na	na	na
Plutonium-238	pCi/L	na	na	0.009 U	0.031 U	na	0.017 U	0.011 U	na	na	na	-0.0011 U	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.019 U	0.007 U	na	-0.001 U	0.0088 U	na	na	na	0.0084 U	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.152	0.158	na	0.207	0.175	na	na	na	0.1	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.033	0.016	na	0.0045 U	0.007 U	na	na	na	0.0129 U	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.155	0.069	na	0.096	0.094	na	na	na	0.055	na	na	na	na	na
Strontium-90	pCi/L	na	na	0.168 U	0.151 U	na	-0.22 U	0.12 U	na	na	na	0.01 U	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	48	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	0.5746	na	na	na	-0.1915 U	na	na	0.2554	-0.1596 U	na	na	0.48	na	0.3193	-0.03193 U	na
Tritium-TU (UM)	TU	0.18	na	na	na	-0.06 U	na	na	0.08	-0.05 U	na	na	0.15	na	0.1	-0.01 U	na

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[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.9
Seven Springs

Date Collected		04/27/97	04/27/97	08/07/97	08/07/97	08/07/97	08/07/97	08/07/97	02/10/98	02/10/98	02/10/98	07/06/98	07/06/98	07/06/98	12/20/99	12/20/99	03/29/00	03/29/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP97-5	PP97-5	0816-97-1047	0816-97-1048	0816-97-1049	PP97-32	PP97-33	0816-98-0036	0816-98-0037	PP98-7	PP98-22	RE16-98-9036	RE16-98-9037	CABG-99-0004	CABG-99-0008	CABG-00-0030	CABG-00-0048
Analyte (Lab[a])	Units																	
Americium-241	pCi/L	na[b]	na	0.013 U[c]	0.002 U	0.012 U	na	na	0.005 U	0.013 U	na	na	0 U	0.012 U	na	na	na	na
Cesium-137	pCi/L	na	na	-0.13 U	0 U	0.13 U	na	na	-0.066 U	-0.011 U	na	na	1.4 U	-0.8 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	0.55	0.97	na	na	0.67 U	0.5	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	1.6	3.3	na	na	3.2	1.9 U	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	313	311	na	na	203	185	na	na	na	na
Plutonium-238	pCi/L	na	na	0.041 U	0.014 U	0.02 U	na	na	-0.007 U	0.0025 U	na	na	-0.013 U	0.007 U	na	na	na	na
Plutonium-239	pCi/L	na	na	0 U	0.011 U	0.0114 U	na	na	0.004 U	-0.0012 U	na	na	-0.0055 U	0.0096 U	na	na	na	na
Uranium-234	pCi/L	na	na	0.633	0.582	0.486	na	na	0.655	0.592	na	na	0.622	0.601	na	na	na	na
Uranium-235	pCi/L	na	na	0.018 U	0.046	0.021 U	na	na	0.0202	0.023	na	na	0.021 U	0.018 U	na	na	na	na
Uranium-238	pCi/L	na	na	0.29	0.247	0.291	na	na	0.269	0.273	na	na	0.274	0.188	na	na	na	na
Strontium-90	pCi/L	na	na	-0.07 U	-0.03 U	0.07 U	na	na	0.07 U	0.05 U	na	na	-0.76 U	-0.15 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	13	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	22.47	na	na	na	na	20.91	21.35	na	na	20.59	22.18	na	na	17.31	na	16.38	na
Tritium-TU (UM)	TU	7.04	na	na	na	na	6.55	6.69	na	na	6.45	6.95	na	na	5.42	na	5.13	na

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[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.10
Pine Spring

