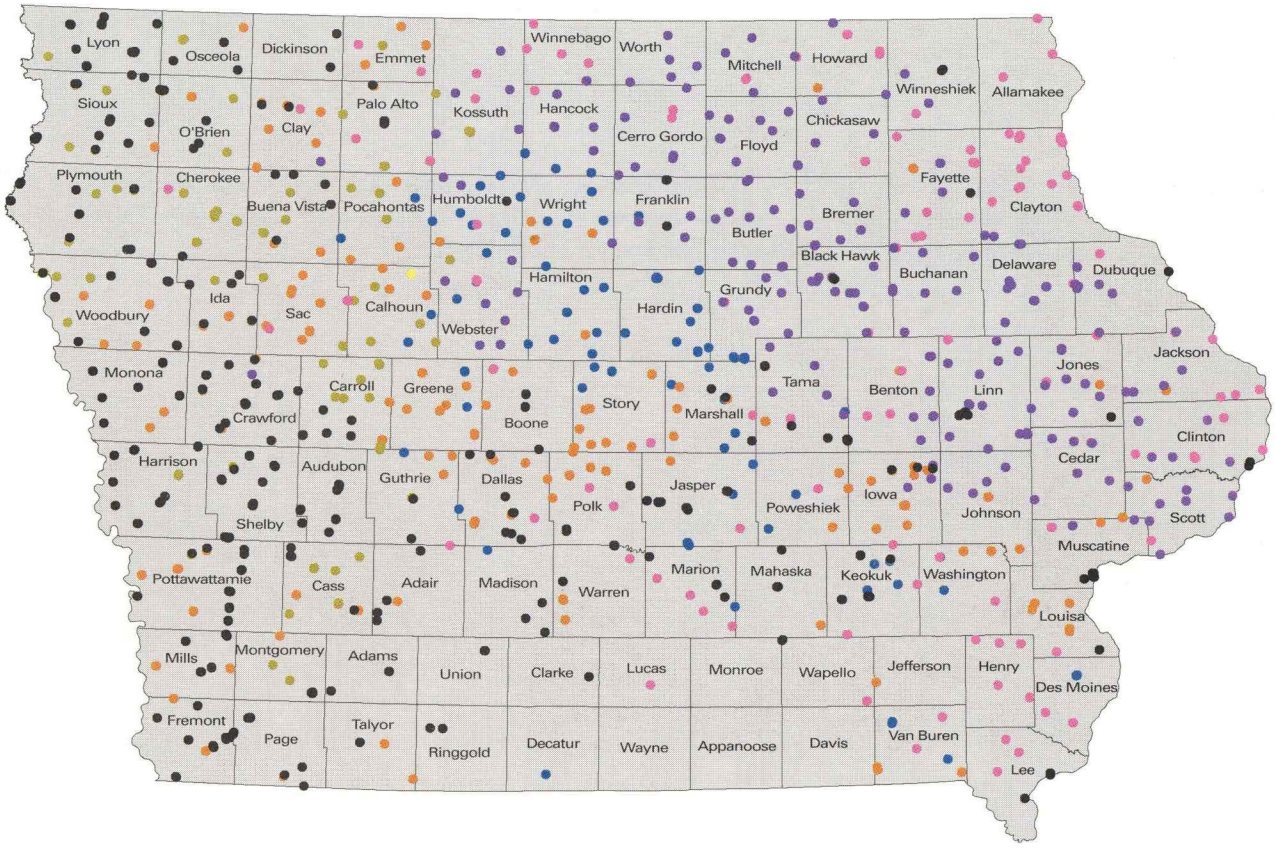
ality of Ground Water Used for ected Municipal Water Supplies In Iowa, 1982–96 Water Years

U.S. GEOLOGICAL SURVEY
Open-File Report 98–3



Prepared in cooperation with the
IOWA DEPARTMENT OF NATURAL RESOURCES, GEOLOGICAL SURVEY BUREAU;
and the UNIVERSITY OF IOWA HYGIENIC LABORATORY

Cover explanation: **Location of wells sampled for the Iowa ground-water-quality monitoring program, 1982–96 water years, with aquifer system indicated using the same color relationship as used for figure 8 (plus yellow for Precambrian aquifer wells).**

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U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
400 S. Clinton Street
Iowa City, Iowa 52244

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NEW REPORT DESCRIBES

QUALITY OF GROUND WATER USED FOR MUNICIPAL WATER SUPPLIES IN IOWA, 1982-1996

The Iowa ground-water-monitoring program has been conducted cooperatively since 1982 by the Iowa Department of Natural Resources, Geological Survey Bureau; the University of Iowa Hygienic Laboratory, and the U.S. Geological Survey. From 1982 through 1996, a total of 2,529 samples has been collected from 1,158 municipal wells throughout Iowa for this program. The 2,529 samples consisted of 1,048 alluvial aquifer samples (387 wells), 530 Pleistocene aquifer samples (224 wells), 139 Cretaceous aquifer samples (86 wells), 187 Carboniferous aquifer samples (104 wells), 447 Silurian-Devonian aquifer samples (222 wells), 177 Cambrian-Ordovician aquifer samples (134 wells), and 1 Precambrian aquifer sample (1 well).

The distribution and occurrence of selected water-quality parameters are described. Some maps show all wells that have been sampled in the various aquifers and other maps show the locations of wells where sulfate and nitrite plus nitrate concentrations exceed the respective Maximum Contaminant Levels and wells where the pesticides, alachlor, atrazine, or cyanazine, were detected. Data collected during the first 15 years of the project are on a compact disc included with the report.

The report, titled "Quality of ground water used for selected municipal water supplies in Iowa, 1982-96 water years", by Bryan D. Schaap and S. Mike Linhart, is published as U.S. Geological Survey Open-File Report 98-3. It is available for inspection at the U.S. Geological Survey, Water Resources Division, Room 269, Federal Building, 400 S. Clinton St., Iowa City, IA 52244. Microfiche and paper copies of the report may be purchased at cost from the U.S. Geological Survey, Branch of Information Services, Box 25286, Denver Federal Center, Denver, CO 80225-0286. A limited number of copies are available upon request from the U.S. Geological Survey, P.O. Box 1230, 400 South Clinton St., Iowa City, Iowa, 52244 (telephone: (319) 337-4191).

Quality of Ground Water Used for Selected Municipal Water Supplies in Iowa, 1982–96 Water Years

By BRYAN D. SCHAAP and S. MIKE LINHART

U.S. GEOLOGICAL SURVEY

Open-File Report 98–3

Prepared in cooperation with the

IOWA DEPARTMENT OF NATURAL RESOURCES, GEOLOGICAL SURVEY BUREAU;

and the UNIVERSITY OF IOWA HYGIENIC LABORATORY

Iowa City, Iowa
1998

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

U.S. GEOLOGICAL SURVEY
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Denver, CO 80225

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CONVERSION FACTORS, ABBREVIATIONS, AND VERTICAL DATUM

Multiply	By	To obtain
acre	4,047	square meter
foot	0.3048	meter
gallon	3.785	liter
inch	2.54	centimeter
pound	0.4536	kilogram

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

$$°F = 1.8\ °C + 32.$$

Abbreviated water-quality units used in this report: Chemical concentrations are given in metric units. Chemical concentration is given in milligrams per liter (mg/L), micrograms per liter (µg/L), picocuries per liter (pCi/L), and microsiemens per centimeter at 25 degrees Celsius (°C). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. Micrograms per liter is a unit expressing the concentration of chemical constituents in solution as weight (micrograms) of solute per unit volume (liter) of water. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million.

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

Water year: The 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends. Thus, the year ending September 30, 1996, is called the "1996 water year."

Quality of Ground Water Used for Selected Municipal Water Supplies in Iowa, 1982–96 Water Years

By Bryan D. Schaap *and* S. Mike Linhart

Abstract

The Iowa ground-water-quality monitoring program has been conducted cooperatively since 1982 by the Iowa Department of Natural Resources, Geological Survey Bureau; the University of Iowa Hygienic Laboratory, and the U.S. Geological Survey. The original objectives of the program were to provide baseline ground-water-quality data throughout the State for the major aquifers and to address any new areas of water-quality concern. Since the program began, the emphasis and objectives of the program have changed several times. For water years 1992 through 1996, more emphasis has been placed on determining trends in ground-water quality and correlating water quality with possible contributing factors such as location, land use, aquifer, aquifer depth, and precipitation.

From 1982 through 1996, a total of 2,529 water samples has been collected from 1,158 municipal wells throughout Iowa. The samples consisted of 1,048 alluvial aquifer samples (387 wells), 530 Pleistocene aquifer samples (224 wells), 139 Cretaceous aquifer samples (86 wells), 187 Carboniferous aquifer samples (104 wells), 447 Silurian-Devonian aquifer samples (222 wells), 177 Cambrian-Ordovician aquifer samples (134 wells), and 1 Precambrian aquifer sample (1 well).

Some samples had concentrations greater than or equal to drinking-water regulations established by the U.S Environmental Protection Agency. Of 1,901 samples analyzed for dissolved sulfate, 137 samples had concentrations greater than or equal to the Maximum Contaminant Level for sulfate. Of 2,510 samples analyzed for dissolved nitrite plus nitrate as nitrogen, 198 samples had concentrations greater than or equal to the Maximum Contaminant Level for nitrite plus nitrate. Of 1,945 samples analyzed for dissolved iron, 1,022 samples had concentrations greater than or equal to the Secondary Maximum Contaminant Level for iron. Of 1,946 samples analyzed for dissolved manganese, 1,082 samples had concentrations greater than or equal to the Secondary Maximum Contaminant Level for manganese. Of 1,659 samples analyzed for alachlor, atrazine, and cyanazine, 401 samples had concentrations greater than or equal to the respective minimum reporting levels. One sample had concentrations of alachlor, atrazine, and cyanazine greater than the respective drinking-water regulations.

Maps show the general location of wells that have been sampled in the various aquifers. Other maps show the location of wells where sulfate and nitrite plus nitrate concentrations exceed the respective Maximum Contaminant Levels and wells where concentrations of the pesticides alachlor, atrazine, or cyanazine exceeded the respective minimum reporting levels. The compact disc included with this report has information about water-quality properties and concentrations of dissolved solids, major ions, nutrients, trace elements, radionuclides, total organic carbon, pesticides, and synthetic organic compounds for water years 1982 through 1996.

INTRODUCTION

The Iowa ground-water-quality monitoring (GWQM) program has been conducted cooperatively since 1982 by the Iowa Department of Natural Resources, Geological Survey Bureau (IDNR-GSB); the University of Iowa Hygienic Laboratory, and the U.S. Geological Survey (USGS). It is a continuation of a program begun by the Iowa State Health Department; the Iowa Department of Natural Resources, Geological Survey Bureau; and the University of Iowa Hygienic Laboratory. The original objectives of the program were to provide baseline water-quality data throughout the State for the major aquifers and to address any new areas of water-quality concern (Detroy, 1985). Since 1982, the emphasis on various water-quality characteristics and the objectives of the program have changed several times. In 1985, the program started emphasizing the quality of water from wells in shallow aquifers susceptible to contamination from nonpoint-source agricultural chemicals (Detroy and others, 1988). In water years 1988 and 1989, the primary focus of the program became the investigation of seasonal variability of nitrates and pesticides in shallow wells where high concentrations of these constituents had been reported previously (Melcher and others, 1989; O'Connell and others, 1989). In water year 1992, a 10-year plan was established that placed more emphasis on determining trends in ground-water quality and correlating water quality with possible contributing factors such as location, land use, aquifer, aquifer depth, and precipitation (Gorman and others, 1992).

Ground-water quality is an important issue to many Iowans. In 1995, public-water supplies used an average of more than 255 million gallons of ground water per day to provide for the commercial, industrial, and domestic needs of their customers. Almost half of that water came from alluvial and Pleistocene aquifers (E.E. Fischer, USGS, written commun., 1997). Figure 1 shows the public-supply ground-water use by county in 1995 and the change in public-water supply ground-water use from 1985 to 1995. Several counties in Iowa with some of the largest cities rely on ground water to meet water needs. In 1995, Black Hawk, Linn, Muscatine, and Woodbury Counties used 10 million gallons of public-supply ground water per day or more. Some counties, including those in southern Iowa, are served by rural water cooperatives because of limitations in the quality and availability of ground water. Adams, Appanoose, Davis, Taylor, and Wayne Counties reported no ground-water use for public-water supplies in 1995.

From 1985 to 1995, public-supply ground-water use in Linn County increased by more than 10 million gallons per day. In Black Hawk, Muscatine, Polk, Sioux, and Woodbury Counties, public-supply ground-water use increased from between 2 and 10 million gallons per day from 1985 to 1995. Increased domestic and industrial use in these counties may make the quality of the municipal-supply ground water even more important in the future. Many communities are increasing reliance on ground water relative to surface water because of concerns about surface-water quality.

Pupose and Scope

The purpose of this report is to describe the Iowa GWQM program, to present the analytical results of water-quality samples collected from selected municipal-water supply wells in Iowa from water year 1982 (October 1, 1981, through September 30, 1982) through water year 1996 (October 1, 1995, through September 30, 1996) and to describe the distribution and occurrence of selected constituents. Sampling strategies used during the 15 years of the program from 1982 through 1996 are described. Statistical summaries and maps demonstrate methods for investigating and describing the wealth of information accumulated for this program. The compact disc included with this report provides access to much of the information collected for the program.

The scope of this report includes water-quality properties (specific conductance, pH, water temperature, dissolved oxygen, hardness, and alkalinity) and concentrations of dissolved solids, major ions, nutrients, trace elements, radionuclides, total organic carbon, pesticides, and synthetic organic compounds for a total of 2,529 samples collected from 1,158 different wells from seven different aquifers in Iowa from water year 1982 through water year 1996. Maps show the general location of wells that have been sampled in the specified aquifer. The location of wells is shown where concentrations of sulfate or nitrite plus nitrate exceed the respective U.S. Environmental Protection Agency Maximum Contaminant Levels. Also, well locations are shown where concentrations of pesticides (alachlor, atrazine, or cyanazine) equalled or exceeded the respective minimum reporting levels.

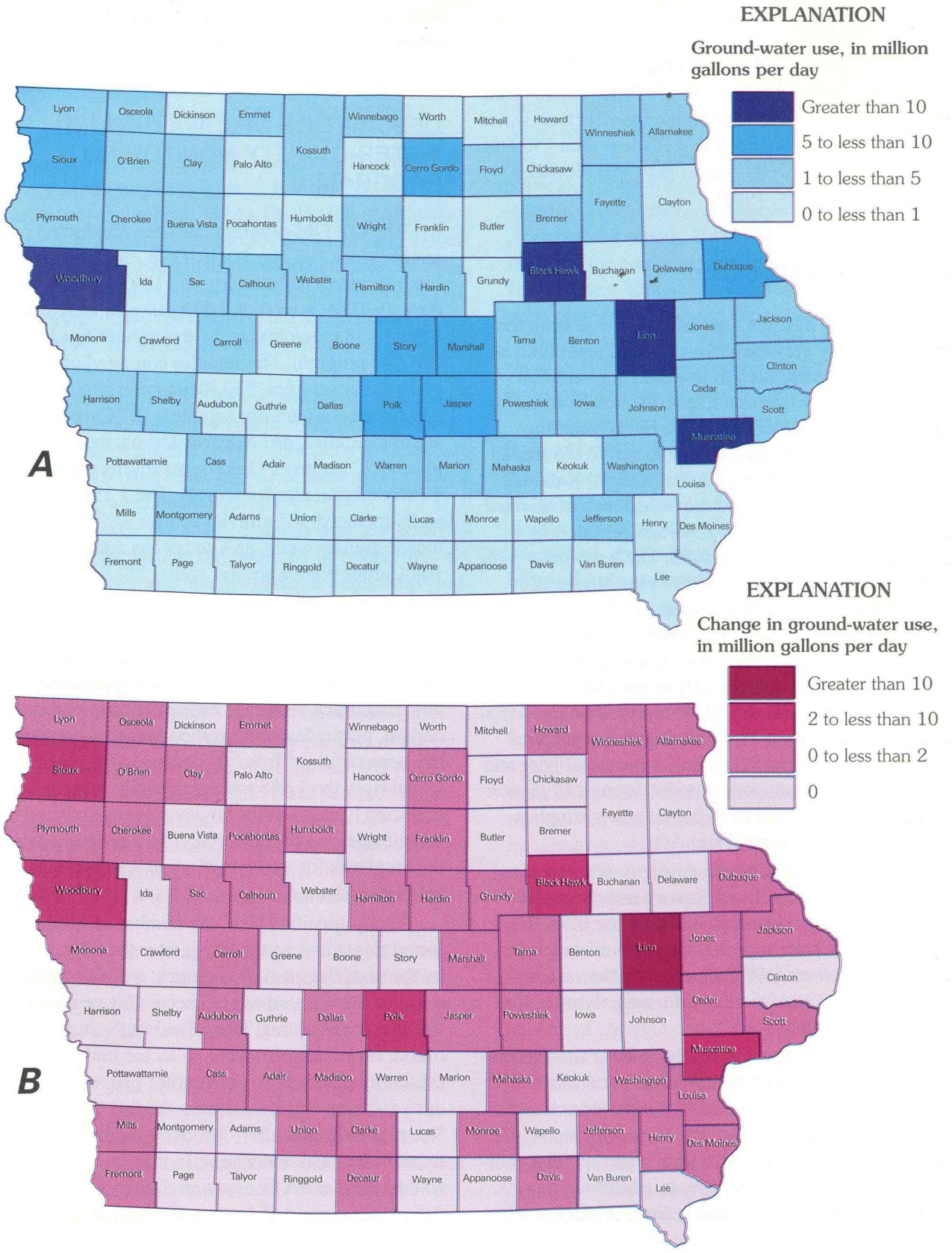

Figure 1. Public-supply ground-water use *(A)* in 1995 and *(B)* change from 1985 to 1995.

In this report, shallow wells are considered to be those with total depth less than or equal to 150 feet below land surface, and deep wells are considered to be those with total depth greater than 150 feet below land surface. Research indicates that human effects on water quality is more pronounced in wells less than 150 feet deep than in those wells greater than 150 feet deep (Hallberg and others, 1996).

Previous Investigations

The quality of Iowa's ground water has been the subject of many previous investigations and publications. Some studies, such as this one, are based on water-quality data from samples collected from municipal wells before water treatment. Every year, the GWQM analytical results are published in the annual USGS water-data reports of Iowa. Kolpin, Kalkhoff, and others (1997) described the occurrence of selected herbicides and herbicide degradation products in Iowa's ground water during 1995. The temporal trends from 1982 through 1995 of nitrite plus nitrate and selected pesticides in Iowa's ground water were studied by Kolpin, Sneck-Fahrer, and others (1997). Reports by Kross and others (1990) and Hallberg and others (1992) describe the water quality of rural wells in Iowa. Cherryholmes and others (1989) reported on the water quality of Iowa's regulated drinking-water supplies from a special one-time sampling survey. Hallberg and others (1996) summarized the 1987 through 1995 monitoring of treated water from public-water supplies under the Safe Drinking Water Act.

Other studies have focused on ground-water quality in selected areas in Iowa. Savoca and others (1997) investigated herbicides and nitrates in the Iowa River alluvial aquifer prior to a wetland restoration project. Kalkhoff and others (1992) reported on the variation of herbicides and nitrates in alluvium underlying a corn field in Iowa County.

The hydrogeology and stratigraphy of the Dakota Formation (Cretaceous) in northwest Iowa were described by Munter and others (1983). Horick and Steinhilber (1973) described the Mississippian aquifer (Carboniferous) in Iowa, including water quality, geology, areal extent, and pumpage. In additional reports, the Silurian-Devonian aquifer in Iowa (Horick, 1984) and the Jordan (Cambrian-Ordovician) aquifer in Iowa (Horick, 1978) are described.

DESCRIPTION OF IOWA GROUND-WATER-QUALITY MONITORING PROGRAM

The GWQM program has been conducted cooperatively since 1982 by IDNR-GSB, the University of Iowa Hygienic Laboratory, and USGS. From 1982 through 1996, a total of 2,529 samples were collected from 1,158 municipal wells throughout Iowa for the GWQM program. The samples consisted of 1,048 alluvial aquifer samples, 530 Pleistocene aquifer samples, 139 Cretaceous aquifer samples, 187 Carboniferous aquifer samples, 447 Silurian-Devonian aquifer samples, 177 Cambrian-Ordovician aquifer samples, and 1 Precambrian aquifer sample. The 1,158 municipal wells included 387 alluvial aquifer wells, 224 Pleistocene aquifer wells, 86 Cretaceous aquifer wells, 104 Carboniferous aquifer wells, 222 Silurian-Devonian aquifer wells, 134 Cambrian-Ordovician aquifer wells, and 1 Precambrian aquifer well.

Information about selected water-quality properties and concentrations of dissolved solids, major ions, nutrients, trace elements, radionuclides, total organic carbon, pesticides, and synthetic organic compounds has been obtained from ground-water samples collected from the 1,158 municipal wells. Not all samples collected from all wells, however, were analyzed for all constituents. As the objectives of the program changed, the emphasis for analysis of some water-quality characteristics changed.

In any specified year, the number of samples collected might be less than or greater than that called for by the sampling plan. Sometimes, wells expected to be sampled were found to be inaccessible or no longer suitable for sampling. If a suitable substitute was not found, fewer samples were collected that year than originally planned. Some samples planned for a calendar year were collected during the fall of that year. Samples collected after October 1 are included with those of the next water year. In this way, two samples could be collected from a well during the same calendar year but reported for two different water years.

Also, some samples were collected to confirm analytical results from the previous year.

In water year 1982, 173 samples were collected from 168 wells. Most of the samples were analyzed by the University of Iowa Hygienic Laboratory, but 64 samples from 62 wells in west-central Iowa were analyzed by the U.S. Environmental Protection Agency laboratory in Region 7, Kansas City, Kansas (Burmeister and others, 1984). Of the 168 total wells, 137 were less than or equal to 150 feet deep, and 119 of these were completed in unconsolidated (alluvial or Pleistocene) aquifers. The wells were selected from an inventory of 1,200 municipal wells on the basis of accessibility, well integrity, and reliability of geologic information.

In water year 1983, 194 samples were collected from 194 wells, none of which had been sampled the previous water year. Of the 194 wells, 55 were less than or equal to 150 feet deep, and 43 of these were completed in unconsolidated aquifers.

In water year 1984, 186 samples were collected from 186 wells. Of the 186 wells, 61 were less than or equal to 150 feet deep, and 49 of these were completed in unconsolidated aquifers. Only three of the wells sampled in water year 1984 had been sampled in water year 1982, and none had been sampled in water year 1983; so during the first 3 years of the program, samples were collected from 545 different wells.

In water year 1985, the primary purpose of the program became the investigation of nitrates and pesticides in shallow wells. A total of 212 samples were collected from 212 wells, which included 110 wells completed in unconsolidated aquifers. Of the 212 wells sampled, 116 were less than or equal to 150 feet deep, and 98 of the 116 wells were in unconsolidated aquifers.

