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Ground-Water Quality Data in the Coastal Los Angeles Basin Study Unit, 2006: Results from the California GAMA Program

Data Series 387
Version 1.1, March 2009

U.S. Department of the Interior
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Cover: Top photograph: Refinery in Long Beach, California.
Bottom: Beverly Hills, California. Photographs taken by Dara Goldrath, U.S. Geological Survey.

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Abbreviations and Acronyms

AB	Assembly Bill (through the California Assembly)
AL-US	Action level (USEPA)
CAS	Chemical Abstract Service (American Chemical Society)
CSU	combined standard uncertainty
E	estimated or having a higher degree of uncertainty
GAMA	Groundwater Ambient Monitoring and Assessment program
GPS	Global Positioning System
IRL	interim reporting level
HAL-US	Lifetime Health Advisory level (USEPA)
HPLC	high-performance liquid chromatography
LRL	laboratory reporting level
LSD	land-surface datum
LT-MDL	long-term method detection level
MCL-US	maximum contaminant level (USEPA)
MCL-CA	maximum contaminant level (CDPH)
MDL	method detection limit
MRL	minimum reporting level
MU	method uncertainty
N	Normal (1 gram-equivalent per liter of solution)
na	not available
nc	sample not collected
NL-CA	California notification level (CDPH)
NWIS	National Water Information System (USGS)
PCFF	personal computer field forms
QC	quality control
RPD	relative percent difference
RSD	relative standard deviation
RSD5	risk-specific dose at 10-5 (USEPA)
SMCL-CA	secondary maximum contaminant level (CDPH)
SMCL-US	secondary maximum contaminant level (USEPA)
CLAB	Coastal Los Angeles Basin study unit
CB	Central Basin study area
DA	Direct assessment wells
OC	Orange County Coastal Plain study area
U	Understanding wells

Abbreviations and Acronyms—Continued

WB	West Coast Basin study area
SSMDC	sample-specific minimum detectable concentration
TT-US	Treatment Technique (USEPA)
US	United States
V	analyte detected in sample and an associated blank thus data are not included in ground-water-quality assessment

Organizations

CDPH	California Department of Public Health
USEPA	U.S. Environmental Protection Agency
LLNL	Lawrence Livermore National Laboratory
MWH	Montgomery Watson-Harza
NAWQA	National Water Quality Assessment (USGS)
NWQL	National Water Quality Laboratory (USGS)
SWRCB	State Water Resources Control Board (California)
USGS	U.S. Geological Survey

Selected Chemical Names

$CaCO_3$	calcium carbonate
CFC	chlorofluorocarbon
CO_3^{-2}	carbonate
DOC	dissolved organic carbon
HCl	hydrochloric acid
HCO_{3-}	bicarbonate
MTBE	methyl tert-butyl ether
NDMA	N-nitrosodimethylamine
PCE	perchloroethene
TCP	trichloropropane
TDS	total dissolved solids
THM	trihalomethane
VOC	volatile organic compound

Abbreviations and Acronyms—Continued

Units of Measure

cm^3 STP g^{-1}	cubic centimeters at standard temperature and pressure (0 degrees Celsius and 1 atmosphere of pressure)
ft	foot (feet)
in	inch
L	liter
mg	milligram
mg/L	milligrams per liter (parts per million)
mi	mile
mL	milliliter
µg/L	micrograms per liter (parts per billion)
µL	microliter
µm	micrometer
pCi/L	picocurie per liter
δiE	delta notation, the ratio of a heavier isotope of an element (iE) to the more common lighter isotope of that element, relative to a standard reference material, expressed in per mil

Notes

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = (1.8 \times °C) + 32$$

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is equivalent to parts per million (ppm) and micrograms per liter is equivalent to parts per billion (ppb).

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Ground-Water Quality Data in the Coastal Los Angeles Basin Study Unit, 2006: Results from the California GAMA Program

By Timothy M. Mathany, Michael Land, and Kenneth Belitz

Abstract

Ground-water quality in the approximately 860 square-mile Coastal Los Angeles Basin study unit (CLAB) was investigated from June to November of 2006 as part of the Statewide Basin Assessment Project of the Ground-Water Ambient Monitoring and Assessment (GAMA) Program. The GAMA Statewide Basin Assessment was developed in response to the Ground-Water Quality Monitoring Act of 2001, and is being conducted by the U.S. Geological Survey (USGS) in cooperation with the California State Water Resources Control Board (SWRCB).

The Coastal Los Angeles Basin study was designed to provide a spatially unbiased assessment of raw ground-water quality within CLAB, as well as a statistically consistent basis for comparing water quality throughout California. Samples were collected from 69 wells in Los Angeles and Orange Counties. Fifty-five of the wells were selected using a spatially distributed, randomized grid-based method to provide statistical representation of the study area ("grid wells"). Fourteen additional wells were selected to evaluate changes in ground-water chemistry or to gain a greater understanding of the ground-water quality within a specific portion of the Coastal Los Angeles Basin study unit ("understanding wells").

Ground-water samples were analyzed for: a large number of synthetic organic constituents [volatile organic compounds (VOCs), gasoline oxygenates and their degradates, pesticides, polar pesticides, and pesticide degradates, pharmaceutical compounds, and potential wastewater-indicators]; constituents of special interest [perchlorate, *N*-nitrosodimethylamine (NDMA), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP)]; inorganic constituents that can occur naturally [nutrients, major and minor ions, and trace elements]; radioactive constituents [gross-alpha and gross-beta radiation, radium isotopes, and radon-222]; and microbial indicators. Naturally occurring isotopes [stable isotopic ratios of hydrogen and oxygen, and activities of tritium and carbon-14] and dissolved noble gases also were measured to help identify the sources and ages of the sampled ground water.

Quality-control samples (blanks, replicates, and samples for matrix spikes) were collected at approximately one-fourth of the wells, and the results for these samples were used to evaluate the quality of the data for the ground-water samples. Field blanks rarely contained detectable concentrations of any constituent, suggesting that contamination was not a significant source of bias. Differences between replicate samples were within acceptable ranges, indicating acceptably low variability. Matrix spike recoveries were within acceptable ranges for most compounds. Assessment of the quality-control information resulted in applying "V" codes to approximately 0.1 percent of the data collected for ground-water samples (meaning a constituent was detected in blanks as well as the corresponding environmental data).

This study did not attempt to evaluate the quality of drinking water delivered to consumers; after withdrawal from the ground, water typically is treated, disinfected, and (or) blended with other waters to maintain acceptable drinking-water quality. Regulatory thresholds are applied to the treated drinking water that is served to the consumer, not to raw ground water. However, to provide some context for the results, concentrations of constituents measured in the raw ground water were compared with regulatory and non-regulatory health-based thresholds established by the U.S. Environmental Protection Agency (USEPA), California Department of Public Health (CDPH, formerly California Department of Health Services [CADHS]) and thresholds established for aesthetic concerns (secondary maximum contaminant levels, SMCL-CA) by CDPH. Comparisons between data collected for this study and drinking-water thresholds are for illustrative purposes only, and are not indicative of compliance or non-compliance with those thresholds.

VOCs were detected in almost three-quarters of the grid wells, and pesticides and pesticide degradates were detected in 42 percent of the grid wells. Potential wastewater indicators were detected in 44 percent of the grid wells. All of the detections of these organic compounds in samples from CLAB grid wells were below health-based thresholds, with

the exception of tetrachloromethane (carbon tetrachloride), a VOC, which was detected above the MCL-CA. In CLAB understanding wells, there were two detections of trichloroethene (TCE) and one detection of perchloroethene (PCE) above the MCL-US.

Nutrient and trace-element concentrations in the CLAB grid wells were below health-based thresholds. There were two detections of boron above the NL-CA of 1,000 µg/L in the CLAB understanding wells. Activities of radioactive constituents in water samples collected in CLAB grid wells were below health-based thresholds, with the exception of two detections of radon-222 that were above the proposed MCL-US of 300 pCi/L; however, none of the samples had an activity above the proposed alternative MCL-US of 4,000 pCi/L. Total coliforms were detected at one of CLAB's understanding wells. Most of the samples from CLAB grid wells had concentrations of major elements and total dissolved solids below the non-enforceable thresholds set for aesthetic concerns. Four grid wells had total dissolved solids concentrations above the SMCL-CA recommended threshold (SMCL-CA threshold for total dissolved solids has a recommended value of 500 mg/L, and an upper value of 1,000 mg/L). There were two detections of manganese, and four detections of iron in CLAB grid wells above their respective SMCL-CAs, and a single detection of arsenic above the MCL-US. Two understanding wells had concentrations of chloride and sulfate above the recommended SMCL-CA (both have a recommended threshold value of 250 mg/L, an upper value of 500 mgL).

Introduction

Ground water comprises nearly half of the water used for public-supply in California (Hutson and others, 2004). To assess the quality of ground water from public-supply wells and establish a program for monitoring trends in ground-water quality, the State Water Resources Control Board (SWRCB), in collaboration with the U.S. Geological Survey (USGS) and Lawrence Livermore National Laboratory (LLNL), implemented a statewide ground-water-quality monitoring and assessment program (http://www.waterboards.ca.gov/gama. The GAMA program consists of three projects: Priority Basin project, conducted by the USGS (http://ca.water.usgs.gov/gama/); Voluntary Domestic Well Assessment, conducted by the SWRCB; and Special Studies, conducted by LLNL.

The SWRCB initiated the GAMA Priority Basin project in response to the Groundwater Quality Monitoring Act of 2001 (Sections 10780-10782.3 of the California Water Code, Assembly Bill 599). AB 599 is a public mandate to assess and monitor the quality of ground water used as public supply for municipalities in California. The project is a comprehensive assessment of statewide ground-water quality designed to help better understand and identify risks to ground-water resources, and to increase the availability of information about ground-water quality to the public. As part of the AB 599 process, the USGS, in collaboration with the SWRCB, developed the monitoring plan for the project (Belitz and others, 2003; State Water Resources Control Board, 2003). Key aspects of the project are inter-agency collaboration, and cooperation with local water agencies and well owners. Local participation in the project is entirely voluntary.

The GAMA Priority Basin project is unique in California because the data collected during the study include analyses for an extensive number of chemical constituents at very low concentrations, analyses that are not normally available. A broader understanding of ground-water composition will be especially useful for providing an early indication of changes in water quality, and for identifying the natural and human factors affecting water quality. Additionally, the GAMA Priority Basin project will analyze a broader suite of constituents than required by the California Department of Public Health (CDPH). An understanding of the occurrence and distribution of these constituents is important for the long-term management and protection of ground-water resources.

The range of hydrologic, geologic, and climatic conditions that exist in California must be considered in an assessment of ground-water quality. Belitz and others (2003) partitioned the State into ten hydrogeologic provinces, each with distinctive hydrologic, geologic, and climatic characteristics (fig. 1), and representative regions in all ten provinces were included in the project design. Eighty percent of California's approximately 16,000 public-supply wells are located in ground-water basins within these hydrologic provinces. These ground-water basins, defined by the California Department of Water Resources, generally consist of relatively permeable, unconsolidated deposits of alluvial or volcanic origin (California Department of Water Resources, 2003). Ground-water basins were prioritized for sampling based upon the number of public-supply wells in the basin, with secondary consideration given to municipal ground-water use, agricultural pumping, the number of leaking underground fuel tanks, and pesticide applications within the basins (Belitz and others, 2003). In addition, some ground-water basins or groups of adjacent similar basins with relatively few public-supply wells were assigned high priority so that all hydrogeologic provinces would be represented in the subset of basins sampled. The 116 priority basins were grouped into 35 study units. Some areas not in the defined ground-water basins were included in several of the study units to achieve representation of the 20 percent of public-supply wells not located in the ground-water basins.

Base from U.S. Geological Survey digital elevation data, 1999, Albers Equal Area Projection

Provinces from Belitz and others, 2004

Figure 1. The 10 hydrogeologic provinces considered for the California Groundwater Ambient Monitoring and Assessment (GAMA) study with the Coastal Los Angeles Basin study unit outlined (Belitz and others, 2003).

Three types of water-quality assessments are being conducted with the data collected in each study unit: (1) Status: assessment of the current quality of the groundwater resource, (2) Trends: detection of changes in ground-water quality, and (3) Understanding: identification of the natural and human factors affecting ground-water quality (Kulongoski and Belitz, 2004). This report is one of a series of reports presenting water-quality data collected in each study unit (Wright and others, 2005; Kulongoski and others, 2006; Bennett and others, 2006; Fram and Belitz, 2007; Kulongoski and Belitz, 2007; Dawson and others, 2008; Landon and Belitz, 2008; Ferrari and others (2008); Shelton and others, 2008; Burton and Belitz, 2008; Land and Belitz, 2008). Subsequent reports will address the status, trends, and understanding aspects of the water-quality assessments of each study unit.

The Coastal Los Angeles Basin GAMA study unit, hereafter referred to as CLAB, contains five ground-water basins (fig. 2). CLAB was considered high priority for sampling on the basis of the large number of public-supply wells and to provide adequate representation of the Southern Coastal Plain area of the Transverse Ranges and Selected Peninsular Ranges hydrogeologic province (Belitz and others, 2003).

Purpose and Scope

The purposes of this report are: (1) to describe the study design, including the hydrogeologic setting of CLAB and the study methods; (2) to present the results of quality-control tests, and (3) to present the analytical results for ground-water samples collected in CLAB. Ground-water samples were analyzed for organic, inorganic, and microbial constituents, field parameters, and chemical tracers. The chemical and microbial data presented in this report were evaluated by comparison to State and Federal drinking-water regulatory and non-regulatory thresholds and other health-based standards that are applied to treated drinking water. Regulatory thresholds considered for this report were established by the United States Environmental Protection Agency (USEPA) and the California Department of Public Health (CDPH). The data presented in this report are intended to characterize the quality of untreated ground-water resources within the study unit, not the treated drinking water delivered to consumers by water purveyors. Discussions of the factors that influence the distribution and occurrence of the constituents detected in ground-water samples will be the subject of subsequent publications.

Acknowledgments

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Hydrogeologic Setting

The Coastal Los Angeles Basin study unit (CLAB) lies at the southwest end of the Transverse Ranges and Selected Peninsular Ranges Hydrogeologic Province described by Belitz and others (2003), and includes a total of five ground-water basins: Orange County Coastal Plain, Central, West Coast, Santa Monica, and Hollywood (California Department of Water Resources, 2003). The five study areas of CLAB were selected to correspond with the boundaries of the five DWR-defined ground-water basins, and cover an area of approximately 860 square-miles (mi^2), in Los Angeles and Orange Counties, California (fig. 2).

The topography of the CLAB study unit is relatively flat. The study unit is bounded on the north by the Santa Monica Mountains, and the Elysian, Repetto, Merced, Puente, and Chino Hills; on the east by the Santa Ana Mountains; on the south by the San Joaquin Hills and the Pacific Ocean (San Pedro Bay); and, on the west by the Palos Verdes Hills and Pacific Ocean (Santa Monica Bay). The major drainages of CLAB are the Los Angeles, the San Gabriel, and the Santa Ana Rivers, all of which have headwaters outside of the study unit (Department of Water Resources, 2003).

The main water-bearing formations within the CLAB study unit occur in unconsolidated and semi-consolidated marine and alluvial sediments of Holocene, Pleistocene, and Pliocene age. Periodic encroachment of the sea, and alluvium derived from weathering and erosion of the rocks in the surrounding mountains, has filled the Coastal Los Angeles basin with deposits of various thicknesses, consisting of sand, gravel, and conglomerate with some silt and clay beds (Department of Water Resources, 2003).

Figure 2. The Coastal Los Angeles Basin GAMA study unit, locations of study areas, major cities, rivers, reservoirs, salt-water barrier projects, CDPH and USGS public-supply wells, topographic features, and ground-water basins.

The climate in the CLAB study unit area is classified as Mediterranean, characterized by warm summers, cool winters, and markedly seasonal rainfall. Daytime highs in the winter average about 70ºF and summer highs average between 80–85ºF. Nearly all rain falls from late autumn to early spring; virtually no precipitation falls during the summer. The average rainfall in the Coastal Los Angeles Basin area is about 15 inches (National Oceanic Atmospheric Administration, 2007). Potential evapotranspiration in the coastal plain exceeds precipitation on an annual basis, and under natural conditions, the lower reaches of rivers that drain the basin are dry in the summer (Department of Water Resources, 2003).

Ground-water flow is largely controlled by engineered recharge along the San Gabriel, the Rio Hondo, and the Santa Ana Rivers, and by ground-water pumping from the many hundreds of wells distributed across the area. The direction of ground-water flow is primarily lateral and radial from the recharge facilities towards the coast. Along the coast near the saltwater-intrusion barriers, the direction of ground-water flow is in the inland direction, affected by water injection in the intrusion barrier and by ground-water pumping to the east (Shelton and others, 2000).

Methods

Methods used for the GAMA program were selected to achieve the following objectives: (1) design a sampling plan suitable for statistical analysis; (2) collect samples in a consistent manner; (3) analyze samples using proven and reliable laboratory methods; (4) assure the quality of the ground-water data; and, (5) maintain data securely and with relevant documentation. The Appendix to this report contains detailed descriptions of the sample-collection protocols and analytical methods, the quality-assurance plan, and the results of analyses of quality-control samples.

Study Design

The wells selected for sampling in this study reflect the combination of two selection strategies. Fifty-five wells were selected to provide a statistically unbiased, spatially distributed assessment of the quality of ground-water resources used for public drinking-water supply, and fourteen additional wells were targeted to provide greater sampling density in several specific areas to gain a greater understanding of ground-water quality within the CLAB study unit.

The spatially-distributed wells were selected using a randomized grid-based method (Scott, 1990). The objective for the CLAB study unit within the GAMA Transverse Ranges and Selected Peninsular Ranges Hydrogeologic Province was to create a sampling density network of at least one well per 10 mi^2 while having at least 10 grid cells per study area. A large number of public-supply wells were listed in statewide databases maintained by the CDPH and USGS. These wells are fairly evenly distributed, and are shown in figure 2.

To ensure that the grid network included only those areas in which wells were commonly available for public supply, adjustments to the grid were made in three of the CLAB study areas. For the assessment of the Orange County Coastal Plain and Central Basin study areas, those areas mapped as uplifted (or) older deposits near the coast or the surrounding hills were excluded from the grid portion. The resulting area was divided into 27 and 21 grid cells (respectively), each having an approximate area of 10 mi^2 (figs. 3, 4). For the assessment of the West Coast basin, Terminal Island and an area bounded by the Newport–Inglewood Fault Zone, San Pedro Bay, and the Los Angeles River were excluded from the grid portion. The resulting area was divided into thirteen 10-mi^2 grid cells (fig. 4).

The objective was to then randomly select one public-supply well per grid cell. If a grid cell contained more than one public-supply well, each well was randomly assigned a rank. The highest ranked well that met basic sampling criteria (for example; sampling point prior to treatment, capability to pump for several hours, available well-construction information) and for which permission to sample could be obtained was then sampled. If a grid cell contained no accessible public-supply wells, then irrigation or industrial wells were considered for sampling. An attempt was made to select irrigation or industrial wells with depths and screened intervals similar to those of public-supply wells in the area. In this fashion, a well was selected in each cell to provide a spatially distributed, randomized monitoring network for each study area. Wells sampled as part of the grid-cell network are hereafter referred to as “grid wells”. Grid wells in the CLAB study unit were named for their respective CADWR ground-water basins then numbered in the order of sample collection with the following prefixes based on study area: “OC” (indicating “Orange County coastal plain”), “CB” (indicating “Central Basin”), and “WB” (indicating “West Coast basin”).

Fifty-five of the 61 grid cells in CLAB had wells that could be sampled; the other six grid cells did not contain active or accessible wells. In the Orange County Coastal Plain, there were no actively pumping wells in three grid cells. In the Central Basin study area there was complete coverage, with every grid cell represented by a well sampled. In the West Coast Basin, there were no actively pumping wells in one cell, and in two cells there were no wells available for sampling during the timeframe of the CLAB study.

Fourteen additional “understanding” wells were sampled within the GAMA CLAB study unit. Eight of the fourteen wells were selected along a regional ground-water flow path, and within specific portions of the Central Basin and Orange County Coastal Plain study areas; they were numbered in the order of sample collection and given the prefix “U” (indicating “understanding”) (figs. 3 and 4).

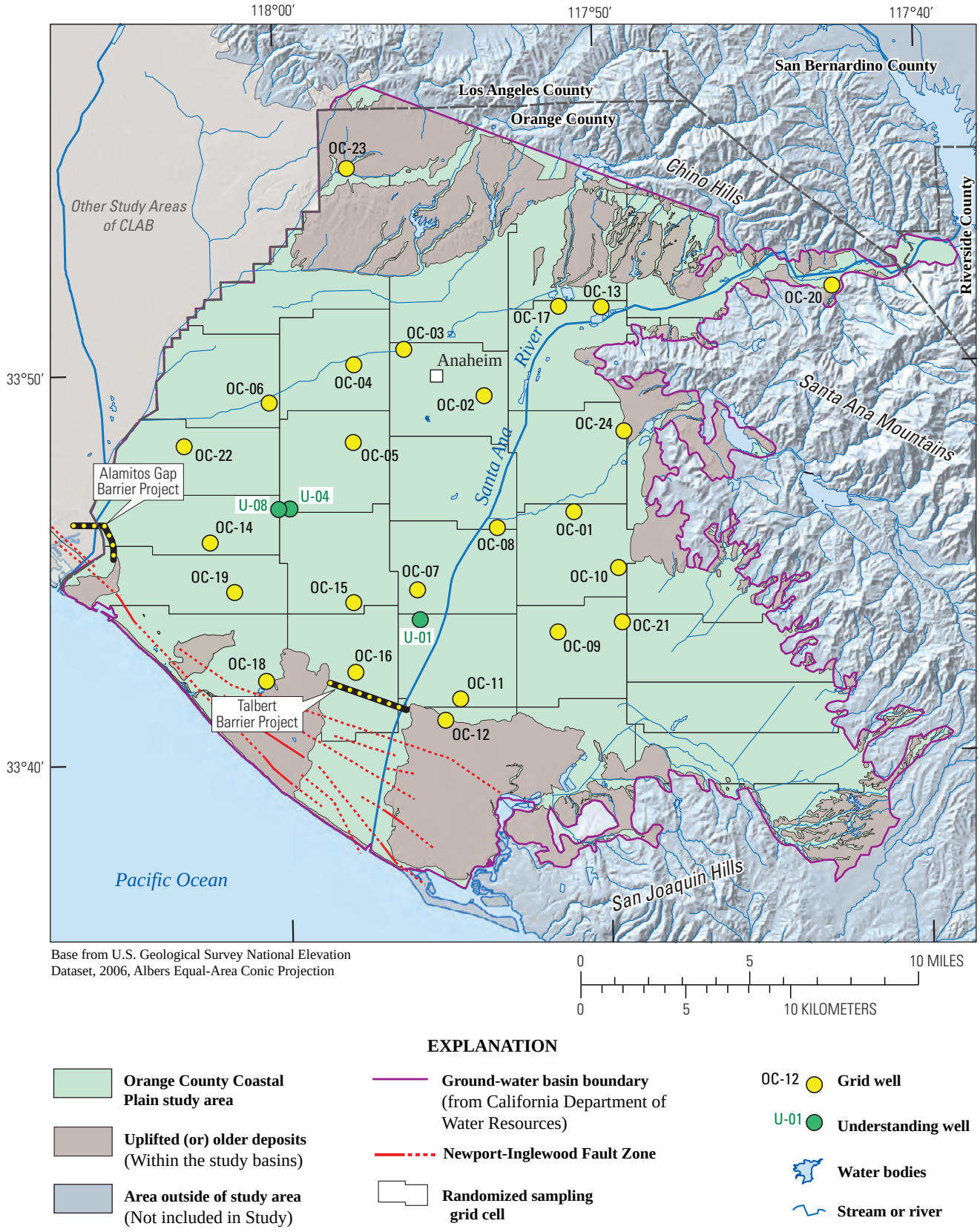

Figure 3. The Orange County Coastal Plain study area, the distribution of the study area grid cells, and the locations of sampled grid wells and understanding wells in the Coastal Los Angeles Basin GAMA study unit, California.

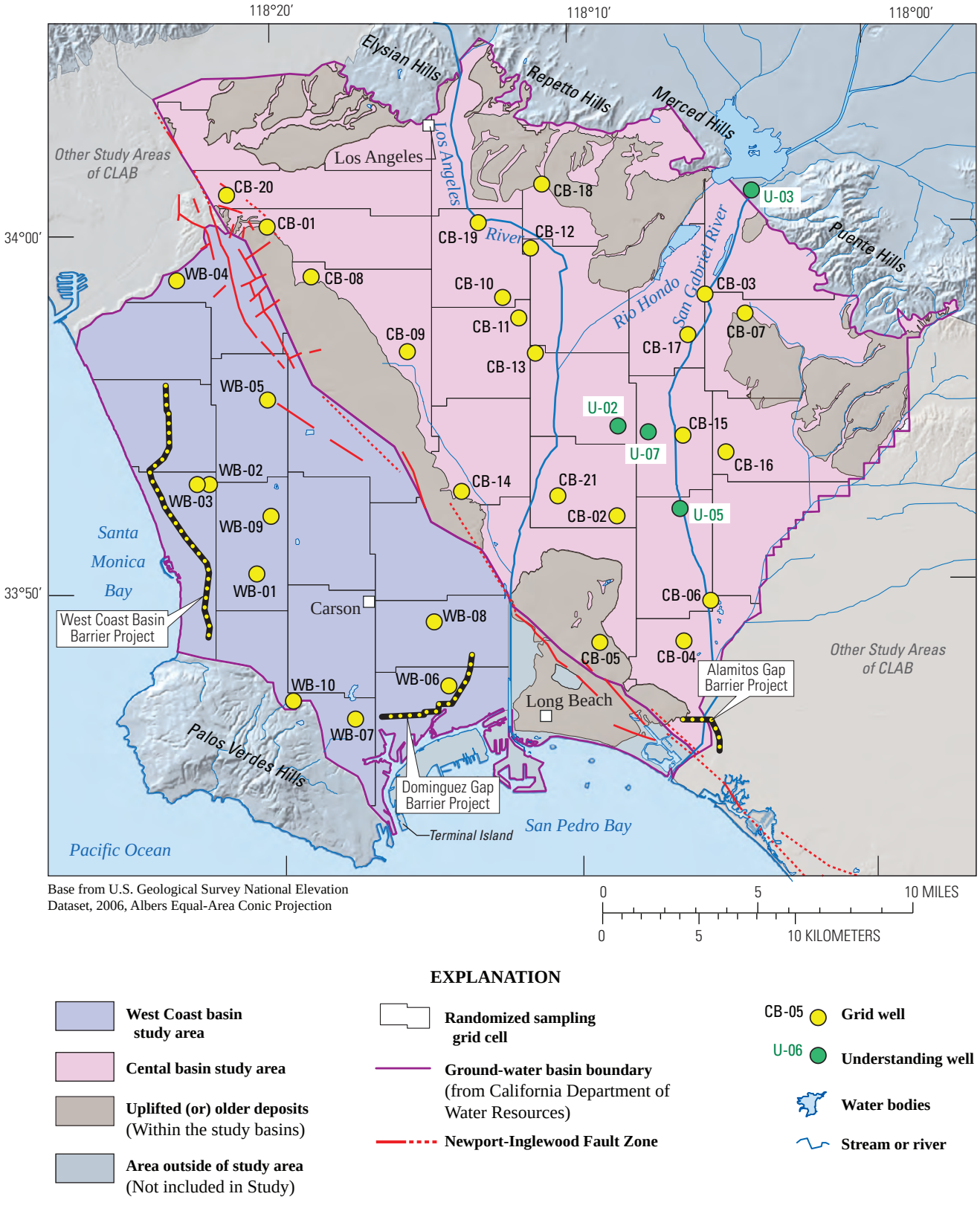

Figure 4. The West Coast Basin and Central Basin study areas, the distribution of study area grid cells, and the locations of sampled grid wells and understanding wells in the Coastal Los Angeles Basin GAMA study unit, California.

The six remaining understanding wells were located in the Santa Monica and Hollywood basins, which are small in area, and the distribution of DPH wells prevented the grid-cell network exercise; therefore, a “direct assessment”, instead of randomized grid-based method, was taken. Four wells were sampled in the Santa Monica basin and two in the Hollywood basin. These six wells were numbered in the order of sample collection, and were given the prefix “DA” (indicating “direct assessment”) (fig. 5).

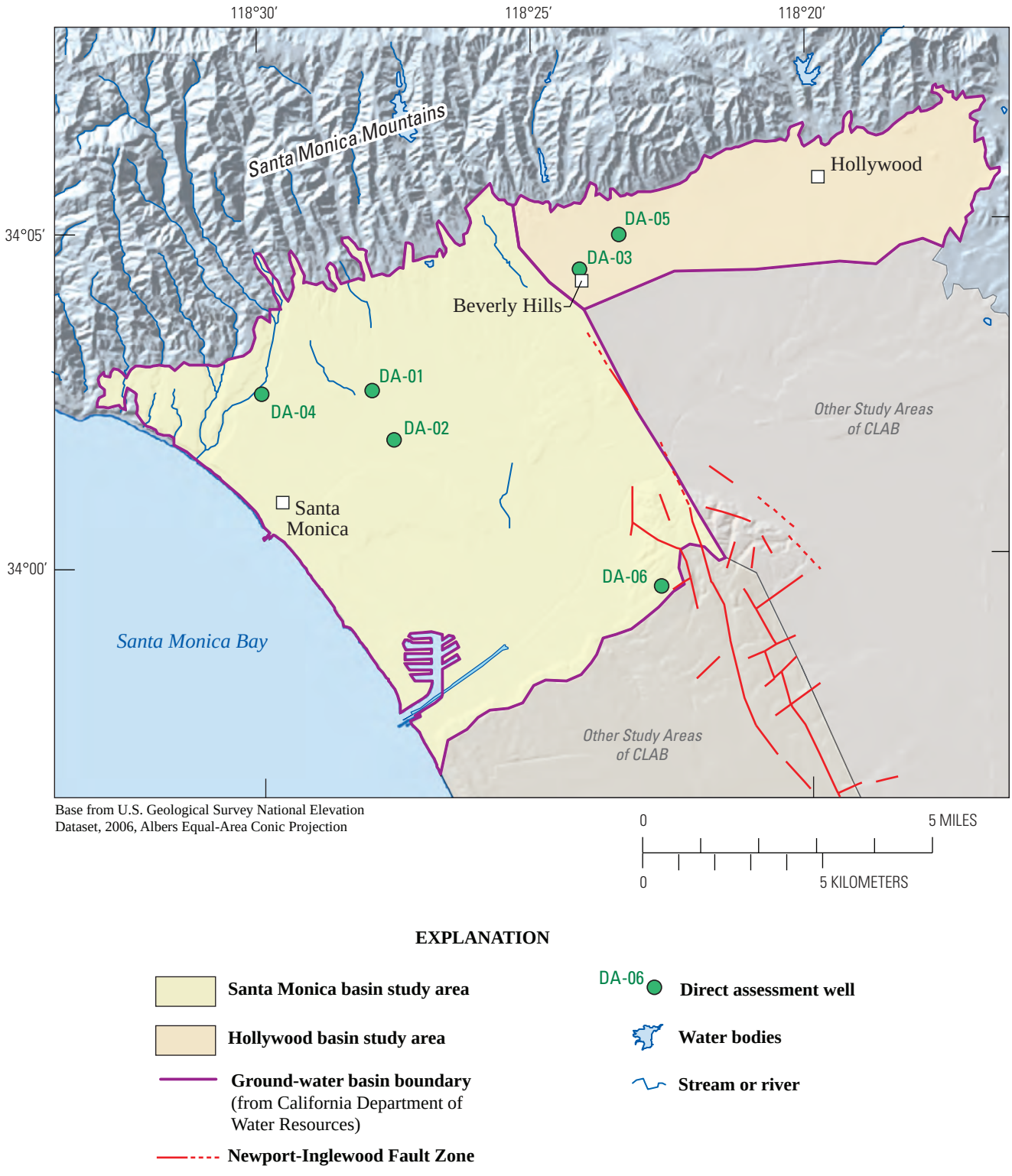

Figure 5. The Santa Monica Basin and Hollywood Basin study areas, and the locations of direct assessment wells sampled in the Coastal Los Angeles Basin GAMA study unit, California.

The fourteen non-randomized wells ("understanding" and "direct assessment") are not considered in the statistical calculations of the sampling results from the grid wells, and are classified together in this report as "understanding wells".

Table 1 provides the GAMA-id (alphanumeric identification number) for each well, along with the date sampled, sampling schedule type, elevation, and well-construction information. Sixty-nine production wells were sampled in CLAB from June to November 2006.

Well locations and identifications were verified using GPS, 1:24,000 scale USGS topographic maps, comparison with existing well information in USGS and CDPH databases, and information provided by well owners. Driller's logs for wells were obtained when available. Well information was recorded by hand on field sheets and electronically using specialized software on field laptop computers. All information was verified and then uploaded into the USGS National Water Information System (NWIS).

The wells in CLAB were sampled using a tiered analytical approach. All wells were sampled for a standard set of water-quality constituents and environmental tracers, including VOCs, pesticides and pesticide degradates, pharmaceutical compounds, potential wastewater indicators, perchlorate, hexavalent chromium, arsenic and iron speciation, tritium, stable isotopes of water, and dissolved noble gases. The standard sampling also included the field parameters: temperature, specific conductance, and dissolved oxygen. This standard set of constituents was termed the "fast" schedule (table 2). Wells on the "intermediate" schedule were sampled for all the constituents on the fast schedule, plus: polar pesticides and pesticide degradates; NDMA; 1,2,3-TCP; 1,4-dioxane; nutrients; dissolved organic carbon; major and minor ions; trace elements; stable isotopes of carbon, carbon-14 abundance; and pH. Wells on the "slow" schedule were sampled for all the constituents on the intermediate schedule, plus gross-alpha and gross-beta radiation, radium isotopes, radon-222, and microbial constituents, alkalinity, and turbidity (table 2). Fast, intermediate, and slow refer to the time required to sample the well for all the analytes on the collection schedule. Generally, one slow, two intermediate, or four fast wells could be sampled in one day. In CLAB, 50 of the ground-water wells were sampled on the fast schedule, nine were sampled on the intermediate schedule, and 10 on the slow schedule (table 1).

Sample Collection and Analysis

Samples were collected in accordance with the protocols established by the USGS National Water Quality Assessment (NAWQA) program (Koterba and others, 1995) and the USGS National Field Manual (U.S. Geological Survey, variously dated). These sampling protocols ensure that a representative sample of ground water is collected at each site, and that the samples are collected and handled in a way that minimizes the potential for contamination of samples and (or) cross contamination between samples collected at wells. The methods used for sample collection are described in the Appendix section "Sample Collection and Analysis".