Date Collected		5/7/97	5/7/97	8/4/97	8/4/97	8/4/97	8/4/97	2/10/98	2/10/98	2/10/98	7/14/98	7/14/98	7/14/98	7/14/98	1/6/00	1/6/00	3/30/00	3/30/00	3/30/00	3/30/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		PP97-6	PP97-6	0816-97-1033	0816-97-1034	PP97-24	PP97-25	0816-98-0038	0816-98-0039	PP98-6	PP98-29	PP98-30	RE16-98-9032	RE16-98-9033	CABG-00-0017	CABG-00-0006	CABG-00-0033	CABG-00-0034	CABG-00-0051	CABG-00-0052
Analyte (Lab[a])	Units																			
Americium-241	pCi/L	na[b]	na	0.031 U[c]	0.02 U	na	na	-0.003 U	0.02 U	na	na	na	0.031 U	0.037 U	na	na	na	na	na	na
Cesium-137	pCi/L	na	na	1.92 U	-0.803 U	na	na	0.22 U	0.529 U	na	na	na	-0.9 U	-1.3 U	na	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	1.8	1.22	na	na	na	1.28 U	0.81 U	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	5.5	3.4	na	na	na	5.46	3.84	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	354	262	na	na	na	161 U	220 U	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	0.038 U	0.01 U	na	na	-0.004 U	-0.003 U	na	na	na	0 U	0.0084 U	na	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.0038 U	0.0092 U	na	na	0.002 U	0.014 U	na	na	na	0.0079 U	0.0019 U	na	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.08	0.074	na	na	0.16	0.069	na	na	na	0.048	0.0103 U	na	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.0071 U	0.0068 U	na	na	0.0061	0.0134	na	na	na	0.0025 U	0.0028 U	na	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.026 U	0.016 U	na	na	0.102	0.124	na	na	na	0.037	0.0131 U	na	na	na	na	na	na
Strontium-90	pCi/L	na	na	0.4 U	0.05 U	na	na	0.12 U	0.08 U	na	na	na	-0.28 U	0 U	na	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	36	na	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	70.86	na	na	na	67.99	5.522	na	na	65.76	64.8	60.65	na	na	na	57.15	52.68	55.24	na	na
Tritium-TU (UM)	TU	22.2	na	na	na	21.3	1.73	na	na	20.6	20.3	19	na	na	na	17.9	16.5	17.3	na	na

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[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.11
Pajarito Spring

Date Collected		4/27/97	4/27/97	8/7/97	8/7/97	8/7/97	2/18/98	2/18/98	2/18/98	2/18/98	2/18/98	7/6/98	7/6/98	7/6/98	1/6/00	1/6/00	3/31/00	3/31/00	3/31/00	3/31/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	filtered
Sample ID		PP97-4	PP97-4	0816-97-1045	0816-97-1046	PP97-31	0816-98-0052	0816-98-0053	0816-98-0054	PP98-8	PP98-9	PP98-21	RE16-98-9030	RE16-98-9031	CABG-00-0016	CABG-00-0005	CABG-00-0035	CABG-00-0036	CABG-00-0053	CABG-00-0054
Analyte (Lab[a])	Units																			
Americium-241	pCi/L	na[b]	na	0.003 U[c]	0.002 U	na	0.021 U	0.0145 U	0.0249	na	na	na	0.027 U	0.019 U	na	na	na	na	na	na
Cesium-137	pCi/L	na	na	-0.51 U	1.44 U	na	-1.61 U	1.03 U	0.079 U	na	na	na	-1.7 U	-1.1 U	na	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	0.18	0.2	0.4	na	na	na	0.6 U	0.7 U	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	2.4	0.38	1.17 U	na	na	na	1.2 U	1.8 U	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	174	118	139	na	na	na	228	219	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	0.002 U	0.032 U	na	0.004 U	0.018 U	0.027 U	na	na	na	0.007 U	-0.0011 U	na	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.003 U	-0.0064 U	na	0.0012 U	-0.008 U	0.0071 U	na	na	na	0.02 U	0.045 U	na	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.69	0.693	na	0.915	0.957	0.885	na	na	na	0.666	0.729	na	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.041	0.039	na	0.044 U	0.021 U	0.046	na	na	na	0.064	0.032 U	na	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.359	0.319	na	0.375	0.414	0.323	na	na	na	0.278	0.292	na	na	na	na	na	na
Strontium-90	pCi/L	na	na	0.17 U	-0.06 U	na	0.13 U	0.24 U	-0.01 U	na	na	na	-0.16 U	-0.1 U	na	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	0.24	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	0.6703	na	na	na	0.03192 U	na	na	na	1.628	1.309	1.149	na	na	na	0.3512	0.1596	-0.09579 U	na	na
Tritium-TU (UM)	TU	0.21	na	na	na	0.01 U	na	na	na	0.51	0.41	0.36	na	na	na	0.11	0.05	-0.03 U	na	na

