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Perchlorate Data for Streams and Groundwater in Selected Areas of the United States, 2004

Data Series 495

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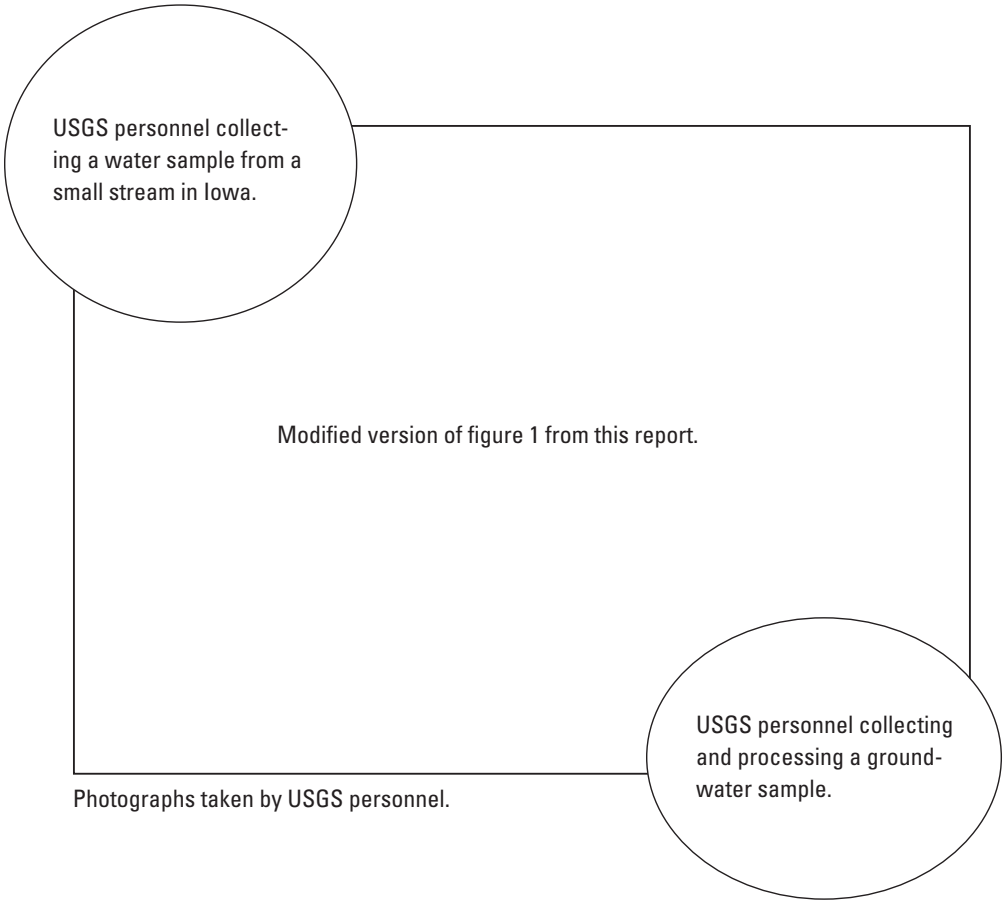

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By Stephen J. Kalkhoff, Sarah J. Stetson, Kris D. Lund, Richard B. Wanty, and Gregory L. Linder

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Conversion Factors, Abbreviations, and Datums

SI to Inch/Pound

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
	Volume	
liter (L)	33.82	ounce, fluid (fl. oz)
	Flow rate	
cubic meter per second (m^3/s)	0.0353	cubic feet per second (ft^3/s)
	Mass	
gram (g)	0.03527	ounce, avoirdupois (oz)

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

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Abstract

This report presents data collected as part of a reconnaissance study to evaluate the occurrence of perchlorate in rivers and streams and in shallow aquifers in selected areas of the United States. Perchlorate, a component in rocket fuels, fireworks, and some explosives is soluble in water and persists in soils and water for long periods. It is biologically active at relatively low-levels in the environment, and has been identified as an endocrine-disrupting chemical. The purpose of this reconnaissance was to determine the occurrence of perchlorate in agricultural areas of the Midwestern and North-Central United States and in arid Central and Western parts of the United States.

Samples were collected from 171 sites on rivers and streams and 146 sites from wells during the summer and early fall of 2004. Samples were collected from surface-water sites in 19 states and from wells in 5 states. Perchlorate was detected in samples collected in 15 states and was detected in 34 of 182 samples from rivers and streams and in 64 of 148 groundwater samples at concentrations equal to or greater than 0.4 micrograms per liter. Perchlorate concentrations were 1.0 micrograms per liter or greater in surface-water samples from seven states and in groundwater samples in four states. Only one surface-water and one groundwater sample had concentrations greater than 5.0 micrograms per liter. Perchlorate concentrations in followup samples collected from 1 to 3 months after the initial sample were unchanged at four of five stream sites.

Introduction

Perchlorate (ClO_4^-), a naturally occurring and manmade compound that is a component in rocket fuels, fireworks, and some explosives, has been detected in many water supplies throughout the country. Most documented occurrences of perchlorate have been related to military and chemical-manufacturing operations. However, a number of studies have documented the presence of perchlorate in nitrate-bearing minerals from Chile that have been or are still being used as fertilizers in the United States.

Although perchlorate has been documented as a point-source contaminant in groundwater near areas where ammonium perchlorate is produced and where solid-fuel rockets, fireworks, and other explosives are manufactured or used, recent studies (Parker and others, 2008) have found perchlorate in areas with no apparent anthropogenic sources and where agricultural activities (fertilizers and irrigation) are prevalent. Small-scale studies have documented perchlorate in groundwater in the Texas High Plains (Rajagopalan and others, 2006), leafy vegetables (Sanchez and others, 2005), beef cattle (Cheng and others, 2004) and selected dairy milk from supermarket shelves in Texas (Kirk and others, 2003). Perchlorate occurs naturally in precipitation (Rajagopalan and others, 2009) and may accumulate in the unsaturated zone in areas with low precipitation (deserts) by deposition processes similar to nitrate (Walvoord and others, 2003). Infiltration of irrigation water can mobilize accumulated perchlorate and transport it from the unsaturated zone to the underlying aquifer (Scanlon and others, 2008).

The identification of perchlorate in sodium nitrate fertilizers derived from Chilean caliche (Urbansky and others, 2001a) may support this suggestion. Although identified in Chilean caliche, perchlorate does not generally occur in manufactured nitrogen fertilizers (Urbansky and others, 2001b), but some questions remain on its occurrence in potash minerals (Orris and others, 2003). Perchlorate in groundwater in the United States has been documented by the U.S. Environmental Protection Agency (2003), but the areal occurrence has not been investigated.

Perchlorate is soluble in water and persists in soils and water for long periods. It is biologically active at relatively low-levels in the environment, and its role as an endocrine-disrupting chemical has been documented in some fish (Patino and others, 2003; Crane and others, 2005). Uptake by plants (Nzengung and others, 1999) and microbial degradation (Coleman and others, 2003; Sturchio and others, 2003) also has been established. The U.S. Environmental Protection Agency established a chronic oral reference dose (RfD) for humans of 0.0007 milligrams per kilogram body weight per day. The RfD equates to a Drinking Water Equivalent Level (DWEL) of 24.5 micrograms per liter (µg/L), or approximately equal to parts per billion (ppb). A DWEL is a lifetime exposure concentration protective of adverse, noncancer health effects that assumes all of the exposure to a contaminant is from drinking

water. (U.S. Environmental Protection Agency, 2008). A number of states have set advisory levels less than the DWEL and as low as 1.0 µg/L (Interstate Technology Regulatory Council, 2005).

The occurrence of perchlorate has been documented in groundwater at pristine areas across the United State (Parker and others, 2008) and has been extensively studied in groundwater in the southern High Plains in Texas and New Mexico (Rajagopalan and others, 2006), Southwestern United States (Balaji and others, 2007), and California. However, additional information on the occurrence of perchlorate in the Central and Midwestern United States is still needed. Research has centered mainly on the occurrence in groundwater, and the occurrence of perchlorate in streams and rivers has not been investigated extensively.

Purpose and Scope

A reconnaissance sampling was conducted in 2004 to: (1) collect data to determine the occurrence of perchlorate over a gradient of agricultural land-use intensity in areas of the Midwestern and North Central United States and (2) collect data to determine if varying annual precipitation across the middle and western parts of the United States affects the occurrence of perchlorate in rivers and streams.

Surface-water and groundwater data were collected in agricultural areas. Surface-water data were collected at sites on small third-order streams draining agricultural watersheds in the Midwestern corn belt in the fall of 2004 during low-flow periods when most water in the stream originates from groundwater discharge. Followup samples were collected from five streams 1 to 3 months after the initial sampling to document any seasonal variability. Groundwater data were collected from shallow aquifers in the summer and early fall of 2004 that have relatively "young" waters that may be susceptible to contamination from current land-use practices.

Surface-water data were collected in the summer and early fall of 2004 from streams and rivers in the Central and Southwestern United States to determine if varying annual rainfall influenced perchlorate occurrence in surface water. Sites were located on small to medium-sized streams that drained a watershed with a single primary land use and larger rivers that integrated multiple land use in the watershed.

The purpose of this report is to present data collected as part of the perchlorate occurrence study in the Central and Southwestern United States. Data includes those from the agricultural land-use gradient component and from the precipitation gradient component of the reconnaissance study. Interpretation of the relations between perchlorate occurrence and geologic, climatologic, and anthropogenic factors is beyond the scope of this report.

Description of the Study Area

The reconnaissance study was concentrated in the Central and Southwestern part of the United States (fig. 1). Perchlorate samples were based on the availability of wells and streams being sampled as part of other U.S. Geological Survey's (USGS) programs. The ongoing USGS water-quality programs include the National Water-Quality Assessment Program (NAWQA): joint US Environmental Protection Agency (EPA) and USGS Landscape Indicators (EPALIPS) project; and several USGS/State cooperative studies. Because of the integrated design, an extensive set of water-chemistry data that include physical properties, major ions, nutrients, and in some cases, trace elements are available in addition to the perchlorate data presented in this report. A list of projects that provided assistance in sample collection and selected reports documenting their findings is provided in appendix 1.

Selection of Sampling Sites

Several criteria were used to select stream and river sites and wells where perchlorate samples were added to existing data collection efforts to determine if perchlorate contamination is more prevalent in areas where nitrogen and potassium minerals are used as fertilizers for agriculture and to determine if perchlorate contamination is more prevalent in areas that receive less rainfall where perchlorate may not be readily flushed through the hydrologic system.

Surface-water and groundwater sites were selected to obtain data on the occurrence of perchlorate in agricultural areas (table 1, at the back of this report). Surface-water sites on medium to large streams and rivers that drain agricultural, urban, and undisturbed watersheds from Texas through Arizona, New Mexico, and California (fig. 1) were sampled to obtain data on the occurrence of perchlorate in streams in relation to a range of annual rainfall.

Water samples were collected from groundwater in an area with a gradient of agricultural intensity and of fertilizer use from Minnesota and Iowa southwest to Colorado. Shallow groundwater that has most likely infiltrated within the last 50 years was sampled to define perchlorate occurrence in aquifers. An extensive set of wells (table 1, at the back of this report) was sampled in Nebraska for perchlorate along with the standard suite of other water-quality constituents. Thirty-eight municipal supply wells were sampled in Iowa during the summer of 2004. These 38 wells occur in shallow alluvial deposits and were selected because the aquifer is susceptible to contamination from land-surface activities. Although these are municipal wells, the wells are located in or near farmland. Additional wells were sampled in Colorado where agricultural land-use intensity is minimal. Small third-order streams that drain primarily agricultural areas in the Midwestern corn-belt were selected to determine if groundwater flowing to streams contained perchlorate. One hundred and ten sites in 10 Midwestern corn-belt states were sampled. Additional sites

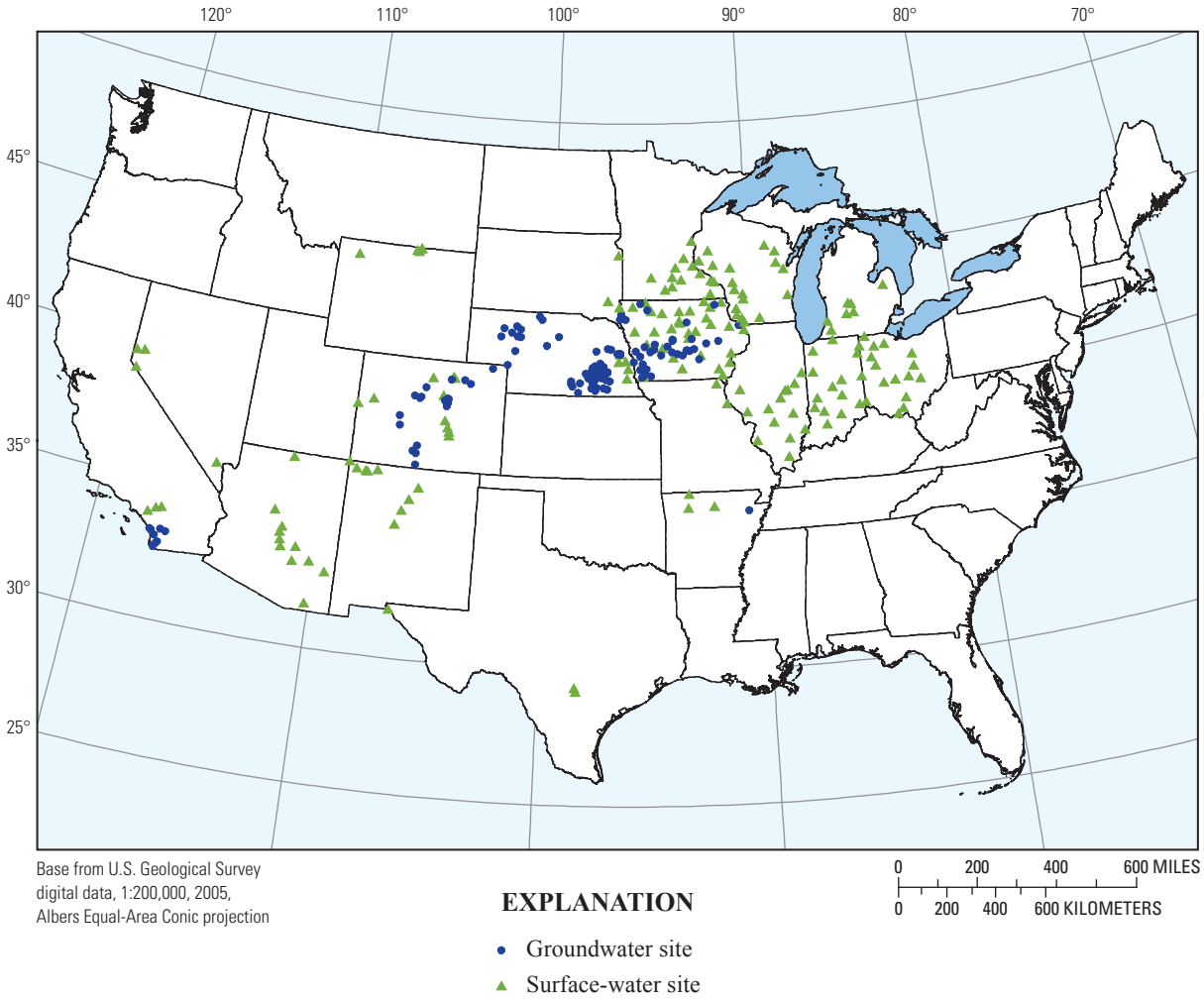

Figure 1. Location of surface-water and groundwater sites for reconnaissance sampling, 2004.

at the mouth of agricultural and undisturbed watersheds were sampled in Minnesota, Iowa, Nebraska, and Colorado during late summer or early fall.

In addition to the perchlorate data presented in this report, major ion, nutrient, pesticide, and, in some cases, trace element data for these sites are available online from the USGS NWISweb (*http://waterdata.usgs.gov/nwis/*) and NAWQA data warehouse (*http://infotrek.er.usgs.gov/traverse/f?p=NAWQA:HOME:927964592963779*).

Methods

Sample Collection Methods

Perchlorate samples were collected using methods that ensured representative surface-water and groundwater samples. For rivers and streams this means that any water-quality variability with depth or variability across the river was integrated into the sample. For groundwater this means that stagnant water in the well casing was removed before water from the aquifer was collected. Once the sample was obtained, appropriate filtration and preservation techniques were used to ensure that water quality did not change during transit to the laboratory. Detailed sampling techniques are provided in the USGS National Field Manual for the collection of water-quality data (U.S. Geological Survey, 1998) and are briefly summarized in the following sections.

All equipment used to collect and process perchlorate samples were precleaned with a 0.1-percent nonphosphate detergent, rinsed with tap water, and then rinsed with deionized water. Once cleaned, equipment was air dried, wrapped in aluminum foil or in plastic bags, and stored in a dust-free environment to ensure clean equipment for the next sample. Detailed cleaning procedures for equipment are described by Wilde (2004).

Surface Water

Samples from flowing streams were collected using depth-integrating sampling methods, described in detail by Webb and others (1999), to obtain a representative sample. A

brief summary follows. Collection of depth-integrated samples involves using an equal-width-increment (EWI) or equal-discharge-increment (EDI) sampling method. The EWI or EDI methods produce a composite sample that represents the discharge weighted concentrations of the stream cross section being sampled. Samples were collected at verticals from increments of the cross section of a stream having a specified width. The number of verticals sampled varies based on the width of the stream. Generally 10–15 vertical samples were composited at each site. However, in narrow streams where it was not practical to obtain multiple vertical samples, one vertical sample was collected. Occasionally, low-flow conditions (stream depth less than about 15 cm deep, or the stream velocity is less than about 0.45 m/s) rendered the use of an isokinetic sampler impractical. In these conditions, a dip sample was collected.

Groundwater

Detailed groundwater sampling protocol is provided in the groundwater sampling section (Chapter 4–2, by Gibbs and Wilde, 1999) of the National Field Manual and in a report documenting NAWQA protocols (Koterba and others, 1995). Initially, a water-level measurement was made to document natural or anthropogenic stresses on the aquifer. Wells were pumped for a sufficient amount of time so that a minimum of three well volumes were removed and so that temperature, specific conductance, and pH of the discharged water were stable. Once purged, the well was sampled by pumping the water through a 0.45 µm capsule filter into a polyethylene bottle as described below.

Sample Processing

Water collected from wells and streams was filtered through a capsule filter with a pore size of 0.45 µm for the perchlorate sample after filtering for major ions, nutrients, alkalinity, radiochemicals, and stable isotopes sample was completed. This ensured that several hundred milliliters of ambient water had been flushed through the filter before water was collected for the perchlorate sample. In addition, the first 20–25 mL of filtrate was used to rinse the polyethylene sample bottle to remove any foreign material. The sample bottle then was filled, capped securely, put in a ziplock bag, and chilled on ice for shipment to the laboratory. Once collected, the sample is kept chilled until analyzed at the laboratory.