In water year 1986, 205 samples were collected from 203 wells. About three-fourths of the samples were analyzed for a comprehensive list of pesticides. The depths of 125 wells were less than or equal to 150 feet.

In water year 1987, 197 samples were collected from 196 wells. Of the 196 wells, 168 were less than or equal to 150 feet deep, and 155 of these were completed in unconsolidated aquifers. This is the first year of the program that some samples were analyzed for synthetic organic chemicals such as benzene, carbon tetrachloride, methylene chloride, and toluene.

In water year 1988, 255 samples were collected from 153 wells. The plan called for single samples to be collected during August and September from 101 wells and to be analyzed for common ions, nutrients, and pesticides. During April, July, and September, samples were to be collected each month from an additional 52 wells in an effort to investigate the seasonal occurrence of nitrates and pesticides in shallow wells where nitrate concentrations near 10 mg/L and (or) pesticide concentrations greater than the minimum reporting level had been detected in earlier samples (Melcher and others, 1989). The April samples were analyzed for common ions, nutrients, and pesticides. The July and September samples from these same wells were only analyzed for nutrients and pesticides. Of the 153 total wells sampled, 93 were less than or equal to 150 feet deep, and 73 of these were completed in unconsolidated aquifers.

In water year 1989, 223 samples were collected from 145 wells. The sampling strategy of the previous year was continued in an effort to assess seasonal variability of nitrate and pesticides as samples were to be collected from the same 52 wells as the previous year. In addition, single samples were to be collected during July and August from 93 other wells. These 93 wells were selected because they were located in municipalities where a well had not been sampled since 1985 and total depths were less than or equal to 250 feet (O'Connell and others, 1989). Of the 145 total wells, 92 were less than or equal to 150 feet deep, and 74 of these were completed in unconsolidated aquifers.

In water year 1990, 252 samples were collected from 247 wells. For this year, the sampling strategy was revised and included fixed and random-selection rotational networks in an effort to assess the overall water quality in primary aquifers throughout Iowa and to study long-term water-quality trends. Fifty wells were selected for a fixed network to be sampled annually, and the other wells for the random-selection rotational network were selected on the basis of a random selection weighted by vulnerability based on the frequency of atrazine detections (O'Connell and others, 1990). Of the 247 wells, 181 were less than or equal to 150 feet deep, and 163 of these were completed in unconsolidated aquifers.

In water year 1991, 233 samples were collected from 233 wells. Of the 233 wells, 149 were less than or equal to 150 feet deep, and 137 of these were completed in unconsolidated aquifers. The sampling strategy from the previous year was used again in water year 1991. Thirty-five samples were collected from 35 wells in the 50-well fixed network. The other

198 samples were collected from 198 wells that were part of the random-selection rotational network (O'Connell and others, 1991).

In water year 1992, 96 samples were collected from 96 wells. Of the 96 wells, 47 were less than or equal to 150 feet deep, and 42 of these were completed in unconsolidated aquifers. The primary purpose of the program became the investigation of water-quality trends. In an effort to eliminate spatial and seasonal variance, well selection was based on aquifer type and vulnerability to contamination (Gorman and others, 1992). For wells completed in unconsolidated aquifers, vulnerability to contamination was based on well depth. Shallower wells were considered to be more vulnerable than deeper wells. For wells completed in bedrock aquifers, vulnerability to contamination was based on research by Hoyer and Hallberg (1991) who had assessed regional susceptibility to contamination using geologic and soil data, the thickness of Quaternary-age cover, proximity to agricultural injection wells and sinkholes, and historical ground-water contamination. From an inventory of about 1,640 municipal wells, 90 wells were selected to be part of the program network. Every year, 45 wells completed in the alluvial and Pleistocene unconsolidated aquifers were to be sampled. The other 45 wells, completed in bedrock aquifers, were to be sampled on a rotational basis depending on vulnerability to contamination. Bedrock wells considered to be vulnerable to contamination were to be sampled every 2 years. Bedrock wells not considered to be vulnerable to contamination were to be sampled every 4 years. All 90 wells in the network were to be sampled in both water year 1992 and water year 1993.

In water year 1993, 89 samples were collected from 89 wells. During this water year, the wells completed in unconsolidated aquifers were to be sampled along with bedrock wells considered to be vulnerable to contamination and bedrock wells not considered to be vulnerable to contamination. Of the 89 wells, 42 were less than or equal to 150 feet deep, and 38 of these were completed in unconsolidated aquifers.

In water year 1994, 101 samples were collected from 101 wells. Of the 101 wells, 88 were less than or equal to 150 feet deep, and 86 of these shallow wells were completed in unconsolidated aquifers. As part of the continuing investigation of water-quality trends, 45 samples were collected from wells completed in the alluvial and Pleistocene unconsolidated aquifers. In a special effort to assess the effects of the 1993 flooding in Iowa, the other 56 samples were collected from 56 wells less than 300 feet deep completed in alluvial plains adjacent to the Missouri River and it tributaries (May and others, 1995).

In water year 1995, 68 samples were collected from 68 wells. During this water year, 45 wells completed in the unconsolidated aquifers and 23 bedrock wells vulnerable to contamination were to be sampled. Of the 68 wells, 39 were less than or equal to 150 feet deep, and 38 of these shallow wells were completed in unconsolidated aquifers.

In water year 1996, 45 samples were collected from 45 wells. During this water year, 45 wells completed in the unconsolidated aquifers were sampled. Of the 45 wells, 38 were less than or equal to 150 feet deep.

Municipal Wells

Table 1, at the back of the report, lists wells that have been sampled at least once from water year 1982 through water year 1996. The wells are organized first by county, then by aquifer, by total depth, and finally by station number. For each well, there is information on which water years the samples were collected. If more than one sample was collected in a water year, the number of samples for that year is listed in parentheses after the year. The legal description indicates the location of the well on the basis of the township-range-section system of land subdivision. The letters after the section number represent subdivisions of the section. These are assigned in a counterclockwise direction beginning with "A" in the northeast quarter. The first letter indicates a 160-acre area. Each successive letter indicates an area one-fourth the size indicated by its predecessor, so that the fourth letter indicates an area one sixty-fourth of 160 acres or a 2.5-acre area. Table 2 at the back of the report lists geologic unit abbreviations and the geologic units used for the wells in table 1.

No municipal wells have been sampled in Appanoose, Davis, Monroe, or Wayne Counties for this program from water year 1982 through water 1996. At least one well has been sampled in each of the other 95 counties in Iowa.

Sample Collection and Analysis

Ground-water samples were collected by USGS personnel as close to the wellhead as possible to obtain

water representative of the corresponding aquifer and before the water had been altered or treated in any way. Samples were collected after stagnant water had been pumped from the well casing and onsite measurements of specific conductance, pH, water temperature, and dissolved oxygen had stabilized.

The rest of the analytical results were determined by the University of Iowa Hygienic Laboratory except those results reported by the U.S. Environmental Protection Agency laboratory for 64 samples collected in water year 1982. The well information (15-digit station number, county location, latitude, longitude, geologic unit, and depth) and the sample information (analyzing agency, sample date, and analytical results) for each sample are listed on the compact disc included with this report as they are stored in the USGS Water Data Storage and Retrieval System (WATSTORE).

For some selected constituents, the number of samples in each aquifer with constituent concentrations exceeding the Maximum Contaminant Level (MCL) or the Health Advisory Level (HAL) specified by the U.S. Environmental Protection Agency (1996a,b) is listed. The MCL is the maximum permissible concentration of a constituent in water of a public-water system (U.S. Environmental Protection Agency, 1996a,b). Adverse noncarcinogenic effects may be expected for a 150-pound adult exposed over a lifetime to drinking water with chemical concentrations greater than the HAL (U.S. Environmental Protection Agency, 1996a,b). When no MCL has been established for the specified contituent, the HAL is listed in table 3. A Secondary Maximum Contaminant Level (SMCL) is an unenforceable Federal guideline regarding taste, odor, color, or other aesthetic effects of drinking water. The U.S. Environmental Protection Agency recommends the SMCL to the States as a reasonable goal, but Federal law does not require water systems to comply with SMCL guidelines (U.S. Environmental Protection Agency, 1996c).

MCLs have not been established for radium-226 and radium-228 individually, but an MCL of 5 pCi/L for the sum of radium-226 plus radium-228 has been set (U.S. Environmental Agency, 1996b). In table 3, the number of samples with total radium-226 plus radium-228 values equal to or exceeding the MCL are reported for both radium-226 and for radium-228.

MCLs, HALs, and SMCLs are drinking-water regulations. The samples for this study were not collected from treated water being delivered to the public, but from water collected from municipal water-supply wells prior to treatment. Treatment of water for delivery to the public may alter the concentrations of some constituents.

Table 4, at the back of the report, presents a statistical summary of eight water-quality characteristics for shallow and deep wells. The format is similar to that of table 3, as is the treatment of censored values. Table 4 shows that nearly two-thirds of the 2,529 samples collected for the program were collected from wells less than or equal to 150 feet deep.

DESCRIPTION OF AQUIFERS

Samples were collected from wells completed in unconsolidated alluvial aquifers and Pleistocene aquifers of Quaternary age and bedrock aquifers of Cretaceous age, Carboniferous age, Silurian-Devonian age, Cambrian-Ordovician age, and Precambrian age. The unconsolidated aquifers are found throughout much of Iowa. Figure 2 shows the areas where bedrock units of a specified age crop out at the land surface (outcrop) or beneath the surficial unconsolidated units (subcrop) (Iowa Geological Survey Bureau, 1989). The bedrock aquifers of a specified age are part of the entire bedrock unit of that age. Some wells are constructed by drilling through one or more units and completing the well in a lower unit. For example, some wells drilled in an area where the uppermost bedrock unit is of Carboniferous age may be completed in the older and deeper aquifers of Silurian-Devonian age.

Figure 3 shows the location of the municipal water-supply wells sampled for water quality in the alluvial and Pleistocene aquifers. Figure 4 shows the location of the Cretaceous aquifer wells and Carboniferous aquifer wells, and figure 5 shows the location of the Silurian-Devonian aquifer wells and Cambrian-Ordovician aquifer wells. For these figures, wells with total depth less than or equal to 150 feet are indicated with a different color symbol than those wells with total depth greater than 150 feet. Total depths are less than or equal to 150 feet for 53 percent of the 1,158 wells sampled. For the unconsolidated alluvial and Pleistocene aquifers, the percentages of sampled wells less than or equal to 150 feet deep are 98 and 69 percent, respectively. For the bedrock Cretaceous, Carboniferous, Silurian-Devonian, Cambrian-Ordovician, and Precambrian aquifers, the percentages of sampled wells less than or equal to 150 feet deep are 22, 22, 14, 3, and 0 percent, respectively.

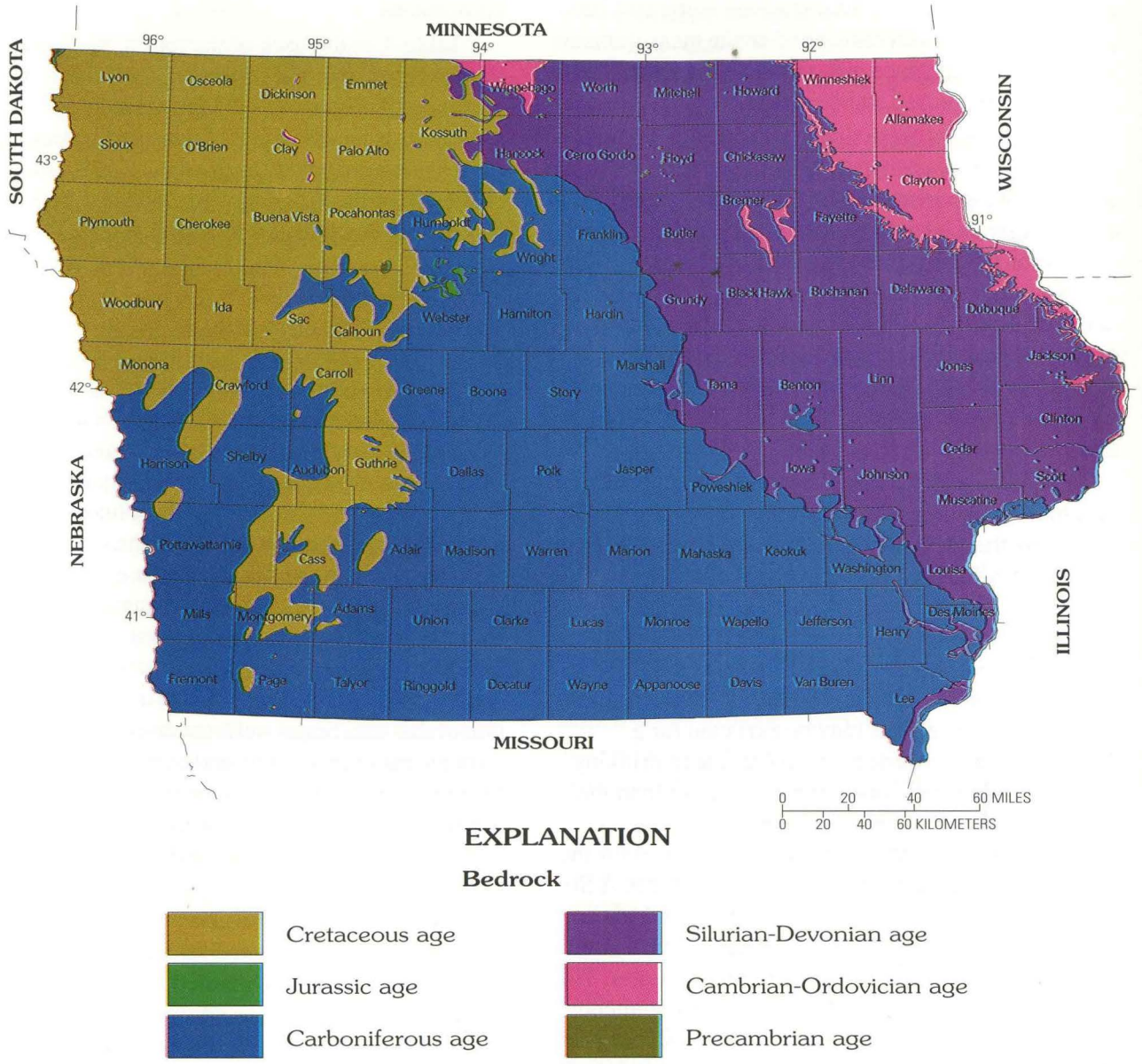

Figure 2. Bedrock geology of Iowa (modified from Iowa Geological Survey Bureau, 1989).

Alluvial Aquifers

Alluvial aquifers of Quaternary age consist of sand and gravel deposits associated with present-day stream systems (Anderson, 1983). A total of 1,048 samples were collected from 387 alluvial aquifer wells. Figure 3 shows that the sampled wells are mostly located in western and south-central Iowa where the use of alluvial aquifers for municipal supplies is more prevalent.

Pleistocene Aquifers

Pleistocene aquifers consist of glacial-drift aquifers and buried-channel aquifers. Glacial-drift aquifers are comprised of discontinuous permeable lenses of

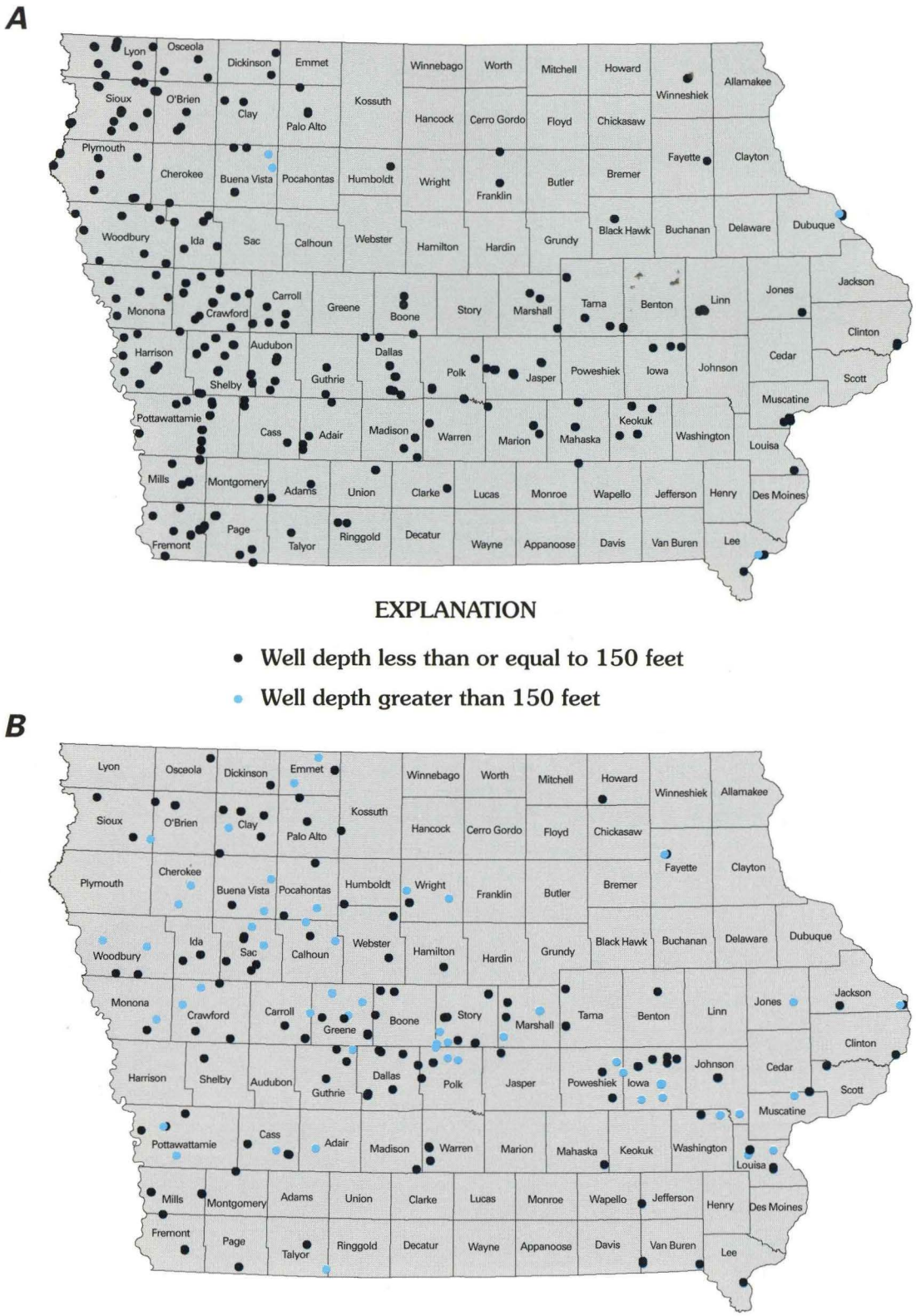

Figure 3. Municipal water-supply wells completed in the *(A)* alluvial aquifers and *(B)* Pleistocene aquifers sampled at least once for water quality from 1982–96.

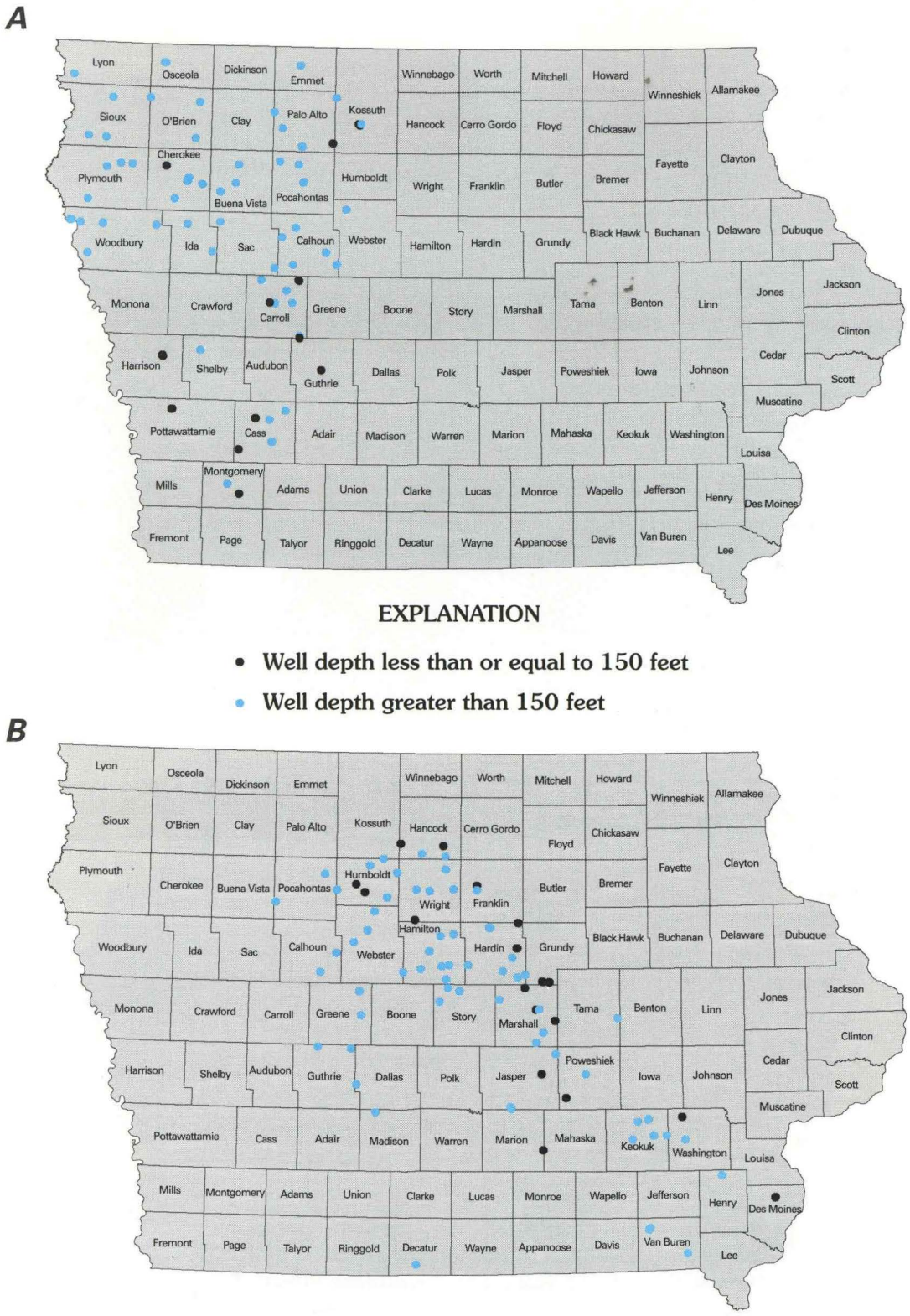

Figure 4. Municipal water-supply wells completed in the *(A)* Cretaceous aquifers and *(B)* Carboniferous aquifers sampled at least once for water quality from 1982–96.