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[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.12
LAOI-1.1(A)

Date Collected		5/9/97	5/9/97	5/9/97	9/5/97	9/5/97	9/5/97	2/25/98	2/25/98	2/25/98	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	1/20/00	1/20/00	4/13/00	4/13/00
Field Prep		filtered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered
Sample ID		PP97-10	PP97-9	PP97-9	0816-97-1095	0816-97-1096	PP97-39	0816-98-0050	0816-98-0051	PP98-12	PP98-36	PP98-37	RE16-98-9019	RE16-98-9020	RE16-98-9021	CABG-00-0024	CABG-00-0025	CABG-00-0043	CABG-00-0061
Analyte (Lab[a])	Units																		
Americium-241	pCi/L	na[b]	na	na	0.04 U[c]	0 U	na	0.022 U	0.009 U	na	na	na	0.026 U	0.029	0.022 U	na	na	na	na
Cesium-137	pCi/L	na	na	na	-2.14 U	-0.17 U	na	1.34 U	-1.2 U	na	na	na	1.2 U	0.1 U	1.1 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	1.3 U	0.13	na	na	na	0.47	0.34	0.72	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	7.4	5.4	na	na	na	7.5	4.94	5.9	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	110.3	143	na	na	na	na	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	na	0.057	0.08	na	0.005 U	0.021 U	na	na	na	0.015 U	0.035 U	-0.0057 U	na	na	na	na
Plutonium-239	pCi/L	na	na	na	0.028 U	0.009 U	na	0.011 U	0.012 U	na	na	na	0.0069 U	0.006 U	-0.0068 U	na	na	na	na
Uranium-234	pCi/L	na	na	na	0.465	0.332	na	0.347	0.149	na	na	na	0.34	0.195	0.239	na	na	na	na
Uranium-235	pCi/L	na	na	na	0.026 U	0.04 U	na	0.015 U	-0.003 U	na	na	na	0.028	0.0071 U	0.04	na	na	na	na
Uranium-238	pCi/L	na	na	na	0.465	0.595	na	0.26	0.101	na	na	na	0.274	0.114	0.133	na	na	na	na
Strontium-90	pCi/L	na	na	na	-0.3 U	-0.23 U	na	-0.05 U	0 U	na	na	na	0.07 U	0.28 U	0.04 U	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	-3	na	na	na	na	1.436	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	0.45	na	na	na	na	na	na
Tritium (UM)	pCi/L	1.213	1.117	na	na	na	0.8618	na	na	0.7661	1.053	1.053	na	na	na	0.3832	na	-0.2235 U	na
Tritium-TU (UM)	TU	0.38	0.35	na	na	na	0.27	na	na	0.24	0.33	0.33	na	na	na	0.12	na	-0.07 U	na

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[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.13
Doe Spring

Date Collected		4/22/97	4/22/97	8/18/97	8/18/97	8/18/97	2/3/98	2/3/98	2/3/98	9/23/98	9/23/98	9/23/98	1/7/00	1/7/00	1/7/00	1/7/00	1/11/00	4/6/00	4/6/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	nonfiltered	filtered
Sample ID		PP97-1	PP97-1	0816-97-1050	0816-97-1051	PP97-36	0816-98-0001	0816-98-0002	PP98-1	PP98-31	RE16-98-9005	RE16-98-9006	CABG-00-0008	CABG-00-0009	CABG-00-0018	CABG-00-0019	CABG-00-0026	CABG-00-0041	CABG-00-0059
Analyte (Lab[a])	Units																		
Americium-241	pCi/L	na[b]	na	0.034 U[c]	-0.0047 U	na	0.001 U	0.05 U	na	na	0.0083 U	0.01 U	na	na	na	na	na	na	na
Cesium-137	pCi/L	na	na	-2.03 U	-1.91 U	na	-0.849 U	1.53 U	na	na	2.1 U	-0.8 U	na	na	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	-0.5	-0.21	na	na	0.29 U	-0.27 U	na	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	0.17	0.99	na	na	-0.32 U	0.86 U	na	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	383 U	234 U	na	na	240	226	na	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	0.02 U	0.035 U	na	0.0177 U	-0.009 U	na	na	0.001 U	0.0021 U	na	na	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.0022 U	0.006 U	na	0.0056 U	-0.008 U	na	na	0.0097 U	0.022 U	na	na	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.281	0.322	na	0.392	0.308	na	na	0.336	0.217	na	na	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.0215 U	0.023 U	na	0.0228	0.0076 U	na	na	-0.0019 U	0.013 U	na	na	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.17	0.144	na	0.273	0.151	na	na	0.169	0.111	na	na	na	na	na	na	na
Strontium-90	pCi/L	na	na	0 U	-0.3 U	na	-0.2 U	0.01 U	na	na	-0.11 U	0.09 U	na	na	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	-2.4 U	na	na	na	1.6	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	-0.75 U	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	0.6065	na	na	na	0.5107	na	na	1.404	-0.2554	na	na	1.149	0.4151	na	na	1.692	1.469	na
Tritium-TU (UM)	TU	0.19	na	na	na	0.16	na	na	0.44	-0.08	na	na	0.47	0.13	na	na	0.53	0.46	na