Analytical Methods

The perchlorate analysis procedure was modified from that of Wagner and others (2004). Samples were analyzed for perchlorate using a Dionex DX-500 Ion Chromaograph (IC) system with a GP40 pump and ED40 electrochemical detector, 2 millimeter AG16 guard and AS16 analytical columns, and 35 millimole potassium hydroxide eluent flowing at a flow rate of 0.25 milliliters per minute (mL/min). A 50-microliter injection loop was used for samples with concentrations greater than 10 µg/L, and 1,000 microliter injection loop used for lower concentrations (less than or equal to 1 µg/L). A membrane suppression unit in the recycle mode was used with a current of 50 milliamps. Samples were pretreated with the barium, silver, and hydrogen cartridges. With the 2-millimeter column system, the signal to noise ratio at 0.2 µg/L was approximately 5.

Quality Assurance

An extensive array of quality-assurance (QA) samples were analyzed to ensure that results were representative of those in the environment and were not because of introduction of perchlorate during equipment cleaning or from cross contamination from previous samples (field blank samples). QA samples also were analyzed to ensure that the analytical method can determine accurate concentrations and can reliably reproduce results (replicate samples). In addition to the standard QA samples, perchlorate concentrations were measured in prepared solutions for more than 600 days to document the long-term stability of perchlorate in samples.

Field Blank Samples

Field blank samples (blank samples) were collected to measure contamination introduced by the site environment (atmosphere) and by sample handling, processing, and analysis. Generally, blank samples were collected routinely during the collection period of environmental water samples and were distributed among sites to assess a broad range of locations, hydrologic conditions, and water types. Blank samples were collected, processed, and analyzed in a manner that simulates the collection, processing, transport, and analysis of environmental water samples through clean sampling and processing equipment. The collection and processing of surface-water samples were simulated by pouring blank water (pesticide-grade water suitable for use in the collection of field blanks) into the sampler bottle, capping the sampler bottle and nozzle assembly, shaking, and pouring the blank water into a splitter. Blank water from the splitter then was filtered into sample bottles. Blank samples from surface-water sites were collected prior to the collection of environmental water samples to determine if cleaning procedures removed contamination introduced by water at the previous site, and if contamination was introduced by the transport of equipment to the current site. No field blank samples contained detectable concentrations of perchlorate (table 2).

Table 2. Quality-assurrance-quality-control samples (field blanks) for perchlorate reconnaissance study in selected areas of the United States.

[<, less than]

Map identification number (figures 2–9)	Site number	Site name	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
IA-01	05387313	Unknown Tributary to Beaver Creek near Lime Springs, IA	10/26/2004	1320	<0.4
MN-02	05316983	County Ditch 24 near Clements, MN	10/07/2004	0900	< .4
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	08/17/2004	1020	< .4
OH-12	405251082164801	Jerome Fork near Ashland, OH	10/01/2004	1008	< .4
SD-01	431559096350100	Little Beaver Creek near Canton, SD	09/02/2004	0830	< .4

Replicate Samples

Replicate samples were collected and analyzed to estimate the precision of concentration values from sample processing and analysis. Each replicate is an aliquot of the native sample water processed in the field through the same sample equipment and processed using identical procedures. Laboratory replicates are an aliquot of an environmental sample submitted for analysis.

Most of the replicate samples (table 3, at the back of this report) did not contain detectable concentrations of perchlorate. Analytical results of replicate samples from 10 sites had concentrations below the detection limit (0.4 µg/L) in both the ambient and replicate sample. Results of replicate samples from five sites had low levels of perchlorate (0.41 to 0.96 µg/L) in the ambient sample but no detectable concentration in the replicate sample. Results from one site had a detection in the replicate but not in the ambient sample.

Laboratory Quality Assurance Procedures

Approximately 10 percent of samples were analyzed in duplicate to ensure that there is reproducibility among analysis. Standards were analyzed between every 5–10 samples and a blank was analyzed approximately every 15 samples to ensure accuracy of data and to verify that no carry over occured between samples. The precision of the method was determined by calculating the standard deviation in the analyzed concentration of standard solutions of 100 and 1 µg/L. To ensure that there was no loss or enrichment of perchlorate during sample preparation, standards were analyzed after preparation in the same manner as samples. The recovered concentrations were found to be within the standard deviation of the original standards.

Stability of Perchlorate in Water Samples

The long-term stability of perchlorate in deionized water and in a common water matrix was determined to quantify any changes in perchlorate concentrations from the time of sample collection until sample analysis. Sets of samples containing 1,000, 100, 10, 1, 0.5 and 0 µg/L perchlorate in deionized water and also in local tap water were formulated. These samples were analyzed by ion chromatography and were compared to perchlorate concentration in freshly prepared standards every 24 hours for the first 7 days, biweekly for the next 4 weeks, and periodically after that for a total of 400 or 610 days for the two lowest concentrations and a total of 428 or 638 days for the high concentrations (Stetson and others, 2006). Perchlorate was found to be stable allowing for holding times of at least 90 days for surface-water samples and at least 300 days for groundwater samples (Stetson and others, 2006).

Occurrence of Perchlorate

Samples were collected from 171 sites on rivers and streams and 146 sites from wells during the summer and early fall of 2004. Samples were collected from surface-water sites in 19 states and from wells in 5 states.

Perchlorate was detected in samples collected in 15 states and was detected in 34 of 182 samples from rivers and streams and in 64 of 148 groundwater samples at concentrations equal to or greater than the 0.4 micrograms per liter (µg/L) reporting limit. Perchlorate concentrations were 1.0 µg/L or greater in surface-water samples from seven states and in groundwater samples in four states (table 5, at the back of this report). Only one surface water and one groundwater sample had concentrations greater than 5.0 µg/L. The results of the reconnaissance study, summarized by State, are shown in table 4 (at the back of this report) and illustrated in figures 2–9.

Perchlorate concentrations in followup samples collected from 1 to 3 months after the initial sample were unchanged at four of five stream sites (table 5). The perchlorate concentration decreased from 0.8 µg/L on August 23, 2004, to less than detection level on October 7, 2004, in the Little Cobb River near Beauford, Minnesota (table 5).

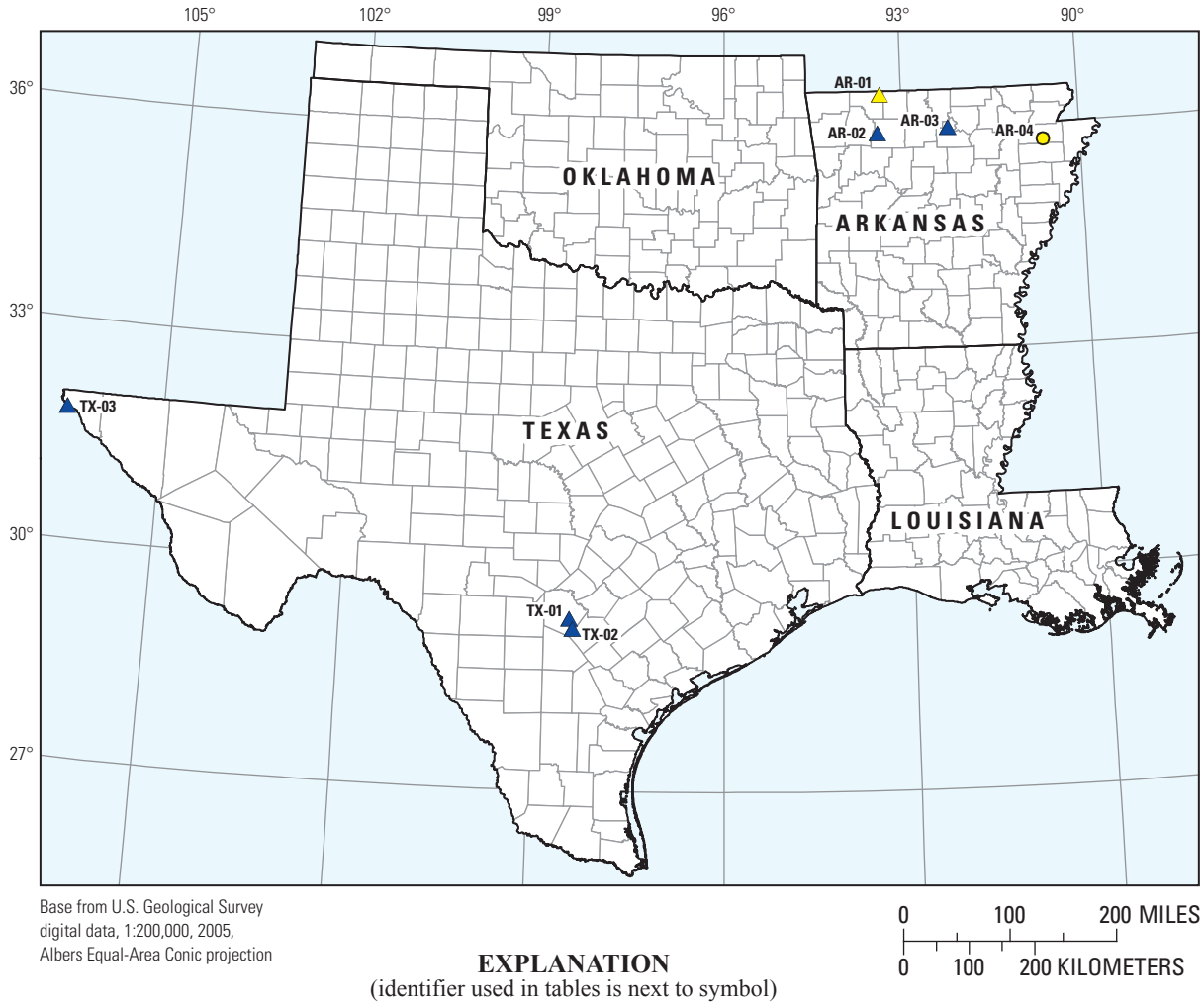

Figure 2. Perchlorate concentrations at selected surface-water and groundwater sites in Arkansas and Texas, 2004.

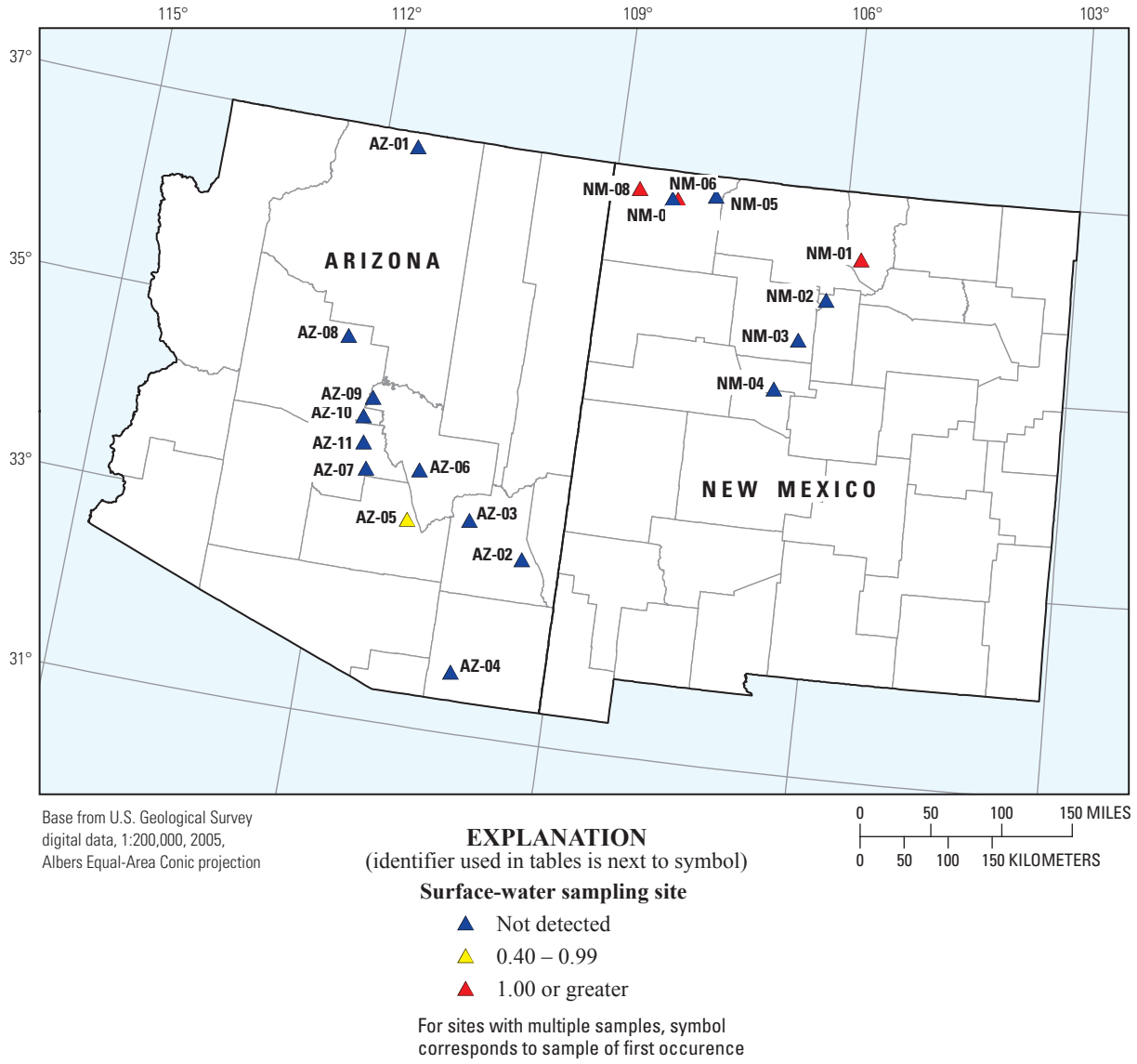

Figure 3. Perchlorate concentrations at selected surface-water sites in Arizona and New Mexico, 2004.

Figure 4. Perchlorate concentrations at selected surface-water and groundwater sites in California and Nevada, 2004.

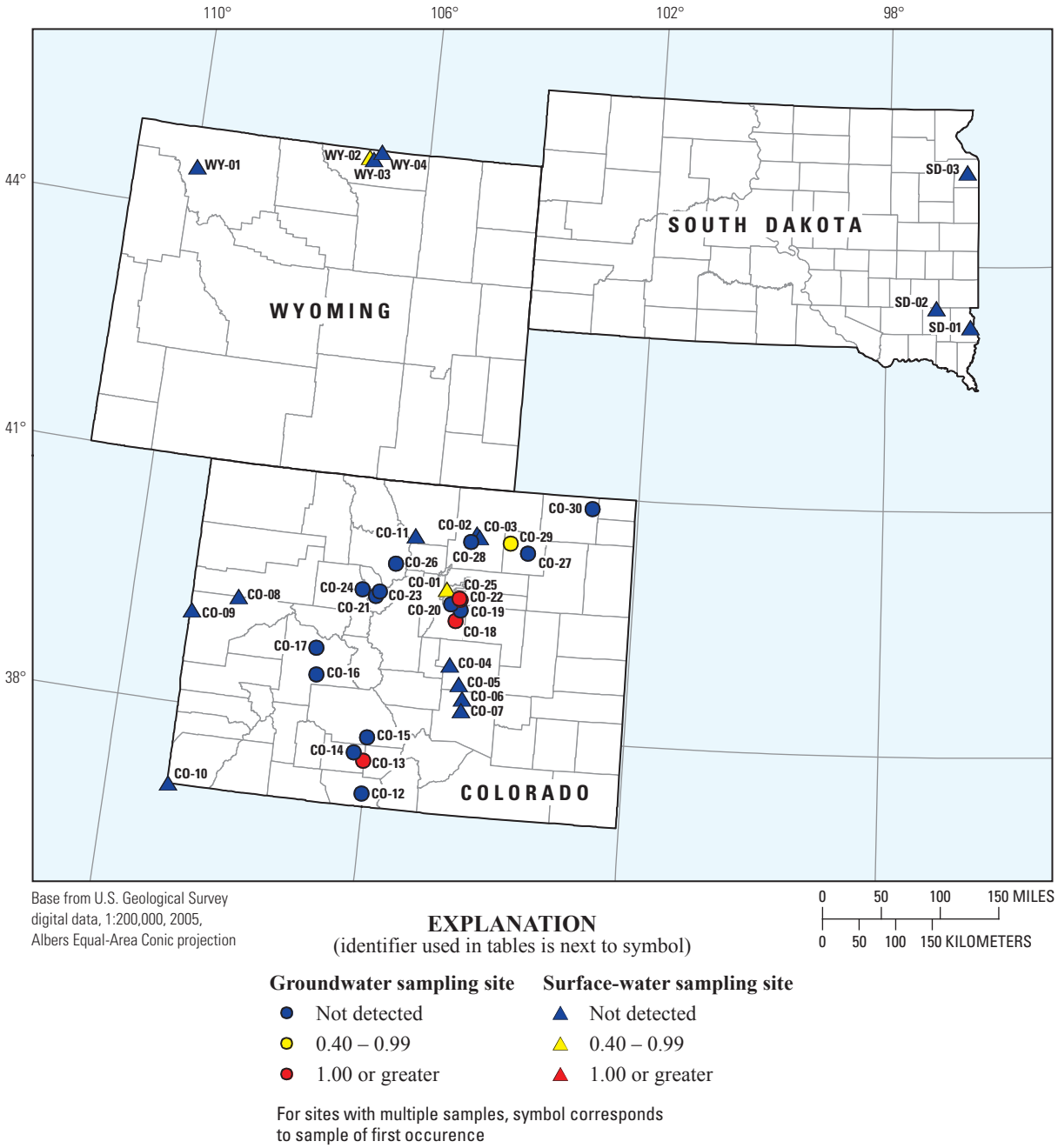

Figure 5. Perchlorate concentrations at selected surface-water and groundwater sites in Colorado, Wyoming, and South Dakota, 2004.