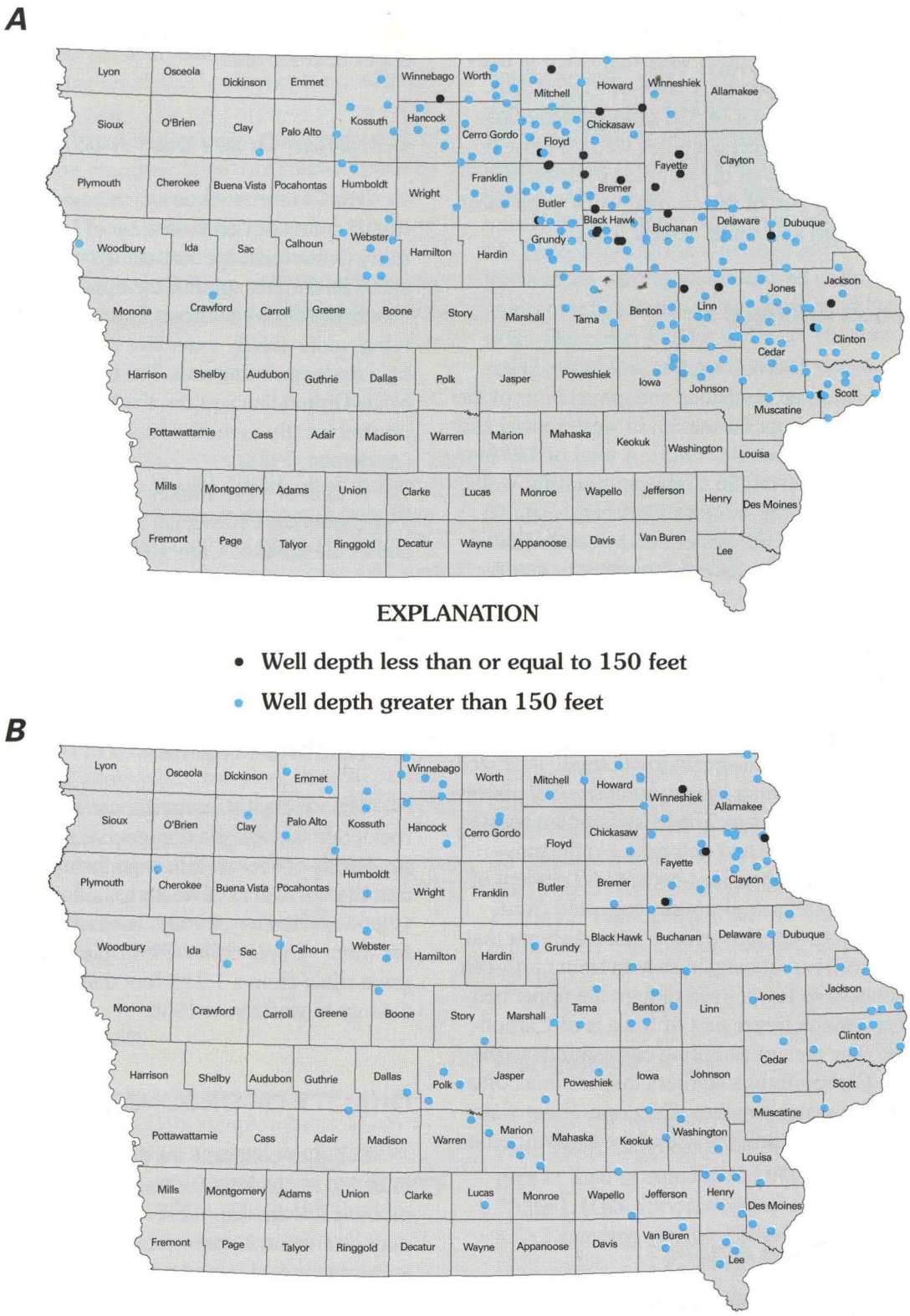

Figure 5. Municipal water-supply wells completed in the *(A)* Silurian-Devonian aquifers and *(B)* Cambrian-Ordovician aquifers sampled at least once for water quality from 1982–96.

sand and gravel interbedded with less-permeable glacial drift. Buried-channel aquifers were formed in areas where coarse sand and gravel were deposited in bedrock valleys and overlain by a layer of glacial drift (Anderson, 1983). A total of 530 samples were collected from 224 Pleistocene aquifer wells. Figure 3 shows that distribution of the sampled Pleistocene wells is similar to that of the alluvial wells, with most located in western and south-central Iowa.

Cretaceous Aquifers

The youngest bedrock aquifer unit in the State includes the saturated sandstone and gravel units of the Cretaceous-age Dakota Formation in west-central and northwestern Iowa (Runkle, 1985). A total of 139 samples were collected from 86 Cretaceous aquifer wells. Figure 4 shows that the sampled Cretaceous aquifer wells are located in northwestern and western Iowa, approximately in areas where the Cretaceous aquifer is the surface bedrock unit.

Carboniferous Aquifers

Carboniferous aquifers include those of Pennsylvanian and Mississippian age. In Iowa, small, localized aquifers of Pennsylvanian age are comprised of discontinuous sandstone deposits. The Mississippian aquifer, composed of limestone and dolomite (Anderson, 1983), is present in subsurface beneath 60 percent of Iowa. A total of 188 samples were collected from 104 Carboniferous aquifer wells. Figure 4 shows that the sampled wells are mostly in an area from north-central to southeastern Iowa, even though the upper bedrock unit in a much larger part of Iowa is of Carboniferous age. The area of sampling corresponds to the parts of the Carboniferous aquifers that are most often used for public-water supplies. Concerns about water quantity and quality limit the use of the Carboniferous aquifers in other areas.

Silurian-Devonian Aquifers

The Silurian-Devonian aquifers consist primarily of porous and fractured dolomite and limestone of Silurian and Devonian age (Anderson, 1983). A total of 447 samples were collected from 222 wells completed in Silurian-Devonian aquifers. Figure 5 shows that most of the sampled wells are located in north-central and east-central Iowa, approximately coincident with the area where bedrock of Silurian-Devonian age is the upper bedrock unit.

Cambrian-Ordovician Aquifers

The Cambrian-Ordovician aquifers consist primarily of dolomite and sandstone of Late Cambrian to Early Ordovician age and sandstone of Early Cambrian age. The Galena aquifer, the uppermost aquifer of Cambrian-Ordovician age, is separated from the underlying, more areally extensive Jordan-St. Peter aquifer by a shale confining unit. The basal aquifer of the Cambrian-Ordovician aquifer, the Dresbach Group, is present locally in northeastern and east-central Iowa (Anderson, 1983).

A total of 177 samples were collected from 134 Cambrian-Ordovician aquifer wells. Figure 5 shows the sampled Cambrian-Ordovician aquifer wells are located predominantly in the northeastern two-thirds of Iowa. Most of these wells are in areas where the Cambrian-Ordovician is not the upper bedrock unit.

Precambrian Aquifer

The Precambrian aquifer consists of crystalline rocks that include granite, gneiss, and gneissoid granite. Rocks of Precambrian age form the upper bedrock unit in a small area of western Calhoun and Pocahontas Counties (Hershey, 1969). The only Precambrian aquifer water sample collected for the Iowa GWQM program came from a 1,211-foot deep well in Calhoun County in water year 1986.

QUALITY OF GROUND WATER

Samples collected for this program are not intended to characterize treated water delivered by municipal water suppliers to their users. Treated water may be chemically treated, filtered, exposed to the atmosphere, and mixed with other sources of water before being delivered.

Table 3, at the back of the report, presents a statistical summary of analytical results organized by property or constituent and then by aquifer. For each property or constituent, the table presents the total number of samples for each aquifer, the percentage of

those samples in which the specified property or constituent was reported, and the median, minimum, and maximum of the reported water-quality property or concentration. For some constituents, more than one minimum reporting level was used over the course of the Iowa GWQM study. For the purposes of the statistical summary, all censored values (concentrations less than the minimum reporting level) are considered to be zero. When the median, minimum, or maximum are less than the most frequently used minimum reporting level for that constituent, the median, minimum, or maximum are presented in this report as being less than the most frequently used minimum reporting level for that constituent.

Sulfate

Of 1,901 samples analyzed for dissolved sulfate, 137 samples (table 3) had concentrations greater than or equal to the sulfate MCL of 500 mg/L (U.S. Environmental Protection Agency, 1996b). These 137 samples include 3 alluvial aquifer samples (3 wells), 30 Pleistocene aquifer samples (20 wells), 30 Cretaceous aquifer samples (28 wells), 19 Carboniferous aquifer samples (13 wells), 27 Silurian-Devonian aquifer samples (18 wells), and 28 Cambrian-Ordovician aquifer samples (25 wells). Most sulfate samples were collected from shallow wells, but more than 90 percent of the samples with concentrations greater than the MCL were collected from deep wells (table 4). Figure 6 shows that most samples with sulfate concentrations greater than or equal to the MCL were collected from wells located in the northwestern and southeastern parts of the State.

Nitrite Plus Nitrate

Of 2,510 samples analyzed for dissolved nitrite plus nitrate as nitrogen, 198 samples (table 3) have concentrations greater than or equal to nitrite plus nitrate as nitrogen MCL of 10 mg/L (U.S. Environmental Protection Agency, 1996b). These 198 samples include 150 alluvial aquifer samples (59 wells), 17 Pleistocene aquifer samples (7 wells), 4 Cretaceous aquifer samples (2 wells), 4 Carboniferous aquifer samples (2 wells), and 23 Silurian-Devonian aquifer samples (10 wells). None of the Cambrian-Ordovician aquifer samples had nitrite plus nitrate concentrations greater than the MCL. Nitrite plus nitrate was detected in more than three-fourths of the shallow well samples, and more than 90 percent of the samples with concentrations greater than or equal to the MCL were from shallow wells (table 4). However, it should be noted that for several years, GWQM sampling plans emphasized shallow wells suspected or known to have high nitrite plus nitrate concentrations. Figure 7 shows that samples with nitrite plus nitrate concentrations greater than or equal to the MCL were collected from wells mostly located in the western and northeastern parts of the State. Most of the alluvial aquifer wells, all of the Pleistocene aquifer wells, and all of the Cretaceous aquifer wells are in western Iowa, and the 10 Silurian-Devonian aquifer wells are clustered in a seven-county area in northeastern Iowa.

Iron

Of 1,945 samples analyzed for dissolved iron, 1,022 samples (table 3) had concentrations greater than or equal to the iron SMCL of 300 µg/L (U.S. Environmental Protection Agency, 1996c). These 1,022 samples include 325 alluvial aquifer samples (186 wells), 259 Pleistocene aquifer samples (156 wells), 76 Cretaceous aquifer samples (52 wells), 104 Carboniferous aquifer samples (68 wells), 178 Silurian-Devonian aquifer samples (112 wells), and 80 Cambrian-Ordovician aquifer samples (69 wells). Samples with iron concentrations greater than or equal to the SMCL were collected from wells throughout the State. Of the 95 counties in Iowa where a well has been sampled for the Iowa GWQM program, only wells in Jackson County in east-central Iowa did not yield a sample with a dissolved iron concentration greater than or equal to 300 µg/L.

Manganese

Of 1,946 samples analyzed for dissolved manganese, 1,082 samples (table 3) had concentrations greater than or equal to the manganese SMCL of 50 µg/L (U.S. Environmental Agency, 1996c). These 1,082 samples include 493 alluvial aquifer samples (277 wells), 267 Pleistocene aquifer samples (157 wells), 109 Cretaceous aquifer samples (69 wells), 97 Carboniferous aquifer samples (61 wells), 91 Silurian-Devonian aquifer samples (57 wells), and 25 Cambrian-Ordovician aquifer samples (22 wells). Samples with manganese concentra-

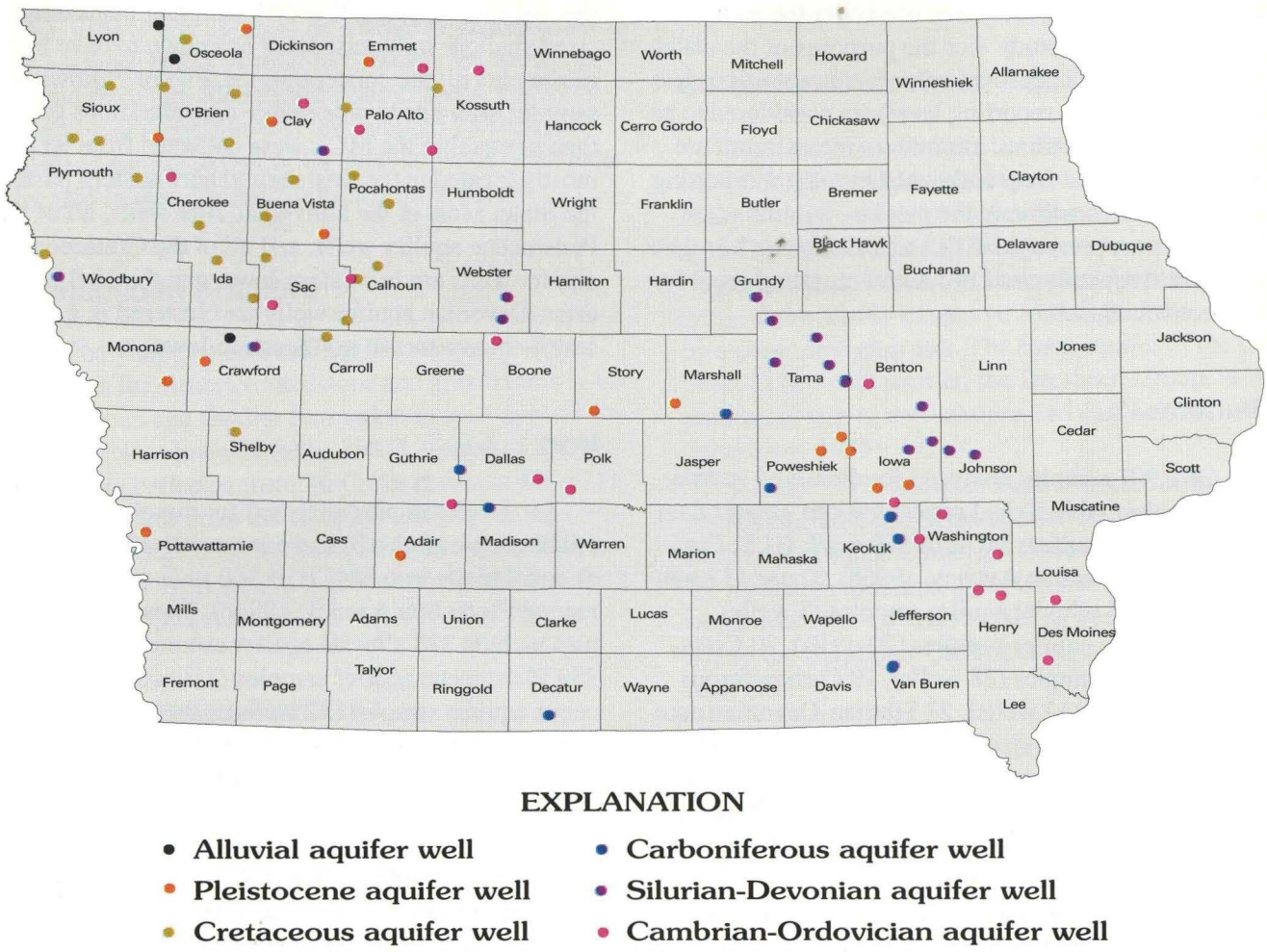

Figure 6. Municipal water-supply wells where sulfate concentrations greater than or equal to 500 milligrams per liter were detected in water samples.

tions greater than or equal to the SMCL were collected from wells throughout the State. Of the 95 counties in Iowa where a well has been sampled for the Iowa GWQM program, only wells in Allamakee, Decatur, and Jefferson Counties did not yield samples with dissolved manganese concentrations greater or equal to 50 µg/L.

Alachlor, Atrazine, and Cyanazine

Many samples collected during the Iowa GWQM program were analyzed for alachlor, atrazine, and cyanazine, and concentrations of these three pesticides exceeded their respective MCLs or HAL more frequently than those for any of the other pesticides (table 3). Of the 1,659 samples analyzed for total alachlor, 52 samples had alachlor concentrations greater than or equal to the minimum reporting level. Alachlor was detected in less than 3 percent of the 819 alluvial aquifer samples and in less than 5 percent

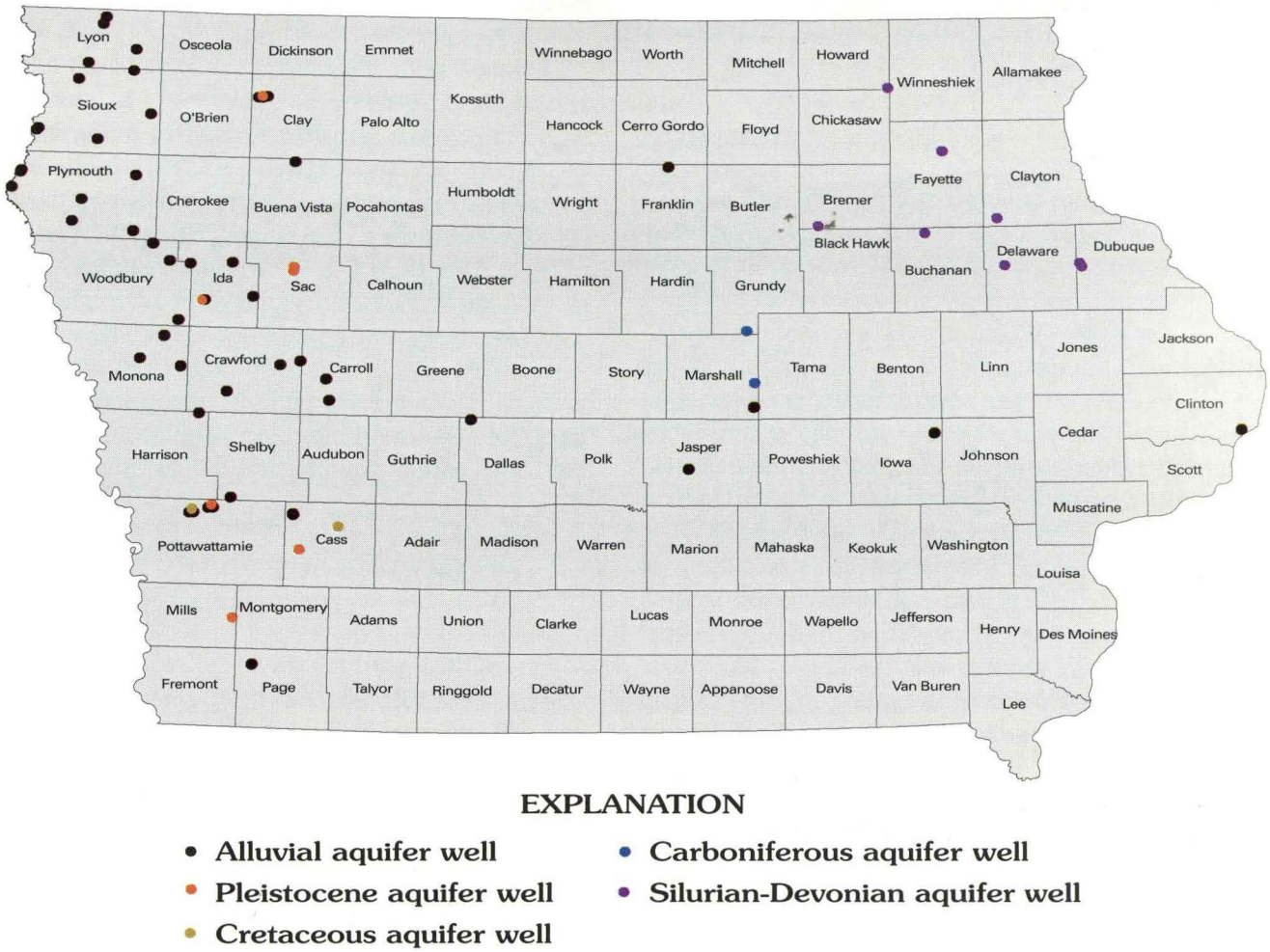

Figure 7. Municipal water-supply wells where nitrite plus nitrate as nitrogen concentrations greater than or equal to 10 milligrams per liter were detected in water samples.

of the 376 Pleistocene aquifer samples (table 3). Eight samples had concentrations greater than or equal to the alachlor MCL, 2 µg/L (U.S. Environmental Protection Agency, 1996a), with two of those samples collected from an alluvial aquifer well, four from a Pleistocene aquifer well, one from a Silurian-Devonian aquifer well, and one from a Cambrian-Ordovician aquifer well.

Of the 1,659 samples analyzed for total atrazine, 384 samples had atrazine concentrations greater than or equal to the minimum reporting level (table 3). Atrazine was detected in almost 29 percent of the 819 alluvial aquifer samples and in almost 30 percent of the 255 Silurian-Devonian aquifer samples. Eighteen samples had concentrations greater than or equal to the atrazine MCL of 3 µg/L (U.S. Environmental Protection Agency, 1996a), with 17 of those samples collected from eight alluvial aquifer wells and one from a Silurian-Devonian aquifer well.