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[b] na = Not analyzed.
[c] U = Not detected.
[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.14
Apache Spring

Date Collected		5/7/97	5/7/97	8/6/97	8/6/97	8/6/97	8/6/97	8/6/97	2/9/98	2/9/98	2/9/98	7/1/98	7/1/98	7/1/98	1/5/00	1/5/00	1/5/00	1/5/00	3/29/00	3/29/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered
Sample ID		PP97-7	PP97-7	0816-97-1042	0816-97-1043	0816-97-1044	PP97-29	PP97-30	0816-98-0008	0816-98-0009	PP98-5	PP98-20	RE16-98-9024	RE16-98-9025	CABG-00-0001	CABG-00-0002	CABG-00-0012	CABG-00-0013	CABG-00-0029	CABG-00-0047
Analyte (Lab[a])	**Units**																			
Americium-241	pCi/L	na[b]	na	0.032 U[c]	0.029 U	0.062	na	na	0.032 U	0.037 U	na	na	0.035 U	0.033 U	na	na	na	na	na	na
Cesium-137	pCi/L	na	na	-1.09 U	0.13 U	-0.38 U	na	na	0.314 U	-2.27 U	na	na	-2.7 U	1 U	na	na	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	0.7	-0.12	na	na	0.71 U	-0.06	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	3.4	3.4	na	na	5.2	3.6	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	329 U	302 U	na	na	170	187	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	-0.012 U	0.026 U	0.038	na	na	-0.008 U	0.005 U	na	na	0.006 U	0.008 U	na	na	na	na	na	na
Plutonium-239	pCi/L	na	na	0.019 U	0.003 U	0.019 U	na	na	-0.011 U	0.007 U	na	na	0.01 U	0.03 U	na	na	na	na	na	na
Uranium-234	pCi/L	na	na	0.157	0.163	0.124	na	na	0.209	0.183	na	na	0.14 U	0.067 U	na	na	na	na	na	na
Uranium-235	pCi/L	na	na	0.0079 U	0.0092 U	0.0134 U	na	na	0.011 U	0.0086 U	na	na	0.026 U	0.0082 U	na	na	na	na	na	na
Uranium-238	pCi/L	na	na	0.074	0.113	0.038	na	na	0.099	0.078	na	na	0.082	0.016 U	na	na	na	na	na	na
Strontium-90	pCi/L	na	na	-0.2 U	0.02 U	-0.23 U	na	na	0.01 U	0.19 U	na	na	0.09 U	-0.02 U	na	na	na	na	na	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	30	na	na	na	na	na	na	na	na	na	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	9.4	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	45.65	na	na	na	na	46.6	47.56	na	na	44.69	42.45	na	na	36.4	35.12	na	na	33.53	na
Tritium-TU (UM)	TU	14.3	na	na	na	na	14.6	14.9	na	na	14	13.3	na	na	11.4	11.0	na	na	10.5	na

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[b] na = Not analyzed.

[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.