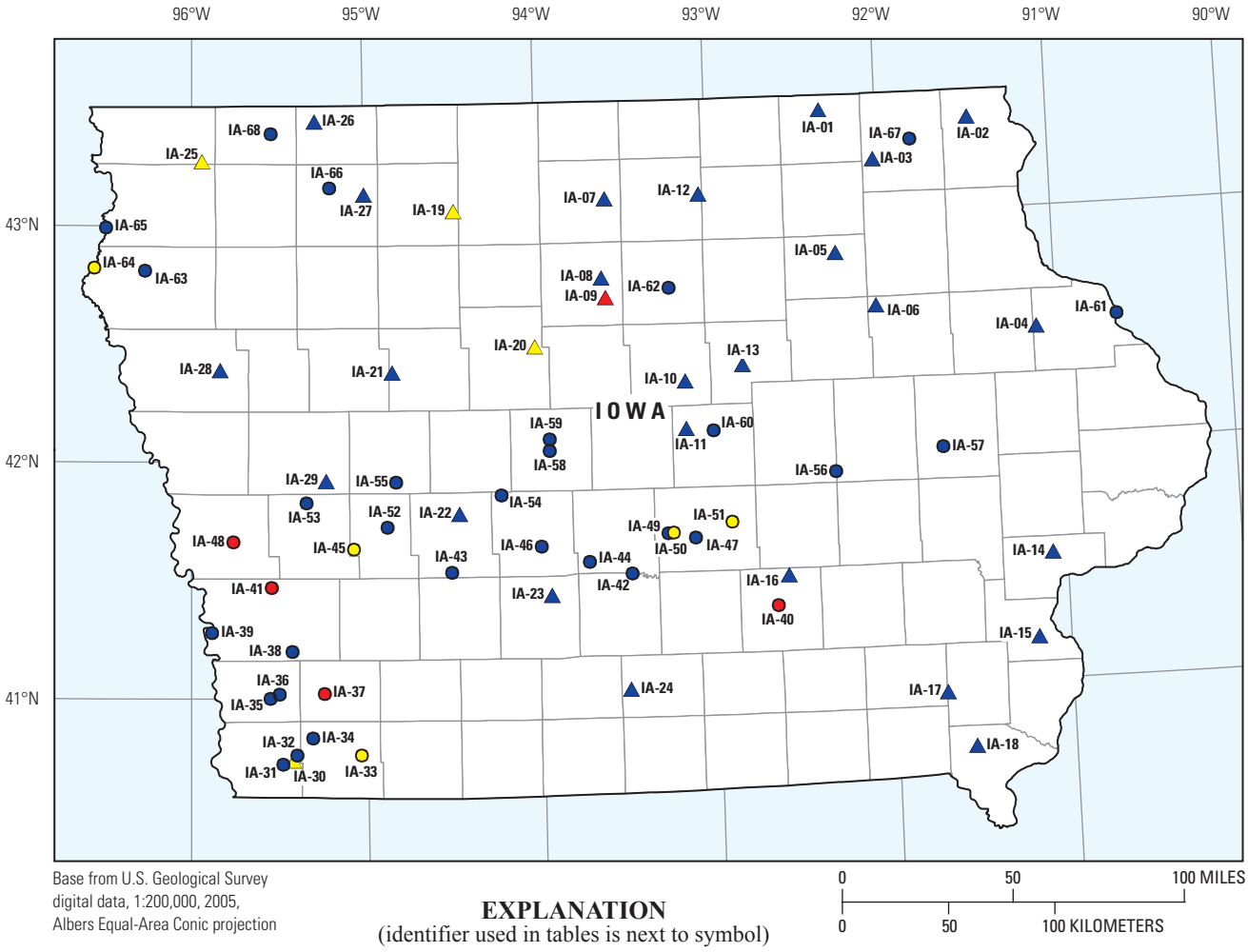

Figure 6. Perchlorate concentrations at selected surface-water and groundwater sites in Iowa, 2004.

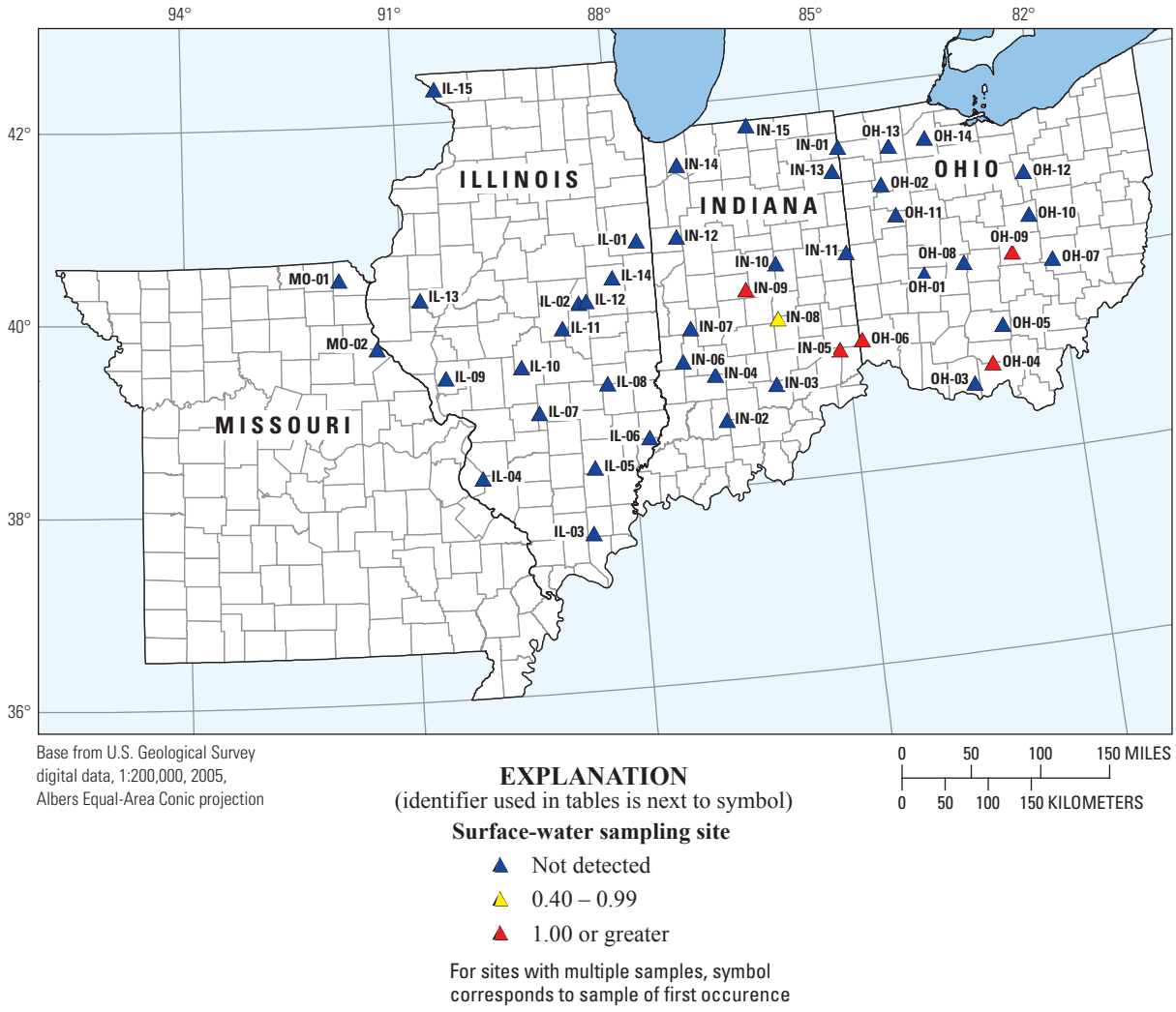

Figure 7. Perchlorate concentrations at selected surface-water sites in Illinois, Indiana, Missouri, and Ohio, 2004.

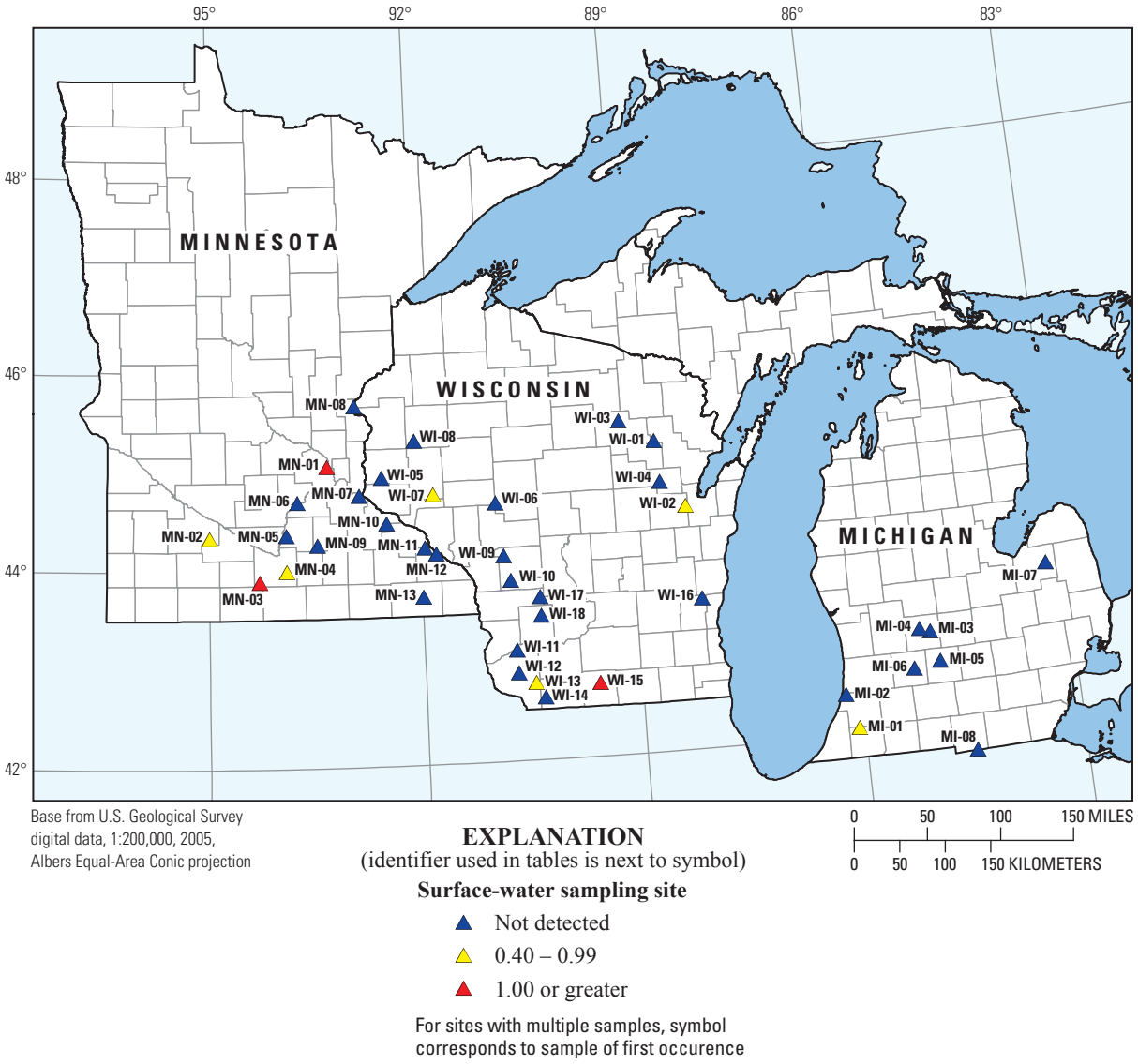

Figure 8. Perchlorate concentrations at selected surface-water sites in Michigan, Minnesota, and Wisconsin, 2004.

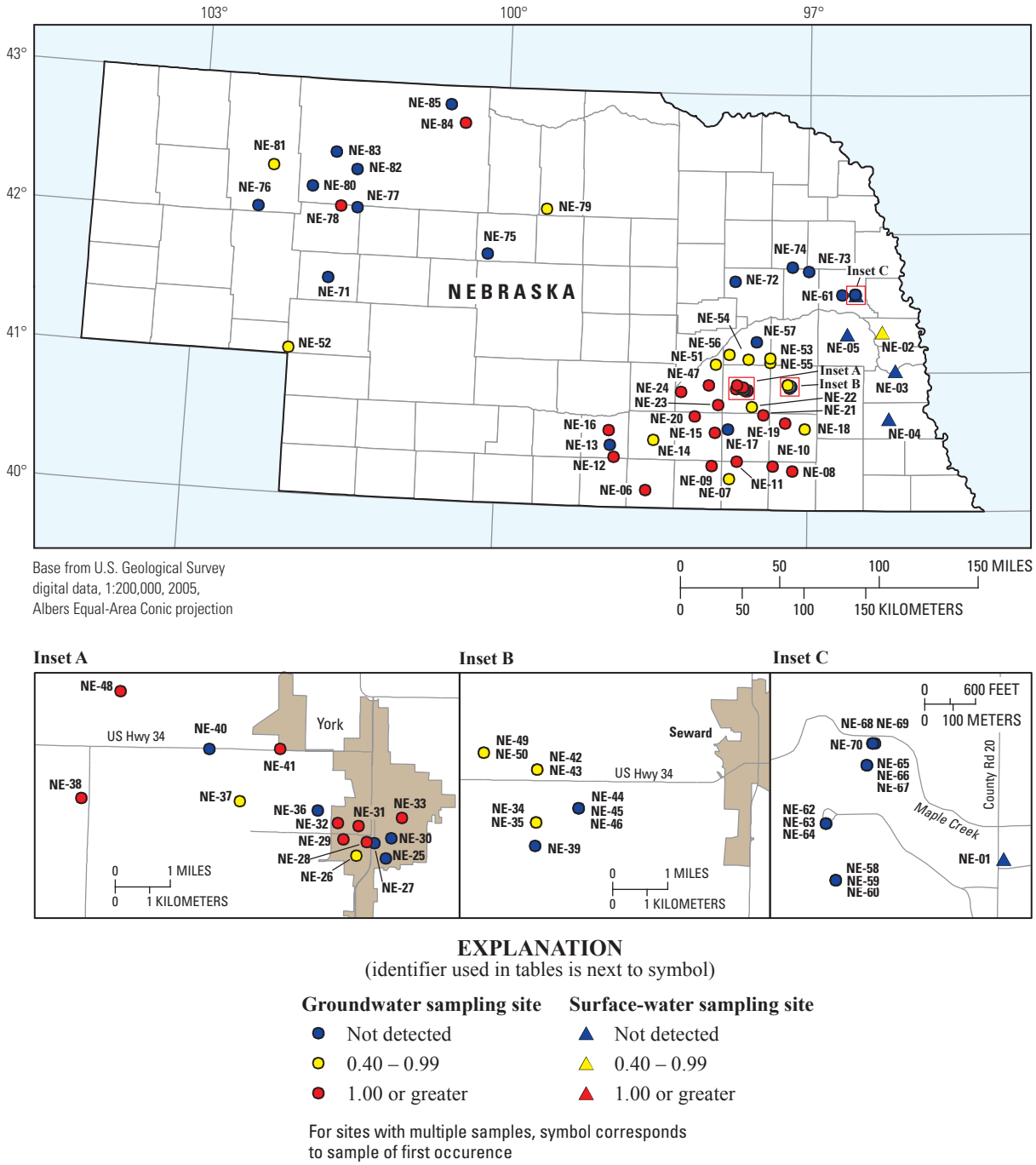

Figure 9. Perchlorate concentrations at selected surface-water and groundwater sites in Nebraska, 2004.

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Tables 1, 3–6

Table 1. Selected sites in the United States sampled for perchlorate analysis.