Of the 1,659 samples analyzed for total cyanazine, 64 samples had cyanazine concentrations greater than or equal to the minimum reporting level (table 3). Cyanazine was detected in almost 6 percent of the 819 alluvial aquifer samples. Five samples, all from

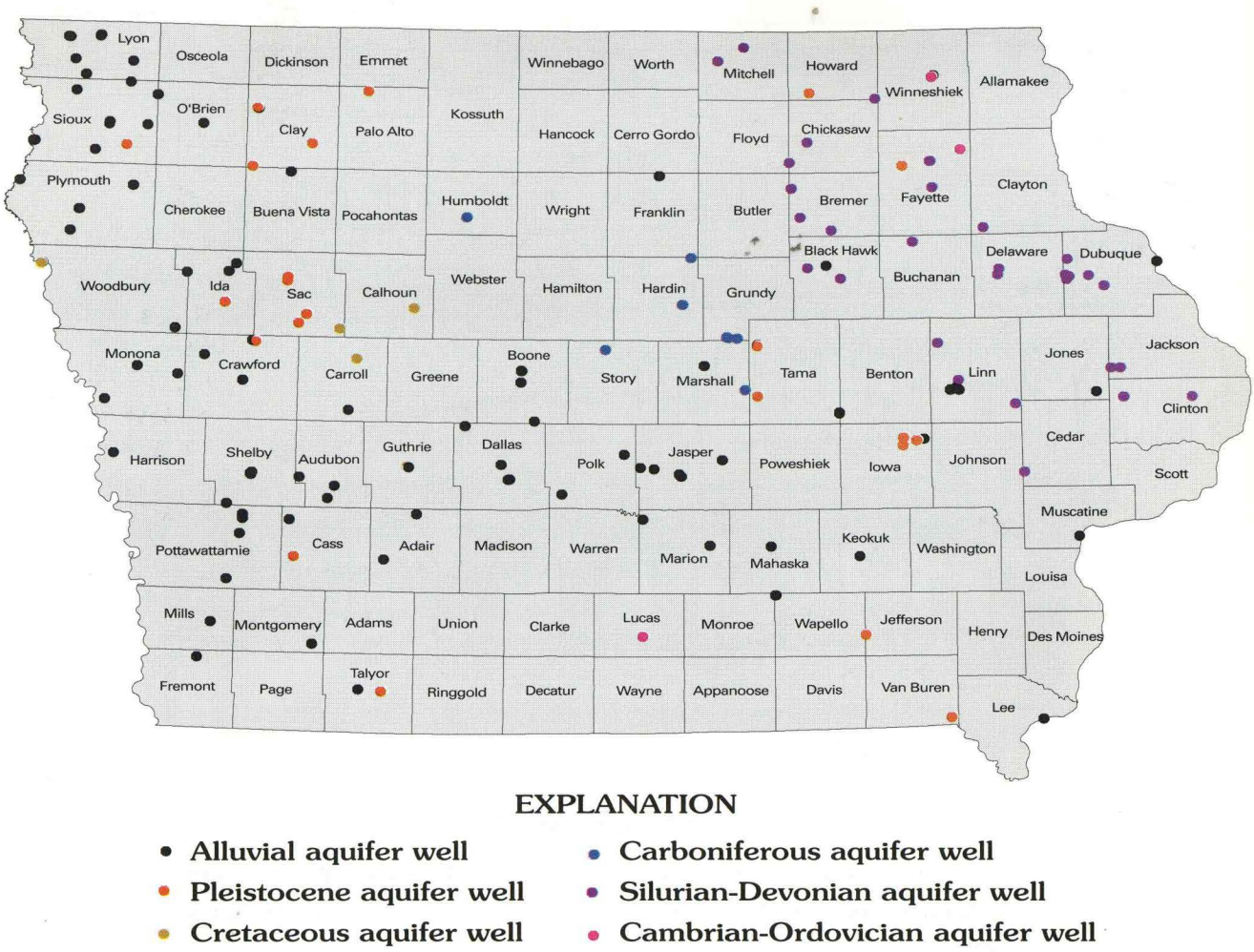

Figure 8. Municipal water-supply wells where alachlor, atrazine, or cyanazine were detected in water samples.

three alluvial aquifer wells, had concentrations greater than or equal to the cyanazine HAL of 1 µg/L (U.S. Environmental Protection Agency, 1996a).

Nearly three-fourths of the samples analyzed for alachlor, atrazine, and cyanazine were collected from shallow wells. For these three herbicides, the median concentrations for shallow and deep wells were less than the minimum reporting level of 0.10 µg/L. Percentage detections, maximum concentrations, and the number of samples greater than or equal to the respective MCL or HAL were greater for samples collected from shallow wells than those from deep wells (table 4). As with nitrite plus nitrate, it should be noted that for some years, shallow wells with known or suspected high concentrations of pesticides were specifically selected for sampling.

A total of 401 samples had alachlor, atrazine, or cyanazine concentrations greater than or equal to the respective minimum reporting levels. Of these samples, 244 were collected from alluvial aquifers (108 wells), 51 from Pleistocene aquifers (22 wells), 5 from the Cretaceous aquifer (5 wells), 19 from the Carboniferous aquifer (8 wells), 78 from the Silurian-Devonian aquifer (35 wells), 4 from the

Cambrian-Ordovician aquifer (3 wells), and none from the Precambrian aquifer. Figure 8 shows that these three pesticides have been detected in samples collected for the Iowa GWQM program from wells in 63 counties throughout the State. Fewer detections are shown (fig. 8) in the north-central and south-central parts of the State where fewer wells were sampled.

A total of 17 samples from 14 wells had detectable concentrations of alachlor, atrazine, and cyanazine. These samples include 11 alluvial aquifer samples (8 wells), 4 Pleistocene aquifer samples (4 wells), 1 Cretaceous aquifer sample, and 1 Silurian-Devonian aquifer sample. Of the 14 wells, 2 wells are located in Lyon County. No other county contained more than one of these wells, which are located throughout the State. One sample had concentrations of alachlor, atrazine, and cyanazine greater than the respective MCLs or HAL. This sample was collected from a 50-foot deep alluvial aquifer well in Jones County during July 1987.

ORGANIZATION OF WATER-QUALITY DATA ON COMPACT DISC

Information collected for the Iowa GWQM program during water years 1982 through 1996 is stored on the compact disc included with this report. The data are presented in two different formats. In both formats, samples are identified by a 15-digit station number, which designates a specific well, and the date the sample was collected. Also in both formats, the symbol "--" is used when the information is not available.

The first format can be used in computer spreadsheets or other data-base management systems. The information for each sample is on a single line in space-delimited columns. In addition to the 15-digit station number and the sample date, each line includes county, latitude, longitude, geologic unit, well depth, well name (legal description, year drilled, and local name), and the analytical results for water-quality properties (specific conductance, pH, water temperature, dissolved oxygen, hardness, and alkalinity) and concentrations of dissolved solids, major ions, nutrients, trace elements, radionuclides, total organic carbon, pesticides, and synthetic organic compounds in that sample. The samples are sorted by county and then by geologic unit, by depth, by station number, and finally by sample date. Once the information has been loaded into a computer spreadsheet, the data can be resorted or selected by county, by aquifer, by date, and so forth, as desired.

The second format consists of 132-character-width lines that can be printed in landscape format on standard 8.5- inch by 11-inch paper. The data for each county are in a separate file. The samples are sorted in the same manner as the first format; however, the data for a single sample occur on several lines.

SUMMARY

The Iowa ground-water-quality monitoring (GWQM) program has been conducted cooperatively since 1982 by the IDNR-GSB, the University of Iowa Hygienic Laboratory, and USGS. The original objectives of the program were to provide baseline ground-water-quality data throughout the State for the major aquifers and to address any new areas of water-quality concern. Since the program began, the emphasis and objectives of the program have changed several times. For water years 1992 through 1996, more emphasis has been placed on determining trends in ground-water quality and correlating water quality with possible contributing factors such as location, land use, aquifer, aquifer depth, and precipitation. In 1995, public-water supplies used an average of more than 255 million gallons of ground water per day to provide for the commercial, industrial, and domestic needs of their customers.

This report describes the Iowa GWQM program, presents the analytical results of water-quality samples collected from selected municipal-water-supply wells in Iowa from water year 1982 (October 1, 1981, through September 30, 1982) through water year 1996 (October 1, 1995, through September 30, 1996), and describes the distribution and occurrence of selected constituents. Water-quality properties (specific conductance, pH, water temperature, dissolved oxygen, hardness, and alkalinity) and concentrations of dissolved solids, major ions, nutrients, trace elements, radionuclides, total organic carbon, pesticides, and synthetic organic compounds are included. For selected constituents, the total number of samples for each aquifer, the percentage of those samples in which the specified constituent was reported, and the median, minimum, and maximum reported values are presented. For some constituents, the number of samples in each aquifer exceeding the MCL or HAL is listed.

Some samples had concentrations greater than or equal to drinking-water regulations established by the U.S Environmental Protection Agency. Of 1,901 samples analyzed for dissolved sulfate, 137 of those sam-

ples had concentrations greater than or equal to the sulfate MCL. Of 2,510 samples analyzed for dissolved nitrite plus nitrate, 198 of those samples had concentrations greater than or equal to the nitrite plus nitrate MCL. Of 1,945 samples analyzed for dissolved iron, 1,022 of those samples had concentrations greater than or equal to the iron SMCL. Of 1,946 samples analyzed for dissolved manganese, 1,082 of those samples had concentrations greater than or equal to the manganese SMCL. Of 1,659 samples analyzed for alachlor, atrazine, and cyanazine, 401 samples had concentrations greater than or equal to the respective minimum reporting levels. Of these 401 samples, 17 samples from 14 wells had reportable concentrations of all three pesticides. One sample had concentrations of alachlor, atrazine, and cyanazine greater than the respective MCLs or HAL.

Information collected for the program is stored on a compact disc included with this report. The samples are sorted by county and then by geologic unit, by depth, by station number, and finally by sample date.

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Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996

[--, no data]

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Adair County			
412854094275301	077N31W07BDCD	1977	Menlo 2	111ALVM	20	1986
412852094275101	077N31W07CAAB	1977	Menlo 3	111ALVM	30	1982, 86, 87, 88 (3), 89 (2), 90 (2), 95, 96
411727094374001	075N33W15DDBB	1976	Fontanelle 5	111ALVM	39	1983, 86, 87, 90
411441094401602	075N33W32CDDD	1943	Bridgewater 1	111ALVM	49	1992, 93
411246094402401	075N33W32CDDB	1967	Bridgewater 2	111HLCN	43	1983, 86, 90, 94
411720094343002	075N32W18DCAD	1965	Fontanelle 4	112PLSC	329	1991
424901095581701	092N43W06BDCB	1977	Remsen 7	217DKOT	417	1987
			Adams County			
405632094534401	071N35W20AACB	1990	Nodaway 4	111ALVM	35	1996
405631094560802	071N35W20AACA	1978	Nodaway 3	111ALVM	36	1985, 87, 88, 90, 92, 93, 94, 95
405631094560801	071N35W20AACA	1968	Nodaway (68-1), 1	111ALVM	38	1983
410115094362201	072N33W23DBAC	1981	Prescott 2	111ALVM	40	1983, 86, 88, 91
			Allamakee County			
431638091282902	098N05W30ACDC	1899	Waukon 2	371JRDN	577	1992, 93, 95
431638091282801	098N05W30ACDC	1957	Waukon 4	371JRDN	662	1990
432953091172001	100N04W11BBCA	1925	New Albin 1	371MSMN	586	1986
432139091125801	099N03W29DAAB	1943	Lansing (4), 1	371MSMN	721	1986
			Appanoosee County			
			None			
			Audubon County			
414221094532202	080N35W26DCBC	1977	Audubon 19	111ALVM	30	1982, 87
414323094524301	080N35W24CBBC	1968	Audubon 11	111ALVM	30.0	1991
414245094524901	080N35W26AAD	1977	Audubon 14	111ALVM	35	1985
414330094524801	080N35W23ADDD	--	Audubon 2	111ALVM	35	1985, 87
414333094525201	080N35W23ADDB	1932	Audubon 3	111ALVM	35	1991
413534094532501	078N35W04BCBD	1964	Exira 10	111ALVM	37	1990, 91
413743095041401	079N36W29BBCA	1966	Kimballton 3	111ALVM	37	1985
413743095041201	079N36W29BBCA	1978	Kimballton 5	111ALVM	38	1982, 87, 91
413731095042201	079N36W30ADDA	1948	Kimballton 1	111ALVM	50	1990
414216094532301	080N35W26CDDA	1977	Audubon 19	111ENRV	35	1990
413234094552401	078N35W19BCDB	1976	Brayton 1	111ENRV	41	1985, 89, 90, 92, 93, 94, 95, 96
413537094532701	078N35W04BCBD	1969	Exira 11	111ENRV	60	1982 (2), 85, 87, 88 (3), 89 (3)
			Benton County			
421016092015901	085N10W17DBDC	1973	Vinton 4	112PLSC	90	1985, 87
421016092020201	085N10W17DBD	1955	Vinton 3	112PLSC	119.5	1983
420535091524002	084N09W15ACC	1932	Shellsburg 2	340DVSL	315	1992, 93, 95
415950091574301	083N10W13CDB	1940	Newhall 1	350SLRN	473	1983
415950091512501	083N09W14DBD	1966	Atkins 2	350SLRN	485	1985

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Benton County—Continued			
421326091525301	086N09W34ABB	1959	Urbana 2	350SLRN	560	1985
421327091520901	086N09W35BBBD	1980	Urbana 3	350SLRN	560	1983
415423091552701	082N09W17CCDD	1974	Norway 3	350SLRN	580	1983
415944091573501	083N10W13CDA	1957	Newhall 2	355NIGR	478	1983, 86
415957091513601	083N09W14DBB	1939	Atkins 1	358KNKK	456	1983
415955092120701	083N12W13CBBB	1921	Keystone 1	364STPR	1300	1985
421011092012101	085N10W16CDBB	1932	Vinton 2	371JRDN	1505	1983
420030092053001	083N11W11DCD	1956	Van Horne 2	371JRDN	1870	1985
420520091524701	084N09W15ACC	1932	Shellsburg 1	371TMPL	1519	1985
			Black Hawk County			
423112092213901	089N13W15DABB	1937	Waterloo 10	111ALVM	76	1985, 87, 90
423103092212701	089N13W15DAAC	1930	Waterloo 7	111ALVM	80	1982
423106092213101	089N13W15DADA	1948	Waterloo 13	111ALVM	82	1987
422457092125101	088N12W23CDB	1951	Gilbertville 1	340DVNN	200	1984, 88
422448092144501	088N12W26BAAA	1983	Gilbertville 3	340DVSL	385	1991
422801092152801	088N12W04BBBC	1960	Elk Run Heights 1	344CDVL	125	1982, 85, 89
423042092265801	089N14W24BBAA	1961	Cedar Falls 5	344CDVL	145	1988 (3), 89 (2), 90
423139092261401	089N14W12DD	1949	Cedar Falls 2	344CDVL	150	1982, 85
422818092212801	089N13W34DDA	1955	Waterloo 15	344CDVL	206	1985
423045092283401	089N14W22AAAA	1971	Cedar Falls 8	344CDVL	216	1990
422819092212701	089N13W34DDAA	1960	Waterloo 17	344DVNNM	215	1992, 93
422805092165901	088N12W06ACAA	1958	Evansdale 3	344WPPC	145	1982, 85, 88, 90
421857092115601	087N12W25CBCD	1961	La Porte City 3	350SLRN	250	1984, 89
423200092224001	089N13W09DA	1957	Waterloo 16	355NIGR	204	1990
423351092092801	090N11W33BCB	1940	Dunkerton 1	355NIGR	272	1984, 86, 91
421903092112601	087N12W25DBBC	1972	La Porte City 4	360OVCB	1400	1990
			Boone County			
420447093560701	084N27W13DDBC	1979	Boone 23	111ALVM	54	1987, 88, 90
420449093560901	084N27W13DCAD	1940	Boone 18	111ALVM	55.2	1991
420158093562001	083N27W01ABCA	1980	Ogden 5	111ALVM	57	1991
420451093561301	084N27W13DCAA	1940	Boone 20	111ALVM	63.7	1992, 94, 95, 96
420156093562401	083N27W01ABCC	1956	Ogden 3	111ALVM	67	1984, 86, 90
420151093562401	083N27W01ACBC	1957	Ogden 4	111ALVM	68	1993
420156093562402	083N27W01ABCC	1985	Ogden 3A	111ALVM	74	1987
415212093520701	082N26W34BDCC	1974	Madrid 9	111ALVM	91	1984, 86, 91
420959094001901	085N27W16CCDC	1967	Pilot Mound 3	112PLSC	30	1984, 86
421025094063001	085N28W16DABA	1932	Boxholm 2	112PLSC	49	1992, 93, 94, 95, 96
420215094083201	084N28W32CCAC	1954	Beaver 1	112PLSC	100	1988

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Boone County—Continued			
421028094061201	085N28W15BCBC	1949	Boxholm 1	364STPR	1955	1984, 92, 93
			Bremer County			
425037092320601	093N14W30ADAA	1969	Plainfield 2	340DVNN	150	1990
424319092283401	091N14W03CABB	1967	Waverly 5	340DVSL	170	1982, 86, 87, 88 (3), 89 (2), 90
424341092291901	091N14W03BACA	1979	Waverly 6	340DVSL	172	1991
425058092315601	093N14W20CC	1959	Plainfield 1	344DVNNM	150	1982, 85, 89
424855092152701	092N12W04AADD	1950	Tripoli 2	344WPPC	129	1986
423902092272502	091N14W35DA	1984	Janesville 3	350SLRN	125	1984, 86, 87, 88 (3), 90 (2)
423902092272501	091N14W35DACA	1959	Janesville 2	350SLRN	150	1989 (2)
424224092133901	091N12W11DBB	1960	Readlyn 2	350SLRN	154	1982, 86
424007092194001	091N13W25BADA	1968	Denver 3	358KNKK	191	1990, 91
424011092194001	091N13W25BAAD	1973	Denver 4	367PRDC	1060	1984
			Buchanan County			
422833091431701	089N08W36DCAA	1980	Winthrop 3	340DVSL	230	1985, 89
422810092035201	089N10W31DDCA	1976	Jesup 3	340DVSL	400	1983, 87, 90, 91
423807092032601	090N10W05BCDD	1977	Fairbank 4	344CDVL	197	1983, 89
423710091540001	090N09W10CBA	1953	Hazleton 1	350SLRN	65	1985, 88 (3), 89 (2), 90
422742091534801	088N09W04DBA	1964	Independence 6	350SLRN	265	1986, 90
421900092002001	087N10W27CB	1955	Brandon 2	350SLRN	405	1985
423600091381501	090N07W23ABB	1952	Lamont 1	358KNKK	160	1982, 86
422852092040101	089N10W31AAB	1957	Jesup 2	358KNKK	380	1983, 92, 93, 95
423807092024301	090N10W05ADBD	1964	Fairbank 3	371JRDN	1292	1983
			Buena Vista County			
425336095144201	093N37W08BBAD	1948	Linn Grove Town No 1	110QRNR	28	1983
425345095090401	093N37W01DDDA	1890	Sioux Rapids 1	110QRNR	28	1983
425336095144202	093N37W08BBAD	1948	Linn Grove 2	110QRNR	31	1982, 86
423837095135002	090N37W05ADAA	1967	Storm Lake 6	110QRNR	110	1985
423840095134601	090N37W04BBCC	1935	Storm Lake City No 1	110QRNR	110	1982
425144094590401	093N35W21BADC	1959	Marathon 1	110QRNR	170	1983, 86, 89
424706094570901	092N35W14BCCC	1937	Albert City Well No 1	110QRNR	189	1983
425344095090401	093N37W01DDDD	1977	Sioux Rapids 2	111ALVM	54	1982, 86, 87, 90, 91, 92, 93, 94, 95, 96
423803095143601	090N37W05ADCD	1972	Storm Lake 11	112PLSC	90	1987, 90
424708094570801	092N35W14BCCC	1949	Albert City 1	112PLSC	190	1988, 93, 94, 95, 96
423619095000701	090N35W17DCC	1951	Newell 3	112PLSC	299	1983
424019095174601	091N38W26ACA	1963	Alta 4	210CRCS	530	1983
424935095095301	093N37W36CABC	1935	Rembrandt Town Well	217DKOT	439	1983
424330095111001	091N37W02CBA	1955	Truesdale 1	217DKOT	442	1983
424027095180903	091N38W26BACA	1950	Alta 3	217DKOT	507	1983

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Butler County			
424704092400803	092N15W18BCAA	1981	Clarksville 3	340DVNN	220	1985, 86, 88
424455092581801	092N18W28DBDD	1925	Dumont 1	340DVNN	285	1985, 90
423512092521001	090N17W29AAAA	1962	Aplington (2)1	341LMCK	112	1983, 85, 89
423505092530101	090N17W29BABB	1977	Aplington (3)2	341LMCK	270	1991
425355092475801	093N17W01ACCC	1948	Greene 1	344CDVL	115	1985, 91
425330092483701	093N17W01DDDA	1960	Greene 2	344CDVL	150	1982, 87, 90, 91, 92, 93
424239092350001	091N15W11ACBB	1939	Shell Rock 1	344CDVL	160	1985, 88
424239092350002	091N15W11ACBB	1954	Shell Rock 2	344CDVL	160	1983
424627092542302	092N17W18CCCC	1967	Bristow 2	344CDVL	180	1985, 88
423412092371701	090N15W33ABBB	1918	New Hartford 1	344CDVL	200	1983
424524092474601	092N17W25ABDA	1897	Allison 2	344CDVL	200	1985, 88
424704092400801	092N15W18BCAA	1938	Clarksville 1, North	344CDVL	225	1982
423436092471601	090N16W30CBAC	1935	Parkersburg 1	344CDVL	280	1990
423437092471001	090N16W30CBD	1955	Parkersburg 2	344CDVL	300	1983, 86, 91
423401092373601	090N15W33BCA	1956	New Hartford 2	344CLVL	165	1983, 86, 89, 90
424524092474602	092N17W25ABDA	1931	Allison 1	350SLRN	283	1983
			Calhoun County			
422814094384201	088N33W01BBDD	1976	Twin Lakes 1	112PLSC	139	1988
423255094410303	089N33W01DCAB	1953	Pomeroy 2	112PLSC	151	1984, 86
422656094271901	088N31W10CBBB	1977	Knierim 1	112PLSC	175	1988
421626094242201	086N31W12ACC	1947	Farnhamville 3	210CRCS	195	1984, 88
422023094291601	087N31W17CDCD	1968	Rinard 2	210CRCS	317	1988, 91
422525094492401	088N34W21BCBA	1985	Lytton 4	217DKOT	162	1991
421615094440701	086N33W07DCBB	1972	Lake City 3	217DKOT	250	1984, 89
422844094431301	089N33W34DACA	1983	Jolley 1	217DKOT	350	1988
422236094254601	087N31W02BDC	1968	Somers 1	330MSSP	410	1984, 91
421614094325101	086N32W11CCAA	1978	Lohrville 4	330MSSP	901	1985
422527094511901	088N34W19BDAA	1945	Lytton 2	360OVCB	1854	1983
423145094320301	089N31W17BAB	1928	Manson 2	400PCMB	1211	1986
			Carroll County			
415512094565201	082N35W17BAAA	1925	Templeton 1	111ALVM	17	1988, 91
420024094575901	083N35W18BAAD	1936	Halbur 1	111ALVM	20	1982, 85, 91
420024094575903	083N35W18BAAD	1952	Halbur 3	111ALVM	32	1990
415442095040301	082N36W17CACB	1978	Manning 9	111ALVM	40	1990
420024094575906	083N35W18BAAD	1985	Halbur 6	111ALVM	40	1987
415808094491901	083N34W28CBCC	1965	Willey 2	111ALVM	43	1990
415430095041601	082N36W17CCCA	1958	Manning 6	111ALVM	50	1985, 87, 91
415435094492801	082N34W17DDBA	1969	Dedham 4	111SRRV	45	1982 (2), 86, 89, 90