Table B-3.15
LAO-B

Date Collected		5/14/97	5/14/97	8/1/97	8/1/97	8/1/97	8/1/97	8/1/97	2/24/98	2/24/98	2/24/98	10/2/98	10/2/98	10/2/98	1/10/00
Field Prep		filtered	nonfiltered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	nonfiltered	nonfiltered	filtered	nonfiltered
Sample ID		PP97-13	PP97-13	0816-97-1028	0816-97-1029	0816-97-1030	PP97-21	PP97-22	0816-98-0048	0816-98-0049	PP98-11	PP98-35	RE16-98-9022	RE16-98-9023	CABG-00-0011
Analyte (Lab[a])	Units														
Americium-241	pCi/L	na[b]	na	0.019 U[c]	0.022 U	0.026	na	na	0.024 U	0.0095 U	na	na	0.04 U	0.017 U	na
Cesium-137	pCi/L	na	na	1.09 U	-0.058 U	0.893 U	na	na	-2.66 U	-0.657 U	na	na	0 U	-0.6 U	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	0.31	-0.78	na	na	0.3	0.2	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	1.9 U	1.3 U	na	na	2.6	2.8	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	203	124	na	na	289	290	na
Plutonium-238	pCi/L	na	na	0.031 U	-0.0038 U	0.028 U	na	na	0.016 U	0.021 U	na	na	-0.013 U	0.0036 U	na
Plutonium-239	pCi/L	na	na	0.0081 U	0.024	0.125	na	na	0.0046 U	0.015 U	na	na	-0.0058 U	0.019 U	na
Uranium-234	pCi/L	na	na	0.02 U	0.033 U	0.038 U	na	na	0.025 U	0.049	na	na	0.032 U	0.019 U	na
Uranium-235	pCi/L	na	na	0.007 U	0.005 U	0.006 U	na	na	-0.002 U	0.0056 U	na	na	0.0083 U	0.0111 U	na
Uranium-238	pCi/L	na	na	0.045 U	-0.005 U	0.011 U	na	na	0.01 U	0.0151 U	na	na	0.016 U	0.004 U	na
Strontium-90	pCi/L	na	na	0 U	0.18 U	-0.06 U	na	na	0.02 U	0.2 U	na	na	0.02 U	0.2 U	na
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	5.6	na	na	na	66.07	na	na
Tritium-TU[d] (CL)	TU	na	na	na	na	na	na	na	1.8	na	na	na	20.7	na	na
Tritium (UM[a])	pCi/L	55.54	na	na	na	na	56.82	56.82	na	na	65.76	64.16	na	na	58.43
Tritium-TU (UM)	TU	17.4	na	na	na	na	17.8	17.8	na	na	20.6	20.1	na	na	18.31

Table B-3.15 — LAO-B (continued)

Date Collected		1/10/00	1/10/00	1/10/00	1/10/00	3/24/00	3/24/00	10/5/00	10/5/00	11/7/01	11/7/01	11/7/01	3/26/02	3/26/02	3/26/02
Field Prep		filtered	nonfiltered	nonfiltered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	filtered	nonfiltered
Sample ID		CABG-00-0021	CABG-00-0022	CABG-00-0023	CABG-00-0022	CABG-00-0028	CABG-00-0046	CALA-00-0176	CALA-00-0175	CALA-01-0471	CALA-01-0497	CALA-01-0472	CALA-02-45277	CALA-02-45281	CALA-02-45278
Analyte (Lab)	Units														
Americium-241	pCi/L	na	na	na	na	na	na	na	na	0.0312	-2.35e-3 U	1.65e-2 U	na	na	na
Cesium-137	pCi/L	na	na	na	na	na	na	na	na	4.08e-1 U	3.78e-1 U	7.31e-2 U	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Plutonium-238	pCi/L	na	na	na	na	na	na	na	na	2.15e-3 U	3.42e-2 U	2.05e-3 U	4.57e-3 U	-2.49e-2 U	-9.88e-10 U
Plutonium-239	pCi/L	na	na	na	na	na	na	na	na	-3.24e-2 U	6.09e-3 U	3.94e-3 U	-4.57e-3 U	-1.42e-2 U	-8.28e-3 U
Uranium-234	pCi/L	na	na	na	na	na	na	na	na	0.0702	0.0667	0.0727	na	na	na
Uranium-235	pCi/L	na	na	na	na	na	na	na	na	5.54e-3 U	-1.22e-3 U	1.89e-2 U	na	na	na
Uranium-238	pCi/L	na	na	na	na	na	na	na	na	3.23e-2 U	0.0563	1.72e-2 U	na	na	na
Strontium-90	pCi/L	na	na	na	na	na	na	3.40e-1 U	2.70e-1 U	1.40e-1 U	-1.00e-2 U	1.83e-1 U	1.22e-1 U	1.81e-1 U	1.95e-2 U
Tritium (CL)	pCi/L	na	na	na	na	na	na	na	na	na	na	-2.58e1 U	na	na	na
Tritium-TU (CL)	TU	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	na	na	58.11	na	54.6	na	na	na	na	na	na	na	na	na
Tritium-TU (UM)	TU	na	na	18.2	na	17.1	na	na	na	na	na	na	na	na	na