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
AR-01	07053250	Yocum Creek near Oak Grove, AR	Arkansas	Carroll	36.454788	-93.356017	11010001	NA	sw
AR-02	07055646	Buffalo River near Boxley, AR	Arkansas	Newton	35.938903	-93.405061	11010005	NA	sw
AR-03	07060710	North Sylamore Creek near Fifty Six, AR	Arkansas	Stone	35.991739	-92.214044	11010004	NA	sw
AR-04	354635090365601	13N04E12ABB1	Arkansas	Craighead	35.776465	-90.615665	08020203	110	gw
AZ-01	09380000	Colorado River at Lees Ferry, AZ	Arizona	Coconino	36.864710	-111.588216	14070006	NA	sw
AZ-02	09448500	Gila River at Head of Safford Valley near Solomon, AZ	Arizona	Graham	32.868397	-109.511186	15040005	NA	sw
AZ-03	09466500	Gila River at Calva, AZ	Arizona	Graham	33.185613	-110.220090	15040005	NA	sw
AZ-04	09471000	San Pedro River at Charleston, AZ	Arizona	Cochise	31.625926	-110.174523	15050202	NA	sw
AZ-05	09474000	Gila River at Kelvin, AZ	Arizona	Pinal	33.102840	-110.976501	15050100	NA	sw
AZ-06	09498500	Salt River near Roosevelt, AZ	Arizona	Gila	33.619495	-110.921504	15060103	NA	sw
AZ-07	09502000	Salt River below Stewart Mountain Dam, AZ	Arizona	Maricopa	33.552823	-111.576524	15060106	NA	sw
AZ-08	09504000	Verde River near Clarkdale, AZ	Arizona	Yavapai	34.852242	-112.065994	15060202	NA	sw
AZ-09	09507980	East Verde River near Childs, AZ	Arizona	Gila	34.276421	-111.638756	15060203	NA	sw
AZ-10	09508500	Verde River below Tangle Creek above Horseshoe Dam, AZ	Arizona	Yavapai	34.073092	-111.716257	15060203	NA	sw
AZ-11	09510000	Verde River below Bartlett Dam, AZ	Arizona	Maricopa	33.808375	-111.663473	15060203	NA	sw
CA-01	11049400	Santa Ana River above Seven Oaks Dam, CA	California	San Bernardino	34.142788	-117.069480	18070203	NA	sw
CA-02	11060400	Warm Creek near San Bernardino, CA	California	San Bernardino	34.078346	-117.300321	18070203	NA	sw
CA-03	11074000	Santa Ana River below Prado Dam, CA	California	Riverside	33.883349	-117.645330	18070203	NA	sw
CA-04	323925117044001	017S002W27P002S	California	San Diego	32.657075	-117.077836	18070304	606	gw
CA-05	324840116584401	016S001W03E001S	California	San Diego	32.811361	-116.979056	18070304	906	gw
CA-06	325157116551401	015S001E18L005S	California	San Diego	32.866111	-116.920556	18070304	230	gw
CA-07	330447117065301	013S002W05D001S	California	San Diego	33.079944	-117.114861	18070304	450	gw
CA-08	331443117181201	011S004W04K005S	California	San Diego	33.245278	-117.303333	18070303	135	gw
CA-09	331659116394701	010S003E27D002S	California	San Diego	33.283083	-116.663056	18070303	295	gw
CA-10	331707117223601	010S005W26C003S	California	San Diego	33.285444	-117.376833	18070302	NA	gw
CA-11	332024116535701	010S001E05B001S	California	San Diego	33.340034	-116.900025	18070303	170	gw
CO-01	06713500	Cherry Creek at Denver, CO	Colorado	Denver	39.742487	-104.999982	10190003	NA	sw
CO-02	06753990	Lonetree Creek near Greeley, CO	Colorado	Weld	40.442481	-104.588849	10190008	NA	sw
CO-03	06754000	South Platte River near Kersey, CO	Colorado	Weld	40.411925	-104.562737	10190003	NA	sw
CO-04	07103707	Fountain Creek below 8th Street at Colorado Springs, CO	Colorado	El Paso	38.829437	-104.839697	11020003	NA	sw
CO-05	07106000	Fountain Creek near Fountain, CO	Colorado	El Paso	38.601665	-104.670250	11020003	NA	sw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
CO-06	07106300	Fountain Creek near Pinon, CO	Colorado	Pueblo	38.429444	-104.598056	11020003	NA	sw
CO-07	07106500	Fountain Creek at Pueblo, CO	Colorado	Pueblo	38.287780	-104.601085	11020003	NA	sw
CO-08	09095300	Dry Fork at Upper Station near De Beque, CO	Colorado	Garfield	39.374701	-108.317864	14010006	NA	sw
CO-09	09163500	Colorado River near Colorado-Utah State Line	Colorado	Mesa	39.132760	-109.027055	14010005	NA	sw
CO-10	09371010	San Juan River at Four Corners, CO	Colorado	Montezuma	37.001111	-109.028889	14080201	NA	sw
CO-11	370936106010501	NA03400929CBB	Colorado	Conejos	37.160010	-106.018634	13010002	24.85	gw
CO-12	373323106025001	NA03800812ACA	Colorado	Rio Grande	37.556392	-106.047804	13010002	19.85	gw
CO-13	373849106124501	NA03900709ABB	Colorado	Rio Grande	37.646947	-106.213086	13010002	28.56	gw
CO-14	375054106013401	NA04200931BAD	Colorado	Saguache	37.849189	-106.027444	13010004	14.4	gw
CO-15	383232106554700	NB04900101BCB	Colorado	Gunnison	38.542189	-106.930206	14020003	23.5	gw
CO-16	385213106584700	SC01408602BCC	Colorado	Gunnison	38.870086	-106.980392	14020001	28	gw
CO-17	392210104482901	SC00806608BCD	Colorado	Douglas	39.369722	-104.808306	10190003	54.21	gw
CO-18	393003104450001	SC00606626BDD	Colorado	Douglas	39.501028	-104.749972	10190003	58.57	gw
CO-19	393408104544001	SC00506732DCA	Colorado	Arapahoe	39.568889	-104.911139	10190002	49.58	gw
CO-20	393431106070801	SC00507834BCB	Colorado	Summit	39.575483	-106.118983	14010002	27	gw
CO-21	393742104453801	SC00506610DBD	Colorado	Arapahoe	39.628389	-104.760639	10190003	28.63	gw
CO-22	393758106041401	SC00507812ACB	Colorado	Summit	39.633028	-106.070667	14010002	58	gw
CO-23	393830106210600	SC00508009AAC	Colorado	Eagle	39.641583	-106.352139	14010003	18	gw
CO-24	393846104465601	SC00506604BDD	Colorado	Arapahoe	39.646306	-104.782278	10190003	38.65	gw
CO-25	395929105510300	SC00107602DAC	Colorado	Grand	39.991517	-105.851819	14010001	28	gw
CO-26	401544103443101	SB00305703BBA	Colorado	Morgan	40.262158	-103.742211	10190012	47	gw
CO-27	402104104404501	SB00506532DDB	Colorado	Weld	40.348728	-104.677797	10190003	19	gw
CO-28	402114105350101	Big Thompson below Moraine Park near Estes Park, CO	Colorado	Larimer	40.353873	-105.584168	10190006	NA	sw
CO-29	402213104015501	SB00505930CBA	Colorado	Morgan	40.370244	-104.031797	10190003	12	gw
CO-30	405159102444201	SB01004805CCC	Colorado	Logan	40.866356	-102.745694	10190012	15	gw
IA-01	05387313	Unknown Tributary to Beaver Creek near Lime Springs, IA	Iowa	Howard	43.441389	-92.326111	07060002	NA	sw
IA-02	05388325	Silver Creek near Hanover, IA	Iowa	Allamakee	43.388889	-91.460278	07060002	NA	sw
IA-03	05411595	Bohemian Creek near Protivin, IA	Iowa	Winneshiek	43.225556	-92.021389	07060004	NA	sw
IA-04	05418080	North Fork Maquoketa River at NE Dyersville, IA	Iowa	Dubuque	42.489167	-91.112500	07060006	NA	sw
IA-05	05420680	Wapsipinicon River near Tripoli, IA	Iowa	Bremer	42.836091	-92.257400	07080102	NA	sw
IA-06	05420858	Unnamed Creek near Fairbank, IA	Iowa	Buchanan	42.606513	-92.032845	07080102	NA	sw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
IA-07	05448910	Unknown Tributary to East Branch Iowa River at Garner, IA	Iowa	Hancock	43.092222	-93.593611	07080207	NA	sw
IA-08	05449500	Iowa River near Rowan, IA	Iowa	Wright	42.759944	-93.621849	07080207	NA	sw
IA-09	05449580	Ditch No. 5 near Galt, IA	Iowa	Wright	42.676389	-93.598333	07080207	NA	sw
IA-10	05451210	South Fork Iowa River Northeast of New Providence, IA	Iowa	Hardin	42.314984	-93.152425	07080207	NA	sw
IA-11	05451425	South Minerva Creek at Clemons, IA	Iowa	Marshall	42.112500	-93.151944	07080207	NA	sw
IA-12	05459800	Little Lime Creek near Nora Springs, IA	Iowa	Cerro Gordo	43.103056	-93.044722	07080203	NA	sw
IA-13	05463080	Black Hawk Creek near Holland, IA	Iowa	Grundy	42.375000	-92.816667	07080205	NA	sw
IA-14	05464925	Little Mosquito Creek near Moscow, IA	Iowa	Muscatine	41.533056	-91.083611	07080206	NA	sw
IA-15	05465500	Iowa River at Wapello, IA	Iowa	Louisa	41.178086	-91.182094	07080209	NA	sw
IA-16	05472330	Buck Creek near New Sharon, IA	Iowa	Mahaska	41.480530	-92.590161	07080106	NA	sw
IA-17	05473340	Wolf Creek near Rome, IA	Iowa	Henry	40.962248	-91.714332	07080107	NA	sw
IA-18	05474195	West Branch Tributary to Suger Creek at La Crew, IA	Iowa	Lee	40.728889	-91.565833	07080104	NA	sw
IA-19	05476680	Prairie Creek near Whittemore, IA	Iowa	Palo Alto	43.053611	-94.474167	07100002	NA	sw
IA-20	05480610	Brushy Creek near Duncombe, IA	Iowa	Webster	42.475556	-94.015000	07100004	NA	sw
IA-21	05482361	West Fork Camp Creek near Yetter, IA	Iowa	Calhoun	42.373333	-94.842222	07100006	NA	sw
IA-22	05483463	Springbrook Creek at Bagley, IA	Iowa	Guthrie	41.773611	-94.465833	07100007	NA	sw
IA-23	05485800	North Branch North River at McBride, IA	Iowa	Madison	41.424157	-93.942727	07100008	NA	sw
IA-24	05487770	Brush Creek near Lucas, IA	Iowa	Lucas	41.018611	-93.506111	07100008	NA	sw
IA-25	06483471	Rat Creek near Matlock, IA	Iowa	Lyon	43.273889	-95.937500	10170204	NA	sw
IA-26	06603760	Tributary West Fork Little Sioux River below Silver Lake near Lake Park, IA	Iowa	Dickinson	43.438333	-95.279444	10230003	NA	sw
IA-27	06605395	Lost Island Outlet above Dickens, IA	Iowa	Clay	43.126667	-94.997222	10230003	NA	sw
IA-28	06606650	Big Creek near Anthon, IA	Iowa	Woodbury	42.389722	-95.833889	10230003	NA	sw
IA-29	06807278	Tributary to West Fork West Nishnabotna River near Manilla, IA	Iowa	Crawford	41.919167	-95.226111	10240002	NA	sw
IA-30	06809775	Fisher Creek near Shenandoah, IA	Iowa	Fremont	40.740278	-95.422222	10240003	NA	sw
IA-31	404327095284801	068N40W07BCAA	Iowa	Fremont	40.724166	-95.480267	10240003	65	gw
IA-32	404521095235801	069N40W26BABD	Iowa	Fremont	40.755831	-95.399711	10240003	33	gw
IA-33	404531095020502	069N36W19CD	Iowa	Page	40.758602	-95.034980	10240009	76	gw
IA-34	404957095183501	070N39W27	Iowa	Page	40.832496	-95.309988	10240002	44.5	gw
IA-35	410007095330501	072N41W27CDCC	Iowa	Mills	41.001942	-95.551666	10240002	56	gw
IA-36	410107095300001	072N41W24DAD	Iowa	Mills	41.018608	-95.500276	10240002	53	gw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
IA-37	410118095144001	072N38W29BA	Iowa	Montgomery	41.021660	-95.244714	10240003	60	gw
IA-38	411154095252501	074N40W22ADDB	Iowa	Pottawattamie	41.198328	-95.423889	10240002	38	gw
IA-39	411649095525001	075N44W22DADA	Iowa	Pottawattamie	41.280276	-95.880846	10230006	121	gw
IA-40	412117092392301	076N16W25CBDA	Iowa	Mahaska	41.354727	-92.656581	07080105	50	gw
IA-41	412812095322701	077N41W15ACDD	Iowa	Pottawattamie	41.469992	-95.541116	10240001	48	gw
IA-42	413031093285501	077N23W03AAAA	Iowa	Warren	41.508601	-93.482158	07100008	43	gw
IA-43	413132094304202	078N32W27ADDC	Iowa	Guthrie	41.525543	-94.511915	07100008	34	gw
IA-44	413342093432801	078N25W15CAAC	Iowa	Polk	41.561656	-93.724110	07100006	42	gw
IA-45	413743095041201	079N36W29BBCA	Iowa	Audubon	41.628599	-95.070269	10240003	38	gw
IA-46	413744093595501	079N27W28BAAA	Iowa	Dallas	41.628877	-93.998841	07100006	44.5	gw
IA-47	413907093070201	079N20W13ADDD	Iowa	Jasper	41.651935	-93.117423	07080105	52	gw
IA-48	413943095453601	079N42W08DCCB	Iowa	Harrison	41.661934	-95.760286	10230007	55	gw
IA-49	414024093153901	079N21W11ABBB 04510	Iowa	Jasper	41.673322	-93.261039	07080105	47	gw
IA-50	414029093145601	079N21W01CCCA	Iowa	Jasper	41.674711	-93.249094	07080105	57	gw
IA-51	414251092541701	080N18W26AADC	Iowa	Jasper	41.714159	-92.903805	07080106	36	gw
IA-52	414315094524201	080N35W24CBCC	Iowa	Audubon	41.720820	-94.878596	10240003	34.5	gw
IA-53	414933095201802	081N39W13CACB	Iowa	Shelby	41.825821	-95.338609	10240002	50	gw
IA-54	415055094131201	081N29W10BBBA 03147	Iowa	Dallas	41.848596	-94.220239	07100006	22	gw
IA-55	415435094492801	082N34W17DDBA 21882	Iowa	Carroll	41.909708	-94.824706	07100007	45	gw
IA-56	415442092180201	082N13W13DACB	Iowa	Tama	41.911663	-92.300741	07080208	37	gw
IA-57	415949091404901	083N07W17DACD	Iowa	Linn	41.996944	-91.680458	07080205	72	gw
IA-58	420156093562402	083N27W01ABCC	Iowa	Boone	42.032205	-93.940230	07100004	74	gw
IA-59	420453093561401	084N27W13DCAA	Iowa	Boone	42.081370	-93.937452	07100004	55.8	gw
IA-60	420607092594501	084N18W07BCAD	Iowa	Marshall	42.101931	-92.995478	07080208	25	gw
IA-61	423138090383601	089N03E18AADB 07468	Iowa	Dubuque	42.527224	-90.643461	07060005	196	gw
IA-62	424312093135201	091N20W05DBCC 40114	Iowa	Franklin	42.708863	-93.231313	07080204	44	gw
IA-63	424838096161001	092N46W03CCAB	Iowa	Plymouth	42.810546	-96.269747	10230002	32	gw
IA-64	424921096334701	093N48W31CCDD	Iowa	Plymouth	42.822493	-96.563366	10170203	47	gw
IA-65	425940096294501	094N48W03ABDA	Iowa	Sioux	42.994433	-96.496142	10170203	37.5	gw
IA-66	430923095114501	096N37W03DDCC	Iowa	Clay	43.156358	-95.196108	10230003	39	gw
IA-67	431816091474401	098N08W16CABD	Iowa	Winneshiek	43.304417	-91.795710	07060002	67	gw
IA-68	432314095320001	099N40W14DCCC	Iowa	Osceola	43.387190	-95.533619	10230003	34	gw
IL-01	05525500	Sugar Creek at Milford, IL	Illinois	Iroquois	40.630036	-87.723918	07120002	NA	sw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
IL-02	05572000	Sangamon River at Monticello, IL	Illinois	Piatt	40.030867	-88.588954	07130006	NA	sw
IL-03	03382125	Little Saline River near Carrier Mills, IL	Illinois	Saline	37.637549	-88.625887	05140204	NA	sw
IL-04	05595210	Rockhouse Creek near Hecker, IL	Illinois	Monroe	38.286718	-90.050942	07140204	NA	sw
IL-05	03380600	Fourmile Creek near Wayne City, IL	Illinois	Wayne	38.314722	-88.540556	05120115	NA	sw
IL-06	03346565	Raccoon Creek Tributary near Petersburg, IL	Illinois	Lawrence	38.585048	-87.778085	05120113	NA	sw
IL-07	05592760	Raccoon Creek near Mulberry Grove, IL	Illinois	Fayette	38.924213	-89.233961	07140202	NA	sw
IL-08	03344435	Island Creek near Woodbury, IL	Illinois	Cumberland	39.179722	-88.278333	05120112	NA	sw
IL-09	05586597	Coates Creek near Berdan, IL	Illinois	Greene	39.344167	-90.468333	07130011	NA	sw
IL-10	05575030	Willow Creek near Morrisonville, IL	Illinois	Christian	39.410605	-89.435648	07130007	NA	sw
IL-11	05573200	Big Creek Tributary near Mt. Zion, IL	Illinois	Macon	39.783369	-88.837573	07130006	NA	sw
IL-12	05571950	Camp Creek Tributary near White Heath, IL	Illinois	Piatt	40.047811	-88.484505	07130006	NA	sw
IL-13	05584790	Cedar Creek near Camden, IL	Illinois	Schuyler	40.170278	-90.761389	07130010	NA	sw
IL-14	03336790	Upper Salt Fork Tributary near Rantoul, IL	Illinois	Champaign	40.269756	-88.102542	05120109	NA	sw
IL-15	05416050	Smallpox Creek at Aitken, IL	Illinois	Jo Daviess	42.348889	-90.410278	07060005	NA	sw
IN-01	04178000	St. Joseph River near Newville, IN	Indiana	DeKalb	41.385606	-84.801626	04100003	NA	sw
IN-02	384113086425401	Beaver Creek near Huron, IN	Indiana	Martin	38.686817	-86.715089	05120208	NA	sw
IN-03	390020086000801	Cooley Creek near Seymour, IN	Indiana	Jackson	39.005647	-86.002322	05120206	NA	sw
IN-04	391014086484501	Lick Creek near Freedom, IN	Indiana	Owen	39.170572	-86.812508	05120202	NA	sw
IN-05	391740085055701	Pipe Creek near Penntown, IN	Indiana	Ripley	39.294322	-85.099058	05080003	NA	sw
IN-06	392007087140201	Big Slough near Riley, IN	Indiana	Clay	39.335144	-87.233992	05120203	NA	sw
IN-07	394024087050901	Rock Fork near Mansfield, IN	Indiana	Parke	39.673419	-87.085881	05120108	NA	sw