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Carroll County—Continued			
415432095041401	082N36W17CCAC	1922	Manning 2	111WNRV	30	1982
415808094491801	083N34W28CBCC	1961	Willey	112PLSC	43.0	1982, 86, 88
415356094400601	082N33W22ADDD	1978	Coon Rapids 1,6	112PLSC	87	1987
415358094400101	082N33W23BCCC	1977	Coon Rapids #2 Crystal	112PLSC	87	1982
415358094400201	082N33W23BCCC	1978	Coon Rapids 2	112PLSC	87	1987
420230094380601	084N33W36DBAB	1971	Ralston 1	112RLCL	170	1982, 88
420331094543101	084N35W27BDD	1953	Carroll 9	210CRCS	141	1991
415151094403501	082N33W34DCCB	1943	Coon Rapids 3,South	217DKOT	120	1982
415147094403501	082N33W34DCCC	1957	Coon Rapids 5	217DKOT	130	1985, 91
421117094411901	085N33W09DDAB	1954	Lanesboro 2	217DKOT	134	1982
421114094412501	085N33W09DAC	1941	Lanesboro 1	217DKOT	145	1986, 88
420331094440101	084N33W30ACBB	1978	Glidden 6	217DKOT	183	1982, 88
420316094515801	084N35W25DACB	1957	Carroll 11	217DKOT	189	1982, 88
415233094403201	082N33W34ABBD	1938	Coon Rapids 1,North	217DKOT	191	1992, 93, 95
420733094465301	085N34W35CCCB	1956	Lidderdale 2	217DKOT	230	1982, 89, 90
421058094582701	085N35W07CCCC	1942	Breda 2	217DKOT	340	1982
			Cass County			
411502094471401	075N34W32CAAA	1979	Massena 79-2	111ALVM	35	1986, 90
412652095064201	077N37W21CDCD	1913	Marne 1	111ALVM	35	1991, 92
412857095064901	077N37W21CCDD	1968	Marne 4	111ALVM	36	1983
412706095065501	077N37W21CBDB	1959	Marne 3	111ALVM	48	1986, 87, 88 (3), 89 (3)
411503094465401	075N34W32DBAA	1979	Massena 79-1	112PLSC	35	1988
411501094460601	075N34W33CAAC	1977	Massena 9	112PLSC	38	1983
411507094464601	075N34W32ADBD	1977	Massena 10	112PLSC	38	1991
411818095045801	075N37W10DDBD	1916	Lewis 1	112PLSC	60	1983, 86, 87, 88 (3), 89 (3)
411622094520901	075N35W27BBAB	1921	Cumberland 1	112PLSC	155	1983, 87, 92, 93, 94, 95, 96
412429094594301	076N36W04CAD	1927	Atlantic 2	217DKOT	81.0	1985, 88
412430094595001	076N36W04CA	1942	Atlantic No 7	217DKOT	82.7	1982
411355095065201	074N37W09BBAA	1956	Griswold 3	217DKOT	99	1988
412400094532001	076N35W09BB	1940	Wiota 1	217DKOT	156	1982, 86, 87
411639094521101	075N35W22CBDC	1978	Cumberland (5)4	217DKOT	213	1993
412714094460701	077N35W21BDDD	1960	Anita 3	217DKOT	236	1983, 85, 89
411637094520201	075N35W22CAC	1961	Cumberland (4)3	217DKOT	257	1985, 92
			Cedar County			
413545090544601	079N01W36CDC	1940	Durant 1	112PLSC	78	1982
413605090542901	079N01W36DCCB	1974	Durant 3	112PLSC	80	1986, 91

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Cedar County—Continued			
414423090582201	080N01W17AAAA	1951	Bennett 1	350SLRN	265	1984, 91
414558091074801	080N02W06BC	1966	Tipton 6	350SLRN	455	1986
415418091153401	082N04W13DCB	1962	Mechanicsville 2	350SLRN	455	1984, 90
415255091034301	082N02W27ACBD	1950	Clarence 2	355GOWR	200	1991
415337091084901	0820W24CAB	1946	Stanwood 1	355NIGR	303	1984, 90
414026091210201	079N04W06DDBA	1957	West Branch 2	355NIGR	428	1983, 87
414026091210602	079N04W06DDBB	1968	West Branch 3	358ALXD	446	1990
414032091210001	079N04W06DACD	1979	West Branch 4	358ALXD	450	1983, 88, 92, 93
415311091035301	082N02W27BADA	1977	Clarence 3	361ODVCU	475	1984, 90
			Cerro Gordo County			
430756093263201	096N22W16DABC	1977	Ventura 1	340DVNN	500	1985
431426093073301	097N19W06DD	1925	Plymouth 1	344CDVL	268	1985, 90
425923093112001	094N20W03ACBB	1939	Rockwell 1	344CDVL	462.5	1983
425841093114101	094N20W10BACA	1983	Rockwell 3	344CDVL	480	1991
425641093230701	094N22W24ACA	1955	Thornton 2	344CDVL	539	1983
425455093282601	094N22W32CBAA	1957	Meservey 1	344CDVL	573	1983, 86
430933093114201	096N20W03CABB	1912	Mason City 8	371DRBC	1225	1983
430929093113901	096N20W03CAB	1910	Mason City 7	371JRDN	1230	1983
430743093120301	096N20W16DADA	1947	Mason City 12	371JRDN	1538	1983
			Cherokee County			
423422095425201	090N41W32BACB	1982	Washta 3	110QRNR	112	1982, 88
423744095383501	090N41W11ADAC	1930	Quimby 2	112PLSC	170	1983, 87
424414095332301	092N40W34CDAC	1971	Cherokee 8	112PLSC	270	1987
424847095430001	092N41W05CBDA	1976	Cleghorn 2	217DKOT	140	1983, 89
424455095323701	092N40W35BBBB	1951	Cherokee 4	217DKOT	199	1983, 87
423744095383301	090N41W11ADAD	1967	Quimby 1	217DKOT	225	1983, 92, 93, 95
424341095331301	091N40W03ACCC	1966	Cherokee 7	217DKOT	255	1990, 92, 93
424358095333001	091N40W03BACB	1964	Cherokee 5	217DKOT	261	1983
424245095261801	091N39W10DBBB	1937	Aurelia 2	217DKOT	305	1983
424251095262101	091N39W10BDDB	1973	Aurelia 4	217DKOT	375	1983
424934095474701	093N42W34CCBB	1948	Marcus 2	364PRSR	880	1983
424934095475501	093N42W34CCBB	1914	Marcus 1	364STPR	1301	1983
			Chickasaw County			
424725092322801	094N14W18CAAD	1979	Nashua (3)4	340DVNN	153	1986, 88 (3), 89 (2), 90 (2)
424705092320803	094N14W18DDAA	1957	Nashua (2)3	344CDVL	150	1984, 87
431155092245801	097N13W20CCCC	1911	Alta Vista 1	344CDVL	150	1988, 90, 91
430408092091001	095N11W04CDAC	1940	Lawler 1	347DVSL	209	1988
430211092270701	095N14W24BBAC	1950	Ionia 1	350SLRN	250	1984, 89

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Chickasaw County—Continued			
430211092270702	095N14W	1983	Ionia 2	350SLRN	252	1990
425753092115501	094N12W13AAAA	1956	Fredericksburg 2	364STPR	792	1984
			Clarke County			
410038093361901	072N24W27BDAC	1973	Woodburn 1	111ALVM	33	1984, 87
			Clay County			
430922095193501	096N38W03CCDD	1976	Everly 3	111ALVM	20	1982, 85, 87, 88 (3), 89 (3), 90
430905095110201	096N37W11BDBD	1976	Spencer 6	111ALVM	30	1983
430945095194101	096N38W03CBBB	1921	Everly 1	112PLSC	23.4	1991
430923095113401	096N37W03DDDD	1971	Spencer 1	112PLSC	35	1982, 90, 91
430923095114501	096N37W03DDCC	1971	Spencer 2	112PLSC	39	1985, 87
430105095022101	095N36W25ACDD	1975	Gillett Grove 1	112PLSC	40	1982, 86, 89
430811095010501	096N35W18ACAC	1969	Dickens 1	112PLSC	47	1982
425507095203901	094N38W33BCDA	1967	Peterson 1	112PLSC	101	1983
425507095203902	094N38W33BCDA	1967	Peterson 2	112PLSC	110	1986
425508095204001	094N38W33BLD	1955	Peterson 2	112PLSC	110	1989, 90
430353095171001	095N38W12BCAB	1978	Royal 1	112PLSC	352	1983
425656095004802	094N35W19ADAA	1974	Webb 2	344CDVL	615	1983
430838095073301	096N36W08CCDA	1958	Spencer City Well #1	371JRDN	970	1983
			Clayton County			
423842091242501	091N05W35CCC	1946	Edgewood 1	350SLRN	248	1986, 89
424026091321502	091N06W22CDDA	1957	Strawberry Point 4	358ALXD	240	1985, 87
424043091350902	091N06W22DABD	1955	Strawberry Point 3	358ALXD	259	1982
430315091233001	095N05W11DDAC	1922	Monona 1	360OVCB	814	1987
424820091324002	092N06W03CC	1985	Volga 2	364GLEN	232	1986, 89
430330091264301	095N05W09CBCB	1958	Luana 1	364ODVCM	347	1986
425208091135801	093N03W18DAAD	1976	Garnavillo 4	364ODVCM	840	1986
425138091234901	093N05W23ABBB	1965	Elkader 5	364STPR	225	1985, 89
425550091233001	094N05W26ADDC	1952	Saint Olaf 1	364STPR	378	1986
425123091241702	093N05W23BCDB	1934	Elkader 2	364STPR	432	1984
430213091105901	095N03W	1988	Marquette 2	370CMBR	515	1991
430240091110001	095N03W15BD	1950	Marquette 2, (1)	371CMBRU	442	1986
425400091091601	093N03W02ADCD	1981	Clayton 1	371JRDN	375	1984
424706091061101	092N02W17ACC	1937	Guttenberg 1	371JRDN	450	1984, 91
425123091241701	093N05W23BCDB	1927	Elkader 3	371JRDN	515	1984
425730091215411	094N04W18BDBC	1939	Farmersburg 1	371JRDN	705	1986
430241091234501	095N05W14ACDD	1978	Monona 3	371JRDN	850	1991
430130091103001	095N03W22DD	1952	McGregor 6	371SLRC	116	1984, 86, 89
424653091060801	092N02W17CADA	1937	Guttenberg 2	371TMPL	435	1985

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Clinton County			
414652090153201	081N06E33ADA	1956	Camanche 2	111ALVM	61.2	1985, 90, 92, 93, 94, 95, 96
414745090151001	081N06E27BCAD	1971	Camanche 4	111ALVM	75	1987
414729090151801	081N06E27CBC	1971	Camanche 3	112PLSC	65	1982, 88 (3), 89 (3), 91
415752090485701	083N01E26CBDD	1911	Lost Nation 1	350SLRN	125	1984, 87
415753090490411	083N01E26CBDC	1963	Lost Nation 2	350SLRN	205	1988 (3), 89 (2), 90
414806090212302	081N05E22DDD	1923	Low Moor 1	350SLRN	256	1991
414921090450401	081N02E17ACC	1937	Calamus 1	350SLRN	278	1985
414926090385501	081N03E18ADCA	1963	Grand Mound 2	355NIGR	251	1984
414806090212301	081N05E22DDD	1959	Low Moor 2	358ALXD	322	1984
415737090275601	083N04E26CCD	1949	Charlotte 2	358EDGD	155	1990
415740090280202	083N04E26CC	1970	Charlotte 3	364STPR	740	1984
415754090230201	083N05E28CA	1911	Goose Lake 1	364STPR	748	1986
415025090110611	081N07E07ACA	1936	Clinton 7	371GLVL	2242	1991
414902090320301	081N04E180CAD	1974	De Witt 6	371JRDN	1295	1984
415010090501801	081N01E10BCCA	1960	Wheatland 2	371JRDN	1325	1992
414930090321601	081N04E18ACBB	1923	De Witt 3	371JRDN	1646	1995
			Crawford County			
421125095193101	085N39W12ADDB	1977	Kiron 4	111ALVM	19	1982, 85, 87, 90, 91
421004095272701	085N40W13CCCC	1925	Schleswig 3	111ALVM	30	1982, 85, 89
420336095115601	084N37W30BDAD	1936	Vail 1	111ALVM	32	1990, 92, 93, 94, 95, 96
420737095341501	085N41W36CCAA	1971	Ricketts 4	111ALVM	32	1987, 90
415650095275602	082N40W02ABDD	1925	Arion 1	111ALVM	38	1985
420415095352201	084N41W23CACC	1951	Charter Oak 3	111ALVM	48	1985
420422095352001	084N41W23CABB	1967	Charter Oak 6	111ALVM	53	1987, 91
415650095275603	082N40W02ABDD	1965	Arion 2	111ALVM	65	1987, 91, 92
420131095221101	083N39W03DCAC	1976	Denison 7	111ALVM	82	1985, 87, 90
420119095215201	083N39W10AAAC	1983	Denison 8	111ALVM	91	1991
420328095122401	084N37W30CBBB	1960	Vail 2	111BRRV	42	1982, 85, 87
420438095055201	084N37W24ABDB	1967	Westside 4	111BRRV	49	1982
420106095220101	083N39W10ADBC	1972	Denison 6	111BRRV	61	1982
420554095185401	084N38W07CADC	1976	Deloit No 1	111BRRV	65	1982
420551095185801	084N38W07CDBA	1977	Deloit 5	111BRRV	75	1985, 87, 90
415538095294502	082N40W10CBAB	1928	Dow City 1	111BRRV	81	1982
420736095342401	085N41W36CCBC	1931	Ricketts 2	111SDRV	39	1982, 85, 88 (3), 89 (3)
420421095351801	084N41W23CABA	1955	Charter Oak 5	111SDRV	46.5	1982, 90
415343095134901	082N38W26ADDB	1931	Manilla 1	111WNRV	87	1982, 91
420423095351801	084N41W23CCAD	1953	Charter Oak 4	112BLPC	210	1982

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Crawford County—Continued			
421003095272801	085N40W13CCCC	1935	Schleswig 4	112BLPC	348	1982
421140095190901	085N39W12AADD	1985	Kiron 6	112PLSC	25	1987
415313095134301	082N38W26ADDA	1949	Manilla 3	112PLSC	85	1985, 87, 90
415313095134601	082N38W26ADDB	1939	Manilla 2	112PLSC	87	1992
415533095291101	082N40W10CBAC	1982	Dow City 3	112PLSC	146	1987, 90
420804095202001	085N39W36BCAA	1982	Ullrich #1	340DVNN	1350	1982 (2)
			Dallas County			
415055094131202	081N29W10BBBA	1969	Dawson 2	111ALVM	22.8	1984, 86, 87, 88 (3), 89 (2), 90 (2), 92, 93
413305094001001	078N27W18DBCB	1956	De Soto 1	111ALVM	38	1990, 91
412924094072203	078N28W13BCBC	1986	Earlham 6	111ALVM	39	1991, 92, 94, 95, 96
413303094001001	078N27W18DBCB	1977	De Soto 3	111ALVM	40	1984, 87
412924094072202	078N28W14ADAD	1986	Earlham 5	111ALVM	41	1993
412924094072201	078N28W14ADDA	1986	Earlham 4	111ALVM	43	1990, 91
413744093595501	079N27W28BAAA	1969	Adel 2	111ALVM	44.5	1991
414125094020701	080N27W31DCBD	1977	Dallas Center 5	111ALVM	45	1991
415057094065301	081N28W09ABBB	1987	Perry 9R	111ALVM	45	1991, 94, 95, 96
414130094021501	080N27W31CDAA	1976	Dallas Center 4	111ALVM	50	1984, 86, 88 (3), 89 (2), 90 (2)
413749093592601	079N27W21CDDA	1977	Adel 3	111ALVM	54	1990, 91
413148093570901	078N27W27BBCA	1968	Van Meter 2	111ALVM	61	1984, 87, 90
413515094114202	078N29W04CAAA	1966	Redfield 2	112PLSC	44.5	1987
413517094114101	078N29W04BDDD	1979	Redfield 3	112PLSC	45	1985
413553094112001	078N29W04ACC	1938	Redfield 1	112PLSC	45	1982
413723094002401	079N27W28BC	1966	Town of Adel No 1	112PLSC	48.0	1982, 86
413517094112801	078N29W04ACDC	1975	Dexter 1	112PLSC	60	1984, 86, 87
414915093561001	081N27W13DDDD	--	Woodward South	112PLSC	104	1988
414538093491504	080N26W12ABAB	1972	Granger 4	112PLSC	108	1984, 87, 90
415022094064101	081N28W09DBDA	1964	Perry 11	112PLSC	123.6	1990
414947094055901	081N28W15BDBD	1968	Perry 15	112PLSC	131	1987
413836094161701	079N29W19BAAC	1966	Linden 3	330MSSP	940	1992, 93
413833094161601	079N29W19BAA	1954	Linden 2	338KKUK	700	1986
413638093530901	079N26W33BAC	1965	Waukee 1	371JRDN	2737	1985
			Davis County			
			None			
			Decatur County			
404248093331801	068N26W35DC	1914	Davis City 1	338OSGE	920	1984

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Delaware County			
422834091281601	089N05W31DAAB	1972	Manchester 6	350SLRN	160	1984, 86, 87, 88 (3), 89 (3)
422852091161701	088N04W36BCBB	1960	Earlville 2	350SLRN	200	1984, 88
422925091270701	089N05W29DAD	1948	Manchester 4	350SLRN	231	1984
423837091235001	090N05W02ABB	1952	Edgewood 2	350SLRN	269	1984, 91
423020091273701	089N05W20DBBB	1981	Manchester 7	350SLRN	270	1984, 92, 93, 95
422543091200701	088N04W17DCBC	1979	Delhi 2	350SLRN	280	1984, 90
422059091291401	087N06W13DBA	1946	Ryan 2	350SLRN	410	1985
422852091161901	088N04W36BCBB	1905	Earlville 1	355NIGR	178	1990
422548091195001	088N04W17DDB	1958	Delhi 1	358ALXD	278	1984
422925091080501	089N03W25DADD	1979	Dyersville 4	371JRDN	1150	1984
			Des Moines County			
410015091093401	072N03W25CBCC	1976	Mediapolis 4	330MDVU	146	1983, 86, 89
410040091095001	072N03W25CBAD	1977	Mediapolis 5	338HGCK	133	1983, 90
405138091185201	070N04W16ADAA	1957	Danville 2	360ODVC	1187	1983
405153091185301	070N04W16ADAA	1942	Danville 1	360ODVC	1189	1983
404933091105701	070N03W34AABA	1978	West Burlington 5	371JRDN	1811	1991
			Dickinson County			
431822094582601	098N35W16ADDD	1947	Terril 1	110QRNR	112	1982, 87
432558094564101	100N35W35CDAD	1979	Superior 1	110QRNR	149	1983, 87
431820094582201	098N35W15CBBB	1981	Terril 2	112WSCS	120	1990
			Dubuque County			
423135090383201	089N03E18AADD	1969	Dubuque 9	111ALVM	125	1987, 90, 92, 93, 94, 95, 96
423136090383001	089N03E18AADD	1981	Dubuque 10	111ALVM	142	1984, 91
423134090383401	089N03E18AADD	1956	Dubuque 4	111ALVM	190	1985
423138090383601	089N03E18AADB	1956	Dubuque 2	111ALVM	196	1984
423136090383501	089N03E18AADC	1956	Dubuque 3	111ALVM	200	1985, 91
422817091070401	089N02W31D	1978	Dyersville 3	340DVSL	180	1990
422910091072701	089N02W30DCCC	1959	Dyersville 1	350SLRN	126	1985, 87, 89 (2)
423305091064901	089N02W05CBBB	1898	New Vienna 1	350SLRN	170	1984, 86, 87, 88 (3), 89 (3)
422906091001901	088N01W07CDAC	1894	Farley 1	350SLRN	208	1991
421812091004001	087N01W31CBA	1958	Cascade 2	358ALXD	180	1984, 88
422705090561201	088N01W11CABB	1978	Epworth 3	358ALXD	212	1985, 89
422654090561201	088N01W11CBB	1964	Epworth 2	358ALXD	220	1982, 90
422852091064301	089N02W32BCD	1970	Dyersville 2	358KNKK	195	1984, 88 (3)
423606090594901	090N01W19AAAA	1937	Holy Cross (1)2	364GLEN	625	1984
423602090595201	090N01W19AA	1987	Holy Cross 1	364GLEN	665	1992, 93, 95

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Emmet County			
432348094285201	099N31W14BBCD	1981	Armstrong 5	112PLSC	130	1990, 91, 92, 93, 94, 95
432351094285002	099N31W14BBCA	1953	Armstrong 3	112PLSC	135.5	1984, 86
432349094285201	099N31W14BCBD2	1995	Armstrong 7	112PLSC	136	1996
431910094473601	098N33W07CBAB	1981	Wallingford 4	112PLSC	161	1984, 88, 91
432801094364601	100N32W22BDCD	1975	Dolliver 3	112PLSC	200	1984, 86
432335094421801	099N33W14ACDC	1956	Gruver 1	217DKOT	290	1984
432339094500101	099N34W14BCAC	1972	Estherville #10	360OVCB	750	1990
431750094302701	098N31W21ABA	1945	Ringsted 3	364GLEN	505	1986
			Fayette County			
425027091391301	093N07W27ACD	1968	Wadena 2	111ALVM	47	1987
425606091565501	094N09W30ABAA	1978	Hawkeye 78-1, 1	112PLSC	85	1982, 85, 87
425614091572902	094N09W19CCD	--	Hawkeye 2	112PLSC	173	1990
424606091594201	092N10W23BDBD	1906	Westgate 1	344CDVL	102	1984, 86
425719091483301	094N08W17DABC	1935	West Union 3	355NIGR	55	1984, 86, 87
425719091482401	094N08W17DAAC	1957	West Union 1	355NIGR	64	1982
425720091484201	094N08W17DBAC	1957	West Union 2	355NIGR	70	1984, 87, 90
425036091480101	093N08W28BBDD	1948	Fayette 1	358ALXD	80	1982 (2), 85
424033091563101	091N09W20CADA	1976	Oelwein 76	361MQKT	145	1984
425713091373101	094N07W13CBCC	1962	Elgin 3	364GLEN	150	1984, 86
425717091382601	094N07W14CBAD	1948	Elgin 1	364GLEN	208	1984
425717091382602	094N07W14CBAD	1954	Elgin 2	364GLEN	220	1992, 93, 95
430010091390102	095N07W34ACAD	1924	Clermont 2	364GLEN	240	1984, 89, 91
430329092020901	095N10W09CABD	1978	Waucoma 1	364STPR	682	1985
424620091525001	092N09W23BB	1959	Maynard 1	364STPR	850	1984
424455091395501	092N07W27CCBB	1980	Arlington 4	371JRDN	1310	1991
424054091543301	091N09W21ACA	1942	Oelwein 42	371JRDN	1328	1984
			Floyd County			
425754092515202	094N17W16BBAA	1920	Marble Rock 2	344CDVL	101	1991
430319092565801	095N18W10DDBB	1914	Rockford 1	344CDVL	185	1984, 88
430458092403703	095N16W01AAB	1963	Charles City 7	344CDVL	185	1982, 90
430458092403701	095N16W01AAB	1950	Charles City 5	344CDVL	187	1984, 88, 91
430741092540601	096N17W18CCAD	1916	Rudd 1	344CDVL	200	1985, 88
425754092515201	094N17W16BBAA	1926	Marble Rock 1	344CDVL	202	1984, 89
430315092563401	095N18W11CCBD	1978	Rockford 2	344CDVL	214	1990, 91
430919092351801	096N15W11BBA	1968	Colwell 1	344CDVL	286	1985
430836093001701	096N18W07DDAD	1958	Nora Springs 1	344CDVL	289	1985
430726092441501	096N16W21ABDD	1948	Floyd 1	344RPID	193	1982, 84, 88
			Franklin County			
424312093132101	091N20W05DADD	1975	Hampton 6	110QRNR	41	1982, 85, 87, 91