Tables 3A–L list the compounds analyzed in each constituent class. Ground-water samples were analyzed for 85 VOCs (table 3A); eight gasoline oxygenates and degradates (table 3B); 122 pesticides, polar pesticides, and pesticide degradates (tables 3C, D); 69 potential wastewater indicators (table 3E); 14 pharmaceutical compounds (table 3F); four constituents of special interest (table 3G); five nutrients and dissolved organic carbon (table 3H); 10 major and minor ions and total dissolved solids (table 3I); 25 trace elements (table 3I); arsenic, iron, and chromium species (table 3J); stable isotopes of water, nine radioactive constituents, including tritium and carbon-14 (table 3K); four microbial constituents (table 3L); and six dissolved noble gases and tritium/helium age dates (table 3M). The methods used for sample analysis are described in the Appendix section "Sample Collection and Analysis".

Results for pharmaceutical compounds are not presented in this CLAB report; they will be included in a subsequent publication. In addition, as of the publishing date of this data report, the samples collected in CLAB for noble gases, tritium and helium isotope ratios had not been analyzed by LLNL, therefore, results are not presented at this time.

Data Reporting

The methods and conventions used for reporting the data are described in the Appendix. Twenty-two constituents analyzed in this study were measured by more than one method at the USGS National Water Quality Laboratory (NWQL). For these constituents, only the results from the preferred method are reported. Five constituents collected at each well—arsenic, iron, and chromium concentrations, tritium activities, and concentrations of 1,2,3-TCP—were measured at more than one laboratory; both sets of results are reported for these constituents.

Quality-Assurance

The quality-assurance methods used for this study follow the protocols of the U.S. Geological Survey National Field Manual (U.S. Geological Survey, variously dated) and the USGS NAWQA program (Koterba and others, 1995). Standard quality-control procedures were followed at the USGS NWQL (Pirkey and Glodt, 1998; Maloney, 2005). Quality-control (QC) samples collected in the CLAB study include source-solution blanks, field blanks, replicates, and matrix and surrogate spikes. QC samples were collected to evaluate bias and variability of the water-quality data that may have resulted from sample collection, processing, storage, transportation, and laboratory analysis. Quality-control procedures and quality-control sample results are described in the Appendix section "Quality-Assurance Methods".

Quality-Control Sample Results

Results of quality-control analyses (blanks, replicates, matrix spikes, and surrogates) were used to evaluate the quality of the data for the ground-water samples (see Appendix). Assessment of the quality-control information from blanks resulted in qualifying of less than 0.1 percent of the data for the ground-water samples. Data from replicates indicated that variability between measurements was acceptably low, confirming that the procedures used to collect the samples were consistent. Average matrix spike recoveries for a number of organic constituents analyzed were lower than the acceptable limits, which may indicate that these constituents might not have been detected in some samples if they were present at very low concentrations. Some surrogate recoveries were not within acceptable limits for the analyses that use surrogates, which may indicate possible problems with the processing and analysis of some samples.

The quality-control results are described in the Appendix section "Quality-Control Sample Results".

Comparison Thresholds

Concentrations of constituents detected in ground-water samples were compared with CDPH and USEPA drinking-water health-based thresholds and thresholds established for aesthetic purposes (California Department of Public Health, 2008a, 2008b; U.S. Environmental Protection Agency, 2008a, 2008b, 2008c). The chemical data presented in this report are meant to characterize the quality of the untreated ground-water resources within CLAB, and are not intended to represent the treated drinking water delivered to consumers by water purveyors. The chemical composition of treated drinking water may differ from untreated ground water because treated drinking water may be subjected to disinfection, filtration, mixing with other waters, and exposure to the atmosphere prior to its delivery to consumers. Comparisons of raw (untreated) ground water to thresholds are for illustrative purposes only, and are not indicative of compliance or non-compliance with drinking-water regulations.

The following thresholds were used for comparisons:

MCL– Maximum Contaminant Level. Legally enforceable standards that apply to public-water systems and are designed to protect public health by limiting the levels of contaminants in drinking water. National MCLs are established by the USEPA, and individual states may choose to set more stringent standards. CDPH has established MCLs for additional constituents not regulated by the USEPA, as well as lowered the threshold concentrations for a number of constituents with USEPA MCLs. In this report, a threshold set by the USEPA is labeled "MCL-US", and one set by CDPH that is different from the MCL-US is labeled "MCL-CA". CDPH is notified when constituents are detected at concentrations exceeding MCL-US or MCL-CA thresholds in samples collected for the GAMA Statewide Basin Assessment project.

AL – Action Level. Legally enforceable standards that apply to public water systems and are designed to protect public health by limiting the levels of copper and lead in drinking water. Detections of copper or lead above the action-level thresholds trigger requirements for mandatory water treatment to reduce the corrosiveness of water to water pipes. The action levels established by the USEPA and CDPH are the same, thus the thresholds are labeled "AL-US" in this report.

TT – Treatment Technique. Legally enforceable standards that apply to public-water systems and are designed to protect public health by limiting the levels of copper, lead, and microbial constituents in drinking water. TT requirements are applied when water delivered to consumers exceeds specified action levels. Detections of microbial constituents above thresholds trigger requirements for mandatory additional disinfection during water treatment. The action levels established by the USEPA and CDPH are the same, thus these thresholds are labeled "TT-US" in this report.

SMCL – Secondary Maximum Contaminant Level. Non-enforceable standards applied to constituents that affect the aesthetic qualities of drinking water, such as taste, odor, and color, or technical qualities of drinking water, such as scaling and staining. Both the USEPA and CDPH define SMCLs, but unlike MCLs, SMCLs established by CDPH are not required to be at least as stringent as those established by USEPA. SMCLs established by CDPH are used in this report (SMCL-CA) for all constituents that have SMCL-CA values. The SMCL-US is used for pH because no SMCL-CA has been defined.

NL – Notification Level. Health-based notification levels established by CDPH for some of the constituents in drinking water that lack MCLs (NL-CA). If a constituent is detected above its NL-CA, California state law requires timely notification of local governing bodies and recommends consumer notification.

HAL-US – Lifetime Health Advisory Level. The concentration of a constituent in drinking water at which, or below, its presence is not expected to cause any adverse carcinogenic effects for a lifetime of exposure. HALs are established by the USEPA (HAL-US) and are calculated assuming consumption of 2 liters (2.1 quarts) of water per day over a 70-year lifetime by a 70-kilogram (154-pound) adult and that 20 percent of that person's exposure comes from drinking water.

RSD5 – Risk-Specific Dose. The concentration of a constituent in drinking water corresponding to an excess estimated lifetime cancer risk of 1 in 100,000. RSD5 is an acronym for risk-specific dose at 10^{-5}. RSD5s are calculated by dividing the 10^{-4} cancer risk concentration established by the USEPA by 10 (RSD5-US).

For constituents with MCLs, detections in ground-water samples were compared to the MCL-US or MCL-CA, whichever is lower. Constituents with SMCLs were compared with the SMCL-CA. For chloride, sulfate, specific conductance, and total dissolved solids, CDPH defines a "recommended" and an "upper" SMCL-CA; detections of these constituents in ground-water samples were compared with both levels. Detected concentrations of constituents that lack MCLs and SMCLs were compared to NL-CAs. For constituents that lack an MCL, SMCL, or NL-CA, detected concentrations were compared with the HAL-US. For constituents that lack an MCL, SMCL, NL-CA, or HAL-US, detected concentrations were compared with the RSD5-US. Note that this hierarchy of selection of comparison thresholds means that for constituents that have multiple types of established thresholds, the threshold used for comparison purposes may not be the one with the lowest concentration. The comparison thresholds used in this report are listed in table 3A–M for all constituents, and in tables 4-16 for constituents detected in ground-water samples from CLAB. Not all constituents analyzed for this study have established thresholds available. Detections of constituents at concentrations greater than the selected comparison threshold are marked with asterisk in tables 4–16.

Ground-Water-Quality Data

Results from analyses of raw (untreated) ground-water samples from CLAB are presented in tables 4–16. Ground-water samples collected in CLAB were analyzed for over 340 constituents, and 204 of those constituents were not detected in any of the samples (tables 3A–M). For organic constituents, the summary tables present only the constituents that were detected, and list only samples that had at least one compound detected. For constituent classes that were analyzed at all of the grid wells, the tables include, the summary statistics for the 55 CLAB grid wells, and for each study area, the number of wells at which each analyte was detected, the frequency at which it was detected (in relation to the number of grid wells), and the total number of constituents detected at each well. For inorganic, radioactive, and microbial constituents, the summary tables include all wells, constituents, and samples analyzed. Results from the understanding wells are presented in the tables, but these results were excluded from the detection frequency calculations to avoid statistical over-representation of grid cells that included understanding wells in addition to their grid wells.

Table 4 includes water-quality indicators measured in the field and at the NWQL, and tables 5 through 16 present the results of ground-water analyses organized by compound classes:

- Organic constituents
  - VOCs and gasoline oxygenates (table 5)
  - Pesticides and pesticide degradates (table 6)
  - Polar pesticides and degradates (table 7)
  - Potential wastewater indicators (table 8)
- Constituents of special interest (table 9)
- Inorganic constituents
  - Nutrients and dissolved organic carbon (table 10)
  - Major and minor ions (table 11)
  - Trace elements (table 12)
  - Arsenic, iron, and chromium speciation (table 13)
- Inorganic tracer constituents
  - Stable isotopes and carbon-14 activities (table 14)
- Radioactive constituents (table 15)
- Microbial indicators (table 16)

Field Parameters

Field measurements of turbidity, water temperature, dissolved oxygen, pH, specific conductance, temperature, and alkalinity are presented in table 4. Laboratory measurements of pH, specific conductance, and alkalinity also were performed for some samples by the USGS NWQL (table 4). Dissolved oxygen and alkalinity are used as indicators of natural processes that control water chemistry. Specific conductance is a measure of the unit electrical conductivity of the water and is proportional to the amount of dissolved salts in the water. The pH value indicates the acidity or basicity of the water. Thirty-six percent of CLAB's grid wells had field specific conductance values above the recommended SMCL-CA, although only one grid well, a saltwater desalination well (WB-01), was above the upper threshold of 1,600 µS/cm. One understanding well had a field specific conductance value above the SMCL-CA upper threshold of 1,600 µS/cm. Two of CLAB's grid wells had field pH values outside of the SMCL-US range for pH.

Organic Constituents

Volatile organic compounds (VOCs) are present in paints, solvents, fuels, fuel additives, refrigerants, fumigants, and disinfected water and are characterized by their tendency to evaporate. VOCs generally persist longer in ground water than in surface water because ground water is isolated from

the atmosphere. Twenty-eight of the 88 VOCs analyzed were detected in CLAB. All detections of VOCs in samples from the CLAB grid wells were below health-based thresholds, with the exception of one detection of carbon tetrachloride above the MCL-CA. Approximately three-quarters of the grid wells sampled had at least one detection of a VOC or gasoline oxygenate or degradate (table 5). Seven of the 88 VOCs sampled were detected in more than 10 percent of the grid wells: chloroform (trichloromethane); trichloroethene (TCE); perchloroethene (PCE); bromodichloromethane, *cis*-1,2-dichloroethene, 1,1-dichloroethene (1,1-DCE); and methyl *tert*-butyl ether (MTBE). For the understanding wells sampled in CLAB, there were two detections of trichloroethene (TCE) and one detection of perchloroethene (PCE) above health-based standards. VOCs were detected in 10 of the 14 understanding wells.

Pesticides include herbicides, insecticides, and fungicides, and are used to control weeds, insects, fungi, and other pests in agricultural, urban, and suburban settings. Sixty-three pesticides and pesticide degradates were analyzed in the CLAB study. All detections of pesticides and pesticide degradates were below health-based thresholds. Approximately 42 percent of the grid wells sampled had at least one detection of a pesticide or pesticide degradate (table 6). Six pesticides were detected in more than 10 percent of the grid wells: deethylatrazine (a degradate of atrazine), atrazine, simazine, 3,4-dichloroaniline, prometon, and tebuthiuron. The first three pesticides listed are among the most commonly detected pesticide compounds in ground water nationally (Gilliom and others, 2006). Pesticides and pesticide degradates were detected in five of the 14 understanding wells.

In addition, ground-water samples for 60 polar pesticides and pesticide degradates, were collected at the intermediate and slow wells. Of the 60 polar pesticides and pesticide degradates analyzed, five were detected (table 7). These detections occurred in two grid and three understanding wells. All detections of polar pesticides and pesticide degradates were below health-based thresholds.

Potential wastewater indicators include; detergents, fragrances, flame retardants, and other man-made compounds, and may originate from sources other than treated wastewater. Approximately 44 percent of the grid wells sampled had at least one detection of a potential wastewater indicator, and all of the detections were below health-based thresholds for the constituents that have health-based thresholds (table 8). One potential wastewater indicator (camphor) was detected in more than 10 percent of the grid wells. Potential wastewater indicators were detected in five of the 14 understanding well Results for pharmaceutical compounds are not presented in the CLAB report; they will be included in a subsequent publication.

Constituents of Special Interest

Perchlorate, 1,2,3-TCP, 1,4-dioxane, and NDMA are constituents of special interest in California because they recently have been found to be widely distributed in or are considered to have the potential to reach, water supplies (California Department of Public Health, 2007b). Perchlorate was sampled for at all 69 wells and was detected in samples at 40 percent of the grid wells; however, all concentrations measured were below the MCL-CA of 6 µg/L (table 9). 1,2,3-TCP, 1,4-dioxane, and NDMA were analyzed for at 17 of the 19 intermediate and slow wells in CLAB. 1,2,3-TCP was not detected in any of the 17 wells for which it was analyzed in the CLAB study unit. One grid well and two understanding wells had detections of 1,4-dioxane. In one of these understanding wells (DA-2), the detection was at a concentration greater than the NL-CA of 3 µg/L. NDMA was detected in one understanding well, at a level below the NL-CA.

Inorganic Constituents

Unlike the organic constituents and the constituents of special interest, most of the inorganic constituents are naturally present in ground water, although their concentrations may be influenced by human activities. Inorganic constituents were sampled for at only the intermediate and slow wells in CLAB (19 of 69 wells). However, arsenic, iron, and chromium speciation samples were collected at all 69 wells.

Nutrients (nitrogen and phosphorus) and dissolved organic carbon present in ground water can affect biological activity in aquifers and in surface-water bodies that receive ground-water discharge. Nitrogen may be present in the form of ammonia, nitrite, or nitrate, depending on the oxidation-reduction state of the ground water. High concentrations of nitrate adversely can affect human health, particularly the health of infants. All concentrations of nitrate, nitrite, and ammonia measured in samples from CLAB wells were below health-based thresholds (table 10).

The major-ion composition, total dissolved solids (TDS) content, and levels of certain trace elements in ground water affect the aesthetic properties of water, such as taste, color, and odor, and the technical properties, such as scaling and staining. Although there are no adverse health effects associated with these properties, they may reduce consumer satisfaction with the water or may have economic impacts. CDPH has established non-enforceable thresholds (SMCL-CAs) that are based on aesthetic or technical properties rather than health-based concerns for the major ions chloride and sulfate, TDS, and several trace elements.

The concentrations of chloride and sulfate measured in samples from the CLAB wells were below the recommended SMCL-CAs (table 11), with the exception of two understanding wells. Fourteen out of the 19 CLAB wells (four grid and 10 understanding), had TDS concentrations above the recommended SMCL-CA, but only one of these samples (an understanding well) was above the upper SMCL-CA of 1,000 mg/L.

Eighteen of the 25 trace elements analyzed in this study have health-based thresholds. Trace element concentrations in samples from CLAB wells were below health-based thresholds, with the exception of two understanding wells that had boron detections at concentrations above the NL-CA of 1,000 µg/L (table 12).

Iron and manganese are trace elements of which concentrations are affected by the oxidation-reduction state of the ground water. Precipitation of minerals containing iron or manganese may cause orange or black staining of surfaces. Five of 19 wells, including two grid wells, had concentrations of manganese above the SMCL-CA of 50 µg/L (table 12). Concentrations of iron typically were below 6 µg/L, however two wells (one grid and one understanding) had concentrations above the SMCL-CA of 300 µg/L. The results were slightly different for iron measured by the speciation method (see below).

Arsenic, iron, and chromium occur in different species, depending on the oxidation-reduction state of the ground water. The oxidized and reduced species have different solubilities in ground water and may have different effects on human health. The relative proportions of the oxidized and reduced species of each element can be used to aid in interpretation of the oxidation-reduction state of the aquifer. Arsenic, iron, and chromium speciation samples for analysis at the USGS Trace Metal Laboratory were collected from all 69 wells in the CLAB study unit. Concentrations of total arsenic, iron, and chromium, and the concentrations of the oxidized or the reduced species of each element are reported on table 13. The concentrations of the other species can be calculated by difference. Four of CLAB's 55 grid wells and two of 14 understanding wells had concentrations of total iron above the SMCL-CA of 300 µg/L. In addition, one grid and one understanding well had total arsenic concentrations above the health-based threshold, the MCL-US of 300 µg/L. None of the 69 wells had chromium detections at levels above the MCL-CA of 50 µg/L. Concentrations of total arsenic, iron, and chromium analyzed at the USGS Trace Metal Laboratory (table 13) generally were similar to those from the USGS NWQL (table 12); minor differences could be due to the different analytical methods (Appendix); concentrations reported on table 12 are considered to be more accurate.

Inorganic Tracer Constituents

Stable isotope ratios, tritium and carbon-14 activities, and noble-gas concentrations can be used as tracers of natural and human processes affecting ground-water composition. Hydrogen and oxygen stable-isotope ratios of water (table 14) can be used to aid in interpretation of ground-water recharge sources. The stable-isotope ratios of water depend on the altitude, latitude, and temperature of precipitation and on the extent of evaporation of surface water or soil water. Noble-gas concentrations can be used to aid in interpretation of ground-water recharge sources because the concentrations of the different noble gases depend on water temperature. Noble-gas concentrations also are used as an aid in interpreting the age of ground water.

As of the publishing date of this data report, the samples collected in CLAB for noble gases, tritium and helium isotope ratios had not been analyzed by LLNL, therefore results are not presented at this time.

Tritium activities, carbon-14 activities (table 14), and helium isotope ratios provide information about the age of the ground water. Tritium is a radioactive isotope of hydrogen that is incorporated into the water molecule. Low levels of tritium are continuously produced by cosmic ray bombardment of water in the atmosphere, and a large amount of tritium was produced by atmospheric testing of nuclear weapons between 1952 and 1963. Thus, concentrations of tritium above background generally indicate the presence of water that has been recharged since the early 1950's (Izbicki, 1996). Helium isotope ratios can be used in conjunction with tritium concentrations to estimate more exact ages for young ground water. Carbon-14 (table 14) is a radioactive isotope of carbon that is incorporated into dissolved carbonate species in water. Low levels of carbon-14 are produced continuously by cosmic ray bombardment of nitrogen in the atmosphere. Because carbon-14 decays with a half-life of approximately 5,700 years, low activities of carbon-14, relative to modern values, generally indicate the presence of ground water that is several thousand years old (Kalin, 2000).

Of the aforementioned tracers, the only one with a health-based threshold is tritium. A single tritium sample in CLAB was collected for analysis at the USGS Stable Isotope and Tritium Laboratory, in Menlo Park, California, and the measured tritium activity in this sample was well below the MCL-CA (table 14).

Radioactive Constituents

Radioactivity is the release of energy or energetic particles during changes in the structure of the nucleus of an atom. Most of the radioactivity in ground water comes from

decay of naturally occurring isotopes of uranium and thorium that are present in minerals in the sediments or fractured rocks of an aquifer. Both uranium and thorium decay in a series of steps, eventually forming stable isotopes of lead. Radium-226, radium-228, and radon-222 are radioactive isotopes formed during the uranium and thorium decay series. In each step in the decay series, one radioactive element turns into a different radioactive element by emitting an alpha or a beta particle from its nucleus. For example, radium-226 emits an alpha particle and, therefore, turns into radon-222. Radium-228 decays to form actinium-228 by emission of a beta particle. The alpha and beta particles emitted during radioactive decay are hazardous to human health because these energetic particles may damage cells. Radiation damage to cell DNA may increase the risk of getting cancer.

Activity often is used instead of *concentration* for reporting the relative presence of radioactive constituents. Activity of radioactive constituents in ground water is measured in units of picocuries per liter (pCi/L), and one picocurie is approximately equal to two atoms decaying per minute. The number of atoms decaying is equal to the number of alpha or beta particles emitted.

Ten CLAB samples on the slow schedule were analyzed for radioactive constituents and had activities of radium, gross-alpha radioactivity (72-hour and 30-day counts), and gross-beta radioactivity (72-hour and 30-day counts) that were much less than established health-based standards (table 15). Samples for activities of radon-222 were collected at nine of the slow wells and six of those were above the proposed MCL-US of 300 pCi/L; however, none of the samples had an activity above the proposed alternative MCL-US of 4,000 pCi/L. The alternative MCL-US will apply if the State or local water agency has an approved multimedia mitigation program to address radon in indoor air (U.S. Environmental Protection Agency, 1999).

Microbial Indicators

Water is disinfected during drinking-water treatment to prevent diseases that may be spread by water-borne microbial constituents derived from human or animal wastes. The specific viruses and bacteria responsible for diseases generally are not measured because routine analytical methods are not available. Measurements are made of more easily analyzed microbial constituents that serve as indicators of the presence of human or animal waste in water. Drinking-water purveyors respond to detections of microbial indicators by applying additional disinfection techniques to the water.

Samples from ten CLAB slow wells were analyzed for microbial indicators. None of the samples contained the viral indicators F-specific and somatic coliphage, and none contained the bacterial indicator *Escherichia coli* (*E. coli*); however, there was one low-level detection of a bacterial indicator (total coliforms) in an understanding well (table 16). The threshold for total coliforms is based on recurring detections in treated drinking water; thus, the detection reported here does not constitute an exceedance of the MCL-US. Total coliforms will be monitored during future sampling.

Future Work

Subsequent reports will be focused on assessment of the data presented in this report using a variety of statistical, qualitative, and quantitative approaches to evaluate the natural and human factors affecting ground-water quality. Water-quality data contained in the CDPH and USGS NWIS databases, and water-quality data available from other State and local water agencies will be compiled, evaluated, and used in combination with the data that is presented in this report; the results of these future efforts will appear in one or more subsequent reports.

Summary

Ground-water quality in the approximately 860 square-mile Coastal Los Angeles Basin study unit (CLAB) was investigated from June to November of 2006 as part of the Priority Basin project of Ground-Water Ambient Monitoring and Assessment (GAMA) Program. The California State Water Resources Control Board (SWRCB), in collaboration with the U.S. Geological Survey (USGS) and the Lawrence Livermore National Laboratory, is implementing the GAMA Program (http://www.waterboards.ca.gov/gama/). The Priority Basin project was designed by the SWRCB and the USGS in response to the Ground-Water Quality Monitoring Act of 2001 (Belitz and others, 2003; State Water Resources Control Board, 2003). The project is a comprehensive assessment of statewide ground-water quality designed to identify and characterize risks to ground-water resources, and to increase the availability of information about ground-water quality to the public. CLAB was the thirteenth study unit sampled as part of the project.

CLAB is in the Southern Coastal Plain area of the Transverse Ranges and Selected Peninsular Ranges hydrogeologic province and includes within it five ground-water basins, as defined by the California Department of Water Resources (California Department of Water Resources, 2003). A total of 69 wells were sampled in Los Angeles

and Orange Counties. Fifty-five of the wells were selected using a randomized grid approach to achieve a statistically unbiased representation of ground-water used for public drinking-water supplies. Fourteen of the wells were selected to provide additional sampling density to aid in understanding processes affecting ground-water quality. Ground-water samples were analyzed for VOCs, pesticides, polar pesticides, and pesticide degradates, potential wastewater-indicators, pharmaceutical compounds, compounds of special interest [perchlorate, *N*-nitrosodimethylamine (NDMA), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP)], nutrients, major and minor ions, trace elements, radioactive constituents [gross-alpha and gross-beta radiation, radium isotopes, and radon-222], and microbial indicators. Naturally occurring isotopes [stable isotopic ratios of hydrogen and oxygen, and activities of tritium and carbon-14] and dissolved noble gases also were measured to provide data that will be used to help interpret the sources and ages of the sampled ground water. This report describes the hydrogeologic setting of the CLAB region, the sampling, analytical, and quality-assurance methods used in the study, and the results of the chemical and microbial analyses of the ground-water samples collected June through November of 2006.

Quality-control samples (blanks, replicates, and samples for matrix spikes) were collected at over 20 percent of the wells, and the results for these samples were used to evaluate the quality of the data for the ground-water samples. Field blanks rarely contained detectable concentrations of any constituent, suggesting that contamination was not a significant source of bias. Differences between replicate samples were within acceptable ranges, indicating acceptably low variability. Matrix spike recoveries were within acceptable ranges for most compounds. Assessment of the quality-control information resulted in applying “V” codes to approximately 0.1 percent of the data collected for ground-water samples (meaning a constituent was detected in blanks as well as the corresponding environmental data).

This study did not attempt to evaluate the quality of water delivered to consumers; after withdrawal from the ground, water typically is treated, disinfected, and blended with other waters to maintain acceptable water quality. Regulatory thresholds do not apply to raw ground water, but do apply to treated water that is served to the consumer. However, to provide some context for the results, concentrations of constituents measured in the raw ground water were compared with regulatory and non-regulatory health-based thresholds established by the U.S. Environmental Protection Agency (USEPA) and California Department of Public Health (CDPH, formerly the California Department of Health Services).

In this study, only six constituents were detected at concentrations higher than health-based thresholds [arsenic, boron, trichloroethene (TCE), perchloroethene (PCE), tetrachloromethane (carbon tetrachloride), and radon-222 (detected above the proposed MCL-US threshold, but not the proposed alternative MCL-US threshold)]. Seven additional constituents (pH, specific conductance, chloride, sulfate, total dissolved solids, manganese, and iron) were detected at concentrations above thresholds set for aesthetic concerns.

Subsequent reports will present analyses of the data presented in this report, using a variety of statistical, qualitative, and quantitative approaches to assess the natural and human factors affecting ground-water quality.

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Table 1. Identification, sampling and construction information for wells sampled for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study, California, June to November 2006.

[CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; All wells in CLAB are public supply wells, with the exception of one desalination well denoted below with an asterisk. **Abbreviations**: ft, foot; LSD, land surface datum; na, not available]

Sampling information			Construction information			
GAMA identification No.	Date (mm/dd/yyyy)	Sampling schedule	Elevation of LSD (ft above NAVD88)	Well depth (ft below LSD)	Top perforation (ft below LSD)	Bottom perforation (ft below LSD)
CLAB Grid Wells						
Central Basin Wells						
CB-01	08/09/2006	Fast	128	456	200	456
CB-02	08/15/2006	Intermediate	65	674	602	644
CB-03	08/16/2006	Slow	157	520	242	446
CB-04	08/17/2006	Slow	19	838	507	838
CB-05	08/21/2006	Fast	40	910	300	898
CB-06	08/21/2006	Fast	22	1,680	605	1,640
CB-07	08/21/2006	Fast	152	900	200	900
CB-08	08/22/2006	Fast	138	1,096	420	1,076
CB-09	08/22/2006	Fast	119	1,428	408	1,400
CB-10	08/22/2006	Fast	142	1,500	500	1,500
CB-11	08/22/2006	Fast	126	1,504	500	1,504
CB-12	08/29/2006	Fast	157	1,182	475	1,094
CB-13	08/29/2006	Fast	108	746	610	746
CB-14	08/29/2006	Fast	71	501	451	501
CB-15	08/30/2006	Fast	87	688	626	688
CB-16	08/30/2006	Fast	88	736	684	718
CB-17	09/14/2006	Intermediate	140	627	277	584
CB-18	11/15/2006	Fast	221	400	na	na
CB-19	11/15/2006	Fast	198	1,010	617	973
CB-20	11/15/2006	Fast	108	502	331	338
CB-21	11/16/2006	Fast	59	660	640	660
Orange County Coastal Plain Wells						
OC-01	06/05/2006	Intermediate	202	1,300	399	1,270
OC-02	06/07/2006	Slow	180	1,550	599	1,530
OC-03	08/23/2006	Fast	147	450	309	425
OC-04	08/23/2006	Fast	112	1,420	482	1,375
OC-05	08/23/2006	Fast	99	1,240	505	1,220
OC-06	08/23/2006	Fast	67	1,300	540	1,280
OC-07	08/24/2006	Fast	68	972	390	940
OC-08	08/24/2006	Fast	125	1,310	570	1,290
OC-09	08/24/2006	Fast	80	1,152	330	1,140
OC-10	08/24/2006	Fast	144	1,180	560	1,160
OC-11	08/28/2006	Fast	34	600	305	580
OC-12	08/28/2006	Fast	32	1,060	310	1,025
OC-13	08/28/2006	Fast	252	420	90	406
OC-14	08/31/2006	Fast	24	880	374	860
OC-15	08/31/2006	Fast	42	1,135	345	1,125
OC-16	08/31/2006	Fast	30	366	201	356
OC-17	08/31/2006	Fast	236	1,230	530	1,210
OC-18	09/11/2006	Fast	6	486	342	486
OC-19	09/11/2006	Fast	27	306	265	291
OC-20	09/13/2006	Intermediate	383	98	60	84
OC-21	09/14/2006	Fast	92	998	397	995
OC-22	11/13/2006	Fast	34	260	na	na
OC-23	11/13/2006	Fast	242	970	460	950
OC-24	11/16/2006	Fast	316	604	256	584

Table 1. Identification, sampling and construction information for wells sampled for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study, California, June to November 2006.—Continued

[CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; All wells in CLAB are public supply wells, with the exception of one desalination well denoted below with an asterisk. **Abbreviations**: ft, foot; LSD, land surface datum; na, not available]

Sampling information			Construction information			
GAMA identification No.	**Date (mm/dd/yyyy)**	**Sampling schedule**	**Elevation of LSD (ft above NAVD88)**	**Well depth (ft below LSD)**	**Top perforation (ft below LSD)**	**Bottom perforation (ft below LSD)**
West Coast Basin Wells						
WB-01*	08/29/2006	Fast	111	445	310	425
WB-02	08/30/2006	Fast	78	490	210	420
WB-03	08/30/2006	Fast	91	445	215	425
WB-04	09/12/2006	Intermediate	76	620	200	600
WB-05	09/12/2006	Fast	53	800	340	730
WB-06	11/13/2006	Fast	35	930	480	910
WB-07	11/14/2006	Fast	83	822	630	800
WB-08	11/14/2006	Fast	26	780	450	750
WB-09	11/14/2006	Fast	63	810	200	786
WB-10	11/16/2006	Fast	174	600	300	600
CLAB Understanding Wells						
Direct Assessment Wells						
DA-01[1]	08/07/2006 & 08/10/2006	Slow	243	250	120	220
DA-02	08/08/2006	Slow	157	550	210	530
DA-03	08/09/2006	Slow	268	665	360	630
DA-04	08/10/2006	Slow	313	282	151	250
DA-05	11/14/2006	Slow	235	740	398	730
DA-06	11/15/2006	Slow	234	440	260	430
Understanding Wells						
U-01	06/06/2006	Intermediate	58	844	312	844
U-02	08/14/2006	Slow	92	572	546	572
U-03	09/13/2006	Intermediate	202	414	183	386
U-04	11/13/2006	Fast	60	540	497	540
U-05	11/15/2006	Fast	67	222	212	220
U-06	11/16/2006	Intermediate	494	300	62	300
U-07	11/16/2006	Intermediate	91	na	na	na
U-08	11/16/2006	Fast	55	120	na	na

[1] Well sampled twice because of SC4433 (potential wastewater indicators) sample bottle breakage.

Table 2. Classes of chemical and microbial constituents and water-quality indicators collected for the slow, intermediate, and fast well sampling schedules in the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study, California, June to November 2006.

Analyte classes	Analyte list table	Schedule		
		Slow	Intermediate	Fast
Water-quality indicators				
Dissolved oxygen, temperature, specific conductance		X	X	X
pH		X	X	
Turbidity, alkalinity		X		
Organic constituents				
Volatile organic compounds	3A	X	X	X
Gasoline additives and oxygenates	3B	X	X	
Pesticides and pesticide degradates	3C	X	X	X
Polar pesticides and pesticide degradates	3D	X	X	
Pharmaceutical compounds[1]	3E	X	X	X
Potential wastewater indicator compounds	3F	X	X	X
Constituents of special interest				
Perchlorate	3G	X	X	X
1,4-Dioxane	3G	X	X	
N-Nitrosodimethylamine (NDMA)	3G	X	X	
1,2,3-Trichloropropane	3G	X	X	
Inorganic constituents				
Nutrients and dissolved organic carbon	3H	X	X	
Major and minor ions and trace elements	3I	X	X	
Chromium abundance and speciation	3J	X	X	X
Arsenic and iron abundances and speciation	3J	X	X	X
Stable isotopes				
Stable isotopes of hydrogen and oxygen in water	3K	X	X	X
Stable isotopes of carbon and carbon-14 abundance	3K	X	X	
Radioactivity and noble gases				
Gross alpha and beta radioactivity	3K	X		
Radium isotopes	3K	X		
Radon-222	3K	X		
Tritium and noble gases[2]	–	X	X	X
Microbial constituents				
Microbial constituents	3L	X		

[1] Results for pharmaceutical compounds are not presented in the CLAB report; they will be included in a subsequent publication.

[2] As of the publishing date of this report, the samples collected in CLAB for noble gases, tritium, and helium isotope ratios had not been analyzed by LLNL, therefore results are not presented at this time.