IN-08	394102085533101	Little Sugar Creek near New Palestine, IN	Indiana	Shelby	39.683900	-85.892000	05120204	NA	sw
IN-09	400101086172501	Mounts Run near Zionsville, IN	Indiana	Boone	40.016911	-86.290400	05120201	NA	sw
IN-10	401510085502501	Little Duck Creek near Elwood, IN	Indiana	Madison	40.252750	-85.840239	05120201	NA	sw
IN-11	401722084513201	Mississinewa River near Union City, IN	Indiana	Randolph	40.289433	-84.858750	05120103	NA	sw
IN-12	403748087101301	Owens Ditch near Fowler, IN	Indiana	Benton	40.630133	-87.170317	05120108	NA	sw
IN-13	410823084551101	Wilbur Ditch near Fort Wayne, IN	Indiana	Allen	41.139750	-84.919669	04100005	NA	sw
IN-14	412215087042801	Cobb Ditch near Kouts, IN	Indiana	Porter	41.370800	-87.074331	07120001	NA	sw
IN-15	414241086030101	Cobus Creek near Elkhart, IN	Indiana	Elkhart	41.711481	-86.050200	04050001	NA	sw
MI-01	04101531	Osborn Drain near Glenwood, MI	Michigan	Cass	42.065599	-86.075014	04050001	NA	sw
MI-02	04102726	Butternut Creek near South Haven, MI	Michigan	Van Buren	42.411698	-86.216140	04050002	NA	sw
MI-03	04115851	Little Libhart Creek near Lyons, MI	Michigan	Ionia	42.958644	-84.966112	04050006	NA	sw
MI-04	04116023	Bellamy Creek near Ionia, MI	Michigan	Ionia	42.994199	-85.113619	04050006	NA	sw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
MI-05	04116734	Little Thornapple River near Gresham, MI	Michigan	Eaton	42.651703	-84.872768	04050007	NA	sw
MI-06	04117448	Cedar Creek near Quimby, MI	Michigan	Barry	42.600869	-85.241671	04050007	NA	sw
MI-07	04150592	South Branch White Creek near Deford, MI	Michigan	Tuscola	43.504465	-83.246336	04080205	NA	sw
MI-08	04177085	Laird Creek near Waldron, MI	Michigan	Hillsdale	41.713106	-84.498838	04100003	NA	sw
MN-01	05288705	Shingle Creek at Queen Avenue in Minneapolis, MN	Minnesota	Hennepin	45.049965	-93.310227	07010206	NA	sw
MN-02	05316983	County Ditch 24 near Clements, MN	Minnesota	Redwood	44.341944	-94.998333	07020008	NA	sw
MN-03	05318283	Judicial Ditch 85 near Willow Creek, MN	Minnesota	Blue Earth	43.890000	-94.289167	07020009	NA	sw
MN-04	05320270	Little Cobb River near Beauford, MN	Minnesota	Blue Earth	43.996633	-93.908563	07020011	NA	sw
MN-05	05325580	Cherry Creek near Ottawa, MN	Minnesota	Le Sueur	44.357744	-93.909126	07020007	NA	sw
MN-06	05329898	Silver Creek near East Union, MN	Minnesota	Carver	44.691389	-93.737222	07020012	NA	sw
MN-07	05331580	Mississippi river below L&D #2 at Hastings, MN	Minnesota	Dakota	44.746634	-92.852427	07010206	NA	sw
MN-08	05339721	Rush Creek above Mouth near Rush City, MN	Minnesota	Chisago	45.656111	-92.890278	07030005	NA	sw
MN-09	05351400	Devil Creek near Morristown, MN	Minnesota	Rice	44.254130	-93.468000	07040002	NA	sw
MN-10	05355307	Wells Creek near Belvidere Mills, MN	Minnesota	Goodhue	44.457778	-92.477222	07040001	NA	sw
MN-11	05377508	Trout Creek near Weaver, MN	Minnesota	Wabasha	44.200556	-91.944444	07040003	NA	sw
MN-12	05377550	Deering Valley Creek near Whitman, MN	Minnesota	Winona	44.134167	-91.788611	07040003	NA	sw
MN-13	05384110	Duschee Creek above Lanesboro, MN	Minnesota	Fillmore	43.699444	-91.990000	07040008	NA	sw
MO-01	05495850	Wyaconda River near Luray, MO	Missouri	Clark	40.415872	-91.869893	07110001	NA	sw
MO-02	05502005	Bear Creek at 29th Street at Hannibal, MO	Missouri	Ralls	39.684768	-91.388205	07110004	NA	sw
MT-01	06306300	Tongue River at State Line near Decker, MT	Montana	Big Horn	45.008863	-106.836178	10090101	NA	sw
NE-01	06800000	Maple Creek near Nickerson, NE	Nebraska	Dodge	41.560278	-96.540833	10220003	NA	sw
NE-02	06800500	Elkhorn River at Waterloo, NE	Nebraska	Douglas	41.293333	-96.283889	10220003	NA	sw
NE-03	06805500	Platte River at Louisville, NE	Nebraska	Sarpy	41.015278	-96.157778	10200202	NA	sw
NE-04	400757098325401	2N 11W15CDDD1	Nebraska	Webster	40.132556	-98.548278	10250016	118.3	gw
NE-05	401329097444501	3N 4W15DADA1	Nebraska	Thayer	40.224722	-97.745833	10270206	58.47	gw
NE-06	401715097083601	4N 2E25ADAA1	Nebraska	Jefferson	40.287500	-97.143333	10270202	128.5	gw
NE-07	401853097550101	4N 5W18DAAA1	Nebraska	Nuckolls	40.314722	-97.916944	10270206	112.4	gw
NE-08	401918097195301	4N 1E 8DDDD1	Nebraska	Jefferson	40.321667	-97.331389	10270207	128.38	gw
NE-09	402103097404201	5N 3W32DCDC1	Nebraska	Fillmore	40.350833	-97.678333	10270206	108.79	gw
NE-10	402154098512601	5N 14W26DDDD1	Nebraska	Kearney	40.365000	-98.857222	10270206	158.43	gw
NE-11	402708098534901	6N 14W28DDCD1	Nebraska	Kearney	40.452222	-98.896944	10270206	129.39	gw
NE-12	402943098284801	6N 10W 7DDDC1	Nebraska	Adams	40.495500	-98.479806	10270206	118.53	gw
NE-13	403314097532801	7N 5W21CDAD1	Nebraska	Clay	40.555806	-97.891222	10270203	118.5	gw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
NE-14	403330098545101	7N 14W20DADA1	Nebraska	Kearney	40.558333	-98.914167	10270206	77.37	gw
NE-15	403502097460101	7N 4W10CCCB1	Nebraska	Fillmore	40.583889	-97.766944	10270204	123.5	gw
NE-16	403520097013901	7N 3E12ADDD1	Nebraska	Saline	40.588889	-97.027500	10270204	114	gw
NE-17	403759097130101	8N 2E29ADDD1	Nebraska	Saline	40.633056	-97.216944	10270204	113.57	gw
NE-18	404010096130101	Wolf Creek near Syracuse, NE	Nebraska	Otoe	40.669500	-96.217028	10240006	NA	sw
NE-19	404020098052401	8N 7W10DDAA1	Nebraska	Clay	40.672222	-98.090000	10270203	118.21	gw
NE-20	404117097253301	8N 1W 4DADD1	Nebraska	Fillmore	40.688056	-97.425833	10270203	100.71	gw
NE-21	404445097322201	9N 2W15CBCC1	Nebraska	York	40.745833	-97.539444	10270203	53.63	gw
NE-22	404525097515101	9N 5W10DDDD1	Nebraska	Hamilton	40.756944	-97.864167	10270203	106.5	gw
NE-23	405047098133201	10N 8W10CCBB1	Nebraska	Hamilton	40.846389	-98.225556	10270203	92.39	gw
NE-24	405131097351401	10N 2W 6DCCC1 OFPS-38	Nebraska	York	40.858900	-97.587551	10270203	43	gw
NE-25	405134097355301	10N 3W 1DDAD1 FP2-43	Nebraska	York	40.859444	-97.598056	10270203	48.1	gw
NE-26	405146097353001	10N 2W 6CABB1 FP3-33	Nebraska	York	40.862778	-97.591667	10270203	37.61	gw
NE-27	405147097354001	10N 2W 6CBDB1 UWT1-53	Nebraska	York	40.863056	-97.594444	10270203	58.83	gw
NE-28	405149097361001	10N 3W 1DACC1 UWT2-23	Nebraska	York	40.863611	-97.602778	10270203	28.6	gw
NE-29	405151097350901	10N 2W 6DBBD1 OFPN-88	Nebraska	York	40.864167	-97.585833	10270203	93.27	gw
NE-30	405200097355101	10N 2W 6BCCB1 UWT3-34	Nebraska	York	40.866667	-97.597500	10270203	38.57	gw
NE-31	405205097361701	10N 3W 1BDA1 FP4-28	Nebraska	York	40.868000	-97.604667	10270203	33.25	gw
NE-32	405207097345501	10N 2W 6ADBB1 UWT4-85	Nebraska	York	40.868611	-97.581944	10270203	93.5	gw
NE-33	405212097110002	11N 2E26CCBB2 FP3-105	Nebraska	Seward	40.890658	-97.177383	10270202	105	gw
NE-34	405212097110003	11N 2E26CCBB3 FP3-125	Nebraska	Seward	40.890658	-97.177383	10270202	125	gw
NE-35	405216097364301	10N 3W 1BBA1 NWT1-39	Nebraska	York	40.871111	-97.611944	10270203	43.5	gw
NE-36	405224097382201	10N 3W 2CBBD1 FP5-45	Nebraska	York	40.873333	-97.639444	10270203	50.77	gw
NE-37	405224097414401	11N 3W31DDCD1	Nebraska	York	40.873333	-97.695556	10270203	98.23	gw
NE-38	405304097103901	11N 2E34AADA1	Nebraska	Seward	40.884444	-97.177500	10270202	102.2	gw
NE-39	405313097390201	11N 3W34BBA1 AWT3-73	Nebraska	York	40.886944	-97.650556	10270203	78.74	gw
NE-40	405314097373201	11N 3W26DCC1 AWT1-83	Nebraska	York	40.887222	-97.625556	10270203	88.86	gw
NE-41	405330097110002	11N 2E23CCBB2 FP2-105	Nebraska	Seward	40.904561	-97.177133	10270201	100	gw
NE-42	405330097110003	11N 2E23CCBB3 FP2-125	Nebraska	Seward	40.904561	-97.177133	10270201	125	gw
NE-43	405340097094501	11N 2E26ADCC1 FP1-90	Nebraska	Seward	40.894572	-97.162361	10270201	89	gw
NE-44	405340097094502	11N 2E26ADCC2 FP1-105	Nebraska	Seward	40.894572	-97.162361	10270201	105	gw
NE-45	405340097094503	11N 2E26ADCC3 FP1-123	Nebraska	Seward	40.894572	-97.162361	10270201	120	gw
NE-46	405353097572601	11N 6W25BACC1	Nebraska	Hamilton	40.898056	-97.957222	10270201	114.07	gw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
NE-47	405406097405601	11N 3W20DCC1 AWT2-71	Nebraska	York	40.901667	-97.682222	10270203	76.77	gw
NE-48	405420097114002	11N 2E22CBBB2 FP4-105	Nebraska	Seward	40.908911	-97.196117	10270201	105	gw
NE-49	405420097114003	11N 2E22CBBB3 FP4-129	Nebraska	Seward	40.908911	-97.196117	10270201	129	gw
NE-50	410247097533601	12N 5W 4BAAA1	Nebraska	Hamilton	41.046389	-97.893333	10270201	122.5	gw
NE-51	410251102024201	SB01204232CDD	Nebraska	Keith	41.047556	-102.044861	10190018	22	gw
NE-52	410410097220601	13N 1W25DAAD1	Nebraska	Butler	41.067167	-97.368667	10270201	116.47	gw
NE-53	410520097344501	13N 2W20BBBC1	Nebraska	Polk	41.088889	-97.579167	10270201	93.57	gw
NE-54	410552097220501	13N 1E18BCCC1	Nebraska	Butler	41.097778	-97.368056	10270201	98.5	gw
NE-55	410710097454201	13N 4W10BAAA1	Nebraska	Polk	41.119444	-97.761667	10270201	114.1	gw
NE-56	411256097301101	14N 2W 2ADDA1	Nebraska	Polk	41.215556	-97.503056	10270201	133.5	gw
NE-57	411636096372901	Duck Creek near Colon, NE	Nebraska	Saunders	41.276639	-96.624778	10200203	NA	sw
NE-58	413334096325301	18N 8W 5DBAB1 NAWQA WELL ACTFS1-1A	Nebraska	Dodge	41.559583	-96.548083	10220003	79	gw
NE-59	413334096325302	18N 8W 5DBAB2 NAWQA WELL ACTFS1-1B	Nebraska	Dodge	41.559583	-96.548083	10220003	91	gw
NE-60	413334096325303	18N 8W 5DBAB3 NAWQA WELL ACTFS1-1C	Nebraska	Dodge	41.559583	-96.548083	10220003	103.5	gw
NE-61	413340096402701	18N 7E 6BCCC1 CNBRLUSCR1 DO-24	Nebraska	Dodge	41.561083	-96.674250	10220003	24.5	gw
NE-62	413341096325501	18N 8W 5ACDC1 NAWQA WELL ACTFS1-2A	Nebraska	Dodge	41.561389	-96.548528	10220003	81.1	gw
NE-63	413341096325502	18N 8W 5ACDC2 NAWQA WELL ACTFS1-2B	Nebraska	Dodge	41.561389	-96.548528	10220003	94	gw
NE-64	413341096325503	18N 8W 5ACDC3 NAWQA WELL ACTFS1-2C	Nebraska	Dodge	41.561389	-96.548528	10220003	104.5	gw
NE-65	413348096324801	18N 8W 5ACAC1 NAWQA WELL ACTFS1-3A	Nebraska	Dodge	41.563250	-96.546778	10220003	60	gw
NE-66	413348096324802	18N 8W 5ACAC2 NAWQA WELL ACTFS1-3B	Nebraska	Dodge	41.563250	-96.546778	10220003	71.1	gw
NE-67	413348096324803	18N 8W 5ACAC3 NAWQA WELL ACTFS1-3C	Nebraska	Dodge	41.563250	-96.546778	10220003	83	gw
NE-68	413350096324701	18N 8W 5ABDD1 NAWQA WELL ACTFS1-4A	Nebraska	Dodge	41.563953	-96.546550	10220003	18.2	gw
NE-69	413350096324702	18N 8W 5ABDD2 NAWQA WELL ACTFS1-4B	Nebraska	Dodge	41.563956	-96.546431	10220003	28	gw
NE-70	413350096324703	18N 8W 5ABDD3 NAWQA WELL ACTFS1-4C	Nebraska	Dodge	41.563944	-96.546528	10220003	38	gw
NE-71	413412101414501	19N 38W33DDDA1	Nebraska	Arthur	41.569944	-101.695944	10180014	232	gw
NE-72	413850097425801	19N 3W 6CBCB1	Nebraska	Platte	41.647222	-97.716111	10200201	193.06	gw
NE-73	414343096595801	20N 4E 5CCDC1 CNBRLUSCR1 CO-13	Nebraska	Colfax	41.728656	-96.999683	10220003	25	gw
NE-74	414527097094101	21N 2E35ABAA1 CNBRLUSCR1 S-11	Nebraska	Stanton	41.757581	-97.161464	10220003	65	gw
NE-75	414748100090901	21N 25W13ABAA1	Nebraska	Blaine	41.796889	-100.152694	10210002	140	gw
NE-76	420326102253201	24N 44W16DBDB1	Nebraska	Sheridan	42.057167	-102.425444	10210001	50	gw
NE-77	420458101270201	24N 36W 2DABC1	Nebraska	Grant	42.082778	-101.450583	10210001	670	gw
NE-78	420515101363901	24N 37W 4ACBB1	Nebraska	Grant	42.087611	-101.610889	10210001	100	gw
NE-79	420821099351101	25N 20W13ADAC1	Nebraska	Rock	42.139056	-99.586278	10210008	110	gw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
NE-80	421317101540201	26N 39W19ADCB1	Nebraska	Cherry	42.221361	-101.900500	10210001	90	gw
NE-81	422120102175301	27N 43W 2AADB1	Nebraska	Sheridan	42.355639	-102.298056	10150003	80	gw
NE-82	422138101282601	28N 36W36CBBB1	Nebraska	Cherry	42.360500	-101.473889	10210006	80	gw
NE-83	422830101411101	29N 37W20DCDA1	Nebraska	Cherry	42.475028	-101.686472	10150004	113	gw
NE-84	424403100253501	32N 27W24ACBB1	Nebraska	Cherry	42.734278	-100.426583	10150004	175	gw
NE-85	425154100342301	33N 28W 1BB 1	Nebraska	Cherry	42.864972	-100.572944	10150004	180	gw
NM-01	08276500	Rio Grande below Taos Junction Bridge near Taos, NM	New Mexico	Taos	36.320023	-105.754459	13020101	NA	sw
NM-02	08313000	Rio Grande at Otowi Bridge, NM	New Mexico	Santa Fe	35.874444	-106.141667	13020101	NA	sw
NM-03	08319000	Rio Grande at San Felipe, NM	New Mexico	Sandoval	35.444444	-106.439444	13020201	NA	sw
NM-04	08331000	Rio Grande at Isleta, NM	New Mexico	Valencia	34.920556	-106.678889	13020203	NA	sw
NM-05	09355500	San Juan River near Archuleta, NM	New Mexico	San Juan	36.801389	-107.697500	14080101	NA	sw
NM-06	09364500	Animas River at Farmington, NM	New Mexico	San Juan	36.722500	-108.201944	14080104	NA	sw
NM-07	09365000	San Juan River at Farmington, NM	New Mexico	San Juan	36.723056	-108.225833	14080105	NA	sw
NM-08	09368000	San Juan River at Shiprock, NM	New Mexico	San Juan	36.776667	-108.683056	14080105	NA	sw
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	Nevada	Clark	36.139695	-115.047776	15010015	NA	sw
NV-02	10309010	East Fork Carson River near Dresslerville, NV	Nevada	Douglas	38.878240	-119.689341	16050201	NA	sw
NV-03	10347699	Truckee River at Chalk Bluff Treatment Plant Intake near Reno, NV	Nevada	Washoe	39.510500	-119.866472	16050102	NA	sw
NV-04	10350500	Truckee River at Clark, NV	Nevada	Storey	39.565453	-119.486186	16050102	NA	sw
OH-01	03267900	Mad River at St. Paris Pike at Eagle City, OH	Ohio	Clark	39.964227	-83.831596	05080001	NA	sw
OH-02	04186500	Auglaize River near Fort Jennings, OH	Ohio	Putnam	40.948662	-84.266059	04100007	NA	sw
OH-03	384641083201001	Mill Creek at Blue Creek, OH	Ohio	Adams	38.777917	-83.335972	05060002	NA	sw
OH-04	385728083032101	Camp Creek near Coopersville, OH	Ohio	Scioto	38.957639	-83.055972	05060002	NA	sw
OH-05	392019082510401	Little Walnut Creek near Mooresville, OH	Ohio	Ross	39.338611	-82.851250	05060002	NA	sw
OH-06	392157084465401	Dry Fork Whitewater River near Okeana, OH	Ohio	Butler	39.365833	-84.781806	05080003	NA	sw
OH-07	395701082030601	Timber Run near Zanesville, OH	Ohio	Muskingum	39.950278	-82.051806	05040006	NA	sw
OH-08	400203083155801	Yutzy Ditch near Plain City, OH	Ohio	Madison	40.034167	-83.266111	05060001	NA	sw
OH-09	400428082353501	Moots Run near Granville, OH	Ohio	Licking	40.074444	-82.593056	05040006	NA	sw
OH-10	402614082172501	East Branch Jelloway Creek near Danville, OH	Ohio	Knox	40.437222	-82.290278	05040003	NA	sw
OH-11	403700084065301	Blackhoof Creek near Wapakoneta, OH	Ohio	Auglaize	40.616528	-84.114861	04100007	NA	sw
OH-12	405251082164801	Jerome Fork near Ashland, OH	Ohio	Adams	40.880972	-82.280000	05040002	NA	sw
OH-13	411956084055401	School Creek near Napoleon, OH	Ohio	Henry	41.332222	-84.098333	04100009	NA	sw
OH-14	412207083345601	North Branch of Portage River near Bowling Green, OH	Ohio	Wood	41.368472	-83.582361	04100010	NA	sw