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Franklin County—Continued			
425341093132501	093N20W05DDAB	1956	Sheffield 2	111ALVM	27	1982, 87, 88 (3), 89 (2), 90, 92, 93, 94, 95, 96
425342093133101	093N20W05DDBB	1977	Sheffield 3	111ALVM	27	1985, 87, 90
424537093220501	092N21W19CCD	1900	Latimer 1	330MSSP	150	1983, 88
424537093220502	092N21W19DCCD	1949	Latimer 2	330MSSP	168	1985
424414093220801	092N21W31DBBC	--	Coulter 2	330MSSP	365	1983
424044093080101	091N19W19DBB	1949	Geneva 1	341APLG	160	1983, 86
424533093061201	092N19W28BBB	1958	Hansell 1	344CDVL	470	1983, 86
424413093220601	092N21W31DBBD	1923	Coulter 1	344CDVL	628	1991
			Fremont County			
404432095361701	069N41W31BAAA	1981	Sidney 6	111ALVM	32	1987, 90, 91
404521095235801	069N40W26BABD	1975	Shenandoah 25	111ALVM	33	1986
404517095245301	069N40W26BAD	1972	Shenandoah 21	111ALVM	34	1985, 94
404501095245601	069N40W26BDDC	1975	Shenandoah 26	111ALVM	36	1990, 91
404520095250501	069N40W26BBAD	1975	Shenandoah 22	111ALVM	36	1991
404615095225701	069N39W19BBBA	1920	Shenandoah 3	111ALVM	44	1991
405225095334901	070N41W16ABBA	1968	Randolph (4)2	111ALVM	52	1984, 94
405225095335001	068N41W14CDBB	1966	Randolph 3	111ALVM	53	1985, 89, 90
404331095285501	068N40W07CBDA	1980	Farragut 79-1 (park)	111ALVM	62	1988, 90
404327095284801	068N40W07BCAA	1980	Farragut 79-2 (North)	111ALVM	65	1991, 92, 93, 94, 95, 96
403604095394401	067N42W21DDCA	1973	Hamburg 5	111ALVM	75	1985, 86, 94
403558095393901	067N42W28AAAB	1982	Hamburg 6	111ALVM	98	1984, 90, 91
404918095454801	070N43W35CBBA	1973	Thurman 1	111ALVM	105	1984, 88, 90, 94
404211095310701	068N41W14CDB	1973	Riverton 1	112PLSC	57	1994
404224095310601	068N41W14CDBB	1973	Riverton 2	112PLSC	57	1984, 85, 86
405354095411402	070N42W04BCBA	1966	Tabor 1	112PLSC	61.5	1984, 86
405354095411403	070N42W04BCBA	1968	Tabor 2, East	112PLSC	62	1994
			Greene County			
420632094143001	084N29W04CCBB	1979	Dana 1	112BVCL	180	1982, 86
420047094223901	083N30W07DADA	1953	Jefferson 4	112HCKC	150	1982, 85
420919094281201	085N31W21CCAA	--	Churdan No 1	112HCKC	160	1982
415527094114901	082N29W11CDB	1945	Rippey Town No 3	112PLSC	135	1985
420921094282501	085N31W21CBCC	1967	Churdan 3	112PLSC	157	1991
420923094282201	0853121CBCC	1977	Churdan 4	112PLSC	158	1986
420053094223001	083N30W08CBBA	1980	Jefferson 6	112PLSC	160	1990, 91
420203094205201	083N30W04ABBB	1981	Jefferson 7	112PLSC	180	1991
420104094324301	083N32W11BDBD	1977	Scranton 4	112PLSC	210	1985, 89, 90
420104094324401	083N32W11BDBC	--	Scranton No 3	112RLCL	20	1982

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Greene County—Continued			
415550094115101	082N29W11BDBC	1945	Rippey 1	112RLCL	135	1982, 87
420953094151201	085N29W20BAAD	1973	Paton 2	320PSLV	400	1986
420950094151101	085N29W20BAAD	1948	Paton 1	325DSMS	400	1982
420148094142002	083N29W04BCDC	1925	Grand Junction 1	330MSSP	320	1982
			Grundy County			
421327092492101	086N17W34BABB	1978	Beaman (2)1	330MSSP	125	1987
421327092492201	086N17W34BB	1979	Beaman (3)2	330MSSP	125	1986
421306092492101	086N17W34BCDB	1957	Beaman (1)3	339CHPN	80	1990
421322092522001	086N17W31ABDA	1962	Conrad 3	339HMPN	120	1983, 92, 93, 95
421336092524401	086N17W30CDDB	1966	Conrad 4	339HMPN	130	1983, 86, 88 (3), 89 (2), 90
422605092560001	088N18W15DBBB	1949	Wellsburg (1)3, 1953-	340DVSL	280	1991
422811092374901	088N15W05BBBD	1935	Dike 1	344CDVL	292	1990
421856092355101	087N15W28DBDD	1978	Reinbeck 3	344CDVL	394	1986
422413092474601	088N17W26DBC	1952	Holland 1	344CDVL	463	1983
422747092374901	088N15W05BBBD	1955	Dike 2	344CLVL	300	1983
423140092423001	089N16W14BB	1956	Stout 1	344CLVL	405	1983
422149092462601	087N17W12ACAD	1961	Grundy Center 4	344CLVL	530	1983
422148092461801	087N17W12ADC	1944	Grundy Center 3	344RPID	559	1983, 92, 93, 95
422611092552501	088N18W14BCCB	1960	Wellsburg 1	371JRDN	2050	1992, 93
			Guthrie County			
414035094302502	079N31W06CDBC	1941	Guthrie Center 2	110QRCU	60	1985, 88 (3), 89 (2), 90
413132094304203	078N32W27ADDC	1981	Casey 4	111ALVM	34	1986
414035094302501	079N31W06CDBC	1929	Guthrie Center 1	112PLSC	61	1982, 85
414624094211201	080N30W04BBAD	1962	Yale 2	112PLSC	82	1982, 85, 87
415034094183601	081N30W11BDD	1979	Jamaica 1	112PLSC	153	1988
415034094254801	081N31W11BDCA	1910	Bagley 1	112RLCL	60	1982, 85, 87
414101094303701	079N31W06CDCB	1984	Guthrie Center 4	217DKOT	65	1987
414101094303801	079N31W06BCBD	1984	Guthrie Center (6), 3	217DKOT	70	1992
415034094183503	081N30W11BDDA	1957	Jamaica 3	320PSLV	196	1982
415118094331301	081N32W03DBDD	1960	Bayard 2	325DSMS	205	1982, 89
413014094185901	078N30W33CCCD	1962	Stuart 1	371CMBRU	2801	1983
			Hamilton County			
421833093382001	087N24W34BBC	1951	Jewell 2	112PLSC	65	1983, 87
421828093381501	087N24W34BBCC	1932	Jewell 1	112PLSC	68	1985
422333093434901	088N25W35BDDB	1977	Kamrar 2	330MSSP	222	1990
422334093435101	088N25W35BDBD	1913	Kamrar 1	330MSSP	283	1988
421828093381701	087N24W34BBCD	1985	Jewell 3	330MSSP	375	1991
422904093324201	089N23W27DCDB	1965	Williams 3	330MSSP	425	1985
421610093553011	086N26W07CD	1959	Stratford 3	330MSSP	550	1991
421417093360701	086N24W26AAAD	1954	Randall 1	339KDRK	347	1985

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Hamilton County—Continued			
422842093383501	089N24W35DBA	1938	Blairsburg1	339KDRK	360	1983
421902093344701	087N23W30CBB	1948	Ellsworth 3	339KDRK	365	1983, 86
421724093474101	086N25W05BCCB	1973	Stanhope 5	339KDRK	585	1985
			Hancock County			
425533093364001	094N23W30CCD	1941	Goodell 2	330MSSP	175	1990
425610093473901	094N25W28AADA	1958	Kanawha 2	330MSSP	200	1983, 86
425936093572401	094N26W06ABAA	1950	Corwith 1	339HMPN	129.5	1982, 85, 89
425939093572302	094N26W06ABAA	1953	Corwith 2	339HMPN	130	1990
425528093364501	094N23W30CCDA	1964	Goodell 1	339HMPN	170	1983, 85, 88, 92, 93
430540093482001	096N25W28CAC	1910	Britt 2	340DVNN	200	1991
430539093482201	096N25W33BAAC	1937	Britt 1	340DVNN	263	1985, 90
430015093360501	095N23W31ACA	1959	Klemme 2	341LMCK	185	1985, 88, 92, 93, 95
430627093361301	096N23W30ABD	1932	Garner 1	344CDVL	225	1985, 89
431308093474201	097N25W16DAA	1947	Crystal Lake 1	344CDVL	304	1983
430546093360901	096N23W31ABAD	1957	Garner 2	344CDVL	325	1990, 91
431350093544201	097N26W10CBBD	1948	Woden 1	361MQKT	531	1986, 91
430015093360502	095N23W31ABDD	1934	Klemme 1	371JRDN	1512	1992, 93
			Hardin County			
421544093002201	086N19W13ACAA	1955	Whitten 1	330MSSP	188	1986, 88
423125093160601	089N21W13ACAC	1978	Iowa Falls 6	330MSSP	250	1991, 92
421856093260101	087N22W29DBCB	1957	Radcliffe 3	330MSSP	365	1986
421658093101101	086N20W03CDC	1946	New Providence 1	330MSSP	485	1985
422441093035701	088N19W28AABB	1964	Steamboat Rock 2	339HMPN	115	1983
422453093035001	088N19W21DDC	1951	Steamboat Rock 1	339HMPN	115	1983, 85, 89
421443093034701	086N19W21DAB	1946	Union 1	339HMPN	190	1988
421455093034601	086N19W21ADBD	1967	Union (3)2, North	339HMPN	195	1985
423131093164301	089N21W13BBDD	1957	Iowa Falls 4	339HMPN	221	1983
422134093060701	087N19W07DAC	1935	Eldora 4	339HMPN	315	1983, 91
423323093034701	089N19W02BB	1942	Ackley 3	339KDRK	140	1985, 91
423036093163401	089N21W13BABD	1957	Iowa Falls 5	339KDRK	232	1983, 86, 90
			Harrison County			
413943095453901	079N42W08DCCB	1989	Logan 2	111ALVM	55	1994
413830095465802	079N42W19BDBD	1975	Logan 6	111ALVM	58	1990, 91
415119095361401	081N41W03DBBD	1954	Dunlap 2	111ALVM	85	1990
413323095533101	078N44W15CABC	1964	Missouri Valley 1	111ALVM	87	1986, 89, 90, 91, 94
413321095533601	078N44W15CBAD	1958	Missouri Valley 3	111ALVM	90	1991
414236096012501	080N45W25DABD	1951	Mondamin 2, South	111ALVM	90	1986, 87, 92, 93, 94, 95, 96
414236096012502	080N45W25DABD	1929	Mondamin No 1	111ALVM	90	1982

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Harrison County—Continued			
415119095361601	081N41W03DBBD	1984	Dunlap 3	111ALVM	90	1986, 87, 94
414234096012401	080N45W25DAAC	1956	Mondamin 1	111ALVM	96	1990
413715096003101	079N44W30DCAB	1941	Modale 1	111ALVM	100	1982, 94
413715096003102	079N44W30DCAB	1961	Modale 2	111ALVM	104	1986, 89, 91
414842096012501	081N45W24DABD	1972	Little Sioux 1	111ALVM	110	1982, 88, 90, 94
415004095552101	081N44W12CCCD	1967	Pisgah 2	111ALVM	142	1987, 91, 94
413819095471101	079N42W19CBAB	1979	Logan 7	111BRRV	60	1982, 86, 89
415118095361501	081N41W03DBBD	1925	Dunlap 1	111BRRV	87	1982, 87
415003095552401	081N44W13BBBB	1929	Pisgah 1	111SDRV	102	1982, 85
414500095420002	080N42W14AACC	1936	Woodbine 1	217DKOT	91.5	1982, 86, 88
414500095420001	080N42W11DC	1949	Woodbine 2	217DKOT	92.0	1994
			Henry County			
410749091324001	073N06W15BBB	1965	Olds 1	330MSSP	274	1985
410851091394401	073N07W09AABD	1978	Wayland 2	360ODVC	1900	1985
410749091324101	073N06W15BBBC	1977	Olds 3	360OVCB	240	1985
410740091260001	073N05W16AA	1921	Winfield 1	360OVCB	1268	1985
405810091330511	071N06W09ABAC	1946	Mount Pleasant 4	360OVCB	1860	1985
405522091233001	071N05W26ADAB	1961	New London (3)2	371JRDN	1872	1983
			Howard County			
431443092261401	097N14W01DDAB	1914	Elma 1	112PLSC	143	1984, 86, 87, 88 (3), 89 (2), 90
431303092052002	097N11W13DBCB	1906	Provitin 1	340DVNN	72	1984, 88
432923092212501	100N13W10DDAB	1898	Chester 1	344CDVL	176	1985, 89
432650092170201	100N12W29DBDC	1944	Lime Springs 1	364GLEN	358	1985
432650092170401	100N12W29DBD	1968	Lime Springs 2	364GLEN	380	1992, 93, 95
432144092332501	099N14W30CACA	1964	Riceville 2	364GLEN	468	1984, 91
431303092052001	097N11W13DBBC	1950	Provitin 2	364ODVCM	699	1984
432225092065701	099N11W23CCCC	1924	Cresco 1	364STPR	670	1984
432257092065701	099N11W23BCBB	1965	Cresco 3	371TMPL	1145	1985
			Humboldt County			
424836094030101	092N27W05DAAD	1966	Hardy 2	110QRNR	98	1983, 85, 87
423911094233402	091N30W33ACCC	1967	Pioneer 3	112PLSC	100	1982, 85, 87
424308094132601	091N29W01CCAC	1973	Humboldt 1	330MSSP	144	1982, 85, 89, 90
425426094050301	093N27W06BABB	1967	Lu Verne 2	330MSSP	164	1985, 88
425205094110801	093N28W17CBDB	1968	Livermore 2	330MSSP	227	1983, 89
424943093584201	093N27W36ACDB	1938	Renwick 1	330MSSP	294	1983
424548094171901	092N29W20DDB	1948	Rutland 1	339GLMC	75	1983, 85, 89
425427094050501	093N27W06BABB	1916	Lu Verne 1	339HMPN	155	1984
424350094260001	091N30W06BA	1957	Gilmore City 3	339HMPN	207	1983, 89
424939093584201	093N27W36ACD	1951	Renwick 2	339HMPN	226	1983, 89

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Humboldt County—Continued			
424128094030902	091N27W17DDB	1962	Thor 2	339KDRK	375	1983
425352094224501	093N30W03CBD	1056	Ottosen 2	340DVNN	600	1983
425208094171401	093N29W17DAD	1948	Bode 2	341APLG	259	1983, 91
424317094120501	091N28W06CACD	1948	Dakota City 2	364GLEN	1025	1983
			Ida County			
422018095205101	087N39W23ABDD	1923	Arthur 1	111ALVM	24	1982, 85, 87, 88 (3), 89 (3), 90
422915095323505	089N39W33DCCC	1985	Holstein 4	111ALVM	28	1991
423033095250501	089N39W23CADA	1957	Galva 2	111ALVM	48	1982, 85, 87
422915095323504	089N39W33CDDD	1985	Holstein 3	111ALVM	54	1990, 92, 93, 94, 95, 96
421908095353701	087N41W26CBBB	1972	Battle Creek 3	111ALVM	59	1983, 85, 87, 90
421849095354901	087N41W27DDCA	1950	Battle Creek 2	112PLSC	42	1991
422106095280201	087N40W14ACBB	1965	Ida Grove 3	112PLSC	65	1983, 85, 87, 88 (3), 89 (3), 92, 93, 96
422109095275401	087N40W14ABDC	1948	Ida Grove 2	112PLSC	70	1982, 94, 95
422009095210101	087N39W23ACBD	1967	Arthur 4	210CRCS	330	1983
422915095323501	089N40W35BBB	1951	Holstein 2	217DKOT	430	1983
			Iowa County			
414745091521201	081N09W26BCDC	1942	Amana 5	111ALVM	33	1983, 87, 90
414737092044101	081N11W25CACD	1980	Marengo 9	111ALVM	40	1989, 90
414742092044001	081N11W25CACA	1980	Marengo 8	111ALVM	40	1983
414811091564001	081N09W30BBAB	1969	High Amana 10	111ALVM	40	1982, 89, 90
414821091575101	081N10W24CCAC	1954	West Amana 11	112PLSC	32.6	1983, 89
414736091534501	081N09W28DBDB	1967	Middle Amana 8	112PLSC	34	1983, 87, 90
414738092042101	081N11W25DBCD	1950	Marengo 3	112PLSC	36	1982
414647091580701	081N10W35DAAD	1979	South Amana (12), 120	112PLSC	38	1983, 89, 91
414514092105801	080N12W12ADDD	1979	Ladora 2	112PLSC	70	1983, 86, 90
414520092112001	080N12W12ADDC	1952	Ladora 1	112PLSC	72.5	1982, 91, 92, 93, 94, 95, 96
413930092002701	079N10W09DDD	1963	Williamsburg 3	112PLSC	160	1986
413422092093601	078N11W08CBCA	1968	Millersburg 1	112PLSC	175	1983, 88
413920092003501	079N10W16AABA	1948	Williamsburg 4	112PLSC	186	1983
413927092003601	079N10W16A	1972	Williamsburg 6	112PLSC	270	1991
413927092005401	079N10W09CDDD	1965	Williamsburg 5	112PLSC	270	1983
414335092175001	080N12W19BCC	1941	Victor 1	112PLSC	349	1983, 87
413501092001101	078N10W03CCCC	1970	Parnell 2	112PLSC	364	1983, 86
414825091511201	081N09W23DADA	1968	East Amana 2	340DVSL	550	1983, 92, 93
414752091520201	081N09W26BCDB	1950	Amana 3	340DVSL	555	1983
414341091594901	080N10W22ABCB	1981	Conroy 2	344CDVL	650	1983

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Iowa County—Continued			
414536091523201	080N09W03DDCB	1967	Homestead 17	350SLRN	750	1983
413048092043001	078N11W36CDAB	1947	North English 2	371JRDN	1940	1983
			Jackson County			
420432090401201	084N02E24AAB	1953	Maquoketa 3	112PLSC	90	1982, 85, 87, 88 (2), 89 (3)
420414090113202	084N07E20BCDD	1920	Sabula 2	112PLSC	112	1984, 88 (3), 89 (3)
420414090113204	084N07E20BCDD	1935	Sabula 2	112PLSC	200	1987
420544090405101	084N02E12CBDA	--	Hurstville 1	340DVSL	135	1991
420435090524501	MONMOUTH 1	1982	Monmouth 1	340DVSL	160	1988, 90
420433090502401	084N01E22	--	Baldwin 2	340DVSL	190	1990
420428090501901	084N01E22BB	1912	Baldwin 1	355HPKN	160	1984, 88
421750090365001	087N03E33DC	1940	La Motte 2	358ALXD	170	1991
420912090352101	085N03E22DAA	1953	Andrew 1	358EDGD	247	1984, 89
421745090370801	087N03E33CDD	1959	La Motte 1	360ODVC	865	1984
420414090113201	084N07E20BCDD	1895	Sabula 1	360OVCB	973	1992, 93, 95
420310090190301	084N06E30BBD	1982	Miles 2	364GLEN	605	1986
420247090234201	084N05E32AAAD	1965	Preston 2	364STPR	697	1986
420241090232401	084N05E33BBBC	1937	Preston 1	364STPR	720	1990
421558090254301	086N05E07CCD	1948	Bellevue 2	371CMBRU	1500	1991
			Jasper County			
414300092544401	080N18W26ABBB	1954	Kellogg 2	111ALVM	30	1983, 87, 90
414251092541701	080N18W26AADC	1939	Kellogg 1, East	111ALVM	36	1983, 85, 88 (3), 89 (2), 90
414022093153801	079N21W11ABBB	1964	Prairie City 2	111ALVM	43.5	1991
413913093070001	079N20W13ADDA	1955	Newton 13	111ALVM	45	1993, 95, 96
414024093153901	079N21W11ABBB	1950	Prairie City 1	111ALVM	47	1990
413846093063801	079N19W18CDCB	1981	Newton 21	111ALVM	48	1990
414028093154502	079N21W02CDD	--	Prairie City 1	111ALVM	51	1986
413911093071402	079N20W13ADCB	1975	Newton 3	111ALVM	53.6	1987, 92
413907093070501	079N20W13ADDC	1952	Newton 7	111ALVM	54	1991, 94
413917093071401	079N20W13ADBC	1970	Newton 5	111ALVM	56.7	1991
414051093190901	079N21W05CAAA	1939	Mitchellville 1	111ALVM	58	1991
414051093190902	079N21W05CAAA	1958	Mitchellville 2	111ALVM	61	1985, 87, 88 (3), 89 (2), 90
414051093190903	079N21W05CAAA	1977	Mitchellville 3	111ALVM	67	1987, 90
414029093145401	079N21W01CCDB	1930	Colfax 3	111HLCN	47	1984, 86
414029093145601	079N21W01CCCA	1972	Colfax 2	111HLCN	57	1990, 91
414954093121202	081N20W17BADD	1970	Baxter 2	112PLSC	58	1984, 86
413121093070201	078N20W36BBAA	1955	Monroe 3	325DSMS	260	1991