Table 3A. Volatile organic compounds, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2020.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 5). **Abbreviations:** LRL, laboratory reporting level; THM, trihalomethane; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acetone	Solvent	81552	67-64-1	6	na	na	–
Acrylonitrile	Organic synthesis	34215	107-13-1	0.4	RSD5-US	0.6	–
tert-Amyl methyl ether (TAME)	Gasoline oxygenate	50005	994-05-8	0.04	na	na	–
Benzene	Gasoline hydrocarbon	34030	71-43-2	0.016	MCL-CA	1	D
Bromobenzene	Solvent	81555	108-86-1	0.02	na	na	–
Bromochloromethane	Fire retardant	77297	74-97-5	0.06	HAL-US	90	–
Bromodichloromethane	Disinfection by-product (THM)	32101	75-27-4	0.04	MCL-US	[1] 80	D
Bromoform (Tribromomethane)	Disinfection by-product (THM)	32104	75-25-2	0.08	MCL-US	[1] 80	D
Bromomethane (Methyl bromide)	Fumigant	34413	74-83-9	0.4	HAL-US	10	–
n-Butylbenzene	Gasoline hydrocarbon	77342	104-51-8	0.14	NL-CA	260	–
sec-Butylbenzene	Gasoline hydrocarbon	77350	135-98-8	0.04	NL-CA	260	–
tert-Butylbenzene	Gasoline hydrocarbon	77353	98-06-6	0.08	NL-CA	260	–
Carbon disulfide	Organic synthesis	77041	75-15-0	0.06	NL-CA	160	D
Carbon tetrachloride (Tetrachloromethane)	Solvent	32102	56-23-5	0.08	MCL-CA	0.5	D
Chlorobenzene	Solvent	34301	108-90-7	0.02	MCL-CA	70	–
Chloroethane	Solvent	34311	75-00-3	0.10	na	na	–
Chloroform (Trichloromethane)	Disinfection by-product (THM)	32106	67-66-3	0.04	MCL-US	[1] 80	D
Chloromethane	Solvent	34418	74-87-3	0.10	HAL-US	30	–
3-Chloropropene	Organic synthesis	78109	107-05-1	0.08	na	na	–
2-Chlorotoluene	Solvent	77275	95-49-8	0.04	NL-CA	140	–
4-Chlorotoluene	Solvent	77277	106-43-4	0.04	NL-CA	140	–
Dibromochloromethane	Disinfection by-product (THM)	32105	124-48-1	0.12	MCL-US	[1] 80	–
1,2-Dibromo-3-chloropropane (DBCP)	Fumigant	82625	96-12-8	0.5	MCL-US	0.2	–
1,2-Dibromoethane (EDB)	Fumigant	77651	106-93-4	0.04	MCL-US	0.05	–
Dibromomethane	Solvent	30217	74-95-3	0.04	na	na	–
1,2-Dichlorobenzene	Solvent	34536	95-50-1	0.04	MCL-CA	600	–
1,3-Dichlorobenzene	Solvent	34566	541-73-1	0.04	HAL-US	600	–
1,4-Dichlorobenzene	Fumigant	34571	106-46-7	0.04	MCL-CA	5	–
trans-1,4-Dichloro-2-butene	Organic synthesis	73547	110-57-6	0.6	na	na	–
Dichlorodifluoromethane (CFC-12)	Refrigerant	34668	75-71-8	0.14	NL-CA	1,000	D
1,1-Dichloroethane (1,1-DCA)	Solvent	34496	75-34-3	0.06	MCL-CA	5	D
1,2-Dichloroethane (1,2-DCA)	Solvent	32103	107-06-2	0.10	MCL-CA	5	D
1,1-Dichloroethene (1,1-DCE)	Organic synthesis	34501	75-35-4	0.04	MCL-CA	7	D
cis-1,2-Dichloroethene (*cis*-1,2-DCE)	Solvent	77093	156-59-2	0.02	MCL-CA	6	D
trans-1,2-Dichloroethene (*trans*-1,2-DCE)	Solvent	34546	156-60-5	0.018	MCL-CA	10	D
1,2-Dichloropropane	Fumigant	34541	78-87-5	0.02	MCL-US	5	–

Table 3A. Volatile organic compounds, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2020.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 5). **Abbreviations:** LRL, laboratory reporting level; THM, trihalomethane; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
1,3-Dichloropropane	Fumigant	77173	142-28-9	0.06	na	na	–
2,2-Dichloropropane	Fumigant	77170	594-20-7	0.06	na	na	–
1,1-Dichloropropene	Organic synthesis	77168	563-58-6	0.04	na	na	–
cis-1,3-Dichloropropene	Fumigant	34704	10061-01-5	0.06	RSD5-US	[2] 4	–
trans-1,3-Dichloropropene	Fumigant	34699	10061-02-6	0.10	RSD5-US	[2] 4	–
Diethyl ether	Solvent	81576	60-29-7	0.08	na	na	–
Diisopropyl ether (DIPE)	Gasoline oxygenate	81577	108-20-3	0.06	na	na	D
Ethylbenzene	Gasoline hydrocarbon	34371	100-41-4	0.02	MCL-CA	300	D
Ethyl *tert*-butyl ether (ETBE)	Gasoline oxygenate	50004	637-92-3	0.04	na	na	–
Ethyl methacrylate	Organic synthesis	73570	97-63-2	0.14	na	na	–
o-Ethyl toluene (1-Ethyl-2-methyl benzene)	Gasoline hydrocarbon	77220	611-14-3	0.04	na	na	–
Hexachlorobutadiene	Organic synthesis	39702	87-68-3	0.10	RSD5-US	9	–
Hexachloroethane	Solvent	34396	67-72-1	0.14	HAL-US	1	–
2-Hexanone (*n*-Butyl methyl ketone)	Solvent	77103	591-78-6	0.4	na	na	–
Iodomethane (Methyl iodide)	Organic synthesis	77424	74-88-4	0.4	na	na	–
Isopropylbenzene	Gasoline hydrocarbon	77223	98-82-8	0.04	NL-CA	770	–
4-Isopropyl-1-methyl benzene	Gasoline hydrocarbon	77356	99-87-6	0.08	na	na	–
Methyl acrylate	Organic synthesis	49991	96-33-3	0.4	na	na	–
Methyl acrylonitrile	Organic synthesis	81593	126-98-7	0.40	na	na	–
Methyl *tert*-butyl ether (MTBE)	Gasoline oxygenate	78032	1634-04-4	0.10	MCL-CA	13	D
Methyl *iso*-butyl ketone (MIBK)	Solvent	78133	108-10-1	0.2	NL-CA	120	–
Methylene chloride (Dichloromethane)	Solvent	34423	75-09-2	0.04	MCL-US	5	–
Methyl ethyl ketone (2-butanone, MEK)	Solvent	81595	78-93-3	1.6	HAL-US	4,000	–
Methyl methacrylate	Organic synthesis	81597	80-62-6	0.20	na	na	–
Naphthalene	Gasoline hydrocarbon	34696	91-20-3	0.4	HAL-US	100	D
n-Propylbenzene	Solvent	77224	103-65-1	0.04	NL-CA	260	–
Styrene	Gasoline hydrocarbon	77128	100-42-5	0.04	MCL-US	100	–
1,1,1,2-Tetrachloroethane	Solvent	77562	630-20-6	0.04	na	na	–
1,1,2,2-Tetrachloroethane	Solvent	34516	79-34-5	0.10	na	na	–
Tetrachloroethene (PCE)	Solvent	34475	127-18-4	0.04	MCL-US	5	D
Tetrahydrofuran	Solvent	81607	109-99-9	1.0	na	na	–
1,2,3,4-Tetramethylbenzene	Gasoline hydrocarbon	49999	488-23-3	0.14	na	na	–
1,2,3,5-Tetramethylbenzene	Gasoline hydrocarbon	50000	527-53-7	0.12	na	na	–
Toluene	Gasoline hydrocarbon	34010	108-88-3	0.018	MCL-CA	150	D
1,2,3-Trichlorobenzene	Organic synthesis	77613	87-61-6	0.12	na	na	–
1,2,4-Trichlorobenzene	Solvent	34551	120-82-1	0.12	MCL-CA	5	–
1,1,1-Trichloroethane (1,1,1-TCA)	Solvent	34506	71-55-6	0.04	MCL-CA	200	D
1,1,2-Trichloroethane (1,1,2-TCA)	Solvent	34511	79-00-5	0.04	MCL-CA	5	–

Table 3A. Volatile organic compounds, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2020.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 5). **Abbreviations:** LRL, laboratory reporting level; THM, trihalomethane; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Trichloroethene (TCE)	Solvent	39180	79-01-6	0.02	MCL-US	5	D
Trichlorofluoromethane (CFC-11)	Refrigerant	34488	75-69-4	0.08	MCL-CA	150	D
1,2,3-Trichloropropane (1,2,3-TCP)	Solvent/organic synthesis	77443	96-18-4	0.12	NL-CA[3]	0.005	–
Trichlorotrifluoroethane (CFC-113)	Refrigerant	77652	76-13-1	0.04	MCL-CA	1,200	D
1,2,3-Trimethylbenzene	Gasoline hydrocarbon	77221	526-73-8	0.08	na	na	–
1,2,4-Trimethylbenzene	Gasoline hydrocarbon	77222	95-63-6	0.04	NL-CA	330	D
1,3,5-Trimethylbenzene	Organic synthesis	77226	108-67-8	0.04	NL-CA	330	–
Vinyl bromide (Bromoethene)	Fire retardant	50002	593-60-2	0.12	na	na	–
Vinyl chloride (Chloroethene)	Organic synthesis	39175	75-01-4	0.08	MCL-US	2	D
m- and *p*-Xylene	Gasoline hydrocarbon	85795	108-38-3/ 106-42-3	0.08	MCL-CA	[4]1,750	D
o-Xylene	Gasoline hydrocarbon	77135	95-47-6	0.04	MCL-CA	[4]1,750	–

[1] The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane.
[2] The RSD5 threshold for 1,3-dichloropropene is the sum of its isomers (*cis* and *trans*).
[3] In earlier reports in this series, the NL-CA (0.005 µg/L) was used as the comparison threshold for 1,2,3-TCP.
[4] The MCL-CA threshold for Xylenes is the sum of *m*- and *p*-Xylene and *o*-Xylene.

Table 3B. Gasoline oxygenates and degradates, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 4024.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-CA, California Department of Public Health maximum contaminant level; NL-CA, California Department of Public Health notification level; **Detection**: D, detected in ground-water samples (table 5). **Abbreviations:** LRL, laboratory reporting level; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acetone	Degradate	81552	67-64-1	1.8	na	na	–
tert-Amyl alcohol	Oxygenate	77073	75-85-4	0.6	na	na	D
tert-Amyl methyl ether (TAME)	Oxygenate	50005	994-05-8	0.05	na	na	–
tert-Butyl alcohol (TBA)	Degradate	77035	75-65-0	1	NL-CA	12	D
Diisopropyl ether (DIPE)	Oxygenate	81577	108-20-3	0.2	na	na	D
Ethyl *tert*-butyl ether (ETBE)	Oxygenate	50004	637-92-3	0.06	na	na	–
Methyl acetate	Degradate	77032	79-20-9	0.4	na	na	–
Methyl *tert*-butyl ether (MTBE)	Oxygenate	78032	1634-04-4	0.04	MCL-CA	13	–

Table 3C. Pesticides and pesticide degradates, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2003.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 6). **Abbreviations:** LRL, laboratory reporting level; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acetochlor	Herbicide	49260	34256-82-1	0.006	na	na	–
Alachlor	Herbicide	46342	15972-60-8	0.005	MCL-US	2	–
Atrazine	Herbicide	39632	1912-24-9	0.007	MCL-CA	1	D
Azinphos-methyl	Insecticide	82686	86-50-0	0.08	na	na	–[1]
Azinphos-methyl oxon	Insecticide degradate	61635	961-22-8	0.042	na	na	–[1]
Benfluralin	Herbicide	82673	1861-40-1	0.01	na	na	–[1]
Carbaryl	Insecticide	82680	63-25-2	0.06	RSD5-US	400	–
2-Chloro-2,6-diethylacetanilide	Herbicide degradate	61618	6967-29-9	0.0065	na	na	–
4-Chloro-2-methylphenol	Herbicide degradate	61633	1570-64-5	0.0050	na	na	–[1]
Chlorpyrifos	Insecticide	38933	2921-88-2	0.005	HAL-US	2	–
Chlorpyrifos oxon	Insecticide degradate	61636	5598-15-2	0.0562	na	na	–[1]
Cyfluthrin	Insecticide	61585	68359-37-5	0.053	na	na	–[1]
Cypermethrin	Insecticide	61586	52315-07-8	0.046	na	na	–[1]
Dacthal (DCPA)	Herbicide	82682	1861-32-1	0.003	HAL-US	70	–
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-s-triazine)	Herbicide degradate	04040	6190-65-4	0.014	na	na	D
Desulfinylfipronil	Insecticide degradate	62170	na	0.012	na	na	D
Desulfinylfipronil amide	Insecticide degradate	62169	na	0.029	na	na	–
Diazinon	Insecticide	39572	333-41-5	0.005	HAL-US	1	–
Diazinon oxon	Insecticide degradate	61638	962-58-3	0.006	na	na	–
3,4-Dichloroaniline	Herbicide degradate	61625	95-76-1	0.0045	na	na	D
Dichlorvos	Insecticide	38775	62-73-7	0.013	na	na	D
Dicrotophos	Insecticide	38454	141-66-2	0.0843	na	na	–[1]
Dieldrin	Insecticide	39381	60-57-1	0.009	RSD5-US	0.02	–
2,6-Diethylaniline	Herbicide degradate	82660	579-66-8	0.006	na	na	–
Dimethoate	Insecticide	82662	60-51-5	0.0061	na	na	–[1]
Ethion	Insecticide	82346	563-12-2	0.016	na	na	–
Ethion monoxon	Insecticide degradate	61644	17356-42-2	0.021	na	na	–
2-Ethyl-6-methylaniline	Herbicide degradate	61620	24549-06-2	0.010	na	na	–
Fenamiphos	Insecticide	61591	22224-92-6	0.029	HAL-US	0.7	–
Fenamiphos sulfone	Insecticide degradate	61645	31972-44-8	0.053	na	na	–[1]
Fenamiphos sulfoxide	Insecticide degradate	61646	31972-43-7	0.040	na	na	–[1]
Fipronil	Insecticide	62166	120068-37-3	0.016	na	na	D
Fipronil sulfide	Insecticide degradate	62167	120067-83-6	0.013	na	na	D
Fipronil sulfone	Insecticide degradate	62168	120068-36-2	0.024	na	na	D
Fonofos	Insecticide	04095	944-22-9	0.006	HAL-US	10	–
Hexazinone	Herbicide	04025	51235-04-2	0.026	HAL-US	400	D
Iprodione	Fungicide	61593	36734-19-7	0.026	na	na	–[1]
Isofenphos	Insecticide	61594	25311-71-1	0.011	na	na	–
Malaoxon	Insecticide degradate	61652	1634-78-2	0.039	na	na	–
Malathion	Insecticide	39532	121-75-5	0.016	HAL-US	100	–
Metalaxyl	Fungicide	61596	57837-19-1	0.0069	na	na	D

Table 3C. Pesticides and pesticide degradates, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2003.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 6). **Abbreviations:** LRL, laboratory reporting level; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Methidathion	Insecticide	61598	950-37-8	0.0087	na	na	–
Metolachlor	Herbicide	39415	51218-45-2	0.0010	HAL-US	100	D
Metribuzin	Herbicide	82630	21087-64-9	0.012	HAL-US	70	–
Myclobutanil	Fungicide	61599	88671-89-0	0.033	na	na	–
1-Naphthol	Insecticide degradate	49295	90-15-3	0.0882	na	na	–[1]
Paraoxon-methyl	Insecticide degradate	61664	950-35-6	0.019	na	na	–[1]
Parathion-methyl	Insecticide	82667	298-00-0	0.008	HAL-US	1	–
Pendimethalin	Herbicide	82683	40487-42-1	0.02	na	na	–
cis-Permethrin	Insecticide	82687	54774-45-7	0.01	na	na	–[1]
Phorate	Insecticide	82664	298-02-2	0.02	na	na	–
Phorate oxon	Insecticide degradate	61666	2600-69-3	0.027	na	na	–
Phosmet	Insecticide	61601	732-11-6	0.0079	na	na	–[1]
Phosmet oxon	Insecticide degradate	61668	3735-33-9	0.0511	na	na	–[1]
Prometon	Herbicide	04037	1610-18-0	0.01	HAL-US	100	D
Prometryn	Herbicide	04036	7287-19-6	0.0059	na	na	–
Pronamide (Propyzamide)	Herbicide	82676	23950-58-5	0.004	RSD5-US	20	–
Simazine	Herbicide	04035	122-34-9	0.006	MCL-US	4	D
Tebuthiuron	Herbicide	82670	34014-18-1	0.016	HAL-US	500	D
Terbufos	Insecticide	82675	13071-79-9	0.012	HAL-US	0.4	–
Terbufos oxon sulfone	Insecticide degradate	61674	56070-15-6	0.045	na	na	–
Terbuthylazine	Herbicide	04022	5915-41-3	0.0083	na	na	–
Trifluralin	Herbicide	82661	1582-09-8	0.009	HAL-US	5	–

[1] The median matrix-spike recovery was less than 70 percent. Low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations.

Table 3D. Polar pesticides and pesticide degradates, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2060.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5} **Detection**: D, detected in ground-water samples (table 7). **Abbreviations:** LRL, laboratory reporting level; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acifluorfen	Herbicide	49315	50594-66-6	0.060	na	na	–
Aldicarb	Insecticide	49312	116-06-3	[1]0.04	MCL-US	3	–
Aldicarb sulfone	Insecticide/degradate	49313	1646-88-4	0.08	MCL-US	3	–[2]
Aldicarb sulfoxide	Degradate	49314	1646-87-3	0.04	MCL-US	4	–
Atrazine	Herbicide	39632	1912-24-9	0.04	MCL-CA	3	–
Bendiocarb	Insecticide	50299	22781-23-3	0.04	na	na	–
Benomyl	Fungicide	50300	17804-35-2	0.02	na	na	–
Bensulfuron-methyl	Herbicide	61693	83055-99-6	0.06	na	na	–
Bentazon	Herbicide	38711	25057-89-0	0.02	MCL-CA	200	–[2]
Bromacil	Herbicide	04029	314-40-9	0.04	HAL-US	90	–
Bromoxynil	Herbicide	49311	1689-84-5	0.12	na	na	–
Caffeine	Wastewater indicator	50305	58-08-2	0.04	na	na	–
Carbaryl	Herbicide	49310	63-25-2	0.02	RSD5-US	700	–
Carbofuran	Herbicide	49309	1563-66-2	0.06	MCL-CA	40	–
Chloramben, methyl ester	Herbicide	61188	7286-84-2	0.10	HAL-US	100	–
Chlorimuron-ethyl	Herbicide	50306	90982-32-4	0.08	na	na	–
3-(4-Chlorophenyl)-1-methyl urea	Degradate	61692	5352-88-5	0.06	na	na	D
Clopyralid	Herbicide	49305	1702-17-6	0.06	na	na	–
Cycloate	Herbicide	04031	1134-23-2	0.06	na	na	–
2,4-D (2,4-Dichlorophenoxyacetic acid); 2,4-D methyl ester (2,4-Dichlorophenoxyacetic acid methyl ester)	Herbicides	39732; 50470	94-75-7; 1928-38-7	0.04	MCL-US	70	–
2,4-DB (4-(2,4-Dichlorophenoxy) butyric acid)	Herbicide	38746	94-82-6	0.020	na	na	–[2]
DCPA (Dacthal) monoacid	Degradate	49304	887-54-7	0.02	na	na	–[2]
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-*s*-triazine)	Degradate	04040	6190-65-4	0.02	na	na	–[2]
Deisopropyl atrazine (2-chloro-6-ethylamino-4-amino-*s*-triazine)	Degradate	04038	1007-28-9	0.08	na	na	D
Dicamba	Herbicide	38442	1918-00-9	0.08	HAL-US	200	–[2]
Dichlorprop	Herbicide	49302	120-36-5	0.04	na	na	–
Dinoseb	Herbicide	49301	88-85-7	0.04	MCL-CA	7	–[2]
Diphenamid	Herbicide	04033	957-51-7	0.04	HAL	200	D
Diuron	Herbicide	49300	330-54-1	0.04	HAL	10	D
Fenuron	Herbicide	49297	101-42-8	0.04	na	na	–
Flumetsulam	Herbicide	61694	98967-40-9	0.06	na	na	–
Fluometuron	Herbicide	38811	2164-17-2	0.04	HAL-US	90	–
Hydroxyatrazine (2-Hydroxy-4-isopropylamino-6-ethylamino-*s*-triazine)	Degradate	50355	2163-68-0	0.080	na	na	–

Table 3D. Polar pesticides and pesticide degradates, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2060.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠ **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5} **Detection**: D, detected in ground-water samples (table 7). **Abbreviations:** LRL, laboratory reporting level; µg/L, micrograms per liter; na, not available; –, analyzed but not detected]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
3-Hydroxycarbofuran	Degradate	49308	16655-82-6	0.02	na	na	–
Imazaquin	Herbicide	50356	81335-37-7	0.04	na	na	–
Imazethapyr	Herbicide	50407	81335-77-5	0.04	na	na	–
Imidacloprid	Insecticide	61695	138261-41-3	0.06	na	na	–
Linuron	Herbicide	38478	330-55-2	0.04	na	na	–
MCPA (2-Methyl-4-chlorophenoxyacetic acid)	Herbicide	38482	94-74-6	0.06	HAL-US	4	–
MCPB (4-(2-Methyl-4-chlorophenoxy) butyric acid)	Herbicide	38487	94-81-5	0.2	na	na	–[2]
Metalaxyl	Fungicide	50359	57837-19-1	0.04	na	na	–
Methiocarb	Insecticide	38501	2032-65-7	0.04	na	na	–
Methomyl	Insecticide	49296	16752-77-5	0.06	HAL-US	200	–
Metsulfuron methyl	Herbicide	61697	74223-64-6	[1]0.14	na	na	–
Neburon	Herbicide	49294	555-37-3	0.02	na	na	–
Nicosulfuron	Herbicide	50364	111991-09-4	0.10	na	na	–
Norflurazon	Herbicide	49293	27314-13-2	0.04	na	na	D
Oryzalin	Herbicide	49292	19044-88-3	0.04	na	na	–
Oxamyl	Insecticide	38866	23135-22-0	0.04	MCL-CA	200	–
Picloram	Herbicide	49291	1918-02-01	0.12	MCL-US	500	–[2]
Propham	Herbicide	49236	122-42-9	0.06	HAL-US	100	–
Propiconazole	Fungicide	50471	60207-90-1	0.06	na	na	–
Propoxur	Insecticide	38538	114-26-1	0.04	HAL-US	3	–
Siduron	Herbicide	38548	1982-49-6	0.04	na	na	–
Sulfometuron-methyl	Herbicide	50337	74222-97-2	0.06	na	na	–
Tebuthiuron	Herbicide	82670	34014-18-1	0.04	HAL-US	500	–
Terbacil	Herbicide	04032	5902-51-2	0.04	HAL-US	90	–
Triclopyr	Herbicide	49235	55335-06-3	0.04	na	na	–[2]

[1] Value is an MRL rather than an LRL.

[2] The median matrix-spike recovery was less than 70 percent. Low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations.

Table 3E. Potential wastewater indicators, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 4433.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 8). **Abbreviations:** LRL, laboratory reporting level; na, not available; –, not detected: µg/L, micrograms per liter]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acetophenone	Fragrance, flavor additive	62811	98-86-2	0.2	na	na	–
Acetyl hexamethyl tetrahydro naphthalene (AHTN)	Musk fragrance	62812	21145-77-7	0.2	na	na	D
Anthracene	Wood preservative, combustion product	34220	120-12-7	0.2	na	na	–
9,10-Anthraquinone	Dye/textiles, seed treatment	62813	84-65-1	0.2	na	na	–
Atrazine	Herbicide	39630	1912-24-9	0.2	MCL-CA	1	–
Benzo[a]pyrene	Combustion product	34247	50-32-8	0.2	MCL-US	0.2	–(1)
Benzophenone	Fixative for perfumes and soaps	62814	119-61-9	0.2	na	na	D
Bisphenol A	Polycarbonate resins, flame retardant	62816	80-05-7	0.4	na	na	D
Bromacil	Herbicide	30234	314-40-9	0.2	HAL-US	70	–
Bromoform (tribromomethane)	Disinfection by-product	32104	75-25-2	0.2	MCL-US	80	–
3-*tert*-Butyl-4-hydroxy anisole (BHA)	Antioxidant, general preservative	61702	25013-16-5	0.2	na	na	–(1)
Caffeine	Beverages	81436	58-08-2	0.2	na	na	–
Camphor	Flavor, odorant, ointments	62817	76-22-2	0.2	na	na	D
Carbaryl	Insecticide	39750	63-25-2	0.2	RSD5-US	400	–
Carbazole	Insecticide	77571	86-74-8	0.2	na	na	–
Chlorpyrifos	Insecticide	38932	2921-88-2	0.2	HAL-US	2	–
Cholesterol	Fecal indicator, plant sterol	62818	57-88-5	0.8	na	na	D
3-β-Coprostanol	Carnivore fecal indicator	62806	360-68-9	0.8	na	na	D
Cotinine	Primary nicotine metabolite	61945	486-56-6	0.8	na	na	–
p-Cresol	Wood preservative	77146	106-44-5	0.2	na	na	D
4-Cumylphenol	Nonionic detergent metabolite	62808	599-64-4	0.2	na	na	D
Diazinon	Insecticide	39570	333-41-5	0.2	HAL-US	1	–
Dichlorvos	Insecticide	30218	62-73-7	0.2	na	na	
N,*N*-Diethyl-*meta*-toluamide (DEET)	Insecticide	61947	134-62-3	0.2	na	na	D
1,4-Dichlorobenzene	Moth repellant, fumigant, deodorant	34571	106-46-7	0.2	MCL-CA	5	–(1)
3,4-Dichlorophenyl isocyanate	Intermediate for the synthesis of organic compounds	63145	102-36-3	2	na	na	D
Diethyl phthalate	Wood stains and varnishes, plasticizer, softener	34336	84-66-2	0.2	na	na	D
2,6-Dimethylnaphthalene	Diesel/kerosene	62085	581-42-0	0.2	na	na	D
Bis(2-ethylhexyl) phthalate	Plasticizer, softener	39100	117-81-7	2	MCL-CA	na	D
Nonylphenol monoethoxylates (total)	Nonionic detergent metabolite	61704	na	2	na	na	D
4-Nonylphenol diethoxylates	Nonionic detergent metabolite	61703	na	3.2	na	na	D

Table 3E. Potential wastewater indicators, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 4433.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 8). **Abbreviations:** LRL, laboratory reporting level; na, not available; –, not detected: µg/L, micrograms per liter]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
4-Octylphenol diethoxylates	Nonionic detergent metabolite	61705	na	0.32	na	na	D
4-Octylphenol monoethoxylates	Nonionic detergent metabolite	61706	na	1	na	na	–
Fluoranthene	Component of coal tar and asphalt	34376	206-44-0	0.2	na	na	D
Hexahydrohexamethyl-cyclopentabenzopyran (HHCB)	Musk fragrance	62823	1222-05-5	0.2	na	na	D
Indole	Pesticide ingredient	62824	120-72-9	0.2	na	na	D
Isoborneol	Fragrance in perfumery	62825	124-76-5	0.2	na	na	–
Isophorone	Solvent	34409	78-59-1	0.2	HAL-US	100	–
Isopropylbenzene	Fuels, paint thinner	77223	98-82-8	0.2	NL-CA	770	–(1)
Isoquinoline	Flavors and fragrances	62826	119-65-3	0.2	na	na	–
d-Limonene	Fungicide	62819	5989-27-5	0.2	na	na	D
Menthol	Cigarettes, cough drops, liniment	62827	89-78-1	0.2	na	na	–
Metalaxyl	Herbicide, fungicide	04254	57837-19-1	0.2	na	na	–
3-Methyl-1(H)-indole (Skatole)	Fragrance, stench in feces	62807	83-34-1	0.2	na	na	–
5-Methyl-1H-benzotriazole	Antioxidant in antifreeze and deicers	61944	136-85-6	1.6	na	na	D
1-Methylnaphthalene	Gasoline, diesel fuel, or crude oil	81696	90-12-0	0.2	na	na	D
2-Methylnaphthalene	Gasoline, diesel fuel, or crude oil	30194	91-57-6	0.2	na	na	D
Methyl salicylate	Liniment, UV-absorbing lotion	62828	119-36-8	0.2	na	na	D
Metolachlor	Herbicide	82612	51218-45-2	0.2	HAL-US	700	–
Naphthalene	Fumigant, moth repellent, gasoline	34696	91-20-3	0.4	NL-CA	17	–
4-Nonylphenol (total)	Nonionic detergent metabolite	62829	84852-15-3	1.6	na	na	D
4-*n*-Octylphenol	Nonionic detergent metabolite	62809	1806-26-4	0.2	na	na	–(1)
4-*tert*-Octylphenol	Nonionic detergent metabolite	62810	140-66-9	0.2	na	na	–
Pentachlorophenol	Fumigant, moth repellent, gasoline	39032	87-86-5	0.8	MCL-US	1	–(1)
Phenanthrene	Manufactured explosives	34461	85-01-8	0.2	na	na	–
Phenol	Disinfectant, organic synthesis	34694	108-95-2	0.2	HAL-US	2,000	D
Prometon	Herbicide	39056	1610-18-0	0.2	HAL-US	100	D
Pyrene	Component of coal tar and asphalt	34469	129-00-0	0.2	na	na	D
β-Sitosterol	Plant sterol	62815	83-46-5	0.8	na	na	–(1)
β-Stigmastanol	Plant sterol	61948	19466-47-8	0.8	na	na	–(1)

Table 3E. Potential wastewater indicators, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 4433.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; RSD5-US, U.S. Environmental Protection Agency risk specific dose at a risk factor of 10^{-5}. **Detection**: D, detected in ground-water samples (table 8). **Abbreviations:** LRL, laboratory reporting level; na, not available; –, not detected: µg/L, micrograms per liter]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	LRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
2,2',4,4'-Tetrabromodiphenyl ether	Brominated flame retardant	63147	5436-43-1	0.2	na	na	–[1]
Tetrachloroethene (PCE)	Solvent, degreaser	34475	127-18-4	0.4	MCL-US	5	–
Tributyl phosphate	Antifoaming agent, flame retardant	62832	126-73-8	0.2	na	na	D
Triclosan	Disinfectant, antimicrobial	61708	3380-34-5	0.2	na	na	D
Triethyl citrate (ethyl citrate)	Cosmetics, pharmaceuticals	62833	77-93-0	0.2	na	na	–
Triphenyl phosphate	Plasticizer	62834	115-86-6	0.2	na	na	D
Tris(2-butoxyethyl)phosphate	Flame retardant	62830	78-51-3	0.2	na	na	D
Tris(2-chloroethyl)phosphate	Plasticizer, flame retardant	62831	115-96-8	0.2	na	na	D
Tris(dichlorisopropyl)phosphate	Flame retardant	61707	13674-87-8	0.2	na	na	D

[1]The median matrix-spike recovery was less than 70 percent. Low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations.

Table 3F. Pharmaceutical compounds, primary uses or sources, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2080.

[The five-digit USGS parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **MDL:** The California Groundwater Ambient Monitoring and Assessment (GAMA) program uses more conservative reporting limits for the pharmaceutical compounds than recommended by the USGS National Water Quality Laboratory. For albuterol, carbamazepine, codeine, dehydronifedipine, diltiazem, sulfamethoxazole, thiabendazole, trimethoprim, and warfarin, the MDL corresponds to the long-term method detection limit determined by the USGS Branch of Quality Systems in October 2007 (BQS LT-MDL). For acetaminophen, caffeine, cotinine, diphenhydramine, and paraxanthine, the MDL corresponds to the effective method detection limit determine from assessment of quality-control data associated with GAMA samples collected from May 2004 through September 2007 (GAMA E-MDL). The GAMA E-MDL are higher than the BQS LT-MDL for those compounds. Detections reported by the USGS National Water Quality Laboratory with concentrations lower than the BQS LT-MDL or GAMA E-MDL are reported as non-detections by the GAMA program. **Abbreviations:** MDL, method detection limit; na, not available; µg/L, micrograms per liter]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	MDL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Acetaminophen	Analgesic	62000	103-90-2	0.0239	na	na	na
Caffeine	Stimulant	50305	58-08-2	0.0149	na	na	na
Carbamazapine	Anticonvulsant; analgesic; mood stabilizer	62793	298-46-4	0.0179	na	na	na
Codeine	Opiod narcotic	62003	76-57-3	0.0223	na	na	na
Cotinine	Nicotine metabolite	62005	486-56-6	0.0284	na	na	na
Dehydronifedipine	Antianginal metabolite	62004	67035-22-7	0.022	na	na	na
Diltiazem	Antianginal; antihypertensive	62008	42399-41-7	0.0178	na	na	na
1,7-Dimethylxanthine	Caffeine metabolite	62030	611-59-6	0.0208	na	na	na
Diphenhydramine	Antihistamine	62796	58-73-1	0.0229	na	na	na
Salbutamol (albuterol)	Anti-inflammatory; bronchodilator	62020	18559-94-9	0.0139	na	na	na
Sulfamethoxazole	Antibacterial, antiprotozoal	62021	723-46-6	0.0237	na	na	na
Thiabendazole	Anthelmintic	62801	148-79-8	0.025	na	na	na
Trimethoprim	Antibacterial	62023	738-70-5	0.0203	na	na	na
Warfarin	Anticoagulant	62024	81-81-2	0.0188	na	na	na

Table 3G. Constituents of special interest, primary uses or sources, comparative thresholds, and reporting information for compounds analyzed at the Montgomery Watson-Harza Laboratory.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type,** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency lifetime health advisory; MCL-CA, California Department of Public Health maximum contaminant level; NL-CA, California Department of Public Health notification level. **Abbreviations:** MRL, minimum reporting level; D, detected in ground-water samples (table 9); µg/L, micrograms per liter; –, analyzed but not detected]

Constituent (common name)	Primary use or source	USGS parameter code	CAS number	MRL (µg/L)	Threshold		Detection
					Type	Value (µg/L)	
Perchlorate	Rocket fuel, fireworks, flares	61209	14797-73-0	0.5	MCL-CA	6	D
1,2,3-Trichloropropane (TCP)	Industrial solvent, organic synthesis	77443	96-18-4	0.005	HAL-US	40	–
1,4-Dioxane	Industrial solvent, synthetic synthesis	81582	123-91-1	2	NL-CA	3	D
N-Nitrosodimethylamine (NDMA)	Disinfection by-product	64176	62-75-9	2	NL-CA	0.01	D

Table 3H. Nutrients and dissolved organic carbon, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 2755 and parameter code 2612.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency lifetime health advisory level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. **Abbreviations:** LRL, laboratory reporting level; D, detected in groundwater samples (table 10); na, not available; mg/L, milligrams per liter]

Constituent (common name)	USGS parameter code	CAS number	LRL (mg/L)	Threshold		Detection
				Type	Value (mg/L)	
Ammonia (as nitrogen)	00608	7664-41-7	0.010	HAL-US	[1]30	D
Nitrite (as nitrogen)	00613	14797-65-0	0.002	MCL-US	1	D
Nitrate plus nitrite (as nitrogen)	00631	na	0.060	MCL-US	10	D
Total nitrogen (ammonia, nitrite, nitrate, organic nitrogen)	62854	17778-88-0	0.06	na	na	D
Phosphorus, phosphate, orthophosphate (as phosphorus)	00671	14265-44-2	0.006	na	na	D
Dissolved organic carbon (DOC)	00681	na	0.33	na	na	D

[1] Threshold value is “as ammonia.”