Table 1. Selected sites in the United States sampled for perchlorate analysis.—Continued

[NA, not applicable; sw, surface water; gw, groundwater]

Map identification number (figs. 2–9)	Site number	Site name	State	County	Latitude, in decimal degrees	Longitude, in decimal degrees	Hydrologic Unit Code	Well depth, in feet	Site type
SD-01	431559096350100	Little Beaver Creek near Canton, SD	South Dakota	Lincoln	43.266389	-96.583611	10170203	NA	sw
SD-02	432947097094800	Unnamed Tributary to East Fork Vermillion River near Monroe, SD	South Dakota	Turner	43.496389	-97.163333	10170102	NA	sw
SD-03	451003096390600	Unnamed Tributary to North Fork Yellowbank River near Milbank, SD	South Dakota	Grnat	45.167500	-96.651667	07020001	NA	sw
TX-01	08178800	Salado Creek at Loop 13 at San Antonio, TX	Texas	Bexar	29.357180	-98.412793	12100301	NA	sw
TX-02	08181800	San Antonio River near Elmendorf, TX	Texas	Bexar	29.222185	-98.355846	12100301	NA	sw
TX-03	08364000	Rio Grande at El Paso, TX	Texas	El Paso	31.802885	-106.540822	13030102	NA	sw
WI-01	04070621	South Branch Oconto River near Markton, WI	Wisconsin	Oconto	45.146086	-88.597606	04030104	NA	sw
WI-02	04072050	Duck Creek at Seminary Road near Oneida, WI	Wisconsin	Outagamie	44.465822	-88.218992	04030103	NA	sw
WI-03	04074730	Hunting River on County Highway T near Summit Lake, WI	Wisconsin	Langlade	45.373853	-89.086781	04030202	NA	sw
WI-04	04078005	Tributary to Wolf River near Shawano, WI	Wisconsin	Shawano	44.729375	-88.555658	04030202	NA	sw
WI-05	040863315	Stoney Creek at Boltonville, WI	Wisconsin	Washington	43.517942	-88.088399	04040003	NA	sw
WI-06	05341865	Parker Creek near River Falls, WI	Wisconsin	St. Croix	44.920245	-92.529917	07030005	NA	sw
WI-07	05365962	Black Creek near Fairchild, WI	Wisconsin	Clark	44.623017	-90.921538	07050006	NA	sw
WI-08	05367064	Cranberry Creek at Meridean, WI	Wisconsin	Dunn	44.734129	-91.799336	07050005	NA	sw
WI-09	05367803	Silver Creek near Arland, WI	Wisconsin	Barron	45.287850	-92.044097	07050007	NA	sw
WI-10	05381441	Soper Creek at Cataract, WI	Wisconsin	Monroe	44.081353	-90.840692	07040007	NA	sw
WI-11	05382415	Little La Crosse River near Melvina, WI	Wisconsin	Monroe	43.827024	-90.761244	07040006	NA	sw
WI-12	054041139	West Branch Baraboo River at Hillsboro, WI	Wisconsin	Vernon	43.651446	-90.357351	07070004	NA	sw
WI-13	054067125	Hawkins Creek at Rockbridge, WI	Wisconsin	Richland	43.461368	-90.355128	07070005	NA	sw
WI-14	05407217	Crooked Creek at Boscobel, WI	Wisconsin	Grant	43.122484	-90.716516	07070005	NA	sw
WI-15	05412880	Rogers Branch near Lancaster, WI	Wisconsin	Grant	42.889156	-90.714293	07060003	NA	sw
WI-16	05414133	Little Platte River near Arthur, WI	Wisconsin	Grant	42.781659	-90.479295	07060003	NA	sw
WI-17	05414924	Galena River at Jenkinsville, WI	Wisconsin	Lafayette	42.630833	-90.359017	07060005	NA	sw
WI-18	05436361	Little Sugar River West Branch at Monticello, WI	Wisconsin	Greene	42.746394	-89.585399	07090004	NA	sw
WY-01	06279795	Crow Creek at Mouth at Pahaska, WY	Wyoming	Park	44.513278	-109.973519	10080012	NA	sw
WY-02	06299980	Tongue River at Monarch, WY	Wyoming	Sheridan	44.900249	-107.020905	10090101	NA	sw
WY-03	06305700	Goose Creek near Acme, WY	Wyoming	Sheridan	44.886361	-106.988959	10090101	NA	sw
WY-04	06306250	Prairie Dog Creek near Acme, WY	Wyoming	Sheridan	44.983863	-106.839789	10090101	NA	sw

Table 3. Quality-assurrance-quality-control samples (replicates) for perchlorate reconnaissance study in selected areas of the United States.

[<, less than]

Map identification number (figs. 2–9)	Site number	Site name	Sample type	Sample date (momth/day/ year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
CA-03	11074000	Santa Ana River below Prado Dam, CA	ambient	08/12/2004	1550	0.87
CA-03	11074000	Santa Ana River below Prado Dam, CA	replicate	08/12/2004	1551	< .4
CA-04	323925117044001	017S002W27P002S	ambient	07/12/2004	1038	< .4
CA-04	323925117044001	017S002W27P002S	replicate	07/12/2004	1150	< .4
CA-08	331443117181201	011S004W04K005S	ambient	07/14/2004	1340	< .4
CA-08	331443117181201	011S004W04K005S	replicate	07/14/2004	1340	< .4
CA-09	331659116394701	010S003E27D002S	ambient	07/13/2004	0920	.44
CA-09	331659116394701	010S003E27D002S	replicate	07/13/2004	0921	< .4
CA-10	331707117223601	010S005W26C003S	ambient	07/15/2004	1040	.82
CA-10	331707117223601	010S005W26C003S	replicate	07/15/2004	1040	< .4
CA-11	332024116535701	010S001E05B001S	ambient	07/19/2004	1410	< .4
CA-11	332024116535701	010S001E05B001S	replicate	07/19/2004	1410	.81
IL-10	05575030	Willow Creek near Morrisonville, IL	ambient	10/20/2004	1400	< .4
IL-10	05575030	Willow Creek near Morrisonville, IL	replicate	10/20/2004	1401	< .4
IN-08	394102085533101	Little Sugar Creek near New Palestine, IN	ambient	09/24/2004	0845	.41
IN-08	394102085533101	Little Sugar Creek near New Palestine, IN	replicate	09/24/2004	0855	< .4
IN-11	401722084513201	Mississinewa River near Union City, IN	ambient	09/20/2004	1100	< .4
IN-11	401722084513201	Mississinewa River near Union City, IN	replicate	09/20/2004	1210	< .4
IN-15	414241086030101	Cobus Creek near Elkhart, IN	ambient	10/21/2004	1215	< .4
IN-15	414241086030101	Cobus Creek near Elkhart, IN	replicate	10/21/2004	1245	< .4
MI-04	04116023	Bellamy Creek near Ionia, MI	ambient	09/14/2004	1045	< .4
MI-04	04116023	Bellamy Creek near Ionia, MI	replicate	09/14/2004	1330	< .4
MN-12	05377550	Deering Valley Creek near Whitman, MN	ambient	08/14/2004	1400	< .4
MN-12	05377550	Deering Valley Creek near Whitman, MN	replicate	08/14/2004	1406	< .4
MN-13	05384110	Duschee Creek above Lanesboro, MN	ambient	09/02/2004	1300	< .4
MN-13	05384110	Duschee Creek above Lanesboro, MN	replicate	09/02/2004	1302	< .4
MO-01	05495850	Wyaconda River near Luray, MO	ambient	08/16/2004	1400	< .4
MO-01	05495850	Wyaconda River near Luray, MO	replicate	08/16/2004	1401	< .4
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	ambient	08/17/2004	1030	6.23
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	replicate	08/17/2004	1040	2.7
OH-14	412207083345601	North Branch of Portage River near Bowling Green, OH	ambient	10/07/2004	0840	< .4
OH-14	412207083345601	North Branch of Portage River near Bowling Green, OH	replicate	10/07/2004	0841	< .4
WI-16	05414133	Little Platte River near Arthur, WI	ambient	09/08/2004	0710	.96
WI-16	05414133	Little Platte River near Arthur, WI	replicate	09/08/2004	0720	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/years)	Sample time (24 hour)	Perchlorate concentration (µg/L)
AR-01	07053250	Yocum Creek near Oak Grove, AR	sw	ambient	NAWQA	SWTREND	07/07/2004	1500	0.68
AR-02	07055646	Buffalo River near Boxley, AR	sw	ambient	NAWQA	SWTREND	07/07/2004	1200	< .4
AR-03	07060710	North Sylamore Creek near Fifty Six, AR	sw	ambient	NAWQA	SWTREND	07/08/2004	0800	< .4
AR-04	354635090365601	13N04E12ABB1	gw	ambient	COOP		09/01/2004	0830	.92
AZ-01	09380000	Colorado River at Lees Ferry, AZ	sw	ambient	NAWQA		09/07/2004	1420	< .4
AZ-02	09448500	Gila River at Head of Safford Valley near Solomon, AZ	sw	ambient	COOP	AZDEQ	08/11/2004	1115	< .4
AZ-03	09466500	Gila River at Calva, AZ	sw	ambient	COOP	AZDEQ	08/12/2004	1105	< .4
AZ-04	09471000	San Pedro River at Charleston, AZ	sw	ambient	COOP	AZDEQ	08/19/2004	1325	< .4
AZ-05	09474000	Gila River at Kelvin, AZ	sw	ambient	COOP	AZDEQ	08/10/2004	1055	.6
AZ-06	09498500	Salt River near Roosevelt, AZ	sw	ambient	COOP	AZDEQ	08/31/2004	1115	< .4
AZ-07	09502000	Salt River below Stewart Mountain Dam, AZ	sw	ambient	COOP	AZDEQ	09/02/2004	1030	< .4
AZ-08	09504000	Verde River near Clarkdale, AZ	sw	ambient	COOP	AZDEQ	09/09/2004	0755	< .4
AZ-09	09507980	East Verde River near Childs, AZ	sw	ambient	COOP	AZDEQ	08/27/2004	1320	< .4
AZ-10	09508500	Verde River below Tangle Creek above Horseshoe Dam, AZ	sw	ambient	COOP	AZDEQ	08/13/2004	1000	< .4
AZ-11	09510000	Verde River below Bartlett Dam, AZ	sw	ambient	COOP	AZDEQ	08/18/2004	1030	< .4
CA-01	11049400	Santa Ana River above Seven Oaks Dam, CA	sw	ambient	NAWQA	SWTREND	08/13/2004	1320	< .4
CA-02	11060400	Warm Creek near San Bernardino, CA	sw	ambient	NAWQA	SWTREND	08/13/2004	0930	.71
CA-03	11074000	Santa Ana River below Prado Dam, CA	sw	ambient	NAWQA	SWTREND	08/12/2004	1550	.87
CA-03	11074000	Santa Ana River below Prado Dam, CA	sw	replicate	NAWQA	SWTREND	08/12/2004	1551	< .4
CA-04	323925117044001	017S002W27P002S	gw	ambient	COOP	GAMA	07/12/2004	1038	< .4
CA-04	323925117044001	017S002W27P002S	gw	replicate	COOP	GAMA	07/12/2004	1150	< .4
CA-05	324840116584401	016S001W03E001S	gw	ambient	COOP	GAMA	07/12/2004		1.93
CA-06	325157116551401	015S001E18L005S	gw	ambient	COOP	GAMA	07/15/2004	1030	< .4
CA-07	330447117065301	013S002W05D001S	gw	ambient	COOP	GAMA	07/20/2004	1100	.45
CA-08	331443117181201	011S004W04K005S	gw	ambient	COOP	GAMA	07/14/2004	1340	< .4
CA-08	331443117181201	011S004W04K005S	gw	replicate	COOP	GAMA	07/14/2004	1340	< .4
CA-09	331659116394701	010S003E27D002S	gw	ambient	COOP	GAMA	07/13/2004	0920	.44
CA-09	331659116394701	010S003E27D002S	gw	replicate	COOP	GAMA	07/13/2004	0921	< .4
CA-10	331707117223601	010S005W26C003S	gw	ambient	COOP	GAMA	07/15/2004	1040	.82