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Jasper County—Continued			
413048093062101	078N20W36DBDA	1981	Monroe 7	325DSMS	300	1992, 93, 95
413049093062001	078N20W36DACB	1981	Monroe 8	325DSMS	300	1984, 90
413118093063201	078N20W36ABB	1960	Monroe 6	325DSMS	305	1984
414220092524401	080N17W30CCAA	1978	Kellogg 3	330MSSP	80	1983
414913092464001	081N17W13CC	1964	Newburg 1	333STLS	225	1984, 89
413423092503601	078N17W08BDDD	1964	Sully 1	371JRDN	2240	1992, 93
			Jefferson County			
405925092100001	072N11W31DCBD	1958	Batavia 1	112PLSC	104	1982, 87
			Johnson County			
414111091350701	080N06W32DCD	1975	Coralville 7	112PLSC	85	1991
414110091352201	079N06W6BAA	1975	Coralville 6	112PLSC	87	1982, 84, 86, 90
414111091350401	079N06W6DCD	1975	Coralville 8	112PLSC	90	1984
412916091254501	077N05W09DAB	1958	Lone Tree 2, Old	112PLSC	159	1987
412916091254502	077N05W09DAB	1972	Lone Tree 2, West	112PLSC	280	1984
414446091353501	080N06W07CDCB	1984	North Liberty 3	340DVSL	500	1990
414213091394902	080N07W28DCAB	1969	Tiffin 2	355NIGR	305	1984
414801091294501	081N06W25BAA	1960	Solon 2	358KNKK	482	1984
414324091473501	080N08W21BCCC	1925	Oxford 2	358KNKK	586	1984
			Jones County			
415852090572701	083N01W21DAAC	1977	Oxford Junction (2)1	111ALVM	50	1984, 86, 87
420607091011001	084N02W12A	1913	Onslow 1	112PLSC	275	1984, 87, 91
420638091044401	084N02W04CACC	1939	Center Junction 1	350SLRN	300	1984
421442091120001	086N03W21CAAA	1977	Monticello 4	350SLRN	320	1992, 93
421420091142001	086N03W21CD	1955	Monticello 3	350SLRN	603	1985
420331091000701	084N01W30A	1933	Wyoming 1	355GOWR	260	1984, 86
420009091084901	083N03W13BA	1910	Olin 1	355HPKN	180	1985, 88, 91
420102091214101	083N04W07B	1969	Martelle 2	355NIGR	249	1985, 89
420631091172001	084N04W03DDD	1955	Anamosa 2	358KNKK	405	1985
420747091105801	085N03W34ACC	1948	Amber 1	358KNKK	405	1985
421731091011501	086N02W01ABCC	1976	Cascade 4	360ODVC	244	1985
420718091165401	084N04W02BABC	1969	Anamosa 4	371TMPL	1640	1990
			Keokuk County			
411817092195401	075N13W14BBDC	1976	Delta 4	111ALVM	29	1983
411817092195101	075N13W14BBDD	1979	Delta 7	111ALVM	30	1987
411817092195701	075N13W14BBCD	1976	Delta 5	111ALVM	31	1983
412809092142201	077N12W15CCBC	1986	Keswick 3	111ALVM	31	1987
411849092121001	075N12W11DACA	1975	Sigourney 8	111ALVM	32	1983
411818092115201	075N12W12CBCA	1975	Sigourney 9	111ALVM	34	1991
411748092114401	075N12W12CBDA	1964	Sigourney 6	111ALVM	35	1990

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Keokuk County—Continued			
411849092115401	075N12W12CBCA	1958	Sigourney 5	111ALVM	35	1983, 86, 87, 88 (3), 89 (2), 90
412723092052001	077N11W23D	1989	South English 1	111ALVM	37	1990
412808092141901	077N12W15CCBC	1979	Keswick 2	111ALVM	39	1982
412809092142001	077N12W15CCBC	1956	Keswick 1	111ALVM	39	1985
412715092051501	077N11W23DDCC	1969	South English 3	330MSSP	250	1983, 89, 92, 93
412144092030101	075N10W30ACAA	1965	Harper 2	330MSSP	265	1983
412027092122301	076N12W35DBDC	1927	Sigourney RckIslnd	330MSSP	280	1983
412141092030101	075N10W30ACAD	1975	Harper 4	330MSSP	280	1983
412701092053001	077N11W23ABCD	1974	South English 4	330MSSP	330	1983
412614092104501	077N11W31BBB	1954	Webster 1	338OSGE	177	1983, 88
412138091571501	076N10W25ACCA	1943	Keota 2	339WSVL	153	1983, 89
412138091570702	076N10W25ACDA	1960	Keota 3	367PRDC	1557.5	1983
411019092182901	074N13W36BDBC	1977	Hedrick 2	371JRDN	2050	1983
			Kossuth County			
430340094252703	095N30W08BBCD	1978	Whittemore 3	112PLSC	120	1984, 89, 90
430427094145801	095N29W02CABB	1959	Algona 5	217DKOT	135	1991
430424094142701	095N29W02CABC	1968	Algona 6	217DKOT	141	1984, 87, 90
430418094142301	095N29W02CABA	1938	Algona 2	217DKOT	155	1984
430417094142401	095N29W02CABA	1936	Algona (5), 1	217DKOT	163	1982
431255094253101	097N30W18DACD	1937	Fenton 2	217DKOT	229	1984, 89
431306094192801	097N29W18BCC	1946	Lone Rock 1	344CDVL	167	1982, 88
432247094052802	099N28W24ADCA	1969	Lakota 2	344CDVL	211	1984, 89, 91
430340094252702	095N30W08BBCD	1958	Whittemore 2	344CDVL	286	1985
431407094022401	097N27W09ACB	1936	Titonka 1	344CDVL	300	1984
430506093593201	096N27W35DADB	1937	Wesley 2	344CDVL	302	1984
431154094130701	097N29W24CDCD	1965	Burt 3	360ODVC	600	1985
431737094125601	098N29W24ACBC	1960	Bancroft 2	364ODVCM	540	1985
			Lee County			
403226091252702	066N05W03CDAA	1985	Montrose 2	111ALVM	62	1987, 91
403745091174701	067N04W02CBBC	1991	Fort Madison 4	111ALVM	147	1992, 93, 94, 95, 96
403748091174301	067N04W02CBBA	1967	Fort Madison 1	111ALVM	149	1983, 85, 87, 91
403804091174001	067N04W02BBDC	1979	Fort Madison 2	111ALVM	161	1983, 85
403226091252701	066N05W03CDAA	1966	Montrose 1	112PLSC	62	1982
404605091310301	069N06W23BAAD	1972	Saint Paul 1	371JRDN	1830	1983
403839091333801	068N06W33CBBA	1969	Donnellson 4	371JRDN	1850	1986
404306091270201	068N05W05DAAC	1977	West Point 3	371JRDN	1910	1983

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Linn County			
415959091433101	083N08W13ACDB	1970	Cedar Rapids S9	111ALVM	58	1986, 87
415959091433001	083N08W13DBBB	1970	Cedar Rapids S7	111ALVM	63	1991
415959091410501	083N07W17DBBA	1984	Cedar Rapids E13	111ALVM	65	1991
420005091431201	083N08W13ACDB	1970	Cedar Rapids S6	111ALVM	65	1992, 93, 94, 95, 96
420031091415701	083N07W07DDDB	1980	Cedar Rapids W9	111ALVM	65	1991
420007091411801	083N07W17BDBB	1964	Cedar Rapids W1	111ALVM	66	1982, 86
420025091414601	083N07W17BBBB	1964	Cedar Rapids W3	111ALVM	68	1987, 88 (3), 89 (2), 90
415510091464801	082N08W16ABAB	1979	Fairfax 2	340DVSL	330	1990
421138091471801	085N08W09BAB	1966	Center Point 1	344SOLN	49	1982, 86, 87, 88 (3), 89 (2), 90
415518091230901	082N05W11DADD	--	Lisbon 3	350SLRN	180	1991
421420091251501	086N05W22CCCC	1910	Prairieburg 1	350SLRN	180	1984, 89, 91
423002091405101	084N07W32DACB	1976	Hiawatha 4	350SLRN	250	1990, 91
415541091230201	082N05W12BCBA	--	Lisbon 2	350SLRN	270	1991
421646091315101	086N06W10BADB	1910	Coggon 1	350SLRN	270	1988
421646091315102	086N06W10BADB	1910	Coggon 2	350SLRN	270	1990
420219091402802	084N07W33CCDB	1953	Hiawatha 2	350SLRN	285	1988
415526091225201	082N05W12CAC	1932	Lisbon 1	350SLRN	350	1984
415221091350801	082N06W31ACAA	1971	Ely 1	350SLRN	415	1986
421205091312401	085N06W03DABC	1963	Central City 2	355NIGR	104	1988
420200091363002	083N07W01BAAA	1953	Marion 2	355NIGR	441	1987, 90, 91
420901091373501	085N07W26AB	1961	Alburnett 1	358ALXD	400	1984, 90
415534091251501	082N05W10CBAA	1936	Mount Vernon 2	358KNKK	400	1991
415509091461701	082N08W16ABA	1959	Fairfax 1	358KNKK	410	1986
421723091465002	086N08W04DCDB	1965	Walker 2	371JRDN	1525	1986 (2)
			Louisa County			
410557091023701	073N02W25BBCC	1973	Oakville 1	110QRNR	126	1983, 85, 87
411539091221501	075N05W36AAD	1966	Columbus City 1	112AFNN	166	1985
411644091110702	075N03W22DCBD	1976	Grandview 2	112AFNN	174	1990
411644091110703	075N03W22DCBD	1975	Grandview 3	112AFNN	174	1992, 93, 94, 95, 96
411644091110701	075N03W22DCBD	1966	Grandview 1	112AFNN	176	1983, 85, 89
411053091111601	074N03W27	1984	Wapello (5)3	112PLSC	74	1990
411056091111501	074N03W27BDDD	1976	Wapello (3)2	112PLSC	77	1983, 85, 87, 91
411652091213801	075N04W19CDA	1947	Columbus Junction 2	112PLSC	81	1982, 85
411652091212801	075N04W19	1989	Columbus Junction 89-1	112PLSC	105	1990, 91
411652091213802	075N04W19CDA	1987	Columbus Junction 4	112PLSC	105	1987

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Louisa County—Continued			
411539091221701	0750536AC	1983	Columbus City 3	112PLSC	165	1990
411539091222001	075N05W36ACBB	1967	Columbus City 2	112PLSC	167	1983, 87
410543091151601	073N04W25ADDA	1963	Morning Sun 2	371JRDN	1819	1983
			Lucas County			
405858093175701	071N20W06ABDA	1956	Russell 1	360OVCB	2520	1992, 93
			Lyon County			
432023096002201	098N44W02ACCA	1935	George 2	110QRNR	30	1991
432636096100801	100N45W33BDBA	1972	Rock Rapids 6	111ALVM	26	1982, 91
432616096101101	100N45W33CACB	1978	Rock Rapids 11	111ALVM	27	1990, 91
432656095525701	100N43W26DDDB	1908	Little Rock 1	111ALVM	28	1982, 88, 91, 94
431645096141301	098N46W26DAAA	--	Doon Town Well	111ALVM	30	1982
432029095593401	098N44W01BDBB	1955	George 3	111ALVM	30	1982, 90
432807096092801	100N45W21DAA	1991	Rock Rapids 17	111ALVM	30	1994
432608096201501	100N47W36DCBD	1968	Lester 2	111ALVM	32	1982, 90, 91
432608096201502	100N47W36DC	1981	Lester (3) 1	111ALVM	32	1986, 89
432608096201503	100N47W36DCBD	1988	Lester (4) 2	111ALVM	32	1992, 93, 94, 95, 96
431646096142601	098N46W26ADCC	1967	Doon 3	111ALVM	35	1986
432018095594101	098N44W01BCDC	1978	George 4	111ALVM	37	1986, 88, 94
432030096175401	098N46W05AACC	1979	Alvord 3	111ALVM	37	1986, 87, 90
432622096101901	100N45W33CBAB	1925	Rock Rapids 2	111ALVM	38	1986, 87, 88 (3), 89 (3)
431646096142901	098N16W26ACDD	1976	Doon 4	111ALVM	50	1987, 90, 91, 94
431844096263501	098N47W18BDB	1941	Inwood 1	217DKOT	518	1985, 91
			Madison County			
411348093553101	074N27W11ABCA	1982	East Peru 1	111ALVM	22	1988
411047093493301	074N26W27DADA	1968	Truro 2	111ALVM	46	1982, 86, 89
411726093503201	075N26W15CCDA	1979	Saint Charles 3	111ALVM	51	1987, 88, 90
411047093493501	074N26W27DADA	1956	Truro 1	112PLSC	50	1991, 92
412923094072302	077N28W06CDCC	1941	Earlham 2	325CHRK	603	1991
			Mahaska County			
412115092391201	076N16W25CACD	1980	Oskaloosa 26	111ALVM	49	1990, 91
412117092392301	076N16W25CBDA	1974	Oskaloosa 22	111ALVM	50	1986
412114092393001	076N16W25CBCD	1991	Oskaloosa 30	111ALVM	55	1991
412938092380601	077N15W07BAAC	1966	New Sharon 2	111ALVM	61	1990, 91
412938092380201	077N15W07BABD	1960	New Sharon 1	111ALVM	65	1984, 86
411233092262201	074N14W14CADD	1983	Fremont 2, (83-1)	112PLSC	71	1991
411230092262201	074N14W14CDA	1971	Fremont 4, (71-2), 1	112PLSC	72	1986
			Marion County			
412803093182601	077N21W17CCAC	1967	Swan 1	111ALVM	34	1987
412144092574603	076N18W20CC	1957	Pella 5	111ALVM	35	1982
412132092575201	07618W29BCAC	1971	Pella Raney Well	111ALVM	40	1989, 91

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Marion County—Continued			
411855092552101	075N18W10BDCA	1977	Harvey 1	111ALVM	79	1984, 86, 90
411647092520601	075N17W19CBC	1966	Tracy 1	333MRMC	147	1988
411940093060101	075N20W01DAAA	1967	Knoxville 1	360ODVC	2290	1986
411213092531501	074N18W13CCCC	1972	Bussey 3	360OVCB	2262	1985
411548093020101	075N19W27CDDD	1972	Pershing Utility Cord	360OVCB	2340	1984
412310093160601	076N21W15BCDC	1967	Pleasantville 1	360OVCB	2405	1985
			Marshall County			
420612092593801	084N18W07BACD	1951	Albion 1	111ALVM	24	1990
420613092593601	084N18W07BACA	1969	Albion 2	111ALVM	26	1984, 86, 87, 88 (3), 89 (2), 90, 91
415423092470801	082N17W13CCCC	1942	Gilman 8	111ALVM	30	1988
420414092550801	084N18W23CBAA	1983	Marshalltown 10	111ALVM	49.8	1990
420145093100501	083N20W03ADBD	1955	State Center 3	112PLSC	32	1988
420648093092101	084N20W02CBBC	1954	Clemons 1	112PLSC	52	1984, 86
420405092545601	084N18W23CACA	1977	Marshalltown 8	112PLSC	223	1990, 93, 94, 95, 96
420410092543801	084N18W23DBAC	1977	Marshalltown 9	112PLSC	270	1991, 92, 93
415529093110801	082N20W09CADC	1987	Rhodes 2	112PLSC	278	1988
415534093111501	082N20W09CADC	1952	Rhodes 1	112PLSC	330	1985
420400092552401	084N18W22DDAA	1981	Marshalltown 6	330MSSP	148	1991
421117093002201	085N19W12ADCC	1962	Liscomb 2	330MSSP	148	1984, 88
420352092552401	084N18W22DDDD	1981	Marshalltown 14	330MSSP	160	1988
415614092520601	082N17W06DCAD	1979	Ferguson 2	339HMPN	160	1988, 91
415250092552701	082N18W27DADC	1947	Laurel 1	339HMPN	248	1988
420728093121301	085N20W32DCC	1934	Saint Anthony 1	339KDRK	438.5	1984
420020092465001	083N17W13BA	1955	Le Grand 2	339PPCH	100	1983, 86, 87, 88 (3), 89 (2), 90
420019092464901	083N17W13BBAD	1977	Le Grand 4	371JRDN	2200	1983
			Mills County			
410847095255801	073N40W03CDD	1984	Henderson 3	111ALVM	40	1994
410107095300001	072N41W24DAD	1965	Hastings 1	111ALVM	53	1990, 94
410114095300001	068N41W14CDBB	1965	Hastings 1	111ALVM	53	1985, 86, 87
410656095380202	073N42W23AAAC	1963	Silver City 2	111ALVM	54	1986, 92
410007095330501	072N41W27CDCC	1978	Malvern 11	111ALVM	56	1986, 90, 91, 94
410007095331901	072N41W27CCCC	1978	Malvern 10	111ALVM	59.5	1991
410656095380201	073N42W23AAAC	1978	Silver City 3	111ALVM	60	1990, 93, 94, 95, 96
410830095253801	073N40W10ACAA	1978	Henderson 2	111ALVM	66	1990
410830095253901	073N40W10ACAA	1963	Henderson 1	111ALVM	66	1986
410116095464101	072N43W22CAC	1972	Glenwood 3	112PLSC	93	1985, 87

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Mills County—Continued			
410117095465101	072N43W22CBD	1972	Glenwood 2	112PLSC	93	1994
410113095242801	072N40W23DACC	1956	Emerson 2	112PLSC	117	1994
410113095242901	072N40W23DACC	1956	Emerson 2	112PLSC	117	1986
410108095241901	072N40W23DDAC	1959	Emerson 3	112PLSC	126	1990
			Mitchell County			
431337092462801	097N16W07DD	--	Orchard 2	340DVSL	355	1989
432610092465801	100N16W31BDDC	1915	Stacyville 1	344CDVL	117	1988
432241092550802	099N18W24CABA	1960	Saint Ansgar 2	344CDVL	240	1984, 89, 91, 92, 93, 95
432150092332401	099N15W25DABA	1917	Riceville 1	344CDVL	515	1984, 92, 93
431337092461901	097N16W07DDDD	1959	Orchard 1	344RPID	220	1985
431654092484501	098N17W26ADBC	1964	Osage 5	364GLEN	650	1984, 90, 92, 93
431701092484101	098N17W25BBBB	1912	Osage 2	364STPR	810	1984
			Monona County			
420245095422001	084N42W35BCD	1949	Ute 2	111ALVM	57.5	1990
420421095544801	084N44W24DBBC	1990	Castana 3	111ALVM	60	1994
420420095545702	084N44W24CAAC	1963	Castana 2	111ALVM	63	1986, 87, 90
420955095475601	085N43W24BDBA	1973	Mapleton 5	111ALVM	63.5	1986, 89, 92, 94, 95
420735096085701	084N46W01BABC	1974	Whiting 3	111ALVM	94	1982, 86, 89, 90
415558096044801	082N45W09ADAD	1973	Blencoe 2	111ALVM	100	1990, 94
415558096044901	082N45W09ADAD	1964	Blencoe 1	111ALVM	100	1982, 86, 89, 91
420140096054002	083N45W04CBDB	1964	Onawa 6	111ALVM	112	1994
420140096054001	083N45W04CBDB	1964	Onawa 5	111ALVM	113.5	1982, 86, 89, 90
420736096084501	084N46W01ABB	1949	Whiting 1	111ALVM	115	1994
420419095545701	084N44W24CAAC	1957	Castana 1	111MPRV	58	1982
420950095480201	085N43W24BAAA	1967	Mapleton 4	111MPRV	72.5	1982, 90
420241095422001	084N42W35CABB	1974	Ute 3	111SDRV	58	1982, 86, 87, 88 (3), 89 (3), 93, 94, 96
415518095510001	082N43W09DDCD	1932	Moorhead 1	112PLSC	76	1982, 89, 94
415518095510002	082N43W09DDCD	1957	Moorhead 2	112PLSC	76	1986, 90
415901095465601	083N42W19CACC	1974	Soldier 4	112PLSC	172	1982, 86, 89, 94
			Monroe County			
			None			
			Montgomery County			
415559094591501	071N36W21DDAB	1974	Villisca (7), 1	111ALVM	41.5	1987, 88
415604094593701	071N36W21DBC	1975	Villisca (8), 3	111ALVM	41.5	1988
405559094591501	071N36W21DDAB	1974	Villisca 7-3	111ALVM	42	1985
405558094592501	071N36W21DCAA	1954	Villisca 4	111ALVM	50	1991
415613094591201	071N36W21DAAB	1981	Villisca (10), 6	111ALVM	50	1990

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Montgomery County—Continued			
410857095094201	073N38W01DBDC	1935	Elliott 1	112PLSC	56	1987, 88, 91
405855095061201	071N37W04ADBC	1970	Stanton 2	217DKOT	150	1991
405850095061701	071N37W04ACD	1953	Stanton 1	217DKOT	158	1982, 88, 92, 93, 95
410216095113401	072N38W14CBBB	1955	Red Oak 4	217DKOT	160	1985, 88, 90
			Muscatine County			
412240091040701	076N02W15DCC	--	Muscatine 15	111ALVM	26	1982
412321091034801	076N02W15AACB	1958	Muscatine 5	111ALVM	62.7	1985, 87, 90
412234091034201	076N02W22AAA	--	Muscatine 14	111ALVM	74	1982
412321091040101	076N02W15ABDB	1965	Muscatine 9	111ALVM	79	1991
412319091034801	076N02W15AACD	1965	Muscatine 12	111ALVM	79.5	1991
412329091041301	076N02W15BAAA	1969	Muscatine 19	111ALVM	83	1985
412213091063601	076N02W20CAAA	1981	Muscatine 26	111ALVM	140	1985, 91
413455091012601	078N02W01DCAA	1981	Wilton 3	112PLSC	195	1985, 91
413428091094601	078N03W11DBBB	1938	Atalissa 1	350SLRN	295	1985, 92
413521090511001	078N01E04CAA	1948	Stockton 1	355HPKN	247	1993, 95
413336091161501	078N04W13CBB	1964	West Liberty 4	371JRDN	1655	1991
413402091155501	078N04W13BABA	1959	West Liberty 3	371JRDN	1663	1983
			O' Brien County			
430517095364602	096N40W31DBCD	--	Primghar 3	111ALVM	24	1982, 86, 87
431157095502901	097N42W29BBBC	1949	Sheldon 5	111ALVM	24	1993, 94
431151095505101	097N42W30ABDD	1929	Sheldon 2	111ALVM	27	1995, 96
431159095500901	097N42W29BABA	1959	Sheldon 8	111ALVM	30	1982, 85, 86
425859095403201	094N41W03CDDC	1955	Paullina 3	111ALVM	35	1985
431203095513001	097N42W19CCDC	1979	Sheldon 10	111ALVM	39	1986, 89, 90
430013095385902	095N41W35DBA	1978	Paullina 5	111ALVM	60	1986, 89
430014095385801	095N41W35DBAA	1978	Paullina 4	111ALVM	60	1991, 92
431147095504701	097N42W30ADBB	1932	Sheldon 3	112PLSC	28	1991
431045095413401	097N41W33ACCC	1980	Sanborn 4	112PLSC	75.5	1986, 89, 90, 91
431045095413801	097N41W33BDDD	1969	Sanborn 2	112PLSC	80	1982, 85
425824095300901	094N39W07CAB	1953	Sutherland 3	210CRCS	471	1983
431140095505801	097N42W30ACDB	1963	Sheldon 9	210CRCS	615	1983
431035095283201	097N39W32ACC	1960	Hartley 3	217DKOT	590	1983
			Osceola County			
432314095320001	099N40W14DCCC	1958	Ocheyedan 1	110QRNR	34	1982, 85
432314095320201	099N40W15BBBB	1958	Ocheyedan 3	110QRNR	34	1988
431703095272401	098N39W28ABBB	1972	Melvin 2	110QRNR	37	1982, 85, 86, 89, 91
431842095473301	098N42W15ACBB	--	Ashton Town Well No 1	110QRNR	68	1982
432646095260201	100N39W27DCDB	1960	Harris 2	112PLSC	90	1982, 85, 86, 89