Table 3I. Major and minor ions and trace elements, comparative thresholds, and reporting information for the U.S. Geological Survey National Water Quality Laboratory Schedule 1948.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; SMCL-CA, California Department of Public Health secondary maximum contaminant level; SMCL-US, California Department of Public Health secondary maximum contaminant level; AL-US, U.S. Environmental Protection Agency action level. **Abbreviations:** LRL, laboratory reporting level; D, detected in ground-water samples (tables 11 and 12); na, not available; mg/L, milligrams per liter; µg/L, micrograms per liter; –, analyzed but not detected]

Constituent	USGS parameter code	CAS number	LRL	Threshold		Detection
				Type	Value	
Major and minor ions (mg/L)						
Bromide	71870	24959-67-9	0.02	na	na	D
Calcium	00915	7440-70-2	0.02	na	na	D
Chloride	00940	16887-00-6	0.2	SMCL-CA	[1]250 (500)	D
Fluoride	00950	16984-48-8	0.10	MCL-CA	2	D
Iodide	78165	7553-56-2	0.002	na	na	D
Magnesium	00925	7439-95-4	0.008	na	na	D
Potassium	00935	7440-09-7	0.16	na	na	D
Silica	00955	7631-86-9	0.04	na	na	D
Sodium	00930	7440-23-5	0.20	na	na	D
Sulfate	00945	14808-79-8	0.18	SMCL-CA	[1]250 (500)	D
Residue on evaporation (total dissolved solids, TDS)	70300	na	10	SMCL-US	[1]500 (1,000)	D
Trace elements (µg/L)						
Aluminum	01106	7429-90-5	1.6	MCL-CA	1,000	D
Antimony	01095	7440-36-0	0.2	MCL-US	6	D
Arsenic	01000	7440-38-2	0.12	MCL-US	10	D
Barium	01005	7440-39-3	0.2	MCL-CA	1,000	D
Beryllium	01010	7440-41-7	0.06	MCL-US	4	–
Boron	01020	7440-42-8	8	NL-CA	1,000	D
Cadmium	01025	7440-43-9	0.04	MCL-US	5	D
Chromium	01030	7440-47-3	0.04	MCL-CA	50	D
Cobalt	01035	7440-48-4	0.04	na	na	D
Copper	01040	7440-50-8	0.4	AL-US	1,300	D
Iron	01046	7439-89-6	6	SMCL-CA	300	D
Lead	01049	7439-92-1	0.08	AL-US	15	D
Lithium	01130	7439-93-2	0.6	na	na	D
Manganese	01056	7439-96-5	0.2	SMCL-CA	50	D
Mercury	71890	7439-97-6	0.010	MCL-US	2	D
Molybdenum	01060	7439-98-7	0.4	HAL-US	40	D
Nickel	01065	7440-02-0	0.06	MCL-CA	100	D
Selenium	01145	7782-49-2	0.08	MCL-US	50	D
Silver	01075	7440-22-4	0.2	SMCL-CA	100	–
Strontium	01080	7440-24-6	0.4	HAL-US	4,000	D
Thallium	01057	7440-28-0	0.04	MCL-US	2	D
Tungsten	01155	7440-33-7	0.06	na	na	D
Uranium	22703	7440-61-1	0.04	MCL-US	30	D
Vanadium	01085	7440-62-2	0.10	NL-CA	50	D
Zinc	01090	7440-66-6	0.6	HAL-US	2,000	D

[1] The recommended SMCL-CA thresholds for chloride, sulfate, and TDS are listed with the upper SMCL-CA thresholds in parentheses.

Table 3J. Arsenic, chromium, and iron species, comparative thresholds, and reporting information for the U.S. Geological Survey Trace Metal Laboratory, Boulder, Colorado.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituents or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency lifetime health advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. **Abbreviations:** MDL, method detection limit; na, not available; µg/L, micrograms per liter; D, detected in ground-water samples (table 13)]

Constituent (valence state)	USGS parameter code	CAS number	MDL (µg/L)	Threshold		Detection
				Type	Level (µg/L)	
Arsenic (III)	99034	22569-72-8	1	na	na	D
Arsenic (total)	01000	7440-38-2	0.5	MCL-US	10	D
Chromium (VI)	01032	18540-29-9	1	na	na	D
Chromium (total)	01030	7440-47-3	1	MCL-CA	50	D
Iron (II)	01047	7439-89-6	2	na	na	D
Iron (total)	01046	7439-89-6	2	HAL-US	300	D

Table 3K. Isotopic and radioactive constituents, comparative thresholds, and reporting information for laboratories.

[The five-digit USGS parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Stable isotope ratios are reported in the standard delta notation (δ), the ratio of a heavier isotope to more common lighter isotope of that element, relative to a standard reference material. **CAS,** Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. **Abbreviations:** MU, method uncertainty; SSMDC, sample specific minimum detectable concentration; MRL, minimum reporting level; na, not available; pCi/L, picocuries per liter; D, detected in ground-water samples (tables 14 and 15)]

Constituent	USGS parameter code	CAS number	Reporting level type	Reporting level or uncertainty	Threshold		Detection
					Type	Value	
Stable isotope ratios (per mil)							
δ^{2}H of water[1]	82082	na	MU	2	na	na	D
δ^{18}O of water[1]	82085	na	MU	0.20	na	na	D
δ^{13}C of dissolved carbonates[2]	82081	na	1 sigma	0.05	na	na	D
Radioactive constituents (percent modern)							
[3]Carbon-14	49933	14762-75-5	1 sigma	0.002	na	na	D
Radioactive constituents (pCi/L)							
[4] Radon-222	82303	14859-67-7	SSMDC	17 – 41	Prop. MCL-US	[5]300 (4,000)	D
Tritium[6, 7]	07000	10028-17-8	MRL	1	MCL-CA	20,000	D
Gross-alpha radioactivity, 72-hour counts[8]	99920	12587-46-1	SSMDC	0.59 – 11.0	MCL-US	15	D
Gross-alpha radioactivity, 30-day counts[8]	99921	12587-46-1	SSMDC	0.69 – 7.0	MCL-US	15	D
Gross-beta radioactivity, 72-hour counts[8]	99922	12587-47-2	SSMDC	0.49 – 3.5	MCL-CA	50	D
Gross-beta radioactivity, 30-day counts[8]	99923	12587-47-2	SSMDC	0.48 – 3.2	MCL-CA	50	D
[8] Radium-226	99915	13982-63-3	SSMDC	0.011 – 0.016	MCL-US	[9]5	D
[8] Radium-228	99916	15262-20-1	SSMDC	0.19 – 0.24	MCL-US	[9]5	D

[1] USGS Stable Isotope Laboratory, Reston, Virginia.

[2] University of Waterloo (contract laboratory).

[3] University of Arizona, Accelerator Mass Spectrometry Laboratory (contract laboratory).

[4] USGS National Water Quality Laboratory.

[5] Two MCLs have been proposed for Radon-222. The proposed Alternative MCL is in parentheses.

[6] USGS Stable Isotope and Tritium Laboratory, Menlo Park, California.

[7] Lawrence Livermore National Laboratory.

[8] Eberline Analytical Services (contract laboratory).

[9] The MCL-US threshold for radium is the sum of radium-226 and radium-228.

Table 3L. Microbial constituents, comparison thresholds, and reporting information for the U.S. Geological Survey Ohio Microbiology Laboratory parameter codes 90901, 90900, 99335 and 99332.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds and threshold values as of November 16, 2006. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level; TT-US, U.S. Environmental Protection Agency treatment technique—a required process intended to reduce the level of contamination in drinking water. **Abbreviations:** MDL, method detection limit; mL, milliliters; D, detected in ground-water samples (table 16); –, analyzed but not detected]

Constituent	USGS parameter code	Primary source	MDL	Threshold		Detection
				Type	Value	
Escherichia coli[1]	90901	Sewage and animal waste indicator	1 colony/ 100 mL	TT-US	Zero	–
Total coliform - including fecal coliform and *E. coli*)[1]	90900	Sewage and animal waste indicator	1 colony/ 100 mL	MCL-US	5 percent of samples positive per month	D
F-specific coliphage	99335	Sewage and animal waste indicator	na	TT-US	99.99 percent killed/ inactivated	–
Somatic coliphage	99332	Sewage and animal waste indicator	na	TT-US	99.99 percent killed/ inactivated	–

[1] Analyzed in the field.

Table 3M. Noble gases and tritium, comparison thresholds and reporting information for the Lawrence Livermore National Laboratory.

[The five-digit U.S. Geological Survey (USGS) parameter code is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **CAS**, Chemical Abstract Service. This report contains CAS Registry Numbers®, which is a Registered Trademark of the American Chemical Society. CAS recommends the verification of the CASRNs through CAS Client Services℠. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-CA, California Department of Public Health maximum contaminant level. **Abbreviations:** MU, method uncertainty; na, not available; cm^3 STP/g, cubic centimeters of gas at standard temperature and pressure per gram of water; pCi/L, picocuries per liter]

Constituent	USGS parameter code	CAS number	MU (percent)	Reporting units	Threshold		Detection
					Type	Value (pCi/L)	
Argon	na	7440-37-1	2	cm^3STP/g	na	na	na
Helium-3 / Helium-4 ratio	na	na / 7440-59-7	0.75	atom ratio	na	na	na
Helium-4	na	7440-59-7	2	cm^3STP/g	na	na	na
Krypton	na	7439-90-9	2	cm^3STP/g	na	na	na
Neon	na	7440-01-09	2	cm^3STP/g	na	na	na
Tritium	07000	10028-17-8	1	pCi/L	MCL-CA	20,000	na
Xenon	na	7440-63-3	2	cm^3STP/g	na	na	na

Table 4. Water-quality indicators in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. SMCL-US, U.S. Environmental Protection Agency secondary maximum contaminant level; TT-US, U.S. Environmental Protection Agency treatment technique—a required process intended to reduce the level of contamination in drinking water; SMCL-CA, California Department of Public Health secondary maximum contaminant level. The SMCL-CA for specific conductance has recommended and upper threshold values. The upper value is shown in parentheses. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; RL, reporting limit or range; °C, degrees celsius; $CaCO_3$, calcium carbonate; E, estimated or having a higher degree of uncertainty; >, greater than; <, less than; mg/L, milligrams per liter; nc, not collected; NTRU, nephelometric turbidity ratio units; µS/cm, microsiemens per centimeter]

GAMA identification No.	Turbidity (NTRU) (63676)	Dissolved oxygen (mg/L) (00300)	Water temperature (°C) (00010)	pH, lab (standard units) (00403)	pH, field (standard units) (00400)	Specific conductance, lab (µS/cm at 25°C) (90095)	Specific conductance, field (µS/cm at 25°C) (00095)	Alkalinity, lab (mg/L as $CaCO_3$) (29801)	Alkalinity, field (mg/L as $CaCO_3$) (29802)
Threshold type	TT-US	na	na	SMCL-US	SMCL-US	SMCL-CA	SMCL-CA	na	na
Threshold level	5	na	na	6.5–8.5	6.5–8.5	900 (1,600)	900 (1,600)	na	na
[RL]	[0.1]	[0.2]	[0.0–38.5]	[0–14]	[0–14]	[5]	[5]	[1]	[1]
CLAB Grid wells									
CB-01	nc	0.6	21.0	nc	7.1	nc	746	nc	nc
CB-02	nc	0.2	19.5	7.5	7.3	613	611	198	nc
CB-03	0.2	0.8	19.5	7.4	7.1	775	752	144	142
CB-04	0.2	<0.2	29.0	* 8.8	* 8.7	337	350	128	126
CB-05	nc	<0.2	28.0	nc	nc	nc	311	nc	nc
CB-06	nc	1.2	22.0	nc	nc	nc	395	nc	nc
CB-07	nc	E 1.7	21.0	nc	nc	nc	* 914	nc	nc
CB-08	nc	E 1.0	19.0	nc	nc	nc	661	nc	nc
CB-09	nc	<0.2	22.5	nc	nc	nc	523	nc	nc
CB-10	nc	<0.2	21.0	nc	nc	nc	553	nc	nc
CB-11	nc	E 0.4	21.0	nc	nc	nc	657	nc	nc
CB-12	nc	<0.2	24.0	nc	nc	nc	697	nc	nc
CB-13	nc	1.2	19.0	nc	nc	nc	688	nc	nc
CB-14	nc	0.2	23.5	nc	nc	nc	534	nc	nc
CB-15	nc	1.1	18.5	nc	nc	nc	855	nc	nc
CB-16	nc	3.8	20.0	nc	nc	nc	850	nc	nc
CB-17	nc	3.0	19.0	7.7	7.3	814	808	224	nc
CB-18	nc	0.2	25.0	nc	7.7	nc	* 1,100	nc	nc
CB-19	nc	3.6	18.5	nc	7.2	nc	896	nc	nc
CB-20	nc	<0.2	23.5	nc	7.5	nc	* 1,560	nc	nc
CB-21	nc	<0.2	24.0	nc	7.8	nc	501	nc	nc
OC-01	0.1	1.5	21.5	7.7	7.4	741	753	nc	158
OC-02	0.1	1.1	17.5	7.8	7.5	* 965	* 952	210	208
OC-03	nc	E 5.4	20.0	nc	nc	nc	* 990	nc	nc
OC-04	nc	E 3.2	19.0	nc	nc	nc	738	nc	nc
OC-05	nc	E 3.5	18.5	nc	nc	nc	* 967	nc	nc
OC-06	nc	E 4.0	19.0	nc	nc	nc	858	nc	nc
OC-07	nc	E 4.5	18.5	nc	nc	nc	490	nc	nc
OC-08	nc	E 4.6	19.0	nc	nc	nc	806	nc	nc
OC-09	nc	E 2.9	23.0	nc	nc	nc	743	nc	nc
OC-10	nc	E 2.6	26.5	nc	nc	nc	654	nc	nc
OC-11	nc	0.5	25.0	nc	nc	nc	476	nc	nc
OC-12	nc	0.5	30.0	nc	nc	nc	613	nc	nc
OC-13	nc	0.3	19.0	nc	nc	nc	794	nc	nc
OC-14	nc	0.3	20.0	nc	nc	nc	414	nc	nc
OC-15	nc	3.9	18.0	nc	nc	nc	507	nc	nc
OC-16	nc	0.6	20.5	nc	nc	nc	* 961	nc	nc
OC-17	nc	2.5	20.0	nc	nc	nc	* 997	nc	nc

Table 4. Water-quality indicators in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. SMCL-US, U.S. Environmental Protection Agency secondary maximum contaminant level; TT-US, U.S. Environmental Protection Agency treatment technique—a required process intended to reduce the level of contamination in drinking water; SMCL-CA, California Department of Public Health secondary maximum contaminant level. The SMCL-CA for specific conductance has recommended and upper threshold values. The upper value is shown in parentheses. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; RL, reporting limit or range; °C, degrees celsius; $CaCO_3$, calcium carbonate; E, estimated or having a higher degree of uncertainty; >, greater than; <, less than; mg/L, milligrams per liter; nc, not collected; NTRU, nephelometric turbidity ratio units; µS/cm, microsiemens per centimeter]

GAMA identification No.	Turbidity (NTRU) (63676)	Dissolved oxygen (mg/L) (00300)	Water temperature (°C) (00010)	pH, lab (standard units) (00403)	pH, field (standard units) (00400)	Specific conductance, lab (µS/cm at 25°C) (90095)	Specific conductance, field (µS/cm at 25°C) (00095)	Alkalinity, lab (mg/L as $CaCO_3$) (29801)	Alkalinity, field (mg/L as $CaCO_3$) (29802)
Threshold type	TT-US	na	na	SMCL-US	SMCL-US	SMCL-CA	SMCL-CA	na	na
Threshold level	5	na	na	6.5–8.5	6.5–8.5	900 (1,600)	900 (1,600)	na	na
[RL]	[0.1]	[0.2]	[0.0–38.5]	[0–14]	[0–14]	[5]	[5]	[1]	[1]
CLAB Grid wells—Continued									
OC-18	nc	<0.2	24.5	nc	* 8.8	nc	412	nc	nc
OC-19	nc	0.2	19.0	nc	7.5	nc	632	nc	nc
OC-20	nc	<0.2	20.0	7.6	7.2	* 1,030	*1,030	218	nc
OC-21	nc	3.4	23.5	nc	7.4	nc	* 975	nc	nc
OC-22[1]	nc	E 7.0	E 17.0	nc	E 7.9	nc	E 450	nc	nc
OC-23	nc	0.3	28.5	nc	7.7	nc	* 1,340	nc	nc
OC-24	nc	2.5	18.5	nc	7.2	nc	* 1,020	nc	nc
WB-01	nc	<0.2	22.5	nc	nc	nc	>** 10,000	nc	nc
WB-02	nc	2.1	22.5	nc	nc	nc	* 1,360	nc	nc
WB-03	nc	0.3	23.5	nc	nc	nc	* 1,130	nc	nc
WB-04	nc	0.2	24.0	7.8	7.6	* 1,220	* 1,210	456	nc
WB-05	nc	<0.2	24.0	nc	8.0	nc	640	nc	nc
WB-06	nc	0.2	29.5	nc	8.2	nc	* 1,060	nc	nc
WB-07	nc	<0.2	25.5	nc	8.0	nc	* 1,350	nc	nc
WB-08	nc	3.6	25.0	nc	8.2	nc	425	nc	nc
WB-09	nc	0.2	21.0	nc	6.5	nc	* 1,270	nc	nc
WB-10	nc	0.2	20.0	nc	7.4	nc	* 1,300	nc	nc
CLAB Understanding wells									
DA-01	0.6	1.8	21.0	6.8	6.5	* 1,170	* 1,190	272	258
DA-02	.2	2.5	20.5	7.1	6.7	* 1,290	* 1,290	314	314
DA-03	.2	<0.2	24.5	7.7	7.4	890	* 913	308	296
DA-04	.3	2.9	20.0	7.0	6.5	* 1,310	* 1,310	335	319
DA-05	.2	<0.2	26.0	8.0	7.8	* 1,460	* 1,470	410	392
DA-06	.3	0.2	23.0	7.4	7.2	** 3,660	** 3,680	485	479
U-01	.1	2.8	19.5	7.6	7.3	509	507	nc	167
U-02	.1	<0.2	19.5	7.5	7.2	854	859	219	215
U-03	nc	0.8	19.0	7.7	7.3	865	865	178	nc
U-04	nc	3.7	18.0	nc	7.5	nc	778	nc	nc
U-05	nc	0.3	19.0	nc	7.5	nc	782	nc	nc
U-06	nc	2.1	21.0	7.3	6.9	* 1,250	* 1,290	290	nc
U-07	nc	0.2	20.0	7.3	7.2	* 1,430	* 1,440	336	nc
U-08	nc	1.3	18.5	nc	7.4	nc	543	nc	nc

* Value exceeds threshold.

** Value exceeds recommended upper threshold.

[1] E-codes for OC-22 values were as a result of an abbreviated well purge time.

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Trihalo-methane	Solvent		Gasoline	Solvent	Organic synthesis	Trihalo-methane
	Chloroform (Trichloro-methane) (µg/L) (32106)	Trichloro-ethene (TCE) (µg/L) (39180)	Tetrachloro-ethene (PCE) (µg/L) (34475)	Methyl *tert*-butyl ether (MTBE) (µg/L) (78032)	*cis*-1,2-Dichloro-ethene (µg/L) (77093)	1,1-Dichloro-ethene (1,1-DCE) (µg/L) (34501)	Bromodi-chloro-methane (µg/L) (32101)
[LRL]	[0.04]	[0.02]	[0.04]	[0.10]	[0.02]	[0.04]	[0.04]
Threshold type	MCL-US	MCL-US	MCL-US	MCL-CA	MCL-CA	MCL-CA	MCL-US
Threshold (µg/L)	80	5	5	13	6	7	80
CLAB Study Unit (55 grid wells sampled)							
Number of wells with detections	25	16	14	11	9	8	6
Detection frequency (percent)	45	29	25	20	16	15	11
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)							
CB-02	E 0.06	–	E0.04	–	–	–	–
CB-03	E 0.06	–	–	0.3	–	–	–
CB-07	E 0.07	1.72	0.35	–	–	E 0.04	–
CB-08	–	0.22	E 0.04	–	–	–	–
CB-10	E 0.07	–	–	–	–	–	–
CB-11	E 0.10	0.79	0.33	–	–	–	–
CB-12	E 0.03	0.13	E 0.02	–	E 0.02	–	–
CB-13	E 0.14	2.22	1.72	0.1	E 0.06	0.26	–
CB-15	E 0.13	0.12	0.34	0.2	–	0.42	–
CB-16	E 0.31	1.04	0.93	–	E 0.05	2.47	E 0.03
CB-17	E 0.06	0.62	4.14	E .1	–	–	–
CB-18	E 0.01	–	–	–	–	–	–
CB-19	0.28	1.15	0.14	–	–	–	–
Number of wells with detections	12	9	10	4	3	4	1
Detection frequency (percent)	57	43	48	19	14	19	5
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Solvent	Refrigerant	Solvent	Organic synthesis	Solvent	Gasoline	
	1,1-Dichloroethane (1,1-DCA) (µg/L) (34496)	Trichlorotrifluoroethane (CFC-113) (µg/L) (77652)	1,1,1-Trichloroethane (1,1,1-TCA) (µg/L) (34506)	Carbon disulfide (µg/L) (77041)	Dichloromethane (µg/L) (34423)	Diisopropyl ether (DIPE) (µg/L) (81577)	Toluene (µg/L) (34010)
[LRL]	[0.06]	[0.04]	[0.04]	[0.06]	[0.04]	[0.06]	[0.018]
Threshold type	MCL-CA	MCL-CA	MCL-US	NL-CA	MCL-US	na	MCL-CA
Threshold (µg/L)	5	1,200	200	160	5	na	150
CLAB Study Unit (55 grid wells sampled)—Continued							
Number of wells with detections	5	5	4	4	2	2	2
Detection frequency (percent)	9	9	7	7	4	4	4
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)—Continued							
CB-02	–	–	–	–	–	–	–
CB-03	–	–	–	–	–	–	–
CB-07	E 0.09	E 0.03	–	–	–	–	–
CB-08	–	–	–	–	–	–	–
CB-10	–	–	–	–	–	–	–
CB-11	–	–	–	–	–	–	–
CB-12	–	–	–	–	–	–	–
CB-13	E 0.05	–	E 0.03	–	–	–	–
CB-15	E 0.05	–	E 0.05	–	–	–	–
CB-16	0.10	–	E 0.08	–	–	–	–
CB-17	E 0.07	–	–	–	–	–	–
CB-18	–	–	–	E0.02	–	–	–
CB-19	–	–	–	–	–	–	–
Number of wells with detections	5	1	3	1	0	0	0
Detection frequency (percent)	24	5	14	5	0	0	0
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Gasoline	Trihalo-methane	Solvent	Refrigerant	Gasoline		Refrigerant
	Benzene (µg/L) (34030)	Bromoform (Tribromo-methane) (µg/L) (32104)	Carbon tetrachloride (Tetrachloro-methane) (µg/L) (32102)	Dichloro-difluormethane (CFC-12) (µg/L) (34668)	Naphthalene, (µg/L) (34696)	1,2,4-Trimethyl-benzene (µg/L) (77222)	Trichloro-fluoromethane (CFC-11) (µg/L) (34488)
[LRL]	[0.016]	[0.08]	[0.08]	[0.14]	[0.4]	[0.04]	[0.08]
Threshold type	MCL-CA	MCL-US	MCL-CA	HAL-US	HAL-US	NL-CA	MCL-CA
Threshold (µg/L)	1	80	0.5	1,000	100	330	150
CLAB Study Unit (55 grid wells sampled)—Continued							
Number of wells with detections	1	1	1	1	1	1	1
Detection frequency (percent)	2	2	2	2	2	2	2
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)—Continued							
CB-02	–	E 0.17	–	–	–	–	–
CB-03	–	–	–	–	–	E 0.07	–
CB-07	–	–	–	–	–	–	–
CB-08	–	–	–	–	–	–	–
CB-10	–	–	–	–	–	–	–
CB-11	–	–	–	–	–	–	–
CB-12	–	–	–	–	–	–	–
CB-13	–	–	–	–	–	–	–
CB-15	–	–	–	–	–	–	–
CB-16	–	–	–	–	–	–	–
CB-17	–	–	–	–	–	–	–
CB-18	–	–	–	–	–	–	–
CB-19	–	–	*1.29	–	–	–	–
Number of wells with detections	0	1	1	0	0	1	0
Detection frequency (percent)	0	5	5	0	0	5	0
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Solvent		Gasoline				Organic synthesis	Detections per well	Any VOC
	1,2-Dichloroethane (1,2-DCA) (µg/L) (32103)	*trans*-1,2-Dichloroethene (*trans*-1,2-DCE) (µg/L) (34546)	Ethylbenzene (µg/L) (34371)	m-Xylene plus *p*-xylene (µg/L) (85795)	*tert*-Amyl alcohol (µg/L) (77073)	*tert*-Butyl alcohol (µg/L) (77035)	Vinyl chloride (µg/L) (39175)		
[LRL]	[0.10]	[0.018]	[0.02]	[0.08]	[0.6]	[1]	[0.08]		
Threshold type	MCL-US	MCL-CA	MCL-CA	MCL-CA	na	NL-CA	MCL-US		
Threshold (µg/L)	5	10	300	1,750	na	12	2		
CLAB Study Unit (55 grid wells sampled)—Continued									
Number of wells with detections	0	0	0	0	0	0	0		41
Detection frequency (percent)	0	0	0	0	0	0	0		75
Total Detections									118
CLAB Central Basin Study Area (21 grid wells sampled)—Continued									
CB-02	–	–	–	–	–	–	–	3	
CB-03	–	–	–	–	–	–	–	3	
CB-07	–	–	–	–	–	–	–	6	
CB-08	–	–	–	–	–	–	–	2	
CB-10	–	–	–	–	–	–	–	1	
CB-11	–	–	–	–	–	–	–	3	
CB-12	–	–	–	–	–	–	–	4	
CB-13	–	–	–	–	–	–	–	8	
CB-15	–	–	–	–	–	–	–	7	
CB-16	–	–	–	–	–	–	–	8	
CB-17	–	–	–	–	–	–	–	5	
CB-18	–	–	–	–	–	–	–	2	
CB-19	–	–	–	–	–	–	–	4	
Number of wells with detections	0	0	0	0	0	0	0		13
Detection frequency (percent)	0	0	0	0	0	0	0		62
Total Detections									56

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Trihalomethane	Solvent		Gasoline	Solvent	Organic synthesis	Trihalomethane
	Chloroform (Trichloromethane) (µg/L) (32106)	Trichloroethene (TCE) (µg/L) (39180)	Tetrachloroethene (PCE) (µg/L) (34475)	Methyl *tert*-butyl ether (MTBE) (µg/L) (78032)	*cis*-1,2-Dichloroethene (µg/L) (77093)	1,1-Dichloroethene (1,1-DCE) (µg/L) (34501)	Bromodichloromethane (µg/L) (32101)
[LRL]	[0.04]	[0.02]	[0.04]	[0.10]	[0.02]	[0.04]	[0.04]
Threshold type	MCL-US	MCL-US	MCL-US	MCL-CA	MCL-CA	MCL-CA	MCL-US
Threshold (µg/L)	80	5	5	13	6	7	80
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)							
OC-01	E 0.06	–	–	E 0.1	–	–	–
OC-02	E 0.05	–	–	0.1	–	–	–
OC-03	0.49	1.45	0.28	0.1	–	0.23	E 0.04
OC-04	0.49	E 0.03	–	–	E 0.02	0.28	E 0.08
OC-05	0.89	E 0.09	–	–	–	–	0.10
OC-06	0.35	–	–	–	–	E 0.05	E 0.07
OC-08	–	–	–	E 0.1	–	E 0.03	–
OC-10	–	–	–	–	–	–	–
OC-12	–	–	–	–	–	–	–
OC-13	E 0.02	–	E 0.04	E 0.1	–	–	–
OC-16	–	E 0.05	E 0.07	0.2	E 0.03	–	–
OC-17	E 0.05	–	0.14	0.1	–	–	–
OC-18	–	–	–	–	–	–	–
OC-20	E 0.01	–	–	–	–	–	–
OC-21	E 0.02	–	–	–	–	–	–
OC-22	E 0.14	–	–	–	–	–	E 0.07
OC-23	–	–	–	–	–	–	–
OC-24	E 0.08	E 0.05	–	–	–	–	–
Number of wells with detections	12	5	4	7	2	4	5
Detection frequency (percent)	50	21	17	29	8	17	21
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)							
WB-01	–	E 0.04	–	–	E 0.03	–	–
WB-02	–	–	–	–	E 0.05	–	–
WB-03	–	E 0.02	–	–	E 0.03	–	–
WB-04	–	–	–	–	–	–	–
WB-05	–	–	–	–	–	–	–
WB-06	–	–	–	–	–	–	–
WB-07	E 0.02	–	–	–	–	–	–
WB-08	–	–	–	–	–	–	–
WB-09	–	–	–	–	–	–	–
WB-10	–	–	–	–	E 0.02	–	–
Number of wells with detections	1	2	0	0	4	0	0
Detection frequency (percent)	10	20	0	0	40	0	0
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Solvent	Refrigerant	Solvent	Organic synthesis	Solvent	Gasoline	
	1,1-Dichloroethane (1,1-DCA) (µg/L) (34496)	Trichlorotrifluoroethane (CFC-113) (µg/L) (77652)	1,1,1-Trichloroethane (1,1,1-TCA) (µg/L) (34506)	Carbon disulfide (µg/L) (77041)	Dichloromethane (µg/L) (34423)	Diisopropyl ether (DIPE) (µg/L) (81577)	Toluene (µg/L) (34010)
[LRL]	[0.06]	[0.04]	[0.04]	[0.06]	[0.04]	[0.06]	[0.018]
Threshold type	MCL-CA	MCL-CA	MCL-US	NL-CA	MCL-US	na	MCL-CA
Threshold (µg/L)	5	1,200	200	160	5	na	150
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued							
OC-01	–	–	–	–	–	–	–
OC-02	–	E 0.09	–	–	–	–	–
OC-03	–	0.12	E 0.03	–	–	–	–
OC-04	–	–	–	–	–	–	–
OC-05	–	0.27	–	–	–	–	–
OC-06	–	E 0.05	–	–	–	–	–
OC-08	–	–	–	–	–	–	–
OC-10	–	–	–	–	–	–	E 0.01
OC-12	–	–	–	E 0.03	–	–	–
OC-13	–	–	–	–	–	–	–
OC-16	–	–	–	–	–	–	–
OC-17	–	–	–	–	–	–	–
OC-18	–	–	–	E 0.04	–	–	–
OC-20	–	–	–	–	–	–	–
OC-21	–	–	–	–	–	–	–
OC-22	–	–	–	–	–	–	–
OC-23	–	–	–	0.12	–	–	–
OC-24	–	–	–	–	–	–	–
Number of wells with detections	0	4	1	3	0	0	1
Detection frequency (percent)	0	17	4	13	0	0	4
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued							
WB-01	–	–	–	–	–	0.15	–
WB-02	–	–	–	–	E 0.03	–	–
WB-03	–	–	–	–	–	–	–
WB-04	–	–	–	0.17	–	–	–
WB-05	–	–	–	–	E 0.02	–	–
WB-06	–	–	–	–	–	–	–
WB-07	–	–	–	–	–	–	–
WB-08	–	–	–	–	–	0.13	–
WB-09	–	–	–	–	–	–	6.98
WB-10	–	–	–	–	–	–	–
Number of wells with detections	0	0	0	1	2	2	1
Detection frequency (percent)	0	0	0	10	20	20	10
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Gasoline	Trihalomethane	Solvent	Refrigerant	Gasoline	Gasoline	Refrigerant
	Benzene (µg/L) (34030)	Bromoform (Tribromomethane) (µg/L) (32104)	Carbon tetrachloride (Tetrachloromethane) (µg/L) (32102)	Dichlorodifluoromethane (CFC-12) (µg/L) (34668)	Naphthalene, (µg/L) (34696)	1,2,4-Trimethylbenzene (µg/L) (77222)	Trichlorofluoromethane (CFC-11) (µg/L) (34488)
[LRL]	[0.016]	[0.08]	[0.08]	[0.14]	[0.4]	[0.04]	[0.08]
Threshold type	MCL-CA	MCL-US	MCL-CA	HAL-US	HAL-US	NL-CA	MCL-CA
Threshold (µg/L)	1	80	0.5	1000	100	330	150
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued							
OC-01	–	–	–	–	–	–	–
OC-02	–	–	–	–	–	–	–
OC-03	–	–	–	–	–	–	–
OC-04	–	–	–	–	–	–	–
OC-05	–	–	–	–	–	–	–
OC-06	–	–	–	–	–	–	–
OC-08	–	–	–	–	–	–	0.15
OC-10	–	–	–	–	–	–	–
OC-12	–	–	–	–	–	–	–
OC-13	–	–	–	–	–	–	–
OC-16	–	–	–	–	–	–	–
OC-17	–	–	–	E 0.04	–	–	–
OC-18	–	–	–	–	–	–	–
OC-20	–	–	–	–	–	–	–
OC-21	–	–	–	–	–	–	–
OC-22	–	–	–	–	–	–	–
OC-23	–	–	–	–	–	–	–
OC-24	–	–	–	–	–	–	–
Number of wells with detections	0	0	0	1	0	0	1
Detection frequency (percent)	0	0	0	4	0	0	4
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued							
WB-01	–	–	–	–	–	–	–
WB-02	–	–	–	–	–	–	–
WB-03	–	–	–	–	–	–	–
WB-04	–	–	–	–	–	–	–
WB-05	–	–	–	–	–	–	–
WB-06	E 0.02	–	–	–	–	–	–
WB-07	–	–	–	–	E 0.4	–	–
WB-08	–	–	–	–	–	–	–
WB-09	–	–	–	–	–	–	–
WB-10	–	–	–	–	–	–	–
Number of wells with detections	1	0	0	0	1	0	0
Detection frequency (percent)	10	0	0	0	10	0	0
Total Detections							