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
CA-10	331707117223601	010S005W26C003S	gw	replicate	COOP	GAMA	07/15/2004	1040	< 0.4
CA-11	332024116535701	010S001E05B001S	gw	ambient	COOP	GAMA	07/19/2004	1410	< .4
CA-11	332024116535701	010S001E05B001S	gw	replicate	COOP	GAMA	07/19/2004	1410	.81
CO-01	06713500	Cherry Creek at Denver, CO	sw	ambient	NAWQA	SWTREND	06/10/2004	1000	.63
CO-02	06753990	Lonetree Creek near Greeley, CO	sw	ambient	NAWQA	SWTREND	06/08/2004	0930	< .4
CO-03	06754000	South Platte River near Kersey, CO	sw	ambient	NAWQA	SWTREND	06/08/2004	1230	< .4
CO-04	07103707	Fountain Creek below 8th Street at Colorado Springs, CO	sw	ambient	COOP		07/20/2004	1345	< .4
CO-05	07106000	Fountain Creek near Fountain, CO	sw	ambient	COOP		07/21/2004	1745	< .4
CO-06	07106300	Fountain Creek near Pinon, CO	sw	ambient	COOP		07/22/2004	1110	< .4
CO-07	07106500	Fountain Creek at Pueblo, CO	sw	ambient	COOP		07/22/2004	1445	< .4
CO-08	09095300	Dry Fork at Upper Station near De Beque, CO	sw	ambient	NAWQA	SWTREND	06/02/2004	1200	< .4
CO-08	09095300	Dry Fork at Upper Station near De Beque, CO	sw	ambient	NAWQA	SWTREND	07/29/2004	1135	< .4
CO-08	09095300	Dry Fork at Upper Station near De Beque, CO	sw	ambient	NAWQA	SWTREND	09/07/2004	1045	< .4
CO-09	09163500	Colorado River near Colorado-Utah State Line	sw	ambient	NAWQA	SWTREND	05/26/2004		< .4
CO-09	09163500	Colorado River near Colorado-Utah State Line	sw	ambient	NAWQA	SWTREND	06/25/2004	0805	< .4
CO-09	09163500	Colorado River near Colorado-Utah State Line	sw	ambient	NAWQA	SWTREND	07/28/2004		< .4
CO-09	09163500	Colorado River near Colorado-Utah State Line	sw	ambient	NAWQA	SWTREND	08/26/2004	1640	< .4
CO-09	09163500	Colorado River near Colorado-Utah State Line	sw	ambient	NAWQA	SWTREND	11/04/2004	0930	< .4
CO-10	09371010	San Juan River at Four Corners, CO	sw	ambient	NAWQA	SWTREND	06/30/2004	0900	< .4
CO-11	370936106010501	NA03400929CBB	gw	ambient	NAWQA	RIOG	08/18/2004	1415	< .4
CO-12	373323106025001	NA03800812ACA	gw	ambient	NAWQA	RIOG	08/19/2004	1100	1.1
CO-13	373849106124501	NA03900709ABB	gw	ambient	NAWQA	RIOG	08/18/2004	0840	< .4
CO-13	373849106124501	NA03900709ABB	gw	ambient	NAWQA	RIOG	08/18/2004	0840	< .4
CO-13	373849106124501	NA03900709ABB	gw	ambient	NAWQA	RIOG	08/18/2004	0840	< .4
CO-14	375054106013401	NA04200931BAD	gw	ambient	NAWQA	RIOG	08/17/2004	0940	< .4
CO-15	383232106554700	NB04900101BCB	gw	ambient	NAWQA	UCOL	05/17/2004	1645	< .4
CO-16	385213106584700	SC01408602BCC	gw	ambient	NAWQA	UCOL	05/18/2004	1135	< .4
CO-17	392210104482901	SC00806608BCD	gw	ambient	NAWQA	SPLT	07/20/2004	1400	3.32
CO-18	393003104450001	SC00606626BDD	gw	ambient	NAWQA	SPLT	07/20/2004	1100	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
CO-19	393408104544001	SC00506732DCA	gw	ambient	NAWQA	SPLT	07/21/2004	1050	< 0.4
CO-20	393431106070801	SC00507834BCB	gw	ambient	NAWQA	UCOL	09/08/2004	1215	< .4
CO-21	393742104453801	SC00506610DBD	gw	ambient	NAWQA	SPLT	07/19/2004	1020	4.19
CO-22	393758106041401	SC00507812ACB	gw	ambient	NAWQA	UCOL	09/07/2004	1240	< .4
CO-23	393830106210600	SC00508009AAC	gw	ambient	NAWQA	UCOL	05/19/2004	1330	< .4
CO-24	393846104465601	SC00506604BDD	gw	ambient	NAWQA	SPLT	07/19/2004	1350	1.83
CO-25	395929105510300	SC00107602DAC	gw	ambient	NAWQA	UCOL	05/20/2004	1130	< .4
CO-26	401544103443101	SB00305703BBA	gw	ambient	NAWQA	SPLT	07/14/2004	0920	< .4
CO-27	402104104404501	SB00506532DDB	gw	ambient	NAWQA	SPLT	07/15/2004	0920	< .4
CO-28	402114105350101	Big Thompson below Moraine Park near Estes Park, CO	sw	ambient	NAWQA	SWTREND	07/07/2004	1100	< .4
CO-29	402213104015501	SB00505930CBA	gw	ambient	NAWQA	SPLT	07/14/2004		.64
CO-30	405159102444201	SB01004805CCC	gw	ambient	NAWQA	SPLT	07/13/2004	1520	< .4
IA-01	05387313	Unknown Tributary to Beaver Creek near Lime Springs, IA	sw	blank	EPALIPS		10/26/2004	1320	< .4
IA-01	05387313	Unknown Tributary to Beaver Creek near Lime Springs, IA	sw	ambient	EPALIPS		10/26/2004	1340	.62
IA-02	05388325	Silver Creek near Hanover, IA	sw	ambient	EPALIPS		11/16/2004	1400	< .4
IA-03	05411595	Bohemian Creek near Protivin, IA	sw	ambient	EPALIPS		11/16/2004	1115	< .4
IA-04	05418080	North Fork Maquoketa River at NE Dyersville, IA	sw	ambient	EPALIPS			0838	< .4
IA-05	05420680	Wapsipinicon River near Tripoli, IA	sw	ambient	EPALIPS/ NAWQA	SWTREND	08/03/2004	1025	< .4
IA-06	05420858	Unnamed Creek near Fairbank, IA	sw	ambient	EPALIPS		10/21/2004	0915	< .4
IA-07	05448910	Unknown Tributary to East Branch Iowa River at Garner, IA	sw	ambient	EPALIPS		10/20/2004	1255	.4
IA-08	05449500	Iowa River near Rowan, IA	sw	ambient	EPALIPS/ NAWQA	SWTREND	08/02/2004	1520	< .4
IA-09	05449580	Ditch No. 5 near Galt, IA	sw	ambient	EPALIPS		10/20/2004	1500	1.12
IA-10	05451210	South Fork Iowa River Northeast of New Providence, IA	sw	ambient	EPALIPS/ NAWQA	SWTREND	08/02/2004	1045	< .4
IA-11	05451425	South Minerva Creek at Clemons, IA	sw	ambient	EPALIPS		10/25/2004	1005	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
IA-12	05459800	Little Lime Creek near Nora Springs, IA	sw	ambient	EPALIPS		10/20/2004	1115	< 0.4
IA-13	05463080	Black Hawk Creek near Holland, IA	sw	ambient	EPALIPS		10/21/2004		< .4
IA-14	05464925	Little Mosquito Creek near Moscow, IA	sw	ambient	EPALIPS		10/01/2004	1012	< .4
IA-15	05465500	Iowa River at Wapello, IA	sw	ambient	NAWQA	SWTREND	08/05/2004	0930	< .4
IA-16	05472330	Buck Creek near New Sharon, IA	sw	ambient	EPALIPS		10/04/2004	1315	< .4
IA-17	05473340	Wolf Creek near Rome, IA	sw	ambient	EPALIPS		09/30/2004	1215	< .4
IA-18	05474195	West Branch Tributary to Suger Creek at La Crew, IA	sw	ambient	EPALIPS		09/30/2004	1000	< .4
IA-19	05476680	Prairie Creek near Whittemore, IA	sw	ambient	EPALIPS		10/26/2004	1015	.73
IA-20	05480610	Brushy Creek near Duncombe, IA	sw	ambient	EPALIPS		10/25/2004	1210	.41
IA-21	05482361	West Fork Camp Creek near Yetter, IA	sw	ambient	EPALIPS		10/25/2004	1405	< .4
IA-22	05483463	Springbrook Creek at Bagley, IA	sw	ambient	EPALIPS		10/05/2004	1005	< .4
IA-23	05485800	North Branch North River at McBride, IA	sw	ambient	EPALIPS		10/05/2004	0800	< .4
IA-24	05487770	Brush Creek near Lucas, IA	sw	ambient	EPALIPS		10/04/2004	1600	< .4
IA-25	06483471	Rat Creek near Matlock, IA	sw	ambient	EPALIPS		10/06/2004	0815	.64
IA-26	06603760	Tributary West Fork Little Sioux River below Silver Lake near Lake Park, IA	sw	ambient	EPALIPS		10/06/2004	1010	< .4
IA-27	06605395	Lost Island Outlet above Dickens, IA	sw	ambient	EPALIPS		10/26/2004	0820	< .4
IA-28	06606650	Big Creek near Anthon, IA	sw	ambient	EPALIPS		10/05/2004	1500	< .4
IA-29	06807278	Tributary to West Fork West Nishnabotna River near Manilla, IA	sw	ambient	EPALIPS		10/05/2004	1230	< .4
IA-30	06809775	Fisher Creek near Shenandoah, IA	sw	ambient	EPALIPS		10/29/2004	1100	.47
IA-31	404327095284801	068N40W07BCAA	gw	ambient	COOP	IAGWM	07/06/2004	1000	< .4
IA-32	404521095235801	069N40W26BABD	gw	ambient	COOP	IAGWM	07/06/2004	0130	< .4
IA-33	404531095020502	069N36W19CD	gw	ambient	COOP	IAGWM	07/14/2004	1130	.44
IA-34	404957095183501	070N39W27	gw	ambient	COOP	IAGWM	07/14/2004	1530	< .4
IA-35	410007095330501	072N41W27CDCC	gw	ambient	COOP	IAGWM	07/01/2004	1130	< .4
IA-36	410107095300001	072N41W24DAD	gw	ambient	COOP	IAGWM	07/08/2004	1600	< .4
IA-37	410118095144001	072N38W29BA	gw	ambient	COOP	IAGWM	07/17/2004	1200	1.15
IA-38	411154095252501	074N40W22ADDB	gw	ambient	COOP	IAGWM	06/28/2004	1130	< .4
IA-39	411649095525001	075N44W22DADA	gw	ambient	COOP	IAGWM	06/29/2004	1340	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
IA-40	412117092392301	076N16W25CBDA	gw	ambient	COOP	IAGWM	07/01/2004	1130	1.73
IA-41	412812095322701	077N41W15ACDD	gw	ambient	COOP	IAGWM	08/05/2004	1500	1.27
IA-42	413031093285501	077N23W03AAAA	gw	ambient	COOP	IAGWM	09/12/2004	1245	< .4
IA-43	413132094304202	078N32W27ADDC	gw	ambient	COOP	IAGWM	07/13/2004	1130	< .4
IA-44	413342093432801	078N25W15CAAC	gw	ambient	COOP	IAGWM	07/13/2004	1530	< .4
IA-45	413743095041201	079N36W29BBCA	gw	ambient	COOP	IAGWM	08/05/2004	1330	.95
IA-46	413744093595501	079N27W28BAAA	gw	ambient	COOP	IAGWM	09/08/2004	1230	< .4
IA-47	413907093070201	079N20W13ADDD	gw	ambient	COOP	IAGWM	07/27/2004	1230	< .4
IA-48	413943095453601	079N42W08DCCB	gw	ambient	COOP	IAGWM	06/29/2004	1100	1.33
IA-49	414024093153901	079N21W11ABBB 04510	gw	ambient	COOP	IAGWM	06/30/2004	1130	< .4
IA-50	414029093145601	079N21W01CCCA	gw	ambient	COOP	IAGWM	06/30/2004	0930	.56
IA-51	414251092541701	080N18W26AADC	gw	ambient	COOP	IAGWM	06/30/2004	1330	.72
IA-52	414315094524201	080N35W24CBCC	gw	ambient	COOP	IAGWM	06/30/2004	1400	< .4
IA-53	414933095201802	081N39W13CACB	gw	ambient	COOP	IAGWM	07/20/2004	1000	< .4
IA-54	415055094131201	081N29W10BBBA 03147	gw	ambient	COOP	IAGWM	07/15/2004	1140	< .4
IA-55	415435094492801	082N34W17DDBA 21882	gw	ambient	COOP	IAGWM	07/13/2004	820	< .4
IA-56	415442092180201	082N13W13DACB	gw	ambient	COOP	IAGWM	06/29/2004	1030	< .4
IA-57	415949091404901	083N07W17DACD	gw	ambient	COOP	IAGWM	06/29/2004	1330	< .4
IA-58	420156093562402	083N27W01ABCC	gw	ambient	COOP	IAGWM	07/14/2004	1450	< .4
IA-59	420453093561401	084N27W13DCAA	gw	ambient	COOP	IAGWM	07/22/2004	1030	< .4
IA-60	420607092594501	084N18W07BCAD	gw	ambient	COOP	IAGWM	09/12/2004	0930	< .4
IA-61	423138090383601	089N03E18AADB 07468	gw	ambient	COOP	IAGWM	07/12/2004	1145	< .4
IA-62	424312093135201	091N20W05DBCC 40114	gw	ambient	COOP	IAGWM	08/30/2004	1445	< .4
IA-63	424838096161001	092N46W03CCAB	gw	ambient	COOP	IAGWM	08/03/2004	0730	< .4
IA-64	424921096334701	093N48W31CCDD	gw	ambient	COOP	IAGWM	08/02/2004	1600	.74
IA-65	425940096294501	094N48W03ABDA	gw	ambient	COOP	IAGWM	08/03/2004	1130	< .4
IA-66	430923095114501	096N37W03DDCC	gw	ambient	COOP	IAGWM	08/31/2004	1440	< .4
IA-67	431816091474401	098N08W16CABD	gw	ambient	COOP	IAGWM	07/13/2004	1115	< .4
IA-68	432314095320001	099N40W14DCCC	gw	ambient	COOP	IAGWM	08/31/2004	0915	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
IL-01	05525500	Sugar Creek at Milford, IL	sw	ambient	EPALIPS/NAWQA	SWTREND	08/06/2004	1005	< 0.4
IL-01	05525500	Sugar Creek at Milford, IL	sw	ambient	EPALIPS/NAWQA	SWTREND	12/15/2004	1245	< .4
IL-02	05572000	Sangamon River at Monticello, IL	sw	ambient	EPALIPS/NAWQA	SWTREND	08/05/2004	1330	< .4
IL-02	05572000	Sangamon River at Monticello, IL	sw	ambient	EPALIPS/NAWQA	SWTREND	10/05/2004	0915	< .4
IL-03	03382125	Little Saline River near Carrier Mills, IL	sw	ambient	EPALIPS		10/26/2004	0900	< .4
IL-04	05595210	Rockhouse Creek near Hecker, IL	sw	ambient	EPALIPS		10/25/2004	1220	< .4
IL-05	03380600	Fourmile Creek near Wayne City, IL	sw	ambient	EPALIPS		10/16/2004	1410	< .4
IL-06	03346565	Raccoon Creek Tributary near Petersburg, IL	sw	ambient	EPALIPS		11/09/2004	0915	< .4
IL-07	05592760	Raccoon Creek near Mulberry Grove, IL	sw	ambient	EPALIPS		10/04/2004	1140	< .4
IL-08	03344435	Island Creek near Woodbury, IL	sw	ambient	EPALIPS		09/28/2004	1040	< .4
IL-09	05586597	Coates Creek near Berdan, IL	sw	ambient	EPALIPS		10/20/2004	0950	< .4
IL-10	05575030	Willow Creek near Morrisonville, IL	sw	ambient	EPALIPS		10/20/2004	1400	< .4
IL-10	05575030	Willow Creek near Morrisonville, IL	sw	replicate	EPALIPS		10/20/2004	1401	< .4
IL-11	05573200	Big Creek Tributary near Mt. Zion, IL	sw	ambient	EPALIPS		09/29/2004	1030	< .4
IL-12	05571950	Camp Creek Tributary near White Heath, IL	sw	ambient	EPALIPS		10/05/2004	1300	< .4
IL-13	05584790	Cedar Creek near Camden, IL	sw	ambient	EPALIPS		10/19/2004	1540	< .4
IL-14	03336790	Upper Salt Fork Tributary near Rantoul, IL	sw	ambient	EPALIPS		09/30/2004	0920	< .4
IL-15	05416050	Smallpox Creek at Aitken, IL	sw	ambient	EPALIPS/NAWQA	SWTREND	11/23/2004	0935	< .4
IN-01	04178000	St. Joseph River near Newville, IN	sw	ambient	EPALIPS		09/08/2004	0900	< .4
IN-02	384113086425401	Beaver Creek near Huron, IN	sw	ambient	EPALIPS		11/08/2004	1600	< .4
IN-03	390020086000801	Cooley Creek near Seymour, IN	sw	ambient	EPALIPS		11/08/2004	1035	< .4
IN-04	391014086484501	Lick Creek near Freedom, IN	sw	ambient	EPALIPS		11/09/2004	0915	< .4
IN-05	391740085055701	Pipe Creek near Penntown, IN	sw	ambient	EPALIPS		10/26/2004	1045	1.49
IN-06	392007087140201	Big Slough near Riley, IN	sw	ambient	EPALIPS		11/09/2004	1330	< .4
IN-07	394024087050901	Rock Fork near Mansfield, IN	sw	ambient	EPALIPS		09/23/2004	0925	< .4
IN-08	394102085533101	Little Sugar Creek near New Palestine, IN	sw	ambient	EPALIPS		09/24/2004	0845	.41

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
IN-08	394102085533101	Little Sugar Creek near New Palestine, IN	sw	replicate	EPALIPS		09/24/2004	0855	< 0.4
IN-09	400101086172501	Mounts Run near Zionsville, IN	sw	ambient	EPALIPS		09/30/2004	0930	1.58
IN-10	401510085502501	Little Duck Creek near Elwood, IN	sw	ambient	EPALIPS		11/10/2004	0945	< .4
IN-11	401722084513201	Mississinewa River near Union City, IN	sw	ambient	EPALIPS		09/20/2004	1100	< .4
IN-11	401722084513201	Mississinewa River near Union City, IN	sw	replicate	EPALIPS		09/20/2004	1210	< .4
IN-12	403748087101301	Owens Ditch near Fowler, IN	sw	ambient	EPALIPS		09/22/2004	0910	< .4
IN-13	410823084551101	Wilbur Ditch near Fort Wayne, IN	sw	ambient	EPALIPS		09/21/2004	0930	< .4
IN-14	412215087042801	Cobb Ditch near Kouts, IN	sw	ambient	EPALIPS		09/21/2004	1610	< .4
IN-15	414241086030101	Cobus Creek near Elkhart, IN	sw	ambient	EPALIPS		10/21/2004	1215	< .4
IN-15	414241086030101	Cobus Creek near Elkhart, IN	sw	replicate	EPALIPS		10/21/2004	1245	< .4
MI-01	04101531	Osborn Drain near Glenwood, MI	sw	ambient	EPALIPS		10/13/2004	1230	.85
MI-02	04102726	Butternut Creek near South Haven, MI	sw	ambient	EPALIPS		09/08/2004	1600	< .4
MI-03	04115851	Little Libhart Creek near Lyons, MI	sw	ambient	EPALIPS		09/13/2004	1340	< .4
MI-04	04116023	Bellamy Creek near Ionia, MI	sw	ambient	EPALIPS		09/14/2004	1045	< .4
MI-04	04116023	Bellamy Creek near Ionia, MI	sw	replicate	EPALIPS		09/14/2004	1330	< .4
MI-05	04116734	Little Thornapple River near Gresham, MI	sw	ambient	EPALIPS		10/12/2004	1135	< .4
MI-06	04117448	Cedar Creek near Quimby, MI	sw	ambient	EPALIPS		09/23/2004	1230	< .4
MI-07	04150592	South Branch White Creek near Deford, MI	sw	ambient	EPALIPS		09/29/2004	1400	< .4
MI-08	04177085	Laird Creek near Waldron, MI	sw	ambient	EPALIPS		09/15/2004	1145	< .4
MN-01	05288705	Shingle Creek at Queen Avenue in Minneapolis, MN	sw	ambient	NAWQA		08/25/2004	1025	2.53
MN-02	05316983	County Ditch 24 near Clements, MN	sw	ambient	EPALIPS		10/06/2004	1420	.87
MN-02	05316983	County Ditch 24 near Clements, MN	sw	blank	EPALIPS		10/07/2004	900	< .4
MN-03	05318283	Judicial Ditch 85 near Willow Creek, MN	sw	ambient	EPALIPS		10/07/2004	1210	1.8
MN-04	05320270	Little Cobb River near Beauford, MN	sw	ambient	EPALIPS/ NAWQA	SWTREND	08/23/2004	1310	.8
MN-04	05320270	Little Cobb River near Beauford, MN	sw	ambient	EPALIPS/ NAWQA	SWTREND	10/07/2004	1005	< .4
MN-05	05325580	Cherry Creek near Ottawa, MN	sw	ambient	EPALIPS		09/03/2004	1040	< .4
MN-06	05329898	Silver Creek near East Union, MN	sw	ambient	EPALIPS		07/28/2004	1300	< .4
MN-07	05331580	Mississippi river below L&D #2 at Hastings, MN	sw	ambient	NAWQA	SWTREND	08/13/2004	1016	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
MN-08	05339721	Rush Creek above Mouth near Rush City, MN	sw	ambient	EPALIPS		07/27/2004	1130	< 0.4
MN-09	05351400	Devil Creek near Morristown, MN	sw	ambient	EPALIPS		08/15/2004	1230	< .4
MN-10	05355307	Wells Creek near Belvidere Mills, MN	sw	ambient	EPALIPS		09/03/2004	1130	< .4
MN-11	05377508	Trout Creek near Weaver, MN	sw	ambient	EPALIPS		09/03/2004	0830	< .4
MN-12	05377550	Deering Valley Creek near Whitman, MN	sw	ambient	EPALIPS		08/14/2004	1400	< .4
MN-12	05377550	Deering Valley Creek near Whitman, MN	sw	replicate	EPALIPS		08/14/2004	1406	< .4
MN-13	05384110	Duschee Creek above Lanesboro, MN	sw	ambient	EPALIPS		09/02/2004	1300	< .4
MN-13	05384110	Duschee Creek above Lanesboro, MN	sw	replicate	EPALIPS		09/02/2004	1302	< .4
MO-01	05495850	Wyaconda River near Luray, MO	sw	ambient	EPALIPS		08/16/2004	1400	< .4
MO-01	05495850	Wyaconda River near Luray, MO	sw	replicate	EPALIPS		08/16/2004	1401	< .4
MO-02	05502005	Bear Creek at 29th Street at Hannibal, MO	sw	ambient	EPALIPS		08/17/2004	0820	< .4
MT-01	06306300	Tongue River at State Line near Decker, MT	sw	ambient	COOP		07/14/2004	1420	.68
NE-01	06800000	Maple Creek near Nickerson, NE	sw	ambient	EPALIPS/ NAWQA	SWTREND	07/13/2004	1030	< .4
NE-01	06800000	Maple Creek near Nickerson, NE	sw	ambient	EPALIPS/ NAWQA	SWTREND	10/12/2004	0930	< .4
NE-02	06800500	Elkhorn River at Waterloo, NE	sw	ambient	NAWQA	SWTREND	07/14/2004	1000	.48
NE-03	06805500	Platte River at Louisville, NE	sw	ambient	NAWQA	SWTREND	07/15/2004	1000	< .4
NE-04	400757098325401	2N 11W15CDDD1	gw	ambient	NAWQA	HPGW	08/17/2004	1400	1.59
NE-05	401329097444501	3N 4W15DADA1	gw	ambient	NAWQA	HPGW	08/19/2004	1500	.69
NE-06	401715097083601	4N 2E25ADAA1	gw	ambient	NAWQA	HPGW	07/16/2004	1000	1.43
NE-07	401853097550101	4N 5W18DAAA1	gw	ambient	NAWQA	HPGW	07/15/2004	1100	1.99
NE-08	401918097195301	4N 1E 8DDDD1	gw	ambient	NAWQA	HPGW	08/20/2004	1000	1.05
NE-09	402103097404201	5N 3W32DCDC1	gw	ambient	NAWQA	HPGW	07/15/2004	1400	1.3
NE-10	402154098512601	5N 14W26DDDD1	gw	ambient	NAWQA	HPGW	08/18/2004	1400	1.49
NE-11	402708098534901	6N 14W28DDCD1	gw	ambient	NAWQA	HPGW	08/18/2004	1200	< .4
NE-12	402943098284801	6N 10W 7DDDC1	gw	ambient	NAWQA	HPGW	08/17/2004	1000	.88
NE-13	403314097532801	7N 5W21CDAD1	gw	ambient	NAWQA	HPGW	07/14/2004	1000	1.8
NE-14	403330098545101	7N 14W20DADA1	gw	ambient	NAWQA	HPGW	08/19/2004	1100	20.87
NE-15	403502097460101	7N 4W10CCCB1	gw	ambient	NAWQA	HPGW	07/14/2004	1400	< .4
NE-16	403520097013901	7N 3E12ADDD1	gw	ambient	NAWQA	HPGW	07/16/2004	1400	.94