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Osceola County—Continued			
432340095450001	099N42W13DBBC	1960	Sibley 3	217DKOT	740	1983
432345095443701	099N42W13DAAC	1979	Sibley 4	217DKOT	759	1983
			Page County			
403906095015001	067N37W01AAAA	1985	Shambaugh 3	111ALVM	30	1988, 90, 92, 93, 94, 95
403906095015101	067N37W01AAA	1973	Shambaugh 2	111ALVM	30	1996
403445095011501	067N36W31BAAB	1967	Braddyville 2	111ALVM	32	1988
404957095183501	070N39W27	1982	Essex 5	111ALVM	44.5	1986
403712095070601	067N37W17BDAB	1968	College Springs 1	111ALVM	52	1988
405006095175601	070N39W26CAAD	1968	Essex 4	111ALVM	53.5	1991
404635095224901	069N39W18CBDA	1954	Shenandoah 17	111ALVM	73	1986
404958095175601	070N39W26CADD	1954	Essex 3	111ALVM	75	1990
403657095072701	067N37W17CBBA	1971	College Springs 3	112PLSC	42	1991
			Palo Alto County			
431429094450601	097N33W09BABB	1964	Graettinger 4	111ALVM	30.5	1984, 86
430546094411601	096N33W36ABBC	1979	Emmetsburg 4	111ALVM	35	1987, 90
430625094411701	096N33W25ACBC	1985	Emmetsburg 5	111ALVM	37	1991
431421094445201	097N33W09ABCC	1978	Graettinger 5	112PLSC	30	1991
430624094411601	096N33W25ACBC	1944	Emmetsburg 3	112PLSC	38	1984
425611094410501	094N33W25ABA	1947	Mallard 3	210CRCS	205	1984, 89
425731094270801	094N31W13ACCC	1949	West Bend 2	217DKOT	115	1992, 93
425608094405701	094N33W25AABC	1961	Mallard 4	217DKOT	192	1991
430218094495501	095N34W23BBAA	1921	Ayrshire 1	217DKOT	359	1984
430745094541101	096N34W18DCAC	1947	Ruthven 2	217DKOT	511	1986
430210094500001	095N34W23BBAB	1962	Ayrshire 2	364STPR	900	1984
425735094270201	094N31W13AC	1959	West Bend 4	371JRDN	1360	1985
			Plymouth County			
423537095583901	090N43W19CCBB	1956	Kingsley 1	110QRNR	37	1982, 91, 92, 93, 94, 95, 96
424306096145701	091N46W11BBDC	1960	Merrill 2	110QRNR	42.5	1985
423737096173201	090N46W08ADDD	1956	Hinton 2	110QRNR	52	1982, 86, 87
424838096161001	092N46W03CCAB	1971	Brunsville 3	111ALVM	32	1982, 85, 87, 90
423531095593901	090N44W24CC	1981	Kingsley 3	111ALVM	34.5	1987, 90
424916095581201	092N43W06BABD	1968	Remsen 5	111ALVM	35	1985, 91
424921095581501	092N43W06BABA	1956	Remsen 3	111ALVM	35	1982, 87, 88 (3), 89 (3), 90
423536095583501	090N43W19CCBB	1979	Kingsley 2	111ALVM	41	1985
424528096362001	092N49W27DAAA	1965	Westfield 1	111ALVM	41	1985, 87, 88 (2), 89 (3)
424305096145301	091N46W11BBDD	1967	Merrill 3	111ALVM	45	1982, 87, 88 (3), 89 (3), 90, 94

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Plymouth County—Continued			
424528096362501	092N49W27DAAB	1980	Westfield 2	111ALVM	47	1983, 87, 90
424921096334701	093N48W31CCDD	1969	Akron 5	111ALVM	47	1982, 87
424948096332901	093N48W31BDDC	1959	Akron 4	111ALVM	49	1983, 85, 87, 88 (3), 89 (3), 90, 94
424911096033001	092N44W05AA	1953	Oyens 1	217DKOT	215	1983, 89, 90, 91
423650096175701	090N46W17ACAC	1974	Hinton 4	217DKOT	270	1983, 86, 91
424756096095501	092N45W09CAAD	1972	Le Mars 8	217DKOT	354	1983
			Pocahontas County			
425240094371002	093N32W15BBBB	1977	Plover 2	112PLSC	46	1987, 88
423449094505002	090N34W27CADA	1969	Fonda No 1	112PLSC	120	1984, 86
423750094355804	090N32W10AAAD	1970	Palmer 5	112PLSC	165	1984, 87, 90
425001094421701	093N33W35ABAC	1963	Havelock 3	217DKOT	190	1984, 88
425058094510802	093N34W27BBAA	1961	Laurens 5	217DKOT	229	1987, 91
424406094400101	092N32W31DCBD	1958	Pocahontas 3	217DKOT	255	1984
424409094395801	092N32W31DCAB	1960	Pocahontas 4	217DKOT	257	1990
425058094510801	093N34W27BBAA	1961	Laurens 6	217DKOT	367	1984, 91
424907094313001	092N31W05AAC	1947	Rolfe 3	330MSSP	185	1984, 88, 90, 91, 92
423930094535801	091N34W31AACC	1963	Varina 3	330MSSP	314	1984
			Polk County			
413418093432403	078N25W10CDDC	1951	West Des Moines 6	111ALVM	35	1985, 87
413342093432801	078N25W15CAAC	1954	West Des Moines 9	111ALVM	42	1987, 88 (3), 89 (2), 90
413350093432801	078N25W15BDDC	1952	West Des Moines 8	111ALVM	42	1990
414409093241001	080N22W15CBDC	1981	Bondurant 4	111ALVM	70	1985, 87
414409093241601	080N22W15CBCD	1981	Bondurant 3	111ALVM	70	1990, 91
414634093423601	081N25W01BABA	1978	Polk City 3	112PLSC	60	1990, 91
414625093424301	081N25W01BACC	1951	Polk City 1	112PLSC	66	1991
414627093424302	081N25W01BACB	1980	Polk City 4	112PLSC	68.5	1987
414117093474101	079N25W06AAAA	1960	Grimes 2	112PLSC	72	1986, 90
414627093424301	081N25W01BACB	1967	Polk City 2	112PLSC	85	1984
414816093361701	081N24W26AABC	1975	Alleman 2	112PLSC	235	1984, 88
414738093313601	081N23W28DCD	1966	Elkhart 2	112PLSC	280	1984, 88
415147093414102	081N24W06BBAB	1951	Sheldahl 1	112PLSC	310	1984
413931093292001	079N23W11DCDD	1976	Altoona 3	360OVCB	2530	1984
414356093363601	080N24W23	1961	Ankeny 4	360OVCB	2715	1984
413351093432301	078N25W15ABCC	1971	West Des Moines 2	371JRDN	2480	1991
			Pottawattamie County			
411453095251201	075N40W35CCBA	1968	Carson (4), 2	111ALVM	24	1986, 90
411501095251301	075N40W35CBCA	1975	Carson (5) 3	111ALVM	25	1991, 92, 94, 95, 96
411445095251601	074N50W35	1963	Carson 2	111ALVM	27	1986

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Pottawattamie County—Continued			
412711095210301	077N39W17ADCC	1978	Avoca 5	111ALVM	30	1994
412813095210701	077N39W17ACDD	1978	Avoca 4	111ALVM	30	1991
411837095245401	075N40W11CAAB	1964	Oakland (8), 5	111ALVM	33	1991
411151095252401	074N40W22ADDA	1989	Macedonia 2	111ALVM	34	1993
412334095214201	076N39W08CCAA	1967	Hancock 4	111ALVM	34	1991
412812095211201	077N39W17ACDC	1955	Avoca 2	111ALVM	37.5	1986 (2)
411154095252501	074N40W22ADDB	1962	Macedonia (2), 3	111ALVM	38	1991
411201095252801	074N40W22AADC	1954	Macedonia 1	111ALVM	39	1985, 86, 90, 94
412813095210901	077N39W17ACDC	1975	Avoca 3	111ALVM	39.5	1990
411838095252801	075N40W10DAAB	1979	Oakland 11	111ALVM	42	1985, 86, 90, 91, 94
412331095215201	076N39W08CCCA	1978	Hancock 5	111ALVM	45	1990
412327095215401	076N39W08CCCC	1978	Hancock 6	111ALVM	48	1985, 86, 94
412812095322701	077N41W15ACDD	1940	Minden 2	111ALVM	48	1986, 88, 91, 94
412655095365701	077N42W24DDCC	1953	Neola (2), 1	111ALVM	53	1990, 91
411649095525001	075N44W22DADA	1957	Council Bluffs 1	111ALVM	121	1988, 94
412754095323701	077N41W15DCBD	1905	Minden (1), (2), 9	112PLSC	51	1991
412326095410101	076N42W16BABB	1956	Underwood 1	112PLSC	80	1991, 94
412144095515501	076N44W23DCDD	1971	Crescent 1	112PLSC	148	1988, 90, 94
412328095411901	076N42W09CCCC	1974	Underwood 3	112PLSC	156	1986, 90
411352095360801	074N41W07ABBD	1981	Treynor 4	112PLSC	226	1983
411356095360801	074N41W07ABBA	1979	Treynor 3	112PLSC	250	1983, 85, 87
412654095371201	077N42W24DCCD	1978	Neola 4	217DKOT	114	1985, 94
412653095370901	077N42W25ABBC	1966	Neola (4), 3	217DKOT	122.5	1982, 87
413449092223901	078N13W08AACA	1940	Deep River 1	112PLSC	55	1984, 85, 89
414337092265707	080N14W23BDB	1954	Brooklyn 3	112PLSC	110	1982, 84, 87
414645092203801	081N13W34DCA	1956	Hartwick 1	112PLSC	410	1984, 87
414224092333201	080N15W26DBDC	1979	Malcom 4	330MSSP	220	1984, 89
413429092420402	078N16W09ADDD	1968	Searsboro 2	338KKUK	120	1988
413429092420401	078N16W09ADDD	1955	Searsboro 1	338KKUK	200	1984, 85, 91
414323092271601	080N14W23ABCD	1961	Brooklyn 5	371JRDN	2040	1984
			Ringgold County			
404835094240201	069N31W03AABB	1967	Clearfield 1	111ALVM	41	1986, 90, 91
404831094201102	069N30W05BBCD	1978	Diagonal 5	111ALVM	56	1984, 86, 90
			Sac County			
421909095162201	087N38W28DBBA	1972	Odebolt 7	112PLSC	30	1987
422739095084201	088N37W03CCAC	1914	Early No 2	112PLSC	30	1986
422739095084202	088N37W03CCAC	1957	Early 1	112PLSC	33	1991
421909095162301	087N38W28DBBB	1972	Odebolt 6	112PLSC	42	1991

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Sac County—Continued			
421617095051001	086N36W07CDBB	1971	Wall Lake 3	112PLSC	43	1982, 86, 87, 91, 96
422644095085501	088N37W09DDAD	1973	Early 2	112PLSC	44	1982, 87, 88 (3), 89 (3)
421808095025301	087N36W33CBAD	1956	Lake View 2	112PLSC	48	1991
421826095025101	087N36W33BCAA	1978	Lake View 3	112PLSC	115	1982, 86, 87, 88 (3), 89 (3)
422447094594101	088N36W26AAAC	1969	Sac City 3	112PLSC	240	1983, 86, 89
422449094595201	088N36W26ABAD	1960	Sac City 2	112PLSC	240	1983, 90
423057095052201	089N36W22BBCA	1966	Nemaha 2	112PLSC	275	1983, 86, 91
421501094522801	086N35W24BBD	1952	Auburn 3	217DKOT	237	1983, 89
423013095173701	089N38W26ABAA	1940	Schaller 1	217DKOT	353	1983
421831095152101	087N38W34BADD	1976	Odebolt 8	360OVCB	2131	1986
422525094513401	088N35W24ADAC	1954	Lytton (2), 3	364STPR	1550	1983
			Scott County			
414422090464701	080N02E18	1916	Dixon 1	112PLSC	108	1984, 89 (2)
413459090463502	078N02E06CDD	1943	Walcott 2	350SLRN	118	1982, 88
414251090523401	080N01E20CC	1949	New Liberty 1	350SLRN	205	1984, 89
412728090431701	077N02E22CAB	1958	Buffalo 1	350SLRN	405	1984
413521090171001	078N05E03CAB	1983	Le Claire 4	350SLRN	421	1986
414017090203701	079N05E02DC	1963	Princeton 1	350SLRN	455	1986
413923090350901	079N03E11CCBD	1929	Eldridge 2	350SLRN	515	1992, 93, 95
413855090430701	079N02E15BDC	1955	Maysville 1	355NIGR	160	1984, 88
413500090462401	078N02E06DCC	1966	Walcott 3	355NIGR	230	1986, 90, 91
414151090345401	080N03E35BAB	1963	Long Grove 1	355NIGR	470	1984
413933090351301	079N03E11CBC	1955	Eldridge 3	355NIGR	490	1985, 86
413040090455001	078N02E32CC	1971	Blue Grass (2), 1	364PLVL	640	1984, 92, 93, 95
			Shelby County			
413824095185801	079N38W19BDDA	1965	Harlan 16	111ALVM	35	1982
413810095185401	079N38W19DBCC	1981	Harlan 27	111ALVM	36	1985, 87, 88 (3), 89 (2), 90
413816095185801	079N38W19CAAD2	--	Harlan 24	111ALVM	36	1991
413823095190501	079N38W19BDCA	1965	Harlan 11	111ALVM	36.5	1991
413842095184201	079N38W19ABAB	1978	Harlan 20	111ALVM	36.5	1985, 87, 90, 91
414407095284101	080N40W14CCBD	1967	Panama 1	111ALVM	38	1982, 85, 91
414350095283101	080N40W23BBDA	1968	Panama 3	111ALVM	39.5	1987, 90
414715095121801	081N37W31BCAB	1956	Irwin 3	111ALVM	39.5	1990
414622095250101	080N39W05ACAA	1968	Earling 1	111ALVM	40	1982, 85, 87
413437095034401	078N37W11AAAB	1967	Elk Horn 9	111ALVM	42	1982, 85, 90
413434095033701	078N37W11AAAD	1968	Elk Horn 10	111ALVM	45	1987, 91
414934095201701	081N39W13CACB	1944	Defiance West	111ALVM	45	1991

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Shelby County—Continued			
413049095254501	078N39W34ACCD	1968	Shelby 5	111ALVM	48.5	1987, 92, 93, 94, 95, 96
414932095201902	081N39W13CACB	1981	Defiance 4	111ALVM	50	1985, 87, 90
413048095260701	078N40W34BDCD	1954	Shelby 3	111ALVM	52	1982, 85, 90
414729095124001	081N38W36AAAB	1946	Irwin 2	111ALVM	54	1985, 91
414340095160301	080N38W21ADAA	1972	Kirkman 1	111ALVM	55	1985, 89
413055095271001	078N40W33BDAC	1944	Shelby 2	111ALVM	68	1991
414932095201801	081N39W13CACB	--	Defiance No 2	111WNRV	42	1982
414724095124001	081N38W36AAAB	1969	Irwin 4	111WNRV	47	1987
414627095245501	080N39W05BACA	1974	Earling 5	112PLSC	40	1987
414625095245501	080N39W05BACD	1968	Earling 2	112PLSC	41	1990
414700095251901	081N39W32CBBB	1981	Earling 7	217DKOT	390	1982
			Sioux County			
430017096285301	095N48W35BDDC	1931	Hawarden 2	110QRCU	36	1992, 93, 94, 95, 96
425756096104501	094N45W17AACA	1915	Maurice 1	110QRNR	20	1982, 87, 94
431441095562501	097N43W04CCCD	1959	Matlock 3	110QRNR	23	1982, 88, 91
431504096000901	097N44W02ADCD	1976	Boyden 3	110QRNR	37	1982, 86, 87
430431095542101	095N43W03DBAC	1961	Hospers 3	110QRNR	47	1982, 87
431239096175001	097N46W20ADAB	1960	Rock Valley 3	110QRNR	51	1982
430108096093801	095N45W28DBAA	1970	Orange City WB 2	110QRNR	69	1985, 87
431238096170501	097N46W21ACBB	1968	Rock Valley 4	110QRNR	70	1994
425942096002801	094N44W02BADA	1945	Alton 3, West	111ALVM	26	1994
431506096000801	097N44W02ADDC	1977	Boyden 3	111ALVM	31	1990
425946096292901	094N48W03AAAB	1960	Hawarden 6	111ALVM	37.5	1986, 87, 88 (3), 89 (3), 90
430503096062001	096N45W36CDDA	1953	Sioux Center (3), 1	111ALVM	39	1982
430459096061901	095N45W01BAAD	1960	Sioux Center (5), 3	111ALVM	40	1986, 89, 90
431507096000801	097N44W02AC	1982	Boyden 4	111ALVM	41	1991
425943096294301	094N48W03ABAD	1950	Hawarden 3	111ALVM	42.5	1991
425948096295401	094N48W03ABBA	1967	Hawarden 7	111ALVM	44	1982, 87
430424096062701	095N45W01CDAB	1968	Sioux Center (7)5	111ALVM	44	1994
430416096063701	095N45W01CDCB	1976	Sioux Center (10), 8	111ALVM	49	1991
425941096002701	094N44W02ABCB	1939	Alton 2	112PLSC	30	1982, 86, 87
431228096173801	097N46W21BCCC	1977	Rock Valley 6	112PLSC	78	1986, 89
425904095522801	094N43W01CDBC	1959	Granville 2	112PLSC	480	1985
425749096104201	094N45W17AACD	1962	Town of Maurice No 3	217DKOT	252	1985
425820096184601	094N46W07DAD	1946	Ireton 3	217DKOT	543	1985
431133096075902	097N45W26CBAA	1959	Hull 4	217DKOT	665	1985

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Story County			
415658093395401	082N24W05ABA	1939	Kelley 1	112KNSN	217	1984, 86
415305093235901	082N22W27CAB	1978	Maxwell 3	112PLSC	79	1987
415357093314101	082N23W21DBAB	1973	Cambridge 2	112PLSC	80	1984, 86
420936093175201	085N21W21ACCA	1959	Zearing 2	112PLSC	105	1990
420932093175101	085N21W21ACCD	1965	Zearing 3	112PLSC	110	1984, 86
415307093234701	082N22W27BDD	1946	Maxwell 2	112PLSC	122	1982, 85, 87, 90
420141093365701	083N24W02CBAA	1968	Ames 12	112PLSC	128	1985, 91
420141093363601	083N24W02DBBB	1966	Ames 9	112PLSC	134	1982, 85
420130093380901	083N24W03CDBB	1982	Ames 17	112PLSC	147	1987, 90, 91
415252093411401	082N24W30DCBB	1945	Slater 1	112PLSC	180	1992, 93, 94, 95, 96
415253093411301	082N24W30DCBB	1957	Slater 2	112PLSC	180	1984, 86
415329093360801	082N24W26AAB	1948	Huxley 2	112PLSC	254	1987
420628093390001	084N24W04CDDD	1914	Gilbert 1	330MSSP	160	1988
421007093290201	085N23W14DDA	1940	Roland 2	330MSSP	255	1990
421110093351401	085N24W12DBA	1945	Story City 2	330MSSP	261	1984
421011093300501	085N23W14CCBB	1930	Roland 1	330MSSP	660	1988
420059093190301	083N21W08ACCA	1959	Colo 3	330MSSP	775	1984
415403093181001	082N21W21BDCA	1977	Collins 3	371JRDN	2535	1984, 85
			Tama County			
421120092430403	085N16W09ACC	1986	Gladbrook 8	111ALVM	34	1987(2)
415502092240105	082N13W18AAC	1963	Chelsea 1	111ALVM	36	1985, 90
415442092180201	082N13W13DACB	1977	Belle Plaine 5	111ALVM	37	1991
415502092240104	082N13W18AAC	1961	Chelsea 2	111ALVM	40	1982, 87, 91
415417092180101	082N13W24AAAD	1961	Belle Plaine 4	111ALVM	42	1992, 93, 94, 95, 96
415422092180101	082N13W13DDDD	1945	Belle Plaine 2	111ALVM	42	1983, 91
415426092175901	082N13W13DDAD	1950	Belle Plaine 3	111ALVM	42	1983, 87
415753092350201	083N15W27CDD	1966	Tama 5	111ALVM	43	1983, 87, 92, 93, 94, 95, 96
415749092345301	083N15W34ABBB	1966	Tama 4	111ALVM	44	1983, 85, 91
421122092430401	085N16W09BDDA	1960	Gladbrook 4	111ALVM	45	1984
421120092430401	085N16W09BDDD	1965	Gladbrook 5	111ALVM	52	1984
421122092431102	085N16W09ACC	1953	Gladbrook 3	112KNSN	52	1985
415852092424901	083N16W21DCAB	1970	Montour 2	112PLSC	46	1985, 87, 88 (3), 89 (2), 90
415857092430501	083N16W21DBC	1947	Montour 1	112PLSC	50	1982
420533092403802	084N16W14ABA	1912	Garwin 1	341LMCK	170	1985
420533092403801	084N16W14ABA	1943	Garwin 2	341LMCK	171	1984, 88
420504092240301	084N13W18	1955	Clutier 1	344CDVL	290	1984, 86, 92, 93

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Tama County—Continued			
421135092275002	085N14W10ABCD	1923	Traer 2	344CDVL	350	1984, 89
421549092413801	086N16W15ADA	1950	Lincoln 1	344CDVL	528	1984
420029092190101	083N13W12	1900	Elberon 1	350SLRN	635	1984
415935092351801	083N15W15CCDC	1977	Toledo Jordan 2	371JRDN	1990	1985
421126092273801	085N14W10ABCD	1963	Traer 3	371TMPL	1813	1984
			Taylor County			
404501094444901	069N34W27ACBC	1970	Gravity 3	111ALVM	35	1986, 90
404454094372901	069N33W27ADDD	1971	Conway 1	112PLSC	56	1983, 86, 87, 88 (3), 89 (3)
403659094285301	067N32W12CAAD	1960	Blockton 1	112PLSC	271	1983, 85, 91, 92, 93, 94, 95, 96
			Union County			
410625094074901	073N29W24ADDC	1971	Lorimor 1	111ALVM	30	1987, 90, 91
410625094074701	073N29W24ADDD	1975	Lorimor 2	111ALVM	31	1984
			Van Buren County			
403844091442901	068N08W350ABB	1941	Farmington 1	112PLSC	38	1983, 86, 88 (3), 89 (2), 90
403926092094902	068N11W30AACB	1967	Milton 3	112PLSC	110	1982, 89
404005092094901	068N11W30ABBB	1961	Milton 2	112PLSC	110	1986, 90
404150091483001	068N08W08CD	1949	Bonaparte 1	330MSSP	205	1983
405001092052201	070N11W26DBAC	1970	Douds 1	330MSSP	370	1983
405030092050501	070N11W26AAAB	1970	Douds 2