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Solvent		Gasoline				Organic synthesis	Detections per well	Any VOC
	1,2-Dichloroethane (1,2-DCA) (µg/L) (32103)	*trans*-1,2-Dichloroethene (*trans*-1,2-DCE) (µg/L) (34546)	Ethylbenzene (µg/L) (34371)	*m*-Xylene plus *p*-xylene (µg/L) (85795)	*tert*-Amyl alcohol (µg/L) (77073)	*tert*-Butyl alcohol (µg/L) (77035)	Vinyl chloride (µg/L) (39175)		
[LRL]	[0.10]	[0.018]	[0.02]	[0.08]	[0.6]	[1]	[0.08]		
Threshold type	MCL-US	MCL-CA	MCL-CA	MCL-CA	na	NL-CA	MCL-US		
Threshold (µg/L)	5	10	300	1,750	na	12	2		
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued									
OC-01	–	–	–	–	–	–	–	2	
OC-02	–	–	–	–	–	–	–	3	
OC-03	–	–	–	–	–	–	–	8	
OC-04	–	–	–	–	–	–	–	5	
OC-05	–	–	–	–	–	–	–	4	
OC-06	–	–	–	–	–	–	–	4	
OC-08	–	–	–	–	–	–	–	3	
OC-10	–	–	–	–	–	–	–	1	
OC-12	–	–	–	–	–	–	–	1	
OC-13	–	–	–	–	–	–	–	3	
OC-16	–	–	–	–	–	–	–	4	
OC-17	–	–	–	–	–	–	–	4	
OC-18	–	–	–	–	–	–	–	1	
OC-20	–	–	–	–	–	–	–	1	
OC-21	–	–	–	–	–	–	–	1	
OC-22	–	–	–	–	–	–	–	2	
OC-23	–	–	–	–	–	–	–	1	
OC-24	–	–	–	–	–	–	–	2	
Number of wells with detections	0	0	0	0	0	0	0		18
Detection frequency (percent)	0	0	0	0	0	0	0		75
Total Detections									50
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued									
WB-01	–	–	–	–	–	–	–	3	
WB-02	–	–	–	–	–	–	–	2	
WB-03	–	–	–	–	–	–	–	2	
WB-04	–	–	–	–	–	–	–	1	
WB-05	–	–	–	–	–	–	–	1	
WB-06	–	–	–	–	–	–	–	1	
WB-07	–	–	–	–	–	–	–	2	
WB-08	–	–	–	–	–	–	–	1	
WB-09	–	–	–	–	–	–	–	1	
WB-10	–	–	–	–	–	–	–	1	
Number of wells with detections	0	0	0	0	0	0	0		10
Detection frequency (percent)	0	0	0	0	0	0	0		100
Total Detections									15

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Trihalomethane	Solvent	Solvent	Gasoline	Solvent	Organic synthesis	Trihalomethane
	Chloroform (Trichloromethane) (µg/L) (32106)	Trichloroethene (TCE) (µg/L) (39180)	Tetrachloroethene (PCE) (µg/L) (34475)	Methyl *tert*-butyl ether (MTBE) (µg/L) (78032)	*cis*-1,2-Dichloroethene (µg/L) (77093)	1,1-Dichloroethene (1,1-DCE) (µg/L) (34501)	Bromodichloromethane (µg/L) (32101)
[LRL]	[0.04]	[0.02]	[0.04]	[0.10]	[0.02]	[0.04]	[0.04]
Threshold type	MCL-US	MCL-US	MCL-US	MCL-CA	MCL-CA	MCL-CA	MCL-US
Threshold (µg/L)	80	5	5	13	6	7	80
CLAB Understanding wells[1] (14 wells sampled)							
DA-01	0.49	–	–	–	–	E 0.03	–
DA-02	12.2	*24.8	*13.2	E 0.1	0.57	2.17	0.1
DA-04	0.78	–	–	–	–	–	E 0.07
DA-05	–	–	–	–	0.12	–	–
DA-06	–	–	–	–	–	–	–
U-02	–	E 0.05	E 0.02	E 0.1	–	–	–
U-03	0.12	1.21	2.24	0.1	E 0.07	E 0.07	–
U-04	E 0.02	–	–	–	–	–	–
U-06	0.39	–	0.48	E 0.1	–	–	E 0.03
U-07	–	*13.2	0.17	–	3.12	0.11	–

GAMA identification No.	Solvent	Refrigerant	Solvent	Organic synthesis	Solvent	Gasoline	
	1,1-Dichloroethane (1,1-DCA) (µg/L) (34496)	Trichlorotrifluoroethane (CFC-113) (µg/L) (77652)	1,1,1-Trichloroethane (1,1,1-TCA) (µg/L) (34506)	Carbon disulfide (µg/L) (77041)	Dichloromethane (µg/L) (34423)	Diisopropyl ether (DIPE) (µg/L) (81577)	Toluene (µg/L) (34010)
[LRL]	[0.06]	[0.04]	[0.04]	[0.06]	[0.04]	[0.06]	[0.018]
Threshold type	MCL-CA	MCL-CA	MCL-US	NL-CA	MCL-US	na	MCL-CA
Threshold (µg/L)	5	1,200	200	160	5	na	150
CLAB Understanding wells[1] (14 wells sampled)—Continued							
DA-01	E 0.09	–	E 0.04	–	–	–	E 0.01
DA-02	0.28	0.34	–	–	–	–	–
DA-04	–	–	E 0.02	–	–	–	–
DA-05	–	–	–	–	–	–	E 0.04
DA-06	–	–	–	–	–	–	–
U-02	E 0.05	–	–	–	–	–	–
U-03	E 0.05	–	–	–	–	–	–
U-04	–	0.23	–	–	–	–	–
U-06	–	–	–	–	–	–	–
U-07	E 0.08	–	–	–	–	0.24	–

Table 5. Volatile organic compounds (VOCs), and gasoline oxygenates and degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in tables 3A and 3B. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory Level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level; NL-CA, California notification level. The MCL-US threshold for trihalomethanes is for the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane. The MCL-CA thresholds for Xylenes is for the sum of *m*- and *p*-Xylene and *o*-Xylene. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; –, not detected; µg/L, microgram per liter; percentage values are detection frequencies]

GAMA identification No.	Gasoline	Trihalomethane	Solvent	Refrigerant	Gasoline		Refrigerant
	Benzene (µg/L) (34030)	Bromoform (Tribromomethane) (µg/L) (32104)	Carbon tetrachloride (Tetrachloromethane) (µg/L) (32102)	Dichlorodifluoromethane (CFC-12) (µg/L) (34668)	Naphthalene, (µg/L) (34696)	1,2,4-Trimethylbenzene (µg/L) (77222)	Trichlorofluoromethane (CFC-11) (µg/L) (34488)
[LRL]	[0.016]	[0.08]	[0.08]	[0.14]	[0.4]	[0.04]	[0.08]
Threshold type	MCL-CA	MCL-US	MCL-CA	HAL-US	HAL-US	NL-CA	MCL-CA
Threshold (µg/L)	1	80	0.5	1,000	100	330	150
CLAB Understanding wells[1] (14 wells sampled)—Continued							
DA-01	–	–	0.14	–	–	–	–
DA-02	–	–	0.32	E 0.28	–	–	0.1
DA-04	–	–	0.18	–	–	–	–
DA-05	–	–	–	–	–	E 0.06	–
DA-06	–	–	–	–	–	–	–
U-02	–	–	–	–	–	–	–
U-03	–	–	–	–	–	–	–
U-04	–	–	–	–	–	–	–
U-06	–	–	E 0.03	E .05	–	–	–
U-07	–	–	–	–	–	–	–

GAMA identification No.	Solvent		Gasoline				Organic synthesis	Detections per well	Any VOC
	1,2-Dichloroethane (1,2-DCA) (µg/L) (32103)	*trans*-1,2-Dichloroethene (*trans*-1,2-DCE) (µg/L) (34546)	Ethylbenzene (µg/L) (34371)	*m*-Xylene plus *p*-xylene (µg/L) (85795)	*tert*-Amyl alcohol (µg/L) (77073)	*tert*-Butyl alcohol (µg/L) (77035)	Vinyl chloride (µg/L) (39175)		
[LRL]	[0.10]	[0.018]	[0.02]	[0.08]	[0.6]	[1]	[0.08]		
Threshold type	MCL-US	MCL-CA	MCL-CA	MCL-CA	na	NL-CA	MCL-US		
Threshold (µg/L)	5	10	300	1,750	na	12	2		
CLAB Understanding wells[1] (14 wells sampled)—Continued									
DA-01	–	–		–	–	–	–	6	
DA-02	–	E 0.03	–	–	–	–	–	13	
DA-04	–	–	–	–	–	–	–	4	
DA-05	–	–	E 0.04	E 0.13	–	–	–	5	
DA-06	–	–	–	–	E 0.2	E 1.15	–	2	
U-02	–	–	–	–	–	–	–	4	
U-03	–	–	–	–	–	–	–	7	
U-04	–	–	–	–	–	–	–	2	
U-06	–	–	–	–	–	–	–	6	
U-07	0.3	E 0.09	–	–	–	–	E 0.1	9	

[*] Value exceeds threshold.

[1] Understanding wells were not included in statistical calculations.

Table 6. Pesticides and pesticide degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs values as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3C. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; µg/L, microgram per liter; na, not available; –, not detected; Analytes are ordered by frequency of detection]

GAMA identification No.	Deethyl-atrazine (µg/L) (04040)	Atrazine (µg/L) (39632)	Simazine (µg/L) (04035)	3,4-Dichloro-aniline (µg/L) (61625)	Prometon (µg/L) (04037)	Tebuthiuron (µg/L) (82670)	Metalaxyl (µg/L) (61596)	Hexazinone (µg/L) (04025)
[LRL]	[0.014]	[0.007]	[0.006]	[0.0045]	[0.01]	[0.016]	[0.0069]	[0.026]
Threshold type[1]	na	MCL-CA	MCL-US	na	HAL-US	HAL-US	na	HAL-US
Threshold (µg/L)	na	1	4	na	100	500	na	400
CLAB Study Unit (55 grid wells sampled)								
Number of wells with detections	19	19	15	8	7	6	4	3
Detection frequency (percent)	35	35	27	15	13	11	7	5
Total Detections								
CLAB Central Basin Study Area (21 grid wells sampled)								
CB-02	E 0.013	0.013	–	–	–	–	–	–
CB-03	E 0.008	0.019	0.076	E 0.021	0.02	0.03	0.010	–
CB-07	E 0.017	0.049	E 0.006	–	–	–	–	–
CB-08	E 0.007	E 0.004	–	–	–	–	–	–
CB-10	E 0.006	E 0.004	–	–	–	–	–	–
CB-11	E 0.042	0.164	0.026	–	–	–	–	–
CB-12	E 0.008	0.009	E 0.004	E 0.006	–	–	–	–
CB-13	E 0.027	0.183	0.117	E 0.005	–	–	E 0.006	–
CB-15	E 0.038	0.247	0.261	E 0.005	–	0.02	E 0.006	–
CB-16	E 0.025	0.018	–	–	–	–	–	–
CB-17	E 0.051	0.045	0.021	E 0.005	–	–	–	–
Number of wells with detections	11	11	7	5	1	2	3	0
Detection frequency (percent)	52	52	33	24	5	10	14	0
Total Detections								44
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)								
OC-02	E 0.015	0.046	0.063	–	–	E 0.02	–	E 0.013
OC-03	E 0.019	0.041	0.08	–	E 0.01	0.02	–	–
OC-04	E 0.006	E 0.004	–	–	–	–	–	–
OC-05	E 0.007	E 0.004	–	–	–	–	–	–
OC-08	–	–	–	–	–	–	–	–
OC-13	E 0.011	0.059	0.268	E 0.024	0.01	E 0.01	–	E 0.016
OC-17	E 0.01	0.019	0.191	E 0.017	0.01	0.02	–	E 0.009
OC-20	E 0.006	E 0.005	0.158	E 0.01	0.01	–	–	–
OC-24	E 0.008	0.008	E 0.006	–	–	–	–	–
Number of wells with detections	8	8	6	3	4	4	0	3
Detection frequency (percent)	33	33	25	12	17	17	0	12
Total Detections								

Table 6. Pesticides and pesticide degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs values as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3C. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; µg/L, microgram per liter; na, not available; –, not detected; Analytes are ordered by frequency of detection]

GAMA identification No.	Deethyl-atrazine (µg/L) (04040)	Atrazine (µg/L) (39632)	Simazine (µg/L) (04035)	3,4-Dichloro-aniline (µg/L) (61625)	Prometon (µg/L) (04037)	Tebuthiuron (µg/L) (82670)	Metalaxyl (µg/L) (61596)	Hexazinone (µg/L) (04025)
[LRL]	[0.014]	[0.007]	[0.006]	[0.0045]	[0.01]	[0.016]	[0.0069]	[0.026]
Threshold type[1]	na	MCL-CA	MCL-US	na	HAL-US	HAL-US	na	HAL-US
Threshold (µg/L)	na	1	4	na	100	500	na	400
CLAB West Coast Basin Study Area (10 grid wells sampled)								
WB-01	–	–	0.013	–	E 0.01	–	–	–
WB-04	–	–	E 0.007	–	–	–	–	–
WB-10	–	–	–	–	0.01	–	E 0.007	–
Number of wells with detections	0	0	2	0	2	0	1	0
Detection frequency (percent)	0	0	20	0	20	0	10	0
Total Detections								
CLAB Understanding wells[1] (14 wells sampled)								
U-01	–	–	–	–	–	–	–	–
U-02	E 0.019	0.104	0.045	–	–	–	0.008	–
U-03	E 0.018	0.020	0.060	E 0.012	0.01	–	–	E 0.010
U-06	E 0.007	–	E 0.008	–	–	–	–	–
U-07	–	E 0.008	–	–	–	–	–	–

Table 6. Pesticides and pesticide degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs values as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3C. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; µg/L, microgram per liter; na, not available; –, not detected; Analytes are ordered by frequency of detection]

GAMA identification No.	Desulfinyl fipronil (µg/L) (62170)	Fipronil (µg/L) (62166)	Dichlorvos (µg/L) (38775)	Fipronil sulfone (µg/L) (62168)	Metolachlor (µg/L) (39415)	Fipronil sulfide (µg/L) (62167)	Detections per well	Any pesticide
[LRL]	**[0.012]**	**[0.016]**	**[0.013]**	**[0.024]**	**[0.010]**	**[0.013]**		
Threshold type[1]	**na**	**na**	**na**	**na**	**HAL-US**	**na**		
Threshold (µg/L)	**na**	**na**	**na**	**na**	**100**	**na**		
CLAB Study Unit (55 grid wells sampled)								
Number of wells with detections	2	2	1	1	1	0		23
Detection frequency (percent)	4	4	2	2	2	0		42
Total Detections								88
CLAB Central Basin Study Area (21 grid wells sampled)								
CB-02	–	–	–	–	–	–	2	
CB-03	E 0.005	E 0.007	–	E 0.007	E 0.006	–	11	
CB-07	–	–	–	–	–	–	3	
CB-08	–	–	–	–	–	–	2	
CB-10	–	–	–	–	–	–	2	
CB-11	–	–	–	–	–	–	3	
CB-12	–	–	–	–	–	–	4	
CB-13	–	–	–	–	–	–	5	
CB-15	–	–	–	–	–	–	6	
CB-16	–	–	–	–	–	–	2	
CB-17	–	–	–	–	–	–	4	
Number of wells with detections	1	1	0	1	1	0		11
Detection frequency (percent)	5	5	0	5	5	0		52
Total Detections								44
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)								
OC-02	–	–	–	–	–	–	5	
OC-03	–	–	–	–	–	–	5	
OC-04	–	–	–	–	–	–	2	
OC-05	–	–	–	–	–	–	2	
OC-08	–	–	E 0.01	–	–	–	1	
OC-13	–	–	–	–	–	–	7	
OC-17	–	–	–	–	–	–	7	
OC-20	E 0.006	E 0.007	–	–	–	–	7	
OC-24	–	–	–	–	–	–	3	
Number of wells with detections	1	1	1	0	0	0		9
Detection frequency (percent)	4	4	4	0	0	0		38
Total Detections								39

Table 6. Pesticides and pesticide degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs values as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3C. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA; California Department of Public Health maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; µg/L, microgram per liter; na, not available; –, not detected; Analytes are ordered by frequency of detection]

GAMA identification No.	Desulfinyl fipronil (µg/L) (62170)	Fipronil (µg/L) (62166)	Dichlorvos (µg/L) (38775)	Fipronil sulfone (µg/L) (62168)	Metolachlor (µg/L) (39415)	Fipronil sulfide (µg/L) (62167)	Detections per well	Any pesticide
[LRL]	**[0.012]**	**[0.016]**	**[0.013]**	**[0.024]**	**[0.010]**	**[0.013]**		
Threshold type[1]	**na**	**na**	**na**	**na**	**HAL-US**	**na**		
Threshold (µg/L)	**na**	**na**	**na**	**na**	**100**	**na**		
CLAB West Coast Basin Study Area (10 grid wells sampled)								
WB-01	–	–	–	–	–	–	2	
WB-04	–	–	–	–	–	–	1	
WB-10	–	–	–	–	–	–	2	
Number of wells with detections	0	0	0	0	0	0		3
Detection frequency (percent)	0	0	0	0	0	0		30
Total Detections								5
CLAB Understanding wells[1] (14 wells sampled)								
U-01	–	–	–	–	E 0.004	–	1	
U-02	–	–	–	–	–	–	5	
U-03	E 0.006	E 0.007	–	–	–	E 0.009	12	
U-06	–	–	–	–	–	–	2	
U-07	–	–	–	–	–	–	2	

[1]Understanding wells were not included in statistical calculations.

Table 7. Polar pesticides and pesticide degradates detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from 17 slow and intermediate wells were analyzed, but only samples with detections are listed. All analytes are listed in table 3D. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Diuron (µg/L) (49300)	Norflurazon (µg/L) (49293)	3-(4-Chlorophenyl)-1-methyl urea (µg/L) (61692)	Deisopropyl atrazine (2-chloro-6-ethylamino-4-amino-*s*-triazine) (µg/L) (04038)	Diphenamid (µg/L) (04033)
[LRL]	[0.04]	[0.04]	[0.06]	[0.08]	[0.04]
Threshold type	HAL-US	na	na	na	HAL-US
Threshold (µg/L)	10	na	na	na	200
CLAB Grid Wells (7 wells sampled)					
CB-03	0.19	0.07	E 0.02	–	–
OC-20	0.15	0.02	–	E 0.01	–
CLAB Understanding wells (10 wells sampled)					
U-02	–	–	–	–	E 0.01
U-03	E 0.16	E 0.02	–	–	–
U-07	–	–	–	–	E 0.01

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Camphor (µg/L) (62817)	Bis(2-ethylhexyl) phthalate (µg/L) (39100)	5-Methyl-1H-benzotriazole (µg/L) (61944)	Tris(2-butoxyethyl) phosphate (µg/L) (62830)	3,4-Dichlorophenyl isocyanate (µg/L) (63145)	1-Methyl-naphthalene (µg/L) (81696)	2-Methyl-naphthalene (µg/L) (30194)
[IRL]	[0.2]	[2]	[1.6]	[0.2]	[2]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na
Threshold (µg/L)	na	na	na	na	na	na	na
CLAB Study Unit (55 grid wells sampled)							
Number of wells with detections	6	5	4	4	2	2	2
Detection frequency (percent)	11	9	7	7	4	4	4
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)							
CB-03	–	–	–	0.4	E 1.9	–	–
CB-05	–	–	–	0.4	–	–	–
CB-07	–	–	–	–	–	–	–
CB-08	E 0.009	–	–	–	–	–	–
CB-11	–	–	–	–	–	–	–
CB-19	–	E 0.8	–	–	–	–	–
Number of wells with detections	1	1	0	2	1	0	0
Detection frequency (percent)	5	5	0	10	5	0	0
Total Detections							
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)							
OC-03	na	–	–	–	–	–	na
OC-04	E 0.007	–	–	–	–	–	–
OC-05	E 0.008	–	–	–	–	–	–
OC-06	E 0.012	–	–	–	–	–	–
OC-07	E 0.007	–	–	–	–	–	–
OC-08	E 0.009	–	–	–	–	–	–
OC-10	–	–	–	–	–	–	–
OC-19	–	–	8	–	na	–	–
OC-20	–	–	–	E 0.04	E 0.50	–	–
OC-21	–	E 2	–	–	–	–	–
OC-23	–	E 0.3	–	–	–	–	–
Number of wells with detections	5	2	1	1	1	0	0
Detection frequency (percent)	21	8	4	4	4	0	0
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)							
WB-03	–	3	4	–	na	–	–
WB-04	–	–	–	–	–	–	–
WB-05	–	–	E 0.4	–	–	–	–
WB-06	–	–	–	–	–	E 0.02	E 0.02
WB-07	–	–	–	–	–	E 1.8	E 2.4
WB-08	–	5	–	E 0.9	–	–	–
WB-09	–	–	E 1	–	–	–	–
Number of wells with detections	0	2	3	1	0	2	2
Detection frequency (percent)	0	20	30	10	0	20	20
Total Detections							

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	3-β-Coprostanol, (µg/L) (62806)	4-Cumylphenol, (µg/L) (62808)	4-Nonylphenol, (µg/L) (62829)	Acetyl hexamethyl tetrahydro naphthalene (AHTN) (µg/L) (62812)	Cholesterol, (µg/L) (62818)	DEET, (µg/L) (61947)	Fluoranthene, (µg/L) (34376)
[IRL]	[0.8]	[0.2]	[1.6]	[0.2]	[0.8]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na
Threshold (µg/L)	na	na	na	na	na	na	na
CLAB Study Unit (55 grid wells sampled)—Continued							
Number of wells with detections	2	2	2	2	2	2	2
Detection frequency (percent)	4	4	4	4	4	4	4
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)—Continued							
CB-03	–	–	–	E 0.1	–	–	–
CB-05	–	–	–	–	–	–	–
CB-07	–	E 0.01	–	–	–	–	–
CB-08	–	–	–	–	–	–	–
CB-11	–	–	–	–	–	–	–
CB-19	–	–	–	–	–	–	–
Number of wells with detections	0	1	0	1	0	0	0
Detection frequency (percent)	0	5	0	5	0	0	0
Total Detections							
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued							
OC-03	–	E 0.01	–	–	–	–	–
OC-04	–	–	–	–	–	–	–
OC-05	–	–	–	–	–	–	–
OC-06	–	–	–	–	–	–	–
OC-07	–	–	–	–	–	–	–
OC-08	–	–	–	–	–	–	–
OC-10	–	–	E 0.1	–	–	–	E 0.003
OC-19	–	–	–	–	–	–	–
OC-20	–	–	–	E 0.03	–	–	–
OC-21	–	–	–	–	–	–	–
OC-23	–	–	–	–	–	–	–
Number of wells with detections	0	1	1	1	0	0	1
Detection frequency (percent)	0	4	4	4	0	0	4
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued							
WB-03	–	–	–	–	–	–	–
WB-04	E 0.4	–	–	–	E 0.4	E 0.01	–
WB-05	–	–	–	–	–	–	–
WB-06	–	–	–	–	–	–	–
WB-07	E 1	–	E 0.8	–	E 1	E 0.04	E 0.02
WB-08	–	–	–	–	–	–	–
WB-09	–	–	–	–	–	–	–
Number of wells with detections	2	0	1	1	2	2	1
Detection frequency (percent)	20	0	10	10	20	20	10
Total Detections							

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Hexahydro-hexamethylcyclo-pentabenzopyran (HHCB), (µg/L) (62823)	Metolachlor, (µg/L) (82612)	Tris (dichloro-isopropyl) phosphate, (µg/L) (61707)	4-Octylphenol diethoxylates, (µg/L) (61705)	*d*-Limonene, (µg/L) (62819)	2,6-Dimethyl-naphthalene, (µg/L) (62805)	Benzophenone, (µg/L) (62814)
[IRL]	[0.2]	[0.2]	[0.2]	[0.32]	[0.2]	[0.2]	[0.2]
Threshold type	na	HAL-US	na	na	na	na	na
Threshold (µg/L)	na	700	na	na	na	na	na
CLAB Study Unit (55 grid wells sampled)—Continued							
Number of wells with detections	2	2	2	1	1	1	1
Detection frequency (percent)	4	4	4	2	2	2	2
Total Detections							
CLAB Central Basin Study Area (21 grid wells sampled)—Continued							
CB-03	–	–	–	–	–	–	–
CB-05	–	E 0.02	E 0.04	–	–	–	–
CB-07	–	–	–	–	–	–	–
CB-08	–	–	–	–	–	–	–
CB-11	–	–	–	–	E 0.01	–	–
CB-19	–	–	–	–	–	–	–
Number of wells with detections	0	1	1	0	1	0	0
Detection frequency (percent)	0	5	5	0	5	0	0
Total Detections							
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued							
OC-03	–	–	–	–	na	–	–
OC-04	–	–	–	–	–	–	–
OC-05	–	–	–	–	–	–	–
OC-06	–	–	–	–	–	–	–
OC-07	–	–	–	–	–	–	–
OC-08	–	–	–	–	–	–	–
OC-10	–	E 0.02	–	–	–	–	–
OC-19	–	–	–	–	–	–	–
OC-20	E 0.03	–	E 0.1	–	–	–	–
OC-21	–	–	–	–	–	–	–
OC-23	–	–	–	–	–	–	–
Number of wells with detections	1	1	1	0	0	0	0
Detection frequency (percent)	4	4	4	0	0	0	0
Total Detections							
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued							
WB-03	–	–	–	–	–	–	–
WB-04	–	–	–	–	–	–	E 0.03
WB-05	–	–	–	–	–	–	–
WB-06	–	–	–	–	–	–	–
WB-07	E 0.03	–	–	E 0.4	–	E 0.5	–
WB-08	–	–	–	–	–	–	–
WB-09	–	–	–	–	–	–	–
Number of wells with detections	0	0	0	1	0	1	1
Detection frequency (percent)	0	0	0	10	0	10	10
Total Detections							

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Bisphenol A, (µg/L) (62816)	4-Nonylphenol diethoxylates, (µg/L) (61703)	Diethyl phthalate, (µg/L) (34336)	Nonylphenol mono-ethoxylates, (µg/L) (61704)	Indole, (µg/L) (62824)	Methyl salicylate, (µg/L) (62828)	*p*-Cresol, (µg/L) (77146)	Phenol, (µg/L) (34694)	Prometon, (µg/L) (39056)
[IRL]	[0.4]	[3.2]	[0.2]	[2]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na	HAL-US	HAL-US
Threshold (µg/L)	na	na	na	na	na	na	na	2000	100
CLAB Study Unit (55 grid wells sampled)—Continued									
Number of wells with detections	1	1	1	1	1	1	1	1	1
Detection frequency (percent)	2	2	2	2	2	2	2	2	2
Total Detections									
CLAB Central Basin Study Area (21 grid wells sampled)—Continued									
CB-03	–	–	–	–	–	–	–	–	–
CB-05	–	–	–	–	–	–	–	–	–
CB-07	–	–	–	–	–	–	–	–	–
CB-08	–	–	–	–	–	–	–	–	–
CB-11	–	–	–	–	–	–	–	–	–
CB-19	–	–	–	–	–	–	–	–	–
Number of wells with detections	0	0	0	0	0	0	0	0	0
Detection frequency (percent)	0	0	0	0	0	0	0	0	0
Total Detections									
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued									
OC-03	–	–	–	–	na	na	na	na	–
OC-04	–	–	–	–	–	–	–	–	–
OC-05	–	–	–	–	–	–	–	–	–
OC-06	–	–	–	–	–	–	–	–	–
OC-07	–	–	–	–	–	–	–	–	–
OC-08	–	–	–	–	–	–	–	–	–
OC-10	–	–	–	–	–	–	–	–	–
OC-19	–	–	–	–	–	–	–	–	–
OC-20	–	–	–	–	–	–	–	–	E 0.04
OC-21	–	–	–	–	–	–	–	–	–
OC-23	–	–	–	–	–	–	–	–	–
Number of wells with detections	0	0	0	0	0	0	0	0	1
Detection frequency (percent)	0	0	0	0	0	0	0	0	4
Total Detections									
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued									
WB-03	E 0.1	–	–	–	–	–	–	–	–
WB-04	–	E 1	–	E 0.1	–	–	–	–	–
WB-05	–	–	–	–	–	E 0.04	–	–	–
WB-06	–	–	–	–	–	–	–	–	–
WB-07	–	–	–	–	–	–	–	–	–
WB-08	–	–	–	–	E 0.04	–	E 0.1	–	–
WB-09	–	–	E 0.1	–	–	–	–	E 0.1	–
Number of wells with detections	1	1	1	1	1	1	1	1	0
Detection frequency (percent)	10	10	10	10	10	10	10	10	0
Total Detections									

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Pyrene, (µg/L) (34469)	Tributyl phosphate, (µg/L) (62832)	Triclosan, (µg/L) (61708)	Triphenyl phosphate, (µg/L) (62834)	Tris(2-chloroethyl) phosphate, (µg/L) (62831)	Detections per well	Any potenital waste-water indicator
[IRL]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]		
Threshold type	na	na	na	na	na		
Threshold (µg/L)	na	na	na	na	na		
CLAB Study Unit (55 grid wells sampled)—Continued							
Number of wells with detections	1	1	1	1	0		24
Detection frequency (percent)	2	2	2	2	0		44
Total Detections							62
CLAB Central Basin Study Area (21 grid wells sampled)—Continued							
CB-03	–	–	–	–	–	3	
CB-05	–	–	–	E 0.03	–	4	
CB-07	–	–	–	–	–	1	
CB-08	–	–	–	–	–	1	
CB-11	–	–	–	–	–	1	
CB-19	–	–	–	–	–	1	
Number of wells with detections	0	0	0	1	0		6
Detection frequency (percent)	0	0	0	5	0		29
Total Detections							11
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)—Continued							
OC-03	–	–	–	–	–	1	
OC-04	–	–	–	–	–	1	
OC-05	–	–	–	–	–	1	
OC-06	–	–	–	–	–	1	
OC-07	–	–	–	–	–	1	
OC-08	–	–	–	–	–	1	
OC-10	E 0.003	–	–	–	–	4	
OC-19	–	–	–	–	–	1	
OC-20	–	E 0.1	–	–	–	7	
OC-21	–	–	–	–	–	1	
OC-23	–	–	–	–	–	1	
Number of wells with detections	1	1	0	0	0		11
Detection frequency (percent)	4	4	0	0	0		46
Total Detections							20
CLAB West Coast Basin Study Area (10 grid wells sampled)—Continued							
WB-03	–	–	–	–	–	3	
WB-04	–	–	–	–	–	6	
WB-05	–	–	–	–	–	2	
WB-06	–	–	–	–	–	2	
WB-07	–	–	E 0.1	–	–	11	
WB-08	–	–	–	–	–	4	
WB-09	–	–	–	–	–	3	
Number of wells with detections	0	0	1	0	0		7
Detection frequency (percent)	0	0	10	0	0		70
Total Detections							31

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Camphor, (µg/L) (62817)	Bis(2-ethylhexyl) phthalate (µg/L) (39100)	5-Methyl-1H-benzotriazole (µg/L) (61944)	Tris(2-butoxyethyl) phosphate (µg/L) (62830)	3,4-Dichlorophenyl isocyanate (µg/L) (63145)	1-Methyl-naphthalene (µg/L) (81696)	2-Methyl-naphthalene (µg/L) (30194)
[IRL]	[0.2]	[2]	[1.6]	[0.2]	[2]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na
Threshold (µg/L)	na	na	na	na	na	na	na
CLAB Understanding wells[1] (14 wells sampled)							
DA-05	–	–	–	–	–	–	–
U-03	–	–	E 1	E 0.1	E 0.28	–	–
U-06	–	–	–	–	–	–	–
U-07	–	4	–	–	–	–	–
U-08	–	–	2	–	–	–	–

GAMA identification No.	3-β-Coprostanol, (µg/L) (62806)	4-Cumylphenol, (µg/L) (62808)	4-Nonylphenol, (µg/L) (62829)	Acetyl hexamethyl tetrahydro naphthalene (AHTN) (µg/L) (62812)	Cholesterol (µg/L) (62818)	DEET (µg/L) (61947)	Fluoranthene (µg/L) (34376)
[IRL]	[0.8]	[0.2]	[1.6]	[0.2]	[0.8]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na
Threshold (µg/L)	na	na	na	na	na	na	na
CLAB Understanding wells[1] (14 wells sampled)—Continued							
DA-05	–	–	–	–	–	–	–
U-03	–	–	–	E 0.03	–	E 0.01	–
U-06	–	–	–	–	–	–	–
U-07	–	–	–	–	–	–	–
U-08	–	–	–	–	–	–	–

GAMA identification No.	Hexahydro-hexamethylcyclo-pentabenzopyran (HHCB) (µg/L) (62823)	Metolachlor (µg/L) (82612)	Tris (dichloro-isopropyl) phosphate (µg/L) (61707)	4-Octylphenol diethoxylates (µg/L) (61705)	*d*-Limonene (µg/L) (62819)	2,6-Dimethyl-naphthalene (µg/L) (62805)	Benzophenone (µg/L) (62814)
[IRL]	[0.2]	[0.2]	[0.2]	[0.32]	[0.2]	[0.2]	[0.2]
Threshold type	na	HAL-US	na	na	na	na	na
Threshold (µg/L)	na	700	na	na	na	na	na
CLAB Understanding wells[1] (14 wells sampled)—Continued							
DA-05	–	–	–	–	–	–	–
U-03	E 0.04	–	E 0.1	–	–	–	E 0.03
U-06	–	–	–	–	–	–	–
U-07	–	–	–	–	–	–	–
U-08	–	–	–	–	–	–	–

Table 8. Potential wastewater indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and IRLs as of November 16, 2006. Samples from all 69 wells were analyzed, but only samples with detections are listed. Analytes are listed in order of decreasing detection frequency in the 55 grid wells. All analytes are listed in table 3E. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, U.S. Environmental Protection Agency Lifetime Health Advisory. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; IRL, interim reporting limit; µg/L, microgram per liter; na, not available; –, not detected]

GAMA identification No.	Bisphenol A, (µg/L) (62816)	4-Nonylphenol diethoxylates (µg/L) (61703)	Diethyl phthalate, (µg/L) (34336)	Nonylphenol mono-ethoxylates, (µg/L) (61704)	Indole (µg/L) (62824)	Methyl salicylate, (µg/L) (62828)	*p*-Cresol, (µg/L) (77146)	Phenol (µg/L) (34694)	Prometon, (µg/L) (39056)
[IRL]	[0.4]	[3.2]	[0.2]	[2]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]
Threshold type	na	na	na	na	na	na	na	HAL-US	HAL-US
Threshold (µg/L)	na	na	na	na	na	na	na	2000	100
CLAB Understanding wells[1] (14 wells sampled)—Continued									
DA-05	–	–	–	–	–	–	–	E 0.1	–
U-03	–	–	–	–	–	E 0.03	–	–	E 0.04
U-06	–	–	–	–	–	–	–	E 0.1	–
U-07	–	–	–	–	–	–	–	–	–
U-08	E 0.1	–	–	–	–	–	–	–	–

GAMA identification No.	Pyrene, (µg/L) (34469)	Tributyl phosphate, (µg/L) (62832)	Triclosan, (µg/L) (61708)	Triphenyl phosphate, (µg/L) (62834)	Tris (2-chloroethyl) phosphate, (µg/L) (62831)	Detections per well	Any potenital waste-water indicator
[IRL]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]		
Threshold type	na	na	na	na	na		
Threshold (µg/L)	na	na	na	na	na		
CLAB Understanding wells[1] (14 wells sampled)—Continued							
DA-05	–	–	–	–	–	1	
U-03	–	E 0.1	–	–	E 0.05	14	
U-06	–	–	–	–	–	1	
U-07	–	–	–	–	–	1	
U-08	–	–	–	–	–	2	

[1] Understanding wells were not included in statistical calculations.