Table B-3.15 — LAO-B (continued)

Date Collected		3/29/01	3/29/01	5/30/02	5/30/02	5/30/02	6/18/01	6/18/01	6/21/00	6/21/00	7/24/00	7/24/00	9/5/00	9/5/00
Field Prep		filtered	nonfiltered	filtered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered	filtered	nonfiltered
Sample ID		CALA-01-0049	CALA-01-0050	CALA-02-45029	CALA-02-45041	CALA-02-45030	CALA-01-0215	CALA-01-0216	CALA-00-0030	CALA-00-0029	CALA-00-0080	CALA-00-0079	CALA-00-0132	CALA-00-0131
Analyte (Lab)	Units													
Americium-241	pCi/L	5.00e-3 U	1.00e-3 U	1.02e-2 U	5.22e-3 U	1.35e-2 U	1.80e-2 U	1.30e-2 U	2.00e-3 U	0.00e0 U	na	na	na	na
Cesium-137	pCi/L	-7.00e-1 U	-2.30e0 U	2.30e-1 U	-2.78e-1 U	6.86e-3 U	-1.50e0 U	1.90e0 U	na	-7.00e-1 U	na	na	na	na
Gross Alpha Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Gross Beta Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Gross Gamma Radiation	pCi/L	na	na	na	na	na	na	na	na	na	na	na	na	na
Plutonium-238	pCi/L	-6.00e-3 U	1.30e-2 U	7.45e-4 U	-6.24e-3 U	9.34e-3 U	-1.00e-3 U	-3.00e-3 U	2.00e-3 U	-3.00e-3 U	na	na	na	na
Plutonium-239	pCi/L	6.00e-3 U	1.00e-2 U	-2.02e-3 U	-2.19e-3 U	3.49e-3 U	1.40e-2 U	2.10e-2 U	7.00e-3 U	-2.00e-3 U	na	na	na	na
Uranium-234	pCi/L	0.078	2.80e-2 U	0.0519	0.0379	0.0762	1.00e-3 U	3.20e-2 U	3.70e-2 U	3.30e-2 U	na	na	na	na
Uranium-235	pCi/L	1.50e-2 U	1.40e-2 U	9.84e-3 U	8.23e-3 U	-7.40e-3 U	1.00e-2 U	1.20e-2 U	7.00e-3 U	3.00e-2 U	na	na	na	na
Uranium-238	pCi/L	9.00e-3 U	2.60e-2 U	0.0511	0.0465	0.0393	1.60e-2 U	1.90e-2 U	9.00e-3 U	2.30e-2 U	na	na	na	na
Strontium-90	pCi/L	-5.00e-1 U	-5.00e-1 U	1.89e-1 U	1.76e-1 U	2.61e-1 U	2.00e-1 U	0.00e0 U	9.00e-2 U	-3.70e-1 U	3.00e-1 U	1.30e-1 U	1.40e-1 U	1.20e-1 U
Tritium (CL)	pCi/L	na	2.00e1 U	na	na	1.09e2 U	na	-5.00e1 U	na	na	na	na	na	na
Tritium-TU (CL)	TU	na	6.26 U	na	na	34.14 U	na	na	na	na	na	na	na	na
Tritium (UM)	pCi/L	na	na	na	na	na	na	na	na	50.4	na	na	na	na
Tritium-TU (UM)	TU	na	na	na	na	na	na	na	na	15.8	na	na	na	na

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[c] U = Not detected.

[d] TU = Tritium units. 1 TU = 3.193 pCi/L.