Table 4. Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
NE-47	405406097405601	11N 3W20DCC1 AWT2-71	gw	ambient	NAWQA	HPGW	07/29/2004	1300	1.31
NE-48	405420097114002	11N 2E22CBBB2 FP4-105	gw	ambient	COOP	SEWARD	08/04/2004	1500	.95
NE-49	405420097114003	11N 2E22CBBB3 FP4-129	gw	ambient	COOP	SEWARD	08/25/2004	1800	0.7
NE-50	410247097533601	12N 5W 4BAAA1	gw	ambient	NAWQA	HPGW	07/20/2004		.6
NE-51	410251102024201	SB01204232CDD	gw	ambient	NAWQA	SPLT	07/13/2004	1040	.61
NE-52	410410097220601	13N 1W25DAAD1	gw	ambient	NAWQA	HPGW	07/13/2004		.67
NE-53	410520097344501	13N 2W20BBBC1	gw	ambient	NAWQA	HPGW	07/20/2004	1300	.78
NE-54	410552097220501	13N 1E18BCCC1	gw	ambient	NAWQA	HPGW	07/12/2004		.5
NE-55	410710097454201	13N 4W10BAAA1	gw	ambient	NAWQA	HPGW	07/19/2004	1700	.77
NE-56	411256097301101	14N 2W 2ADDA1	gw	ambient	NAWQA	HPGW	07/13/2004		< .4
NE-57	411636096372901	Duck Creek near Colon, NE	sw	ambient	EPALIPS		09/20/2004	1000	< .4
NE-58	413334096325301	18N 8W 5DBAB1 NAWQA WELL ACTFS1-1A	gw	ambient	NAWQA	ACT	08/16/2004	1630	.44
NE-59	413334096325302	18N 8W 5DBAB2 NAWQA WELL ACTFS1-1B	gw	ambient	NAWQA	ACT	08/16/2004	1500	< .4
NE-60	413334096325303	18N 8W 5DBAB3 NAWQA WELL ACTFS1-1C	gw	ambient	NAWQA	ACT	08/16/2004	1330	< .4
NE-61	413340096402701	18N 7E 6BCCC1 CNBRLUSCR1 DO-24	gw	ambient	NAWQA	CNBR	09/08/2004	1500	< .4
NE-62	413341096325501	18N 8W 5ACDC1 NAWQA WELL ACTFS1-2A	gw	ambient	NAWQA	ACT	08/17/2004	1200	< .4
NE-63	413341096325502	18N 8W 5ACDC2 NAWQA WELL ACTFS1-2B	gw	ambient	NAWQA	ACT	08/17/2004	1030	< .4
NE-64	413341096325503	18N 8W 5ACDC3 NAWQA WELL ACTFS1-2C	gw	ambient	NAWQA	ACT	08/17/2004	1000	< .4
NE-65	413348096324801	18N 8W 5ACAC1 NAWQA WELL ACTFS1-3A	gw	ambient	NAWQA	ACT	08/18/2004	1100	< .4
NE-66	413348096324802	18N 8W 5ACAC2 NAWQA WELL ACTFS1-3B	gw	ambient	NAWQA	ACT	08/18/2004	1330	< .4
NE-67	413348096324803	18N 8W 5ACAC3 NAWQA WELL ACTFS1-3C	gw	ambient	NAWQA	ACT	08/18/2004	1230	< .4
NE-68	413350096324701	18N 8W 5ABDD1 NAWQA WELL ACTFS1-4A	gw	ambient	NAWQA	ACT	08/17/2004	1500	< .4
NE-69	413350096324702	18N 8W 5ABDD2 NAWQA WELL ACTFS1-4B	gw	ambient	NAWQA	ACT	08/17/2004	1600	< .4
NE-70	413350096324703	18N 8W 5ABDD3 NAWQA WELL ACTFS1-4C	gw	ambient	NAWQA	ACT	08/17/2004	1530	< .4
NE-71	413412101414501	19N 38W33DDDA1	gw	ambient	NAWQA	HPGW			< .4
NE-72	413850097425801	19N 3W 6CBCB1	gw	ambient	NAWQA	HPGW	07/19/2004	1100	< .4
NE-73	414343096595801	20N 4E 5CCDC1 CNBRLUSCR1 CO-13	gw	ambient	NAWQA	ACT	09/09/2004	1000	< .4
NE-74	414527097094101	21N 2E35ABAA1 CNBRLUSCR1 S-11	gw	ambient	NAWQA	ACT	08/19/2004	1100	< .4
NE-75	414748100090901	21N 25W13ABAA1	gw	ambient	NAWQA	HPGW	06/14/2004	1000	< .4
NE-76	420326102253201	24N 44W16DBDB1	gw	ambient	NAWQA	HPGW	06/08/2004	1600	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
NE-77	420458101270201	24N 36W 2DABC1	gw	ambient	NAWQA	HPGW	06/08/2004	1200	< 0.4
NE-78	420515101363901	24N 37W 4ACBB1	gw	ambient	NAWQA	HPGW	06/23/2004	1000	1.57
NE-79	420821099351101	25N 20W13ADAC1	gw	ambient	NAWQA	HPGW	06/24/2004	1100	.45
NE-80	421317101540201	26N 39W19ADCB1	gw	ambient	NAWQA	HPGW	06/16/2004	1000	< .4
NE-81	422120102175301	27N 43W 2AADB1	gw	ambient	NAWQA	HPGW	06/16/2004	1300	.42
NE-82	422138101282601	28N 36W36CBBB1	gw	ambient	NAWQA	HPGW	06/15/2004		< .4
NE-83	422830101411101	29N 37W20DCDA1	gw	ambient	NAWQA	HPGW	06/09/2004	1100	< .4
NE-84	424403100253501	32N 27W24ACBB1	gw	ambient	NAWQA	HPGW	06/03/2004	1100	1.28
NE-85	425154100342301	33N 28W 1BB 1	gw	ambient	NAWQA	HPGW	06/09/2004		< .4
NM-01	08276500	Rio Grande below Taos Junction Bridge near Taos, NM	sw	ambient	COOP		07/22/2004	1230	1.06
NM-02	08313000	Rio Grande at Otowi Bridge, NM	sw	ambient	COOP		07/22/2004	1210	< .4
NM-03	08319000	Rio Grande at San Felipe, NM	sw	ambient	COOP		07/19/2004	1200	< .4
NM-04	08331000	Rio Grande at Isleta, NM	sw	ambient	COOP		07/13/2004	1140	< .4
NM-05	09355500	San Juan River near Archuleta, NM	sw	ambient	COOP		07/29/2004	1500	< .4
NM-06	09364500	Animas River at Farmington, NM	sw	ambient	COOP		07/01/2004	0800	2.06
NM-07	09365000	San Juan River at Farmington, NM	sw	ambient	COOP		07/01/2004	1205	< .4
NM-08	09368000	San Juan River at Shiprock, NM	sw	ambient	COOP		06/30/2004	1305	1.69
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	sw	blank	NAWQA	SWTREND	08/17/2004	1020	< .4
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	sw	ambient	NAWQA	SWTREND	08/17/2004	1030	6.23
NV-01	094196783	Las Vegas Wash below Flamingo Wash Confluence near Las Vegas, NV	sw	replicate	NAWQA	SWTREND	08/17/2004	1040	2.7
NV-02	10309010	East Fork Carson River near Dresslerville, NV	sw	ambient	NAWQA	SWTREND	08/12/2004	1010	< .4
NV-03	10347699	Truckee River at Chalk Bluff Treatment Plant Intake near Reno, NV	sw	ambient	NAWQA	SWTREND	08/18/2004	0910	< .4
NV-04	10350500	Truckee River at Clark, NV	sw	ambient	NAWQA	SWTREND	08/09/2004	1115	< .4
OH-01	03267900	Mad River at St. Paris Pike at Eagle City, OH	sw	ambient	EPALIPS		09/07/2004	1100	< .4
OH-02	04186500	Auglaize River near Fort Jennings, OH	sw	ambient	EPALIPS		09/08/2004	1100	< .4
OH-02	04186500	Auglaize River near Fort Jennings, OH	sw	ambient	EPALIPS		10/20/2004	0930	< .4

Table 4. Perchlorate concentrations at selected surface-water and groundwater sites in the United States.—Continued

[USGS, U.S. Geological Survey; µg/L, micrograms per Liter; sw, surface water; gw, groundwater; NAWQA, National Water Quality Assessment program; COOP, Federal/State cooperative project; EPALIPS, Landscape Indicators project; SWTREND, Surface Water Trends network; AZDEQ, Arizona Department of Environmental Quality; GAMA, California Groundwater Ambient Monitoring and Assessment; RIOG, Rio Grande Valley; UCOL, Upper Colorado River Basin; SPLT, South Platte River Basin; IAGWM, Iowa Groundwater Monitoring Network; HPGW, High Plains Regional Ground Water Study; TANC, Transport of Anthropogenic and Natural Contaminants Study; SEWARD, City of Seward, Nebraska.; ACT, Agricultural Chemical Transport study; CNBR, Central Nebraska Basins; TRIVER, Tongue River Surface-Water-Quality Monitoring Network; <, less than]

Map identification number (figs. 2–9)	Site number	Site name	Site type	Sample type	USGS Program	USGS Project	Sample date (month/day/year)	Sample time (24 hour)	Perchlorate concentration (µg/L)
WI-06	05341865	Parker Creek near River Falls, WI	sw	ambient	EPALIPS		10/06/2004	0925	< 0.4
WI-07	05365962	Black Creek near Fairchild, WI	sw	ambient	EPALIPS		10/05/2004	1015	< .4
WI-08	05367064	Cranberry Creek at Meridean, WI	sw	ambient	EPALIPS		10/05/2004	1430	.93
WI-09	05367803	Silver Creek near Arland, WI	sw	ambient	EPALIPS		10/04/2004	1605	< .4
WI-10	05381441	Soper Creek at Cataract, WI	sw	ambient	EPALIPS		09/14/2004	0740	< .4
WI-11	05382415	Little La Crosse River near Melvina, WI	sw	ambient	EPALIPS		09/14/2004	0910	< .4
WI-12	054041139	West Branch Baraboo River at Hillsboro, WI	sw	ambient	EPALIPS		09/13/2004	1020	< .4
WI-13	054067125	Hawkins Creek at Rockbridge, WI	sw	ambient	EPALIPS		09/13/2004	0855	< .4
WI-14	05407217	Crooked Creek at Boscobel, WI	sw	ambient	EPALIPS		09/07/2004	1300	< .4
WI-15	05412880	Rogers Branch near Lancaster, WI	sw	ambient	EPALIPS		09/08/2004	1250	< .4
WI-16	05414133	Little Platte River near Arthur, WI	sw	ambient	EPALIPS		09/08/2004	0710	.96
WI-16	05414133	Little Platte River near Arthur, WI	sw	replicate	EPALIPS		09/08/2004	0720	< .4
WI-17	05414924	Galena River at Jenkinsville, WI	sw	ambient	EPALIPS		09/09/2004	0920	< .4
WI-18	05436361	Little Sugar River West Branch at Monticello, WI	sw	ambient	EPALIPS		09/10/2004	0815	1.41
WY-01	06279795	Crow Creek at Mouth at Pahaska, WY	sw	ambient	COOP	TRIVER	08/20/2004	1230	< .4
WY-02	06299980	Tongue River at Monarch, WY	sw	ambient	COOP	TRIVER	07/14/2004	1645	.49
WY-03	06305700	Goose Creek near Acme, WY	sw	ambient	COOP	TRIVER	07/15/2004	0810	< .4
WY-04	06306250	Prairie Dog Creek near Acme, WY	sw	ambient	COOP	TRIVER	07/14/2004	1100	< .4

Table 5. Summary of perchlorate detections and concentrations in selected states.

[µg/L, micrograms per liter; <, less than]

State	Number of samples	Number of samples with detectable concentration (0.4 µg/L or greater)	Percent of samples with concentration 1.0 µg/L or greater	Percent of samples with concentration 2.0 µg/L or greater	Percent of samples with concentration 5.0 µg/L or greater	Maximum concentration (µg/L)
Surface water						
Arizona	11	1	0	0	0	0.6
Arkansas	3	1	0	0	0	.68
California	3	2	0	0	0	.87
Colorado	17	1	0	0	0	.63
Illinois	17	0	0	0	0	<.4
Indiana	15	3	13	0	0	1.58
Iowa	30	7	3	0	0	1.12
Michigan	8	1	0	0	0	.85
Minnesota	14	4	14	7	0	2.53
Missouri	2	0	0	0	0	<.4
Montana	1	1	0	0	0	.68
Nebraska	6	1	0	0	0	.48
Nevada	4	1	25	25	25	6.23
New Mexico	8	3	38	12	0	2.06
Ohio	15	3	20	0	0	1.58
South Dakota	3	0	0	0	0	<.4
Texas	3	0	0	0	0	<.4
Wisconsin	18	4	6	0	0	1.41
Wyoming	4	1	0	0	0	.49
Groundwater						
Arkansas	1	1	0	0	0	.92
California	8	4	13	0	0	1.93
Colorado	21	5	19	9	0	4.19
Iowa	38	9	11	0	0	1.73
Nebraska	80	45	31	6	1.25	20.9

Table 6. Perchlorate concentrations in streams sampled twice during the reconnaissance study.

Map identification number (figs. 2–9)	Site number	Site name	Sample date (month/day/year)	Sample time (24 hours)	Perchlorate concentration (ug/L)
IL-01	05525500	Sugar Creek at Milford, IL	08/06/2004	1005	<0.4
IL-01	05525500	Sugar Creek at Milford, IL	12/15/2004	1245	<.4
IL-02	05572000	Sangamon River at Monticello, IL	08/05/2004	1330	<.4
IL-02	05572000	Sangamon River at Monticello, IL	10/05/2004	0915	<.4
MN-04	05320270	Little Cobb River near Beauford, MN	08/23/2004	1310	.8
MN-04	05320270	Little Cobb River near Beauford, MN	10/07/2004	1005	<.4
NE-01	06800000	Maple Creek near Nickerson, NE	07/13/2004	1030	<.4
NE-01	06800000	Maple Creek near Nickerson, NE	10/12/2004	0930	<.4
OH-02	04186500	Auglaize River near Fort Jennings, OH	09/08/2004	1100	<.4
OH-02	04186500	Auglaize River near Fort Jennings, OH	10/20/2004	0930	<.4

Appendix

Appendix 1. Project support.

Core funding was provided by the U.S. Geological Survey's Central Region Integrated Science Program.

Collection of samples from such a large part of the United States was only possible because of the willingness of personnel working on Federal/State cooperative (COOP) projects, the National Water-Quality Assessment program (NAWQA) , and U.S. Geological Survey/ U.S. Environmental Protection Agency Landscape Indicators (EPALIPS) project to collect an additional water sample. Collection of perchlorate samples was supported as part of the following programs.

Federal/State Cooperative Program		
Water Science Center	**Project/cooperator**	**Description**
Arkansas	Master well monitoring	
Arizona	Arizona Department of Environmental Quality (AZDEQ)	
California	Groundwater Ambient Monitoring and Assessment (GAMA)/California State Water Resources Control Board	An assessment of groundwater quality in areas where public supply wells are an important source of drinking water (Wright and others, 2005). Perchlorate samples are routinely analyzed by a commercial laboratory as part of the GAMA project, but additional samples were collected for this study.
Colorado	Water Quality in the Arkansas River basin near Pueblo, CO/ Southeastern Colorado Water Activity Enterprise	Monitoring in the Fountain and Monument Creek watersheds from 1981 through 2006 to evaluate the effects of stormflow and wastewater-treatment effluent on Fountain and Monument Creeks in the Colorado Springs, Colorado area. (Mau and others, 2007)
Iowa	Iowa Groundwater Monitoring Network (IAGWM) /Iowa Department of Natural Resources	38 of 150 municipal supply wells completed in shallow alluvial deposits that are susceptible to contamination from land surface were sampled for perchlorate. (Littin, 2004)
Montana	Tongue River Surface-Water-Quality Monitoring Network (TRIVER)	Monitoring surface water within or near the Powder River structural basin in northeastern Wyoming and southeastern Montana to characterize water quality in streams draining an area of coalbed natural gas development. (Clark and Mason, 2007)
Nebraska	City of Seward (SEWARD)	A study of groundwater age and quality was conducted to improve understanding of: (1) travel times from recharge areas to public-supply wells, (2) the effects of geochemical reactions in the aquifer on water quality, and (3) how water quality has changed historically in response to land-use practices. (Stanton and others, 2007)
New Mexico	Statewide monitoring	

National Water-Quality Assessment Program (NAWQA)		
Topical Study	**Study Unit**	**Description**
Surface-WaterTrends (SWTREND)	Central Arizona Basins Central Nebraska Basins (CNBR) Eastern Iowa Basins Nevada Basin and Range Ozark Plateaus Rio Grande (RIOG) Santa Ana	Ambient resource assessment over decades with a regional and national perspective to evaluate ecological conditions and the occurrence, trends, and transport of nutrients and pesticides in rivers and streams. Twenty-five surface-water sites on both medium-sized rivers indicative of a single land use and large rivers that integrate the effects of agricultural and urban land use.

Appendix 1. Project support.—Continued

Core funding was provided by the U.S. Geological Survey's Central Region Integrated Science Program.

Collection of samples from such a large part of the United States was only possible because of the willingness of personnel working on Federal/State cooperative (COOP) projects, the National Water-Quality Assessment program (NAWQA) , and U.S. Geological Survey/ U.S. Environmental Protection Agency Landscape Indicators (EPALIPS) project to collect an additional water sample. Collection of perchlorate samples was supported as part of the following programs.

National Water-Quality Assessment Program (NAWQA)—Continued		
Topical Study	**Study Unit**	**Description**
Agricultural Chemical Transport (ACT)	Central Nebraska Basins	A study to (1) understand the links between the sources of water and agricultural chemicals (nutrients and pesticides) and their behavior and transport through the environment; (2) predict the behavior and transport of water and agricultural chemicals in other agricultural areas not being studied; and (3) evaluate what the study results mean for management of water and water quality in a variety of agricultural settings. (Fredrick and others, 2006)
Transport of Anthropogenic and Natural Contaminants Study (TANC)	Central Nebraska Basins	Study of the hydrogeology and geochemistry of the High Plains aquifer in a 42-square-mile study area at York, Nebraska that contains the zone of contribution to a public supply well (PSW). Data were used to describe factors controlling the transport of selected anthropogenic and natural contaminants to PSWs. (Landon and others, 2008)

Groundwater trends South Platte River Basin	
Topical Study	**Description**
High Plains Regional Ground Water Study (HPGW)	Water quality of the High Plains aquifer was assessed for the period 1999-2004 through a stratified, nested group of studies designed to assess linkages between the quality of water recharging the aquifer, the effect of transport through the hydrologic system on water quality, and the quality of the resource used for human consumption and agricultural applications. (McMahon and others, 2007)

USGS/USEPA Landscape Indicators Project (EPALIPS)	
Water Science Centers	**Description**
Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, South Dakota, Wisconsin	There were 110 third order streams draining agricultural watersheds in 10 corn-belt States that were sampled in September 2004 during base flow when most streamflow was derived from groundwater discharge. Samples collected at base flow integrated the water quality of a watershed over temporal and geographical scales.

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