[*] Values exceed regulatory threshold.

Table 9. Results of analyses for the constituents of special interest: perchlorate, *N*-nitrosodimethylamine (NDMA), and 1,4-dioxane detected in the samples collected in the Coastal Los Angeles Basin Ground-Water Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit USGS parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. All analytes are listed in table 3G. Samples from all 69 wells were analyzed for perchlorate, 17 wells for *N*-Nitrosodimethylamine and 1,4-Dioxane, but only wells with detections are listed. **Perchlorate:** Perchlorate was sampled at all 69 wells. ***N*-Nitrosodimethylamine:** *N*-Nitrosodimethylamine and 1,4-dioxane were sampled at 17 slow and intermediate wells. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; MRL, method reporting level; NL-CA, California notification level; MCL-CA; California Department of Public Health maximum contaminant level; µg/L, microgram per liter; nc, not collected; –, not detected. Note: 1,2,3,TCP was sampled at 17 slow and intermediate wells and not detected]

GAMA identification No.	Perchlorate (µg/L) (61209)	*N*-Nitrosodimethylamine (µg/L) (64176)	1,4-Dioxane (µg/L) (81582)
Threshold type	MCL-CA	NL-CA	NL-CA
Threshold (µg/L)	6	0.01	3
[MRL]	[0.5]	[0.002]	[2]
CLAB Grid wells			
CB-02	0.6	–	–
CB-07	2.0	nc	nc
CB-11	1.0	nc	nc
CB-12	0.6	nc	nc
CB-13	1.1	nc	nc
CB-15	1.5	nc	nc
CB-16	5.1	nc	nc
CB-17	1.8	–	3.0
CB-19	3.4	nc	nc
OC-03	3.3	nc	nc
OC-04	3.5	nc	nc
OC-05	4.4	nc	nc
OC-06	5.0	nc	nc
OC-07	0.8	nc	nc
OC-08	3.8	nc	nc
OC-09	1.2	nc	nc
OC-10	2.1	nc	nc
OC-15	0.6	nc	nc
OC-16	1.5	nc	nc
OC-19	0.6	nc	nc
OC-21	3.9	nc	nc
WB-07	1.7	nc	nc
CLAB Understanding wells			
DA-02	1.9	–	17.0
DA-04	1.3	–	–
U-02	–	–	2.7
U-03	0.6	0.003	–
U-04	4.0	nc	nc
U-06	4.2	–	–

*Value above regulatory threshold.

Table 10. Nutrients and dissolved organic carbon detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from the 19 slow and intermediate wells were analyzed. All analytes are listed in table 3H. **Ammonia:** Threshold value is "as ammonia." **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. HAL-US, Lifetime Health Advisory; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; V, analyte detected in sample and an associated blank thus data are not included in ground-water-quality assessment; LRL, laboratory reporting level; mg/L, milligram per liter; na, not available; nc, not collected; –, not detected]

GAMA identification No.	Ammonia, as nitrogen (mg/L) (00608)	Nitrite plus nitrate, as nitrogen (mg/L) (00631)	Nitrite, as nitrogen (mg/L) (00613)	Total nitrogen (nitrate + nitrite + ammonia + organic-nitrogen) as nitrogen (mg/L) (62854)	Orthophosphate, as phosphorus (mg/L) 00671)	Dissolved organic carbon (DOC) (mg/L) (00681)
Threshold type	HAL-US	MCL-US	MCL-US	na	na	na
Threshold (mg/L)	30	10	1	na	na	na
[LRL]	[0.01]	[0.06]	[0.002]	[0.06]	[0.006]	[0.33]
CLAB Grid Wells (8 wells sampled)						
CB-02	V 0.012	0.58	–	0.62	0.067	E 0.3
CB-03	V 0.010	3.29	–	3.44	0.027	0.9
CB-04	0.233	–	–	0.33	0.022	1.2
CB-17	–	2.78	–	[1]2.69	0.025	0.3
OC-01	–	1.67	0.029	1.72	0.023	nc
OC-02	–	4.14	–	[1]4.00	0.030	0.5
OC-20	V 0.01	2.22	0.253	[1]2.17	0.351	1.6
WB-04	2.93	–	–	3.19	0.160	4.1
CLAB Understanding wells[2] (11 wells sampled)						
DA-01	0.04	2.94	–	[1]2.85	0.076	0.4
DA-02	V 0.01	6.51	–	6.84	0.110	0.3
DA-03	0.29	–	–	[1]0.28	0.038	0.5
DA-04	V 0.01	4.19	–	4.23	0.125	0.3
DA-05	1.10	–	–	1.09	0.054	1.2
DA-06	2.07	–	–	2.13	0.135	3.4
U-01	V 0.01	1.29	–	[1]1.29	0.04	nc
U-02	V 0.01	1.17	–	1.21	0.025	0.6
U-03	–	2.45	–	[1]2.39	0.015	0.8
U-06	–	7.07	–	5.94	0.138	0.8
U-07	–	–	–	E 0.04	0.026	1.1

[1]Total nitrogen in these samples is less than the sum of the filtered nitrogen analytes, but falls within the U.S. Geological Survey National Water Quality Laboratory acceptance criteria of a 10 percent relative percent difference.

Table 11. Major and minor ions and dissolved solids detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit USGS parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from the 19 slow and intermediate wells were analyzed. All analytes are listed in table 3I. **Threshold type:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level; SMCL-CA, California Department of Public Health secondary maximum contaminant level. The SMCL-CA for chloride, sulfate, and total dissolved solids have recommended and upper threshold values. The upper value is shown in parentheses. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; LRL, laboratory reporting level; mg/L, milligrams per liter; na, not available; nc, not collected; E, estimated or having a higher degree of uncertainty]

GAMA Identification No.	Calcium (mg/L) (00915)	Magnesium (mg/L) (00925)	Potassium (mg/L) (00935)	Sodium (mg/L) (00930)	Bromide (mg/L) (71870)	Chloride (mg/L) (00940)	Fluoride (mg/L) (00950)	Iodide (mg/L) (71865)	Silica (mg/L) (00955)	Sulfate (mg/L) (00945)	Total dissolved solids (TDS) (mg/L) (70300)
Threshold type	na	na	na	na	na	SMCL-CA	MCL-US	na	na	SMCL-CA	SMCL-CA
Threshold (mg/L)	na	na	na	na	na	250 (500)	2	na	na	250 (500)	500 (1,000)
[LRL]	[0.02]	[0.014]	[0.04]	[0.2]	[0.02]	[0.12]	[0.1]	[0.002]	[0.018]	[0.18]	[10]
CLAB Grid Wells (8 wells sampled)											
CB-02	81.2	14.4	3.33	27.7	0.07	30.9	0.48	0.002	22.6	73.2	376
CB-03	58.4	13.8	3.81	70.8	0.17	83.3	0.35	0.012	20.1	99.6	472
CB-04	9.10	0.377	0.74	62.7	0.05	12.0	0.62	0.010	16.1	27.2	219
CB-17	101	20.5	3.47	31.2	0.16	53.2	0.31	E 0.002	21.7	118	*511
OC-01	70	13.8	1.93	58.2	0.14	63.6	0.30	nc	20.6	106	438
OC-02	96.9	17.3	4.23	67.5	0.23	91.4	0.49	0.010	21.4	133	*512
OC-20	93.4	21.6	6.10	86.0	0.18	96.1	0.50	0.022	21.0	166	*658
WB-04	62.4	28.4	13.4	160	0.76	106	0.36	0.196	37.2	54.2	*729
CLAB Understanding wells (11 wells sampled)											
DA-01	115	53.2	3.04	72.9	0.30	111	0.34	0.018	35.0	188	*775
DA-02	128	56.4	2.16	74.3	0.39	85.6	0.37	0.005	31.8	235	*873
DA-03	59.5	32.3	4.68	85.6	0.12	36.9	0.53	0.037	40.0	121	*579
DA-04	112	55.0	3.08	88.6	0.24	102	0.36	0.002	27.5	215	*857
DA-05	23.8	21.5	6.03	254	1.19	220	1.50	0.226	37.6	7.05	*818
DA-06	252	110	14.8	438	6.14	**640	0.26	1.12	39.2	**561	**2,430
U-01	53.3	10.8	1.67	34	0.06	23.6	0.47	nc	21.7	50.1	303
U-02	106	20.6	4.45	47.0	0.15	64.2	0.42	0.009	20.6	133	*551
U-03	88.2	15.2	4.48	56.7	0.19	81.1	0.26	0.013	19.6	135	*544
U-06	136	61.4	1.62	59.4	0.29	105	0.57	0.005	37.6	233	*851
U-07	180	33.6	5.36	95.8	0.39	116	0.34	0.013	24.9	*279	*971

* Value exceeds recommended threshold.

** Value exceeds upper threshold.

Table 12. Trace elements detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from the 19 slow and intermediate wells were analyzed. All analytes are listed in table 3I. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. AL-US, U.S. Environmental Protection Agency action level; HAL-US (USEPA), Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; SMCL-US, U.S. Environmental Protection Agency secondary maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; V, analyte detected in sample and an associated blank thus data are not included in ground-water-quality assessment; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; nc, not collected; –, not detected: µg/L, microgram per liter]

GAMA identification No.	Aluminum (µg/L) (01106)	Antimony (µg/L) (01095)	Arsenic (µg/L) (01000)	Barium (µg/L) (01005)	Beryllium (µg/L) (01010)	Boron (µg/L) (01020)	Cadmium (µg/L) (01025)	Chromium (µg/L) (01030)	Cobalt (µg/L) (01035)	Copper (µg/L) (01040)	Iron (µg/L) (01046)	Lead, (µg/L) (01049	Lithium (µg/L) (01130)
Threshold type	MCL-US	MCL-US	MCL-US	MCL-CA	MCL-CA	NL-CA	MCL-US	MCL-CA	na	AL-US	SMCL-US	NL-CA	na
Threshold	1,000	6	10	1,000	4	1,000	5	50	na	1,300	300	15	na
[LRL]	[1.6]	[0.20]	[0.12]	[0.20]	[0.06]	[8]	[0.04]	[0.04]	[0.04]	[0.40]	[6]	[0.08]	[0.6]
CLAB Grid Wells (8 wells sampled)													
CB-02	1.9	–	3.6	163	–	75	E 0.02	0.26	E 0.03	1.1	E 4	0.91	1.6
CB-03	E1.0	E 0.15	1.8	67	–	228	0.04	0.17	3.9	2.9	E 3	0.50	1.2
CB-04	17.0	–	0.12	0.73	–	70	–	V 0.04	–	–	E 3	0.12	4.6
CB-17	E 0.9	–	1.8	96	–	73	–	1.1	0.05	2.3	–	0.95	1.6
OC-01	2.5	–	0.83	92	–	106	E 0.03	0.25	0.164	2.2	–	1.11	7.8
OC-02	–	–	1.5	96	–	184	E 0.02	0.29	0.245	1.2	–	0.25	5.8
OC-20	E 1.5	0.21	6.8	54	–	261	0.15	V 0.06	1.6	4.1	E 6	0.38	12.6
WB-04	E 1.5	–	–	60	–	492	–	0.22	0.04	–	*500	0.44	16.1
CLAB Understanding wells (11 wells sampled)													
DA-01	–	–	0.37	46	–	127	–	0.84	0.14	E 0.37	68	–	20.3
DA-02	–	E 0.04	0.73	48	–	95	0.06	2.4	E 0.03	9.7	12	1.14	16.3
DA-03	2.3	–	0.93	54	–	239	–	0.14	0.08	0.42	47	0.15	28.0
DA-04	–	–	0.81	53	–	149	0.05	1.2	–	2.3	14	1.78	23.0
DA-05	–	–	3.8	102	–	*1,190	–	V 0.07	–	–	47	–	25.0
DA-06	V 2.5	–	–	99	–	*1,260	–	–	E 0.04	–	*793	–	30.6
U-01	–	–	0.92	49	–	68	E 0.03	2.5	0.11	1.2	–	0.26	4.9
U-02	E 1.3	–	1.6	166	–	155	–	0.58	0.10	1.2	–	1.32	1.7
U-03	E 1.3	E 0.15	1.6	67	–	87	–	0.65	1.3	1.9	–	0.72	1.9
U-06	–	E 0.04	0.44	158	–	71	E 0.02	1.2	E 0.02	1.3	–	0.65	9.5
U-07	–	0.10	1.5	48	–	232	E 0.02	E 0.11	0.37	0.51	48	0.56	2.3

Table 12. Trace elements detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November.—Continued

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from the 19 slow and intermediate wells were analyzed. All analytes are listed in table 3I. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. AL-US, U.S. Environmental Protection Agency action level; HAL-US (USEPA), Lifetime Health Advisory; MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level; NL-CA, California Department of Public Health notification level; SMCL-US, U.S. Environmental Protection Agency secondary maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; V, analyte detected in sample and an associated blank thus data are not included in ground-water-quality assessment; E, estimated or having a higher degree of uncertainty; LRL, laboratory reporting level; na, not available; nc, not collected; –, not detected: µg/L, microgram per liter]

GAMA identification No.	Manganese (µg/L) (01056)	Mercury (µg/L) (71890)	Molybdenum (µg/L) (01060)	Nickel (µg/L) (01065)	Selenium (µg/L) (01145)	Silver (µg/L) (01075)	Strontium (µg/L) (01080)	Thallium (µg/L) (01057)	Tungsten (µg/L) (01155)	Uranium (µg/L) (22703)	Vanadium (µg/L) (01085)	Zinc (µg/L) (01090)
Threshold type	SMCL	MCL-US	HAL-US	MCL-CA	MCL-US	MCL-US	HAL-US	MCL-US	na	MCL-US	NL-CA	SMCL-CA
Threshold	50	2	40	100	50	100	4,000	2	na	30	50	5,000
[LRL]	[0.2]	[0.010]	[0.4]	[0.06]	[0.08]	[0.2]	[0.4]	[0.04]	[0.06]	[0.04]	[0.10]	[0.60]
CLAB Grid Wells (8 wells sampled)—Continued												
CB-02	19.1	–	3.0	V 0.15	0.54	–	595	–	0.42	3.08	2.0	2.5
CB-03	6.7	–	4.5	3.6	0.21	–	451	–	E 0.14	1.09	2.8	3.5
CB-04	1.3	–	6.9	0.30	–	–	28.5	–	8.1	–	0.51	1.1
CB-17	0.8	–	2.0	0.50	1.3	–	769	–	0.11	8.70	4.0	4.0
OC-01	0.4	nc	7.5	2.50	0.3	–	540	–	nc	2.49	2.4	2.6
OC-02	–	–	3.8	3.44	0.54	–	669	–	0.19	14.7	4.4	1.2
OC-20	*709	0.012	9.9	2.6	0.28	–	648	–	3.7	8.03	5.2	1.5
WB-04	*154	–	3.9	V 0.19	–	–	482	–	0.25	0.05	0.52	2.8
CLAB Understanding wells (11 wells sampled)—Continued												
DA-01	*52.7	–	5.4	1.6	2.6	–	514	–	–	3.46	2.1	5.1
DA-02	5.3	nc	8.6	0.57	3.8	–	595	–	–	9.29	4.9	4.7
DA-03	30.6	–	2.0	V 0.11	E 0.06	–	432	–	0.13	0.55	0.13	0.63
DA-04	3.3	–	2.4	0.61	2.9	–	557	E 0.02	–	1.37	2.0	9.0
DA-05	12.3	–	1.2	V 0.03	–	–	284	–	7.8	–	0.15	E 0.39
DA-06	*177	–	0.8	0.54	E 0.12	–	1,950	–	–	0.08	0.28	–
U-01	E 0.2	nc	5.5	1.76	1.10		393	–	nc	2.64	3.2	1.3
U-02	E0.3	E 0.008	2.1	0.96	0.15	–	745	–	0.12	4.69	2.5	5.8
U-03	1.8	–	1.0	1.6	0.19	–	587	–	0.28	3.28	3.4	2.2
U-06	–	nc	2.4	V 0.23	1.0	–	708	–	–	2.67	8.3	6.7
U-07	*173	–	2.5	1.1	E 0.05	–	856	–	0.15	5.99	1.9	3.3

*Value exceeds threshold.

Table 13. Species of inorganic arsenic, iron, and chromium detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Samples analyzed by U.S. Geological Survey Trace Metals Labratory using research methods. Values on table 12 are considered more accurate therefore values on this table are not stored in the USGS NWIS database. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed for arsenic, iron, and chromium speciation. All analytes are listed in table 3J. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA, California Department of Public Health maximum contaminant level; SMCL-CA, California Department of Public Health secondary maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; MDL, method detection level; na, not available; nc, not collected; –, not detected; µg/L, micrograms per liter]

GAMA identification No.	Iron (µg/L)	Iron (II) (µg/L)	Arsenic (µg/L)	Arsenic (III) (µg/L)	Chromium (µg/L)	Chromium (VI) (µg/L)	Detections per well	Any Detection
Threshold type	SMCL-CA	na	MCL-US	na	MCL-CA	na		
Threshold (µg/L)	300	na	10	na	50	na		
[MDL]	[2]	[2]	[0.5]	[1]	[1]	[1]		
CLAB Study Unit (55 grid wells sampled)								
Number of wells with detections	37	33	29	2	11	7		51
Detection frequency (percent)	67	60	53	4	20	13		93
Total Detections								124
CLAB Central Basin Study Area (21 grid wells sampled)								
CB-01	5	5	–	–	–	–	2	
CB-02	–	–	2.8	–	–	–	1	
CB-03	–	–	2.7	–	–	–	1	
CB-04	2	2	–	–	–	–	2	
CB-05	6	6	0.6	–	–	–	3	
CB-06	21	18	*19	19	–	–	4	
CB-07	9	2	0.8	–	2	1	5	
CB-08	8	4	0.8	–	2	1	5	
CB-09	25	16	–	–	–	–	2	
CB-10	52	24	1.4	–	–	–	3	
CB-11	9	4	3.2	–	–	–	3	
CB-12	32	4	1.3	–	–	–	3	
CB-13	–	–	3.2	–	2	–	2	
CB-14	31	28	–	–	–	–	2	
CB-15	2	–	2.2	–	–	–	2	
CB-16	19	6	–	–	1	–	3	
CB-17	–	–	1.0	–	–	–	1	
CB-18	180	180	–	–	–	–	2	
CB-19	4	3	–	–	1	1	4	
CB-20	188	174	–	–	–	–	2	
CB-21	103	4	2	–	–	–	3	
Number of wells with detections	17	16	13	1	5	3		21
Detection frequency (percent)	81	76	62	5	24	14		100
Total Detections								55

Table 13. Species of inorganic arsenic, iron, and chromium detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[Samples analyzed by U.S. Geological Survey Trace Metals Labratory using research methods. Values on table 12 are considered more accurate therefore values on this table are not stored in the USGS NWIS database. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed for arsenic, iron, and chromium speciation. All analytes are listed in table 3J. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA, California Department of Public Health maximum contaminant level; SMCL-CA, California Department of Public Health secondary maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; MDL, method detection level; na, not available; nc, not collected; –, not detected; µg/L, micrograms per liter]

GAMA identification No.	Iron (µg/L)	Iron (II) (µg/L)	Arsenic (µg/L)	Arsenic (III) (µg/L)	Chromium (µg/L)	Chromium (VI) (µg/L)	Detections per well	Any Detection
Threshold type	SMCL-CA	na	MCL-US	na	MCL-CA	na		
Threshold (µg/L)	300	na	10	na	50	na		
[MDL]	[2]	[2]	[0.5]	[1]	[1]	[1]		
CLAB Orange County Coastal Plain Study Area (24 grid wells sampled)								
OC-01	nc	nc	nc	nc	–	–	0	
OC-02	nc	nc	nc	nc	3	2	2	
OC-03	–	–	0.8	–	–	–	1	
OC-04	2	–	2.1	–	1	1	4	
OC-05	–	–	1.2	–	1	–	2	
OC-06	–	–	0.6	–	2	2	3	
OC-07	–	–	1.6	–	1	1	3	
OC-08	6	–	2.5	–	–	–	2	
OC-09	4	–	1.5	–	–	–	2	
OC-10	–	–	0.8	–	–	–	1	
OC-11	–	–	1.2	–	–	–	1	
OC-12	–	–	–	–	–	–	0	
OC-13	2	2	2.8	–	–	–	3	
OC-14	11	8	1.6	–	–	–	3	
OC-15	4	3	1.0	–	–	–	3	
OC-16	–	–	–	–	–	–	0	
OC-17	3	2	1.1	–	–	–	3	
OC-18	–	–	–	–	–	–	0	
OC-19	–	–	1.1	–	–	–	1	
OC-20	–	–	5.1	–	–	–	1	
OC-21	17	3	1.2	–	–	–	3	
OC-22	64	45	2.0	1.8	–	–	4	
OC-23	133	133	–	–	–	–	2	
OC-24	11	8	2.4	–	–	–	3	
Number of wells with detections	11	8	18	1	5	4		20
Detection frequency (percent)	46	33	75	4	21	17		83
Total Detections								47
CLAB West Coast Basin Study Area (10 grid wells sampled)								
WB-01	12	10	–	–	2	–	3	
WB-02	80	64	–	–	–	–	2	
WB-03	74	74	–	–	–	–	2	
WB-04	*488	477	–	–	–	–	2	
WB-05	*331	302	–	–	–	–	2	
WB-06	30	31	–	–	–	–	2	
WB-07	130	130	–	–	–	–	2	
WB-08	13	13.0	–	–	–	–	2	
WB-09	*2,820	2,830	–	–	–	–	2	
WB-10	*990	940	0.6	–	–	–	3	
Number of wells with detections	10	10	1	0	1	0		10
Detection frequency (percent)	100	100	10	0	10	0		100
Total Detections								22

Table 13. Species of inorganic arsenic, iron, and chromium detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[Samples analyzed by U.S. Geological Survey Trace Metals Labratory using research methods. Values on table 12 are considered more accurate therefore values on this table are not stored in the USGS NWIS database. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from all 69 wells were analyzed for arsenic, iron, and chromium speciation. All analytes are listed in table 3J. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level; MCL-CA, California Department of Public Health maximum contaminant level; SMCL-CA, California Department of Public Health secondary maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; MDL, method detection level; na, not available; nc, not collected; –, not detected; µg/L, micrograms per liter]

GAMA identification No.	Iron (µg/L)	Iron (II) (µg/L)	Arsenic (µg/L)	Arsenic (III) (µg/L)	Chromium (µg/L)	Chromium (VI) (µg/L)	Detections per well	Any Detection
Threshold type	SMCL-CA	na	MCL-US	na	MCL-CA	na		
Threshold (µg/L)	300	na	10	na	50	na		
[MDL]	[2]	[2]	[0.5]	[1]	[1]	[1]		
CLAB Understanding wells[1] (14 wells sampled)								
DA-01	69	60	–	–	–	–	2	
DA-02	12	6	0.9	–	2	2	5	
DA-03	46	46	1.2	1.2	–	–	4	
DA-04	13	6	–	–	–	–	2	
DA-05	47	47	3.1	3.4	–	–	4	
DA-06	*728	722	–	–	–	–	2	
U-01	nc	nc	nc	nc	3	2	2	
U-02	2	–	2.2	–	–	–	2	
U-03	–	–	2.5	–	–	–	1	
U-04	9	7	1.0	–	–	–	3	
U-05	*316	263	*14	–	–	–	3	
U-06	–	–	–	–	–	–	0	
U-07	39	22	0.9	–	–	–	3	
U-08	28	4	1.0	–	–	–	3	

* Value exceeds threshold.

[1] Understanding wells were not included in statistical calculations.

Table 14. Results for analyses of stable-isotope ratios, carbon-14 activities, and tritium in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Samples from all 69 wells were analyzed for stable isotopes of water; samples from 14 wells were analyzed for carbon; one sample was analyzed for tritium. Information about analytes given in table 3K. Stable isotope ratios are reported in the standard delta notation (δ), the ratio of a heavier isotope to more common lighter isotope of that element, relative to a standard reference material. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-CA, California Department of Public Health maximum contaminant level. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; pCi/L, picocuries per liter; na, not available; nc, not collected]

GAMA well identification No.	$\delta^{2}H$ (per mil) (82082)	$\delta^{18}O$ (per mil) (82085)	$\delta^{13}C$ (per mil) (82081)	Carbon-14 (percent modern) (49933)	Tritium (pCi/L) (07000)
Threshold type	na	na	na	na	MCL-CA
Threshold level	na	na	na	na	20,000
CLAB Grid Wells					
CB-01	-46.40	-7.17	nc	nc	nc
CB-02	-57.00	-8.34	-12.34	93.37	nc
CB-03	-57.00	-8.08	-12.91	95.61	nc
CB-04	-56.60	-8.39	-13.64	28.11	nc
CB-05	-58.50	-8.60	nc	nc	nc
CB-06	-53.80	-8.08	nc	nc	nc
CB-07	-57.30	-8.28	nc	nc	nc
CB-08	-46.70	-7.26	nc	nc	nc
CB-09	-48.10	-7.29	nc	nc	nc
CB-10	-48.80	-7.45	nc	nc	nc
CB-11	-57.30	-8.27	nc	nc	nc
CB-12	-54.40	-7.92	nc	nc	nc
CB-13	-55.10	-7.86	nc	nc	nc
CB-14	-48.50	-7.27	nc	nc	nc
CB-15	-59.20	-8.16	nc	nc	nc
CB-16	-62.60	-8.67	nc	nc	nc
CB-17	-60.70	-8.42	nc	nc	nc
CB-18	-43.20	-6.68	nc	nc	nc
CB-19	-44.80	-6.92	nc	nc	nc
CB-20	-48.20	-7.40	-11.96	59.03	nc
CB-21	-49.20	-7.54	nc	nc	nc
OC-01	-53.30	-7.54	nc	nc	nc
OC-02	-56.30	-7.85	-12.31	105.0	13.8
OC-03	-67.20	-8.81	nc	nc	nc
OC-04	-61.70	-8.73	nc	nc	nc
OC-05	-64.30	-8.80	nc	nc	nc
OC-06	-58.70	-8.39	nc	nc	nc
OC-07	-57.20	-8.38	nc	nc	nc
OC-08	-58.70	-8.30	nc	nc	nc
OC-09	-51.60	-7.59	nc	nc	nc
OC-10	-53.90	-7.81	nc	nc	nc
OC-11	-57.00	-8.32	nc	nc	nc
OC-12	-58.00	-8.57	nc	nc	nc
OC-13	-55.40	-7.71	nc	nc	nc
OC-14	-58.20	-8.49	nc	nc	nc
OC-15	-57.10	-8.23	nc	nc	nc
OC-16	-55.60	-7.94	nc	nc	nc
OC-17	-56.60	-7.76	nc	nc	nc
OC-18	-58.40	-8.57	nc	nc	nc
OC-19	-57.20	-8.20	nc	nc	nc
OC-20	-54.20	-7.50	-14.27	98.82	nc
OC-21	-50.00	-7.18	nc	nc	nc
OC-22	-55.50	-8.20	nc	nc	nc
OC-23	-41.70	-6.41	nc	nc	nc
OC-24	-50.00	-6.95	nc	nc	nc
WB-01	-79.10	-10.08	nc	nc	nc
WB-02	-56.10	-7.81	nc	nc	nc
WB-03	-56.00	-7.91	nc	nc	nc
WB-04	-42.20	-6.54	-13.50	35.71	nc
WB-05	-46.70	-7.08	nc	nc	nc
WB-06	-54.00	-8.05	nc	nc	nc
WB-07	-49.10	-7.46	nc	nc	nc
WB-08	-47.10	-7.34	nc	nc	nc
WB-09	-44.10	-6.80	nc	nc	nc
WB-10	-39.10	-6.09	nc	nc	nc
CLAB Understanding and wells					
DA-01	-54.50	-7.80	-15.65	88.99	nc
DA-02	-47.30	-7.12	nc	nc	nc
DA-03	-36.80	-5.96	-15.45	41.17	nc
DA-04	-57.00	-8.03	-16.12	93.93	nc
DA-05	-39.40	-6.31	-10.00	20.94	nc
DA-06	-45.60	-6.63	nc	nc	nc
U-01	-56.60	-8.33	nc	nc	nc
U-02	-57.30	-8.27	nc	nc	nc
U-03	-57.60	-7.97	-13.80	92.70	nc
U-04	-61.20	-8.72	nc	nc	nc
U-05	-51.20	-7.78	nc	nc	nc
U-06	-54.50	-7.72	-16.41	88.70	nc
U-07	-55.60	-7.89	-13.91	106.4	nc
U-08	-55.40	-8.23	nc	nc	nc

Table 15. Radioactive constituents detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S. Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. Thresholds, threshold values, and LRLs as of November 16, 2006. Samples from 10 slow wells were analyzed. All analytes are listed in table 3K. **Threshold:** Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-CA, California Department of Public Health maximum contaminant level; MCL-US, U.S. Environmental Protection Agency maximum contaminant level. The MCL-US threshold for radium is the sum of radium-226 and radium-228. Two MCLs have been proposed for Radon-222. The proposed alternative MCL is in parentheses. **Abbreviations:** CLAB; Coastal Los Angeles Basin; CLAB Grid Wells; CLAB Understanding Wells; E, estimated or having a higher degree of uncertainty; nc, not collected; pCi/L, picocuries per liter; <, less than]

GAMA well identification No.	Radium-226 (pCi/L) (99915)	Radium-228 (pCi/L) (99916)	Radon-222 (pCi/L) (82303)	Alpha radioactivity (pCi/L)		Beta radioactivity (pCi/L)	
				72-hour count (99920)	30-day count (99921)	72-hour count (99922)	30-day count (99923)
Threshold type	MCL-US	MCL-US	Proposed MCL-US	MCL-US	MCL-US	MCL-CA	MCL-CA
Threshold value	5	5	300 (4,000)	15	15	50	50
CLAB Grid wells							
CB-03	E 0.056	< 0.520	*370	<2.6	<1.9	E 2.17	4.47
CB-04	< 0.032	< 0.480	80	<1.3	<3.0	<1.1	E 1.11
OC-02	0.086	E 0.37	*390	E 7.4	7	4.4	8.1
CLAB Understanding wells							
DA-01	1.042	E 0.327	*3,180	<5.7	<3.5	7.4	3.95
DA-02	E 0.045	E 0.27	*360	<3.9	E 2.25	E 2.01	E 2.84
DA-03	0.464	E 0.47	*1,560	E 1.14	E 2.37	E 3.49	E 3.5
DA-04	E 0.046	< 0.410	nc	<4.7	<4	E 3.17	E 1.05
DA-05	0.141	E 0.378	*590	<7.5	<6.4	5.5	E 4.6
DA-06	0.404	1.02	160	<24.0	<16.0	14.4	12.3
U-02	0.126	E 0.277	300	E 1.7	<3.1	4.36	5.62

*Value exceeds threshold.

Table 16. Microbial indicators detected in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[The five-digit U.S.Geological Survey (USGS) parameter code below the constituent name is used to uniquely identify a specific constituent or property. All analytes are listed in table 3L. **Threshold:** Thresholds and threshold values as of November 16, 2006. Samples from 10 slow wells were analyzed, but only the sample with a detection is listed. Maximum contaminant level thresholds are listed as MCL-US when the MCL-US and MCL-CA are identical, and as MCL-CA when the MCL-CA is lower than the MCL-US or no MCL-US exists. MCL-US, U.S. Environmental Protection Agency maximum contaminant level. **Abbreviations:** mL, milliliter]

GAMA Identification No.	Total coliforms colonies/ 100 mL (90900)
Threshold type	MCL-US
Threshold	5 percent of samples per month
DA-02	1

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Appendix

This appendix includes discussions of the methods used to collect and analyze ground-water samples and report the resulting water-quality data. These methods were selected to obtain representative samples of the ground water from each well and to minimize the potential for contamination of the samples or bias in the data. Procedures used to collect and assess quality-control data, and the results of the quality-control assessments are also discussed.

Sample Collection and Analysis

Field Methods

Ground-water samples were collected using standard and modified USGS National Field Manual protocols (Koterba and others, 1995; U.S. Geological Survey, variously dated), and protocols described by Weiss, 1968; Shelton and others, 2001; Ball and McClesky, 2003a,b; and Wright and others, 2005. These sampling protocols ensure that a representative sample of ground water was collected at each site and that the samples were collected and handled in a way that minimized the potential for airborne contamination of samples or cross contamination between samples collected at wells.

Prior to sampling, each well was pumped continuously to purge at least three casing-volumes of water from the well (Wilde and others, 1999). Wells were sampled using Teflon tubing with brass and stainless-steel fittings attached to a sampling point on the well discharge pipe as close as possible to the well. The sampling point always was located upstream of any well-head treatment system or water storage tank. Samples were collected before filtration or chemical treatment, such as chlorination. If well chlorination could not be avoided, when possible, the chlorinator was shut off at least 24 hours prior to purging and sampling the well to clear all chlorine out of the system. For the *fast* and *intermediate* schedules, samples were collected at the well head using a foot-long length of Teflon tubing. For the *slow* schedule, the samples were collected inside an enclosed chamber that was located inside a mobile laboratory and connected to the well head by an insulated 10- to 50-ft length of the Teflon tubing (Lane and others, 2003). All fittings and lengths of tubing were cleaned between samples (Wilde, 2004).

For the field measurements, ground water was pumped through a flow-through chamber fitted with a multi-probe meter that simultaneously measures the water-quality indicators (temperature, dissolved oxygen, pH, and specific conductance). Turbidity was measured in the field with a calibrated turbidity meter. Field measurements were made in accordance with protocols in the USGS National Field Manual (Radtke and others, 2005; Wilde and Radtke, 2005; Lewis, 2006; Wilde, 2006; and Wilde and others, 2006). All sensors on the multi-probe meter were calibrated daily. Measured temperature, dissolved oxygen, pH, specific conductance, and turbidity values were recorded at 5-minute intervals for at least 30 minutes, and when these values remained stable for 20 minutes, samples for laboratory analyses were collected.

Field measurements and instrument calibrations were recorded by hand on field record sheets and electronically in PCFF-GAMA, a software package designed by the USGS with support from the GAMA program. Analytical service requests and chain-of-custody documentation also were managed by PCFF-GAMA. Information from PCFF-GAMA was uploaded directly into NWIS at the end of every week of sample collection.

For analyses requiring filtered water, ground water was diverted through a 0.45-µm pore-size vented capsule filter, a disk filter, or a baked glass-fiber filter, depending on the protocol for the analysis (Wilde and others, 1999; 2004). Prior to sample collection, polyethylene sample bottles were pre-rinsed using native water three times before sample collection. Samples requiring acidification were acidified to a pH of 2 or less with the appropriate acids using ampoules of certified, traceable concentrated acids obtained from the USGS National Water Quality Laboratory (NWQL).

Temperature-sensitive samples were stored on ice prior to daily shipping to the various laboratories. The non-temperature-sensitive samples for tritium, noble gases, chromium speciation, and stable isotopes were shipped monthly, while samples for volatile organic compounds, pesticides, potential wastewater indicators, pharmaceutical compounds, compounds of special interest, dissolved organic carbon, nutrients, major and minor and trace elements, radium isotopes, gross alpha and beta radioactivity, and radon-222 were shipped daily.

Detailed sampling protocols for individual analyses and groups of analytes are described in Koterba and others (1995) and the USGS National Field Manual (Wilde and others, 1999; Wilde and others, 2004) and in the references for analytical methods listed in table A1; only brief descriptions are given here. Volatile organic compounds (VOCs) and gasoline oxygenates and degradates and 1,2,3-trichloropropane (1,2,3-TCP) samples were collected in 40-mL baked amber glass sample vials that were purged with three vial volumes of sample water before bottom-filling to eliminate atmospheric contamination. Six normal (6 N) hydrochloric acid (HCl) was added as a preservative to the VOC samples, but not to the gasoline additives samples or to the 1,2,3-TCP samples. Perchlorate samples were collected in a 125-mL polyethylene bottles. Tritium samples were collected by bottom-filling two 1-L polyethylene bottles with unfiltered ground water, after first overfilling the bottle with three volumes of water. Stable isotopes of hydrogen and oxygen in water were collected in 60-mL clear glass bottles filled with unfiltered water, sealed with a conical cap, and secured with electrical tape to prevent leakage and evaporation.

Pesticides, polar pesticides and pesticide degradation products, potential wastewater-indicator compounds, pharmaceutical compounds, 1,4-dioxane, and *N*-nitrosodimethylamine (NDMA) samples were collected in 1-L baked amber glass bottles. Pesticide, polar pesticide, and pharmaceutical samples were filtered with a glass fiber filter, whereas the 1,4-dioxane and NDMA samples were filtered at the Montgomery Watson-Harza (MWH) laboratory prior to analysis. Potential wastewater indicators were collected unfiltered in 1-L baked amber glass bottles.

Ground-water samples for major and minor ions, trace elements, field alkalinity, and total dissolved solids analyses required filling one 250-mL polyethylene bottle with raw ground water, and one 500-mL and one 250-mL polyethylene bottles with filtered ground water (Wilde and others, 2004). Filtration was done using a Whatman capsule filter. The 250-mL filtered sample then was preserved with 7.5 N nitric acid. Mercury samples were collected by filtering ground water into 250-mL glass bottles and preserving with 6 N hydrochloric acid. Arsenic and iron speciation samples were filtered into 250-mL polyethylene bottles that were covered with tape to prevent light exposure, and preserved with 6 N hydrochloric acid. Nutrient samples were filtered into 125-mL brown polyethylene bottles. Radium isotopes and gross alpha and beta radiation samples were filtered into 1-L polyethylene bottles and acidified with nitric acid. Carbon isotope samples were filtered and bottom-filled into two 500-mL glass bottles that were first overfilled with three bottle volumes of ground water. These samples had no headspace and were sealed with a conical cap to avoid atmospheric contamination. Samples for field alkalinity titrations were collected by filtering ground water into a 500-mL polyethylene bottles.

DOC, chromium, radon-222, dissolved gases, and microbial constituents were collected from the hose bib at the well head, regardless of the sampling schedule (fast, intermediate, or slow). DOC was collected after rinsing the sampling equipment with VOC free blank water (Wilde and others, 2004). Using a 50-mL syringe and 0.45-µm disk filter, each ground-water sample was filtered into a 125-mL baked glass bottle and preserved with 4.5-N sulfuric acid. Chromium speciation samples were collected using a 10-mL syringe with an attached 0.45-µm disk filter. After the syringe was rinsed thoroughly and filled with ground water, 4 mLs were forced through the disk filter; the next 2 mLs of the ground water were filtered slowly into a small centrifuge vial for analysis of total chromium. Hexavalent chromium, Cr (VI), then was collected by attaching a small cation-exchange column to the syringe filter, and after conditioning the column with 2 mLs of sample water, 2 mLs were collected in a second centrifuge vial. Both vials were preserved with 10 µL of 7.5-N nitric acid (Ball and McClesky, 2003a,b).

For the collection of radon-222, a stainless-steel and Teflon valve assembly was attached to the sampling port at the well head (Wilde and others, 2004). The valve was closed partially to create back pressure, and a 10-mL sample was taken through a Teflon septum on the valve assembly using a glass syringe affixed with a stainless-steel needle. The sample then was injected into a 25-mL vial partially filled with scintillation mixture (mineral oil) and shaken. The vial then was placed in a cardboard tube to be shielded from light during shipping.

Noble gases were collected in 3/8-in. copper tubes using reinforced nylon tubing connected to the hose bib at the wellhead. Ground water was flushed through the tubing to dislodge bubbles before flow was restricted with a back pressure valve. Clamps on either side of the copper tube then were tightened, trapping a sample of ground water for analyses of noble gases (Weiss, 1968).

Samples for analysis of microbial constituents also were collected at the well head following protocols described in Myers (2004) and Bushon (2003). Prior to the collection of samples, the sampling port was sterilized using isopropyl alcohol, and ground water was run through the sampling port for at least 3 minutes to remove any traces of the sterilizing agent. Two sterilized 250-mL bottles then were filled with ground water for coliform analyses (total and *Escherichia coliform* determinations), and one sterilized 3-L carboy was filled for coliphage analyses (F-specific and somatic coliphage determinations).

Alkalinity, total coliforms, and *Escherichia coliform* (*E. coli*) were measured in the mobile laboratory at the well site. Alkalinity and the concentrations of bicarbonate (HCO_3^-) and carbonate (CO_3^{2-}) were measured on filtered samples by Gran's titration method (Gran, 1952; Stumm and Morgan, 1996). Titration data were entered directly into PCFF-GAMA and the concentrations of bicarbonate (HCO_3^-) and carbonate (CO_3^{2-}) automatically were calculated from the titration data using the advanced speciation method. Total coliforms and *Escherichia coliform* (*E. coli*) plates were prepared using sterilized equipment and reagents (Myers, 2004). Plates were counted under an ultraviolet light, following a 22- to 24-hour incubation time.

Laboratory Methods

Nine laboratories performed chemical and microbial analyses for this study (table A1). Most of the analyses were performed at the NWQL or by laboratories contracted by the NWQL. The NWQL maintains a rigorous quality-assurance program (Maloney, 2005). Laboratory quality-control samples, including method blanks, continuing calibration verification standards, standard reference samples, reagent spikes, external

certified reference materials, and external blind proficiency samples, are analyzed regularly. Method detection limits are tested continuously and laboratory reporting levels updated accordingly. NWQL maintains National Environmental Laboratory Accreditation Program (NELAP) and other certifications (http://nwql.usgs.gov/lab_cert.shtml). In addition, the Branch of Quality Systems within the USGS Office of Water Quality maintains independent oversight of quality assurance at the NWQL and laboratories contracted by the NWQL. The Branch of Quality Systems also runs a National Field Quality Assurance program that includes annual testing of all USGS field personnel for proficiency in making field water-quality measurements (http://bqs.usgs.gov/nfqa/). Results for analyses made at the NWQL or by laboratories contracted by the NWQL are uploaded directly into NWIS by the NWQL. Laboratory quality-control data also are stored in NWIS.

Data Reporting

Laboratory Reporting Conventions

The USGS NWQL uses the laboratory reporting level (LRL) as a threshold for reporting analytical results. The LRL is set to minimize the reporting of false negatives (not detecting a compound when it is actually present in a sample) to less than one percent (Childress and others, 1999). The LRL usually is set at two-times the long-term method detection level (LT-MDL). The LT-MDL is derived from the standard deviation of at least 24 MDL determinations made over an extended period of time. The method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with a 99-percent confidence level that the concentration is greater than zero (at MDL there is less than a one percent chance of a false positive) (U.S. Environmental Protection Agency, 2002a). The USGS NWQL monitors and updates LT-MDL and LRL values regularly, and the values listed in this report were in effect during the period that analyses were made for ground-water samples from the CLAB study.

Some concentrations in this study are reported using minimum reporting levels (MRLs) or method uncertainties (MU). The MRL is the smallest measurable concentration of a constituent that may be reliably reported using a given analytical method (Timme, 1995). The MU generally indicates the precision of a particular analytical measurement; it gives a range of values wherein the true value will be found.

Detections between the LRL and the LT-MDL are reported as estimated concentrations (designated with an “E” before the values in the tables and text). For information-rich methods, detections below the LRL have high certainty of detection, but the precise concentration is uncertain. Information-rich methods are those that utilize gas chromatography or high-performance liquid chromatography (HPLC) with mass spectrometry detection (VOCs, gasoline oxygenates, pesticides, polar pesticides, and pesticides degradates, potential wastewater indicators, pharmaceutical compounds). For these methods, compounds are identified by presence of characteristic fragmentation patterns in their mass spectra, in addition to being quantified by measurement of peak areas at their associated chromatographic retention times. E-coded values also may result from detections outside the range of calibration standards, for detections that did not meet all laboratory quality-control criteria, and for samples that were diluted prior to analysis (Childress and others, 1999).

Detections that could have resulted from unintended sample contamination are reported with a “V” before the values in the tables. The potential for sample contamination was assessed using results from field, source-solution, and laboratory blanks.

The reporting levels for radiochemical constituents (gross-alpha radioactivity, gross-beta radioactivity, radium-226, and radium-228) are based on a sample-specific critical value, a combined standard uncertainty (CSU), and a sample-specific minimum detectable concentration (SSMDC) (Bennett and others, 2006). A result above the critical value represents a greater-than-95-percent certainty that the result is greater than zero (significantly different from the instrument’s background response to a blank sample), and a result above the SSMDC represents a greater-than-95-percent certainty that the result is greater than the critical value. Using these reporting level elements, three unique cases were possible when screening the raw analytical data. If the raw analytical result was less than the critical value (case 1), the analyte was considered “not detected”, and the concentration was reported on table 15 as less than the SSMDC. If the analytical result was greater than the critical value, the ratio of the CSU to the analytical result is calculated as a percent (percent-relative CSU). For those samples with percent-relative CSU greater than 20 percent (case 2), concentrations were reported as “estimated” values (designated by an “E” preceding the value on table 15). For those samples that have a relative CSU less than 20 percent, concentrations were reported on table 15 with no qualifiers (case 3).

Scenario	Critical value (pCi/L)	SSMDC (pCi/L)	Combined standard uncertainty (pCi/L)	Relative CSU (percent)	Raw result (pCi/L)	Reported result (pCi/L)
Case 1 - Result less than critical value	1.4	3.2	±1.2	133	0.9	<3.2
Case 2 – Relative combined standard uncertainty greater than 20 percent	0.5	1.4	±0.6	32	2.0	E2.0
Case 3 – Relative combined standard uncertainty less than 20 percent	0.4	1.1	±0.5	14	3.2	3.2

Stable isotopic compositions of oxygen, hydrogen, and carbon are reported as relative isotope ratios in units of per mil using the standard delta notation (Coplen and others, 2002):

$$\delta^{i}E = \left[\frac{R_{sample}}{R_{reference}} - 1\right] \bullet 1,000, \quad (1)$$

where

i is the atomic mass of the heavier isotope of the element,

^{i}E is the element (O for oxygen, C for carbon, or H for hydrogen),

R_{sample} is the ratio of the abundance of the heavier isotope of the element (^{18}O, ^{13}C, or or ^{2}H) to the lighter isotope of the element (^{16}O,^{12}C, or ^{1}H), in the sample and,

$R_{reference}$ is the ratio of the abundance of the heavier isotope of the element to the lighter isotope of the element in the reference material hydrogen.

The reference material for oxygen and hydrogen is Vienna Standard Mean Ocean Water (VSMOW), which is assigned $\delta^{18}O$ and $\delta^{2}H$ values of 0 per mil (note than $\delta^{2}H$ also is written as δD because the common name of the heavier isotope of hydrogen, hydrogen-2, is deuterium). The reference material for carbon is Vienna Peedee Belemnite (VPDB), which is assigned a $\delta^{13}C$ value of 0 per mil. Positive values indicate enrichment of the heavier isotope and negative values indicate depletion of the heavier isotope, compared to the ratios observed in the standard reference material.

Constituents on Multiple Analytical Schedules

Twenty-seven constituents targeted in this study were measured by more than one analytical schedule or by more than one laboratory (table A2). The preferred methods for these constituents were selected based on the procedure recommended by the NWQL (http://wwwnwql.cr.usgs.gov/USGS/Preferred_method_selection_procedure.html). Methods with full approval are preferred over those with provisional approval and approved methods are favored over research methods. The method with greater accuracy and precision and lower LRLs for the overlapping constituents often is preferred; however, a method also may be selected as the preferred method to provide consistency with historical data analyzed by the same method.

Twenty-two of the 27 constituents targeted for analyses appear on schedules at the NWQL. Analytical schedules, which have overlapping constituents, include the VOCs (Schedule 2020; table 3A), gasoline oxygenates and degradates (Schedule 4024; table 3B), pesticides and pesticide degradates (Schedule 2003; table 3C), polar pesticides and pesticide degradates (Schedule 2060; table 3D), potential wastewater-indicators (Schedule 4433; table 3E [table A2], pharmaceutical compounds [SC2080; table 3F]). For constituents on Schedules 2020 and 4024, the preferred method was Schedule 2020 to provide consistency (all samples collected for the GAMA Priority Basin project are analyzed using Schedule 2020). For constituents on Schedules 2020 and 4433, the preferred method was Schedule 2020 because it has greater precision and accuracy, and lower LRLs for VOCs. For constituents on Schedules 2003 and 4433, the preferred method was Schedule 2003 because it has greater accuracy and precision and lower LRLs for pesticide constituents, and for consistency (all samples collected for the GAMA Priority Basin project are analyzed using Schedule 2003 or an equivalent). For constituents on Schedules 2060 and 4433, the preferred method was Schedule 2060 because it has greater precision and accuracy, and lower LRLs for polar pesticides. For constituents on SC2080 and Schedule 4433, the preferred method at the time of the CLAB study was SC2080 because it had a lower LRL for the two overlapping constituents. However, as of 2007, the NWQL considered Schedule 4433 the preferred method because SC2080 had provisional approval, whereas, Schedule 4433 had full approval. For constituents that appear on two NWQL analytical schedules, only the results from the preferred method are reported.

The water-quality indicators—pH, specific conductance, and alkalinity—were measured in the field and at the NWQL. The field measurements are the preferred method for all three constituents; however, both are reported because laboratory pH and alkalinity measurements were made on a greater number of samples.

For arsenic, chromium, and iron concentrations, the approved method, Schedule 1948, used by the NWQL is preferred over the research methods used by the USGS Trace Metal Laboratory, although both are reported. The concentrations measured by the Trace Metal Laboratory are used only to calculated ratios of redox species for each element, $\frac{As(V)}{As(III)}$ for arsenic, $\frac{Cr(VI)}{Cr(III)}$ for chromium, and $\frac{Fe(III)}{Fe(II)}$ for iron. For example:

$$\frac{Fe(III)}{Fe(II)} = \frac{Fe(T) - Fe(II)}{Fe(II)}, \quad (2)$$

where

Fe(T) is the total iron concentration (measured),

Fe(II) is the concentration of ferrous iron (measured), and

Fe(III) is the concentration of ferric iron (calculated).

Tritium results from both the USGS Stable Isotope and Tritium Laboratory and LLNL will be reported (as they become available) even though the LLNL method is preferred.

Quality-Assurance Methods

The quality-assurance methods used for this study follow protocols described in the USGS National Field Manual (U.S. Geological Survey, variously dated), protocols used by the USGS NAWQA program (Koterba and others, 1995), and the NWQL quality-assurance plan (Maloney, 2005). Quality-control (QC) samples were collected concurrently with approximately 22 percent of samples in the CLAB study. This was done to assess the bias and variability of water-quality data potentially introduced during sample collection, processing, storage, transportation, and laboratory analysis, as well as intrinsic variability within the ground water itself. Four types of QC samples were collected and analyzed: blanks, field replicates, laboratory matrix spikes, and laboratory surrogates.

Blanks

Blank samples (blanks) were collected using water (VO-purged organic-free blank water and inorganic-free blank water) certified by the NWQL to contain less than the LRL or MRL of the analytes investigated in the study. Two types of blanks were collected: source-solution and field blanks. Source-solution blanks were collected to verify that the blank water used for the field blanks was free of analytes of interest. Field blanks and source-solution blanks for organic constituent analyses were collected at approximately nine percent of the wells sampled. Field blanks for inorganic analysis were collected at four percent of the wells sampled. These blank analysis were used to determine if equipment or procedures used in the field and (or) laboratory introduced contamination. Field blanks were analyzed for VOCs; gasoline oxygenates; pesticides, polar pesticides, and pesticide degradates; pharmaceuticals; potential wastewater indicator; perchlorate; NDMA; 1,2,3-TCP; 1,4-dioxane; nutrients; dissolved organic carbon; major and minor ions; trace elements; iron, arsenic, and chromium speciation; and radioactive constituents.

Source-solution blanks were collected at the sampling site by pouring blank water directly into sample containers that were preserved, stored, shipped, and analyzed in the same manner as the ground-water samples. For field blanks, blank water either was pumped or poured through the sampling equipment (fittings and tubing) used to collect ground water, then processed and transported using the same protocols for the ground-water samples.

If a constituent was detected in a field blank, the associated source-solution blank results were examined for similar constituent detections. If the field blank and the source-solution blank contained the same constituent(s), then the source-solution water was interpreted as the origin of the contamination in the blanks, and any field-blank detections originating from the same blank water were disregarded as having any affect on the environmental samples. If a field blank detection could not be attributed to the source solution, then the ground-water samples collected prior to, and following the blank were evaluated. If the ground-water samples prior to, or following the contaminated field blank had no detections, then carry-over contamination was ruled out. If a compound was detected in multiple field blanks and the detections could not be attributed to the source-solution water, then any ground-water sample that had a detection of the compound in question was evaluated for possible bias due to contamination.

This report uses a preliminary strategy for qualifying ground-water data due to random contamination. If the concentration of an analyte detected in a field blank was greater than the concentration measured in a ground-water sample collected prior to or following the blank sample, then the ground-water value was qualified. In addition, another screening level was defined as the highest concentration of the constituent detected in a field blank plus one-half of the LRL for that constituent. Detections of the constituent in ground-water samples at concentrations less than this screening level were qualified. Qualified values are indicated by a ‘V’ preceding the value in the data tables, noted in table A3, and these values also are excluded from the assessment of ground-water quality.

However, results from the small number of field blanks collected during a single study unit may not be representative of the results for a large number of field blanks collected over many study units. A subsequent report will present a more robust strategy for qualifying that is based on a statistical assessment of results for over 100 field blanks collected during 20 study units. The preliminary strategy used in this report may over- or underestimate the qualifying levels derived from the statistical assessment.

Field blanks were not collected for noble gases, carbon-14, stable isotopes, and tritium, as described below. Noble gases, carbon-14 (in atmospheric carbon dioxide), and tritium are present in the atmosphere and would dissolve into any solution used in collecting a blank, making it impractical to collect a field blank for these analytes. An indirect indicator of the quality of sampling data is that for tritium, activities are expected to be less than three pCi/L in water recharged prior to the 1950s. The presence of tritium below the MRL of one pCi/L in the sample collected implies that the sampling methods did not bias the sampling result for tritium. Stable-isotopic ratios of oxygen, hydrogen, and carbon are an intrinsic property of any of these elements and the concept of a blank does not apply to these ratios, which always have values as long as the element is present and cannot be measured if the element is absent.

Replicates

Sequential replicate samples were collected to assess variability that may result from the processing and analyses of inorganic and organic constituents. Relative standard deviation (RSD) of the measured values was used to express the variability between replicate pairs for each compound (table A4). The RSD is defined as the standard deviation divided by the mean concentration for each replicate pair of samples, multiplied by 100 percent. If one value in a sample pair was reported as a non-detection and the other value was reported as an estimate below the LRL or MRL, the RSD was set to zero because the values are analytically identical. If one value in a sample pair was reported as a non-detection and the other value was greater than the LRL or MRL, then the non-detection value was set equal to one-quarter of the LRL and the RSD was calculated (Hamlin and others, 2002). Values of RSD less than 20 percent are considered acceptable in this study. An RSD value of 20 percent corresponds to a relative percent difference (RPD) value of 29 percent. High RSD values for a compound at low concentrations may be the result of analytical uncertainty, particularly for concentrations within an order of magnitude of LT-MDL or MDL. Sequential replicate samples were collected at up to seven percent of the wells sampled, although not all analyte classes were tested at every well.

Matrix Spikes

Addition of a known concentration of a constituent (‘spike’) to a replicate environmental sample enables the laboratory to determine the effect of the matrix—in this case, ground water—on the analytical technique used to measure the constituent. The known compounds added in matrix spikes are the same as those being analyzed in the method. This enables an analysis of matrix interferences on a compound-by-compound basis. Matrix spikes were added at the laboratory performing the analysis. Compounds with low recoveries are of particular concern if environmental concentrations are close to the MCLs; a low recovery could falsely indicate a concentration below the MCL. Conversely, compounds with high recoveries are of potential concern if the environmental concentrations exceed MCLs: a high recovery could falsely indicate a concentration above the MCL.

Acceptable ranges for matrix-spike recoveries are based on the acceptable ranges established for laboratory “set” spike recoveries. Laboratory set spikes are aliquots of laboratory blank water to which the same spike solution used for the matrix spikes has been added. One set spike is analyzed with each set of samples. Acceptable ranges for set spike recoveries are 70 to 130 percent for NWQL schedules 2020, 4024, and 4433 (Connor and others, 1998; Zaugg and others, 2002; and Rose and Sandstrom, 2003), 60 to 120 percent for NWQL schedules 2003 and 2060 (pesticides; Furlong and others, 2001; Sandstrom and others, 2001), and 60 to 130 percent for schedule 2080 (Kolpin and others, 2002). Based on these ranges, we defined 70 to 130 percent as the acceptable range for matrix-spike recoveries for organic compounds in this study.

Matrix spikes were done for VOCs, gasoline oxygenates and their degradates, pesticide, polar pesticide, and pesticide degradate compounds, pharmaceutical compounds, potential wastewater indicators, NDMA, 1,4-dioxane, and 1,2,3-TCP because the analytical methods for these constituents are chromatographic methods which may be susceptible to matrix interferences. Replicate samples for matrix spike additions were collected at four percent of the wells sampled, although not all analyte classes were tested at every well (table A5A-E).

Surrogates

Surrogate compounds are added to environmental samples in the laboratory prior to analysis to monitor the method performance for each sample. Surrogate compounds were added to all of the ground-water and quality-control samples that were analyzed for VOCs, gasoline oxygenates and their degradates, pesticides and their degradates, potential wastewater indicators, 1,4-dioxane, NDMA, and 1,2,3-TCP (table A5E). Most of the surrogate compounds are deuterated analogs of compounds being analyzed. For example, the surrogate toluene-d8 used for the VOC analytical method has the same chemical structure as toluene, except that the eight hydrogen-1 atoms on the molecule have been replaced by deuterium (hydrogen-2). Toluene-d8 and toluene behave very similarly in the analytical procedure, but the small mass difference between the two results in slightly different chromatographic retention times, thus the use of a toluene-d8 surrogate does not interfere with the analysis of toluene (Grob, 1995). Only 0.015 percent of hydrogen atoms are deuterium (Firestone and others, 1996), thus, deuterated compounds like toluene-d8 do not occur naturally and are not found in

environmental samples. Surrogates are used to identify general problems that may arise during sample analysis that could affect the analysis results for all compounds in that sample. Potential problems include matrix interferences (such as high levels of dissolved organic carbon) that produce a positive bias, or incomplete laboratory recovery (possibly due to improper maintenance and calibration of analytical equipment) that produces a negative bias. A 70- to 130-percent recovery of surrogates generally is considered acceptable, values outside this range indicate possible problems with the processing and analysis of samples (table A6) (Connor and others, 1998; Sandstrom and others, 2001).

Quality-Control Sample Results

Detections in Field and Source-Solution Blanks

Table A3 presents a summary of detections in field blanks. In the CLAB study unit, field and source-solution blanks were collected at approximately nine percent of the sites sampled.

VOCs observed in field blanks, with their maximum detected concentration in parentheses, include acetone (E 3 µg/L), bromodichloromethane (0.11 µg/L), carbon disulfide (E 0.03 µg/L), chloroform (trichloromethane) (0.19 µg/L), dichloromethane (E 0.05 µg/L), and toluene (0.06 µg/L). All of the environmental samples collected prior to, during, and following these field blanks were free from these constituents, as were the source-solution blanks collected with these samples; hence no ground-water sample detections were qualified as a result of these blank detections. There was one situation where toluene was detected in the source-solution blank (E 0.01 µg/L) and in the associated environmental sample (E 0.01 µg/L); however, it was not detected in the associated field blank, or in any other environmental samples collected during this field sampling phase and, therefore, not of potential QC concern.

Field blanks were collected at three of the 17 sites sampled for analysis of nutrients. Ammonia was detected in two of the three field blanks at 0.007 µg/L and 0.008 µg/L, respectively. The later detection was used to establish a qualifying threshold at 0.018 µg/L (maximum field blank detection plus one-half the LRL). As a result, seven ground-water samples were coded with a "V" in table 10. Orthophosphate was detected in one of the three field blanks at 0.005 µg/L. This blank detection resulted in a qualifying concentration set at 0.008 µg/L (field blank detection plus one-half the LRL). None of the 19 ground-water samples collected had orthophosphate levels below the qualifying threshold; therefore, the field blank detection was not of QC concern.

Field blanks were collected at three (and source-solution blanks at one) of the 17 sites sampled for analysis of trace elements. Chromium was detected in one field blank and one source-solution blank at concentrations of 0.07 and E 0.03 µg/L, respectively. The concentration of chromium in the field blank (0.07 µg/L) added to half the LRL (0.02 µg/L) were used to establish a qualifying threshold at 0.09 µg. The source-solution detection was accompanied with a field blank sample free of chromium, so the source-solution detection was not of QC concern. Three ground-water samples had concentrations of chromium below the established qualifying threshold; therefore, they were qualified with a "V" in table 12. Calcium was detected in one source-solution blank and one of three field blanks samples at concentrations of 0.04 and 0.05 µg/L, respectively. The field blank associated with the source-solution blank was free of calcium, therefore, the source solution blank detection was not of potential QC concern. The concentration of calcium in the field blank was less than one percent of the lowest concentration in any of the environmental detections of calcium in CLAB (9.1 µg/L), therefore, none of the environmental samples were qualified. Vanadium was detected in one of three field blanks at 0.05 µg/L, the corresponding source solution blank was free of vanadium, and all environmental samples were above the qualifying threshold (maximum field blank detection plus one-half the LRL), therefore no environmental data were qualified, as a result. Copper, lead, and zinc each were detected in one of three field blanks at concentrations of 1.71, 0.92, and 6.6 µg/L, respectively. The corresponding environmental samples collected successively were free of these trace elements, therefore, the blank detections were not of potential QC concern, and no environmental samples were qualified as a result.

Barium and strontium each were detected once in one of three field blanks at 0.5 and E 0.3 µg/L, correspondingly. These concentrations were much lower than the associated environmental samples of 99 and 1,950 µg/L. All environmental samples were above the qualifying threshold (maximum field blank detection plus one-half the LRL), therefore, no environmental data were qualified as a result. Silicon was detected in one of the three field blanks; this detection was paired with a source solution blank detection, both detections were 0.03 µg/L. These detections were about one-thousandth the level of any of the environmental detections; therefore, these blank detections did not result in the qualifying of any environmental samples. Nickel was detected in two of the three field blanks at concentrations of E 0.04 µg/L and 0.22 µg/L, respectively. The later blank detection set a qualifying threshold at 0.25 µg/L (maximum field blank detection plus one-half the LRL). As a result, five environmental ground-water samples were coded with a "V" in table 12. Aluminum was detected in the final of the three field blanks at a concentration of 1.8 µg/L. This detection was determined to be exclusive to the final week of CLAB sampling (11/13/06 to 11/16/06, [table 1]) since the two previous field blanks collected had no detections of aluminum. The only detection of aluminum in ground-water samples for this sampling week was the one paired with the field blank; therefore, it was coded with a "V" in table 12.

Field blanks were collected at six of the 69 sites sampled for chromium, arsenic, and iron speciation analysis at the USGS Trace Metal Laboratory (TML). One field blank out of the six collected contained 0.7 µg/L of arsenic (total), 4 µg/L of iron (total), and 2 µg/L of iron (II). These blank detections were hypothesized to be from sporadic contamination at the TML, which could have affected other samples, but which is not systematic enough to support any pattern of "V-coding". However, it is important to note that measurements of iron (total) and arsenic (total) from the NWQL were preferred over measurements at the TML (table A2), so not qualifying the ground-water samples with potential contamination concerns did not affect the interpretations of environmental concentrations. There were no detections of arsenic (III), chromium (III) chromium (VI), or chromium (total) in the six field blanks analyzed at the TML.

Radium 226 and Radium 228 were the only radioactive constituents collected for field blank analysis; they were detected at (0.0108 pCi/L and 0.02 pCi/L [respectively]). Analysis of the corresponding environmental samples showed that these concentrations were of limited concern due to the relatively low blank concentrations and no environmental values were qualified as a result of the blank detections.

No compounds were detected in field blanks for the following analyte groups: pesticides and pesticide degradates (six field blanks), polar pesticides and pesticide degradates (one field blank), potential wastewater indicators (four field blanks), perchlorate (three field blanks); NDMA, 1,4-dioxane, and 1,2,3-TCP (one field blank [respectively]); microbial indicators, *F-specific or somatic coliphage* (one field blank), and no detections in ground-water samples.

Variability in Replicate Samples

Table A4 summarizes the results of replicate sample pairs for analytes in ground-water samples collected in the CLAB study. Over 1,300 (1,388) replicate pairs (by constituent) were considered in the replicate QC analysis. Almost 1,300 (1,297) replicate pairs had non-detections and are not reported in table A4. Additionally, concentrations or activities in the environmental and replicate samples are reported only for all replicate sample pairs with analyte detections and RSD values greater than 20 percent (table A4). Most replicate analyses had RSD values less than five percent and only 28 had RSD values greater than the acceptable limit of 20 percent. Of the replicate pairs, for which both concentrations were detections, constituents with one or more replicate analyses with RSD values greater than 20 percent include: 1,2,4-trimethylbenzene, 2-chloro-6-ethylamino-4-amino-*s*-triazine, diuron, norflurazon, 3,4-dichlorophenyl isocyanate, diethyl phthalate, phenol, zinc, iron, chromium, aluminum, and arsenic (total) analyzed by the USGS Trace Metal Laboratory. Most replicate pairs with RSD values greater than 20 percent had concentrations within a factor of five of the LRLs for the respective analytes. At these low concentrations, small deviations in measured values result in large RSDs. Thirteen pairs of replicate analyses included one detection and one non-detection (3-methyl-1[H]-indole [skatole], 5-methyl-1H-benzotriazole, bis[2-ethylhexyl] phthalate, bisphenol A, caffeine, methyl salicylate, *p*-cresol, phenol, aluminum, chromium, iron, nickel, arsenic [total] analyzed by the USGS Trace Metal Laboratory). All of the detected concentrations were less than twice the LRLs, therefore, none of the data were censored as a result of variability in replicate analyses.

Matrix-Spike Recoveries

Tables A5A-E presents a summary of matrix-spike recoveries for the CLAB study. Addition of a spike or known concentration of a constituent to an environmental sample enables the laboratory to determine the effect of the matrix, in this case ground water, on the analytical technique used to measure the constituent. Three environmental samples on schedule 2020 and one on schedule 4024 were spiked with VOCs to calculate matrix-spike recoveries (table A5A). In total, 87 of the 88 VOC spike compounds had median recoveries within the acceptable range of 70 and 130 percent. Only one matrix-spike sample, (carbon disulfide) had a median recovery below 70 percent (69 percent), thus, no VOC detections in the ground-water were qualified.

Three ground-water samples were spiked with pesticide and pesticide degradate compounds to calculate matrix-spike recoveries. Forty-three of the 63 spike compounds had median recoveries within the acceptable range of 70 and 130 percent (table A5B). Twelve of the 14 compounds detected in ground-water samples had spike median recoveries within the acceptable range. Five spike compounds had at least one recovery greater than 130 percent. Of the 63 spike compounds, 42 had at least one recovery below 70 percent. [NOTE – low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations].

One ground-water sample was spiked with polar pesticide and pesticide degradate compounds to calculate matrix-spike recoveries. Forty-two of the 59 spike compounds had recoveries within the acceptable range of 70 and 130 percent (table A5C). Four of the five compounds detected in ground-water samples had spike recoveries within the acceptable range. Six spike compounds in the ground-water samples had a recovery greater than 130 percent, while 12 compounds had a recovery below 70 percent. [NOTE – low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations].

Two ground-water samples were spiked with potential wastewater indicators with two exceptions; on one occasion 14 compounds were omitted from the spike mixture and only spiked once, while one compound, bis (2-ethylhexyl) phthalate, was not included in any of the spike mixtures.

Twenty-three of the 69 compounds had median spike recoveries less than 70 percent and none had recoveries greater than 130 percent (table A5D). Twenty-two of the 34 compounds detected in ground-water samples had median recoveries within the acceptable range of 70 and 130 percent. [NOTE – low recoveries may indicate that the compound might not have been detected in some samples if it was present at very low concentrations].

Results for pharmaceutical compounds are not presented in the CLAB report; they will be included in a subsequent publication.

One ground-water sample was spiked with NDMA, 1,2,3-TCP, and 1,4-dioxane. All spike recoveries were within the acceptable range of 70 to 130 percent (table A5E).

Surrogate Compound Recoveries

Surrogate compounds were added to environmental samples in the laboratory and analyzed to evaluate the recovery of similar constituents. Table A6 lists in columns the surrogate, analytical schedule on which it was applied, the number of analyses for blank and non-blank samples, the number of surrogate recoveries below 70 percent, and the number of surrogate recoveries above 130 percent for the blank and non-blank samples. Blank and non-blank samples were considered separately to assess whether the matrices present in non-blank samples affect surrogate recoveries. No systematic differences between surrogate recoveries in blank and non-blank samples were observed. Eighty-nine of surrogate recoveries in analyses of VOC and gasoline oxygenate and degradate analyses were in the acceptable range of 70 to 130 percent, as were 92 percent of the surrogate recoveries for pesticide, polar pesticide and pesticide degradates. Sixty percent of the surrogate recoveries for potential wastewater indicators, and 72 percent of NDMA, 1,2,3-TCP, and 1,4-dioxane surrogate recoveries were in the acceptable the range of 70 to 130 percent.

Eleven environmental samples with detections of VOCs had recoveries of the surrogate 1,2-dichloroethane-d4 greater than 130 percent (table A6). A number of VOCs detected in these seven samples elute near 1,2-dichloroethane-d4 in the chromatographic sequence. A high recovery for a surrogate suggests that the measured concentrations of analytes eluting near the surrogate may be biased toward higher concentrations, and that their true concentrations could be lower than reported.

Table A1. Analytical methods used for the determination of organic, inorganic, and microbial constituents by the U.S. Geological Survey (USGS) National Water Quality Laboratory (NWQL) and additional contract laboratories.

[Laboratory entity codes in the U.S. Geological Survey (USGS) National Water Information System (NWIS) for laboratories other than the USGS National Water Quality Laboratory (NWQL) are given in parentheses after the laboratory names. **Abbreviations:** MI agar, supplemented nutrient agar in which coliforms (total and *Escherichia*) produce distinctly different fluorescence under ultraviolet lighting; UV, ultraviolet; VOCs, volatile organic compounds]

Analyte	Analytical method	Laboratory and analytical schedule/lab code	Citation(s)
		Water-quality indicators	
Field parameters		USGS field measurement	U.S. Geological Survey, variously dated
		Organic constituents	
VOCs	Purge and trap capillary gas chromatography/mass spectrometry	NWQL, Schedule 2020	Connor and others, 1998
Gasoline oxygenates and degradates	Heated purge and trap/gas chromatography/mass spectrometry	NWQL, Schedule 4024	Rose and Sandstrom, 2003
Pesticides and degradates	Solid-phase extraction and gas chromatography/mass spectrometry	NWQL, Schedule 2003	Zaugg and others, 1995; Lindley and others, 1996; Madsen and others, 2003; Sandstrom and others, 2001
Polar pesticides and degradates	Solid-phase extraction and high-performance liquid chromatography/mass spectrometry	NWQL, Schedule 2060	Furlong and others, 2001
Pharmaceuticals	Solid-phase extraction and HPLC/mass spectrometry	NWQL, Schedule 2080	Kolpin and others, 2002; Furlong and others, 2008
Wastewater-indicators	Solid-phase extraction and gas chromatography/mass spectrometry	NWQL, Schedule 4433	Zaugg and others, 2002
		Constituents of special interest	
Perchlorate	Ion chromatography and mass spectrometry	Montgomery Watson-Harza Laboratory (CA-MHWL)	Hautman and others, 1999
N-Nitrosodimethylamine (NDMA)	Gas chromatography and mass spectrometry	Montgomery Watson-Harza Laboratory (CA-MHWL)	U.S. Environmental Protection Agency, 1996; U.S. Environmental Protection Agency, 1999
1,4-Dioxane	Chromatography / mass spectrometry	Montgomery Watson-Harza Laboratory (CA-MHWL)	U.S. Environmental Protection Agency, 1996
1,2,3-Trichloropropane	Gas chromatography/electron capture detector	Montgomery Watson-Harza Laboratory (CA-MHWL)	U.S. Environmental Protection Agency, 1995
		Inorganic constituents	
Nutrients	Alkaline persulfate digestion, Kjedahl digestion	NWQL, Schedule 2755	Fishman, 1993; Patton and Kryskalla, 2003
Dissolved organic carbon	UV-promoted persulfate oxidation and infrared spectrometry	NWQL, Lab Code 2612	Brenton and Arnett, 1993
Major and minor ions, trace elements and nutrients	Atomic absorption spectrometry, colorimetry, ion-exchange chromatography, inductively-coupled plasma atomic emission spectrometry and mass spectrometry	NWQL, Schedule 1948	Fishman and Friedman, 1989; Fishman, 1993; Faires, 1993; McLain, 1993; Garbarino, 1999; Garbarino and Damrau, 2001; American Public Health Association, 1998; Garbarino and others, 2006
Chromium, arsenic and iron speciation	Various techniques of ultraviolet visible (UV-VIS) spectrophotometry and atomic absorbance spectroscopy	USGS Trace Metal Laboratory, Boulder, Colorado (USGSTMCO)	Stookey, 1970; To and others, 1998; Ball and McCleskey, 2003a and 2003b; McCleskey and others, 2003

Table A1. Analytical methods used for the determination of organic, inorganic, and microbial constituents by the U.S. Geological Survey (USGS) National Water Quality Laboratory (NWQL) and additional contract laboratories.—Continued

[Laboratory entity codes in the U.S. Geological Survey (USGS) National Water Information System (NWIS) for laboratories other than the USGS National Water Quality Laboratory (NWQL) are given in parentheses after the laboratory names. **Abbreviations:** MI agar, supplemented nutrient agar in which coliforms (total and *Escherichia*) produce distinctly different fluorescence under ultraviolet lighting; UV, ultraviolet; VOCs, volatile organic compounds]

Analyte	Analytical method	Laboratory and analytical schedule/lab code	Citation(s)
		Stable isotopes	
Stable isotopes of water	Gaseous hydrogen and carbon dioxide-water equilibration and stable-isotope mass spectrometry	USGS Stable Isotope Laboratory, Reston, Virginia (USGSSIVA), NWQL Schedule 1142	Epstein and Mayeda, 1953; Coplen and others, 1991; Coplen, 1994
Carbon isotopes	Accelerator mass spectrometry	University of Waterloo, Environmental Isotope Lab (CAN-UWIL); University of Arizona Accelerator Mass Spectrometry Lab (AZ-UAMSL), NWQL Schedule 2015	Donahue and others, 1990; Jull and others, 2004
		Radioactivity and gases	
Tritium	Electrolytic enrichment-liquid scintillation	USGS Stable Isotope and Tritium Laboratory, Menlo Park, California (USGSH3CA)	Thatcher and others, 1977
Tritium and noble gases	Helium-3 in-growth and mass spectrometry	Lawrence Livermore National Laboratory (CA-LLNL)	Moran and others, 2002; Eaton and others, 2004
Dissolved gases: nitrogen, argon, and methane	Membrane inlet mass spectrometry	Lawrence Livermore National Laboratory (CA-LLNL)	Singleton and Hudson, 2005; Singleton and others, 2007
Radon-222	Liquid scintillation counting	NWQL, Schedule 1369	American Society for Testing and Materials, 1998
Radium isotopes	Alpha activity counting	Eberline Analytical Services (CA-EBERL), NWQL Schedule 1262	Kreiger and Whittaker, 1980 (USEPA methods 903 and 904)
Gross alpha and beta radioactivity	Alpha and beta activity counting	Eberline Analytical Services, NWQL Schedule 1792	Kreiger and Whittaker, 1980 (USEPA method 900.0)
		Microbial constituents	
F-specific and somatic coliphage	Single-agar layer (SAL) and two-step enrichment methods	USGS Ohio Water Microbiology Laboratory (USGSOHML)	U.S. Environmental Protection Agency, 2001
Total and *Escherichia coliform*	Membrane filter technique with “MI agar”	USGS field measurement	U.S. Environmental Protection Agency, 2002; U.S. Geological Survey, variously dated

Table A2. Preferred analytical schedules for constituents appearing on multiple schedules for samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Preferred analytical schedules are methods of analysis preferred for the compound in question on the basis of the greatest accuracy, precision, or historical consistency of the results. **Abbreviations:** LLNL, Lawrence Livermore National Laboratory; MWH, Montgomery Watson-Harza Laboratory; SITL, U.S. Geological Survey Stable Isotope and Tritium Laboratory; TML, U.S. Geological Survey Trace Metal Laboratory; VOC, volatile organic compound]

Constituent	Primary constituent classification	Analytical schedules	Preferred analytical schedule
Results from preferred method reported			
Acetone	VOC	2020, 4024	2020
Atrazine	Pesticide	2003, 2060, 4433	2003
Bromacil	Pesticide	2060, 4433	2060
Bromoform	VOC	2020, 4433	2020
Caffeine	Potential waste-water indicator	2060, 2080, 4433	2080
Carbaryl	Pesticide	2003, 2060, 4433	2003
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-*s*-triazine)	Pesticide degradate	2003, 2060	2003
Chlorpyrifos	Pesticide	2003, 4433	2003
Cotitine	Potential waste-water indicator	4433, 2080	2080
Diazinon	Pesticide	2003, 4433	2003
1,4-Dichlorobenzene	VOC, pesticide	2020, 4433	2020
Dichlorvos	Pesticide	2003, 4433	2003
Diisopropyl ether	VOC	2020, 4024	2020
Ethyl *tert*-Butyl ether (ETBE)	VOC	2020, 4024	2020
Isopropylbenzene	VOC	2020, 4433	2020
Metalaxyl	Pesticide	2003, 2060, 4433	2003
Methyl *tert*-butyl ether (MTBE)	VOC	2020, 4024	2020
Methyl *tert*-pentyl ether	VOC	2020, 4024	2020
Metolachlor	Pesticide	2003, 4433	2003
Naphthalene	VOC	2020, 4433	2020
Tetrachloroethene (PCE)	VOC	2020, 4433	2020
Tebuthiuron	Pesticide	2003, 2060	2003
Results from both methods reported			
Arsenic, total	Trace element	1948, TML	1948
Chromium, total	Trace element	1948, TML	1948
Iron, total	Trace element	1948, TML	1948
1,2,3-Trichloropropane (TCP)	VOC	2020, MWH	MWH
Tritium	Radioactive	LLNL, SITL	LLNL

Table A3. Constituents detected in field blanks collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Data qualified due to associated blank contamination are reported but not used in summary statistics. **Number of environmental samples qualified with a V-code:** Environmental samples were not censored as a result of detections in the corresponding blank samples if the environmental samples taken prior to, and following the blank sample detections were free from the constituent observed in the blank sample. **Abbreviations:** E, estimated or having a higher degree of uncertainty; µg/L, micrograms per liter; pCi/L, picocuries per liter; –, not detected]

Constituent	Number of field blank detections/analyses	Maximum concentration detected in field blanks	Minimum concentration detected in environmental samples	Number of environmental samples qualified with a V-code
Organic constituents (µg/L)				
Acetone	1/7	E 3.0	–	0
Bromodichloromethane	1/7	0.11	E 0.03	0
Carbon disulfide	1/7	E 0.03	E 0.02	0
Chloroform (trichloromethane)	1/7	0.19	E 0.01	0
Dichloromethane	1/7	E 0.05	E 0.02	0
Toluene	[1,2]4/7	E 0.06	E 0.01	0
Inorganic constituents (µg/L)				
Orthophosphate (as phosphorus)	1/3	E 0.005	0.015	0
Ammonia (as nitrogen)	2/3	0.005	E 0.005	7
Calcium	[2]2/3	0.05	9.1	0
Aluminum	1/3	1.8	E 0.9	1
Barium	1/3	0.5	0.73	0
Chromium	[2]2/3	E 0.03	0.04	3
Copper	1/3	1.71	E 0.37	0
Lead	[3]1/3	0.92	0.25	0
Nickel	2/3	0.22	E 0.03	5
Silica	1/3	0.03	16.08	0
Strontium	1/3	E 0.3	28.5	0
Vanadium	[2]1/3	E 0.05	0.15	0
Zinc	[3]1/3	6.6	E 0.39	0
Arsenic (TML)[4]	1/6	0.7	0.6	0
Iron (TML)[4]	1/6	4.0	2.0	0
Radioactive constituents (pCi/L)				
Radium-226	1/1	0.011	E 0.045	0
Radium-228	1/1	0.02	E 0.27	0

[1] Constituents also detected in associated source-solution blanks.

[2] Constituents detected in source-solution blank and environmental sample, but not in associated field blank so it was not of potential QC concern.

[3] Constituents detected in field blank, but not in associated environmental sample so it was not of potential QC concern.

[4] Iron and and arsenic analyses performed by the U.S. Geological Survey Trace Metal Laboratory.

Table A4. Quality-control summary of replicate analyses collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[**Abbreviations:** E, estimated or having a higher degree of uncertainty; <, less than; mg/L, milligram per liter; µg/L, microgram per liter; –, not detected; RSD, relative standard deviation in percent; nv, no measured values with RSD greater than 20 percent]

Constitutent	Number of relative standard deviations greater than 20 percent/ number of replicate pairs	Maximum relative standard deviation (percent)	Measured values for pairs with RSD greater than 20 (environmental/replicate)
Volatile organic compounds, gasoline oxygenates and degradates from schedules 2020 and 4024			
1,2,4-Trimethylbenzene	1/5	74	(E 0.6; 0.19)
All other VOCs from schedule 2020 and 4024	0/5	< 20	nv
Pesticides, polar pesticides and pesticide degradates from schedules 2003 and 2060			
All pesticides and pesticide degradates from schedule 2003	0/5	< 20	nv
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-*s*-triazine) (µg/L)	1/1	47	(E 0.01; E 0.02)
Diuron (µg/L)	1/1	20	(0.15; 0.20)
Norflurazon (µg/L)	1/1	28	(0.02; 0.03)
All other polar pesticides and pesticide degradates from schedule 2060	0/1	< 20	nv
Potential waste-water indicators from schedule 4433			
3-Methyl-1(H)-indole (Skatole) (µg/L)	1/5	98	(– ; E 0.04)
3,4- Dichlorophenyl isocyanate (mg/L)	1/5	21	(E 1.94; E 2.63)
5-Methyl-1H-benzotriazole (µg/L)	1/5	64	(4.28; –)
Bis(2-ethylhexyl) phthalate (µg/L)	1/5	28	(2.97; –)
Bisphenol A (µg/L)	1/5	72	(E 0.13; –)
Caffeine (µg/L)	1/5	58	(– ; E 0.08)
Diethyl phthalate (µg/L)	1/5	32	(E 0.14; E 0.09)
Methyl salicylate (µg/L)	1/5	102	(– ; E 0.03)
p-Cresol (µg/L)	1/5	87	(– ; 0.85)
Phenol (µg/L)	2/5	97	(E 0.13; 0.73)(E 0.07; –)
All other potential waste-water indicator compounds from schedule 4433	0/5	< 20	nv
Constituents of special interest[1]			
Perchlorate	0/5	< 20	nv
1,2,3-Trichloropropane, 1,4-dioxane and *N*-nitrosodimethylamine (NDMA)	0/3	< 20	nv
Major ions, minor ions, trace elements, nutrients, and arsenic, chromium, and iron speciation			
Aluminum (mg/L)	2/3	34	(E 2.0; E 1.2) (– ; E 1.03)
Chromium (µg/L)	2/3	37	(0.17; 0.23) (E 0.07; –)
Iron (µg/L)	2/3	47	(E 3.00; –) (E 6.00; E4.37)
Nickel (µg/L)	1/3	47	(E 0.03; –)
Zinc (µg/L)	2/3	30	(1.50; 1.02) (E 0.39; 0.60)
Arsenic (total) (µg/L)[2]	2/5	94	(2.7; 1.6) (– ; 2.5)
Iron (total), iron(III), chromium (total), chromium(VI), arsenic(III) (µg/L)[2]	0/5	< 20	nv
All additional major ions, minor ions, trace elements from schedule 1948, nutrients from schedule 2755, and dissolved organic carbon from lab code 2612	0/3	< 20	nv

Table A4. Quality-control summary of replicate analyses collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.—Continued

[**Abbreviations:** E, estimated or having a higher degree of uncertainty; <, less than; mg/L, milligram per liter; µg/L, microgram per liter; –, not detected; RSD, relative standard deviation in percent; nv, no measured values with RSD greater than 20 percent]

Constitutent	Number of relative standard deviations greater than 20 percent/ number of replicate pairs	Maximum relative standard deviation (percent)	Measured values for pairs with RSD greater than 20 (environmental/replicate)
Isotopes and radioactivity			
Oxygen and hydrogen isotopes	0/5	< 20	nv
Carbon-14	0/2	< 20	nv
Radon-222	0/2	< 20	nv
Microbial indicators			
F-specific and somatic coliphage	0/1	< 20	nv
E. coli and total coliforms	0/10	< 20	nv

[1] Analyses performed at Montgomery Watson-Harza Laboratories, Monrovia, California.

[2] Analyses performed at U.S. Geological Survey Trace Metal Laboratory, Boulder, Colorado.

Table A5A. Quality-control summary of matrix-spike recoveries for volatile organic compounds (VOCs) and gasoline oxygenates and degradates in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study, California, June to November 2006.

[Acceptable recovery range is between 70 and 130 percent]

Constituent	Number of spike samples	Recovery (percent)		
		Minimum	Maximum	Median
Acetone[1]	3	94	103	97
Acrylonitrile	3	93	102	102
tert-Amyl alcohol	1	103	103	103
Benzene[2]	3	96	100	98
Bromobenzene	3	96	100	98
Bromochloromethane	3	102	108	104
Bromodichloromethane (THM)[2]	3	98	113	102
Bromoethene	3	101	117	112
Bromoform (tribromomethane)[2]	3	92	100	97
Bromomethane	3	89	111	94
2-Butanone (ethyl methyl ketone)	3	94	102	96
tert-Butyl alcohol (TBA)	1	100	100	100
Butylbenzene (n-Butylbenzene)	3	70	91	75
sec-Butylbenzene	3	81	96	87
tert-Butylbenzene	3	93	100	97
Carbon disulfide[2]	3	56	77	69
Chlorobenzene	3	96	98	96
Chloroethane	3	96	106	96
Chloroform (trichloromethane)	3	96	111	106
Chloromethane	3	92	113	99
3-Chloropropene	3	109	115	109
2-Chlorotoluene	3	91	98	91
4-Chlorotoluene	3	89	100	89
Dibromochloromethane	3	90	101	95
1,2-Dibromo-3-chloropropane (DBCP)	3	94	99	94
1,2-Dibromoethane (EDB)	3	100	106	100
Dibromomethane	3	104	115	104
1,2-Dichlorobenzene	3	94	98	98
1,3-Dichlorobenzene	3	91	102	96
1,4-Dichlorobenzene	3	87	98	94
trans-1,4-Dichloro-2-butene	3	94	98	94
Dichlorodifluoromethane (CFC-12)[2]	3	70	89	80
1,1-Dichloroethane[2]	3	105	110	106
1,1-Dichloroethene (DCE)[2]	3	89	96	89
1,2-Dichloroethane[2]	3	97	111	111
cis-1,2-Dichloroethene[2]	3	98	109	102
trans-1,2-Dichloroethene[2]	3	96	102	100
Dichloromethane (methylene chloride)	3	106	106	106
1,1-Dichloropropene	3	84	90	90
1,2-Dichloropropane	3	98	102	100
1,3-Dichloropropane	3	99	106	99
cis-1,3-Dichloropropene	3	84	88	85
trans-1,3-Dichloropropene	3	79	95	86
2,2-Dichloropropane	3	86	90	89
Diethyl ether	3	96	102	96
Diisopropyl ether[1,2]	3	94	102	95
Ethylbenzene[2]	3	89	98	91
Ethyl *tert*-butyl ether (ETBE, *tert*-butyl ethyl ether)[1]	3	83	96	88
Ethyl methacrylate	3	86	93	89
o-Ethyl toluene (2-Ethyltoluene)	3	83	89	85
Hexachlorobutadiene	3	63	85	70
Hexachloroethane	3	91	102	96
2-Hexanone (*n*-Butyl methyl ketone)	3	89	102	95
Iodomethane (Methyl iodide)	3	98	109	99
Isopropylbenzene (cumene)	3	94	98	94
4-Isopropyl-1-methylbenzene	3	77	98	83
Methyl acetate	1	107	107	107
Methyl acrylate	3	94	103	96
Methyl acrylonitrile	3	96	113	100
Methyl *tert*-butyl ether (MTBE)[1,2]	3	91	96	96
Methyl methacrylate	3	88	97	91
4-Methyl-2-pentanone (MIBK, isobutyl methyl ketone)	3	89	93	93
Methyl *tert*-pentyl ether[1]	3	90	95	95
Naphthalene[2]	3	77	107	91
n-Propylbenzene	3	79	94	87
Styrene	3	85	96	88
1,1,1,2-Tetrachloroethane	3	96	104	96

Table A5A. Quality-control summary of matrix-spike recoveries for volatile organic compounds (VOCs) and gasoline oxygenates and degradates in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study, California, June to November 2006.—Continued

[Acceptable recovery range is between 70 and 130 percent]

Constituent	Number of spike samples	Recovery (percent)		
		Minimum	Maximum	Median
1,1,2,2-Tetrachloroethane	3	98	104	98
Tetrachloroethene (PCE)[2]	3	87	98	96
Tetrachloromethane (carbon tetrachloride)[2]	3	94	136	99
Tetrahydrofuran	3	96	112	101
1,2,3,4-Tetramethylbenzene	3	70	105	84
1,2,3,5-Tetramethylbenzene	3	78	113	85
Toluene[2]	3	96	98	96
1,2,3-Trichlorobenzene	3	85	106	85
1,2,4-Trichlorobenzene	3	77	92	77
1,1,1-Trichloroethane (1,1,1-TCA)[2]	3	98	106	100
1,1,2-Trichloroethane (1,1,2-TCA)	3	98	102	100
Trichloroethene (TCE)[2]	3	45	98	89
Trichlorofluoromethane (CFC-11)[2]	3	99	112	100
1,2,3-Trichloropropane (1,2,3-TCP)[2]	3	96	104	104
1,1,2-Trichlorotrifluoroethane (CFC-113)[2]	3	70	87	74
1,2,3-Trimethylbenzene	3	95	105	95
1,2,4-Trimethylbenzene[2]	3	83	106	88
1,3,5-Trimethylbenzene	3	83	100	88
Vinyl chloride[2]	3	96	117	106
m- and *p*-Xylene[2]	3	88	101	93
o-Xylene	3	89	91	89

[1] Constituents on schedules 2020 and 4024; only values from schedule 2020 are reported because it is the preferred analytical schedule.

[2] Constituents detected in ground-water samples.

Table A5B. Quality-control summary of matrix-spike recoveries for pesticides and pesticide degradates in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Acceptable recovery range is between 70 and 130 percent]

Constituent	Number of spike samples	Recovery (percent)		
		Minimum	Maximum	Median
Acetochlor	3	72	115	103
Alachlor	3	76	107	103
Atrazine[1]	3	85	119	111
Azinphos-methyl	3	37	119	67
Azinphos-methyl-oxon	3	27	108	27
Benfluralin, water	3	41	72	63
Carbaryl	3	58	111	99
2-Chloro-2,6-diethylacetanilide	3	68	107	98
4-Chloro-2-methylphenol	3	59	76	67
Chlorpyrifos	3	82	101	99
Chlorpyrifos oxon	3	33	35	34
Cyfluthrin	3	32	77	62
Cypermethrin	3	30	68	58
Dacthal (DCPA)	3	97	118	98
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-*s*-triazine)[1]	3	90	107	94
Desulfinylfipronil[1]	3	67	123	87
Desulfinylfipronil amide	3	41	121	98
Diazinon	3	76	95	94
Diazinon oxon	3	47	101	98
3,4-Dichloroaniline[1]	3	77	98	88
Dichlorvos[1]	3	27	38	37
Dicrotophos	3	22	35	31
Dieldrin	3	74	93	89
2,6-Diethylaniline	3	87	108	98
Dimethoate	3	20	36	31
Ethion	3	58	97	88
Ethion monoxon	3	58	97	88
2-Ethyl-6-methylaniline	3	90	107	94
Fenamiphos	3	57	143	87
Fenamiphos sulfone	3	34	214	51
Fenamiphos sulfoxide	3	16	62	19
Fipronil[1]	3	50	123	113
Fipronil sulfide[1]	3	53	100	90
Fipronil sulfone[1]	3	50	131	94
Fonofos	3	76	106	94
Hexazinone[1]	3	42	124	64
Iprodione	3	32	80	58
Isofenphos	3	70	124	119
Malaoxon	3	58	113	91
Malathion	3	70	114	103
Metalaxyl[1]	3	72	100	97
Methidathion	3	79	120	94
Metolachlor[1]	3	89	112	108
Metribuzin	3	44	80	78
Myclobutanil	3	56	111	100
1-Naphthol	3	20	39	35
Paraoxon-methyl	3	36	56	50
Parathion-methyl	3	46	91	87
Pendimethalin	3	56	105	92
cis-Permethrin	3	40	68	57
Phorate	3	64	80	73
Phorate oxon	3	57	116	115
Phosmet	1	34	34	34
Phosmet oxon	1	18	18	18
Prometon[1]	3	62	101	101
Prometryn	3	76	117	111
Pronamide (Propyzamide)	3	63	99	95
Simazine[1]	3	72	113	110
Tebuthiuron[1]	3	29	186	127
Terbufos	3	112	142	118
Terbufos oxon sulfone	3	46	119	76
Terbuthylazine	3	83	107	104
Trifluralin	3	46	80	71

[1] Constituents detected in ground-water samples.

Table A5C. Quality-control summary of matrix-spike recoveries for polar pesticides and pesticide degradates in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Acceptable recovery range is between 70 and 130 percent]

Constituent	Number of spike samples	Recovery (percent)
Acifluorfen	1	77
Aldicarb	1	77
Aldicarb sulfone	1	57
Aldicarb sulfoxide	1	90
Atrazine	1	108
Bendiocarb	1	80
Benomyl	1	76
Bensulfuron-methyl	1	169
Bentazon	1	57
Bromacil	1	96
Bromoxynil	1	46
Caffeine	1	87
Carbaryl	1	96
Carbofuran	1	97
Chloramben, methyl ester	1	103
Chlorimuron-ethyl	1	195
3-(4-Chlorophenyl)-1-methyl urea[1]	1	65
Clopyralid	1	88
Cycloate	1	77
2,4-D (2,4-Dichlorophenoxyacetic acid)	1	77
2,4-D methyl ester (2,4-Dichlorophenoxyacetic acid methyl ester)	1	91
2,4-DB (4-(2,4-Dichlorophenoxy)butyric acid)	1	61
DCPA (Dacthal) monoacid	1	69
Deethylatrazine (2-Chloro-4-isopropylamino-6-amino-*s*-triazine)	1	69
Deisopropyl atrazine (2-chloro-6-ethylamino-4-amino-*s*-triazine)[1]	1	88
Dicamba	1	54
Dichlorprop	1	73
Dinoseb	1	61
Diphenamid[1]	1	96
Diuron[1]	1	103
Fenuron	1	84
Flumetsulam	1	176
Fluometuron	1	96
Hydroxyatrazine (2-Hydroxy-4-isopropylamino-6-ethylamino-*s*-triazine)	1	96
3-Hydroxycarbofuran	1	84
Imazaquin	1	126
Imazethapyr	1	107
Imidacloprid	1	108
Linuron	1	96
MCPA (2-Methyl-4-chlorophenoxyacetic acid)	1	73
MCPB (4-(2-Methyl-4-chlorophenoxy) butyric acid)	1	61
Metalaxyl	1	103
Methiocarb	1	97
Methomyl	1	92
Metsulfuron methyl	1	161
Neburon	1	107
Nicosulfuron	1	180
Norflurazon[1]	1	107
Oryzalin	1	77
Oxamyl	1	80
Picloram	1	46
Propham	1	91
Propiconazole	1	123
Propoxur	1	96
Siduron	1	107
Sulfometuron-methyl	1	164
Tebuthiuron	1	115
Terbacil	1	94
Triclopyr	1	61

[1] Constituents detected in ground-water samples.

Table A5D. Quality-control summary of matrix-spike recoveries for potential waste-water indicators in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Acceptable recovery range is between 70 and 130 percent. **Symbols:** –, not included in spike mixture]

Constituent	Number of spike samples	Recovery (percent)		
		Minimum	Maximum	Mean
Acetophenone	1	76	76	76
Acetyl hexamethyl tetrahydronaphthalene[1]	2	69	73	71
Anthracene, water	2	72	75	73
9,10-Anthraquinone	2	69	78	74
Atrazine	2	83	93	88
Benzo[a]pyrene	2	64	68	66
Benzophenone[1]	2	78	82	80
Bis(2-ethylhexyl) phthalate[1]	0	–	–	–
Bisphenol A[1]	2	73	81	77
Bromacil	2	77	83	80
Bromoform (tribromomethane)	2	61	64	62
3-*tert*-Butyl-4-hydroxyanisole	2	44	57	50
Caffeine	2	72	78	75
Camphor[1]	1	77	77	77
Carbaryl	2	68	71	70
Carbazole	2	81	83	82
Chlorpyrifos	2	65	79	72
Cholesterol[1]	2	64	67	66
3-β-Coprostanol[1]	2	68	68	68
Cotinine	2	41	61	51
p-Cresol[1]	1	72	72	72
4-Cumylphenol[1]	2	81	83	82
N,*N*-diethyl-meta-toluamide (DEET)[1]	2	82	90	86
Diazinon	2	73	76	75
1,4-Dichlorobenzene	2	26	61	44
3,4-Dichlorophenyl isocyanate	2	69	102	86
Dichlorvos	1	74	74	74
Diethyl phthalate[1]	2	83	94	88
2,6-Dimethylnaphthalene[1]	2	54	69	62
Fluoranthene[1]	2	67	76	72
Hexahydrohexamethyl cyclopentabenzopyran[1]	2	67	72	69
Indole[1]	1	78	78	78
Isoborneol	1	71	71	71
Isophorone	1	78	78	78
Isopropylbenzene	2	12	49	31
Isoquinoline	1	75	75	75
d-Limonene[1]	1	42	42	42
Menthol	1	83	83	83
Metalaxyl	2	80	89	85
1-Methylnaphthalene[1]	2	63	73	68
2-Methylnaphthalene[1]	1	72	72	72
3-Methyl-1H-indole	2	76	86	81
5-Methyl-1H-benzotriazole[1]	2	69	70	69
Methyl salicylate[1]	1	71	71	71
Metolachlor	2	82	90	86
Naphthalene	2	58	75	67
Nonylphenol, monoethoxy-(total)	2	71	73	72
4-Nonylphenol diethoxylates[1]	2	64	64	64
4-Octylphenol[1]	2	67	76	71
4-Octylphenol diethoxylates[1]	2	52	96	74
4-Octylphenol monoethoxylates	2	65	74	69
4-*tert*-Octylphenol	2	77	78	78
4-Nonylphenol[1]	2	74	79	76
Pentachlorophenol	2	52	82	67
Phenanthrene	2	74	77	76
Phenol[1]	1	74	74	74
Prometon[1]	2	74	84	79
Pyrene[1]	2	67	76	72
β-Sitosterol	2	58	72	65
β-Stigmastanol	2	51	82	67
2,2',4,4'-Tetrabromo-diphenyl ether	2	40	51	45
Tetrachloroethylene[1]	1	–	27	27
Tributyl phosphate[1]	2	74	84	79
Triclosan[1]	2	69	69	69
Triethyl citrate	2	70	109	90
Triphenyl phosphate[1]	2	66	69	67
Tris(2-butoxyethyl) phosphate[1]	2	79	82	80
Tris(2-chloroethyl) phosphate[1]	2	73	82	80
Tris(dichloroisopropyl) phosphate[1]	2	69	74	71

[1] Constituents detected in ground-water samples.

Table A5E. Quality-control summary of matrix-spike recoveries for constituents of special interest in samples collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[Acceptable recovery range is between 70 and 130 percent]

Constituent	Number of spike samples	Recovery (percent)
1,2,3-Trichloropropane (TCP)	1	95
1,4-Dioxane[1]	1	90
N-Nitrosodimethylamine (NDMA)[1]	1	94

[1]Constituents detected in ground-water samples.

Table A6. Quality-control summary of surrogate recoveries for volatile organic compounds, gasoline oxygenates and degradates, pesticides and pesticide degradates, potential waste-water indicators, and constituents of special interest, collected for the Coastal Los Angeles Basin Groundwater Ambient Monitoring and Assessment (GAMA) study unit, California, June to November 2006.

[**Abbreviations:** MWH, Montgomery Watson-Harza Laboratory; VOC, volatile organic compound]

Surrogate	Analytical schedule	Constituent or constituent class analyzed	Number of blank sample analyses	Median recovery in blanks (percent)	Number of surrogate recoveries in blanks		Number of environmental sample analyses	Median recovery in environmental samples (percent)	Number of surrogate recoveries in environmental samples	
					Below 70 percent	Above 130 percent			Below 70 percent	Above 130 percent
1,2-Dichloro-ethane-d4	2020, 4024	VOC, gasoline oxygenate	12	113	0	3	69	116	0	11
1-Bromo-4-fluorobenzene	2020, 4024	VOC, gasoline oxygenate	12	96	0	0	69	92	14	0
Toluene-d8	2020, 4024	VOC, gasoline oxygenate	12	82	0	0	69	98	0	0
Isobutyl alcohol-d6	4024	Gasoline oxygenate	2	91	0	0	17	92	0	0
alpha-HCH-d6	2003	Pesticide	6	96	0	0	68	95	1	0
Diazinon-d10	2003	Pesticide	6	108	0	0	68	100	1	0
2,4,5-T (2,4,5-trichloro-phenoxyacetic acid)	2060	Pesticide degradate	1	70	1	0	17	71	7	0
Barban	2060	Pesticide degradate	1	86	0	0	17	88	1	0
Caffeine-^{13}C	2060	Pesticide degradate	1	90	0	0	17	77	5	0
Bisphenol A-d3	4433	Potential waste-water indicator	8	64	6	0	69	73	28	0
Caffeine-C13	4433	Potential waste-water indicator	8	80	0	0	69	75	25	0
Decafluorobiphenyl	4433	Potential waste-water indicator	8	67	5	0	69	64	53	0
Fluoranthene-d10	4433	Potential waste-water indicator	8	89	0	0	69	85	7	0
Toluene-d8	MWH	1,2,3-TCP[1]	2	97	0	0	15	99	0	0
NDMA-d6	MWH	NDMA[1]	2	71	1	0	14	101	2	0
Nitrobenzene-d5	MWH	1,4 Dioxane[1]	2	82	0	0	14	74	5	0
Terphenyl-d14	MWH	1,4 Dioxane[1]	2	81	0	0	14	51	11	0
2-Flurobiphenyl	MWH	1,4 Dioxane[1]	2	92	0	0	14	81	4	0

[1]Constituent analyzed at Montgomery Watson-Harza Laboratory (MWH), Monrovia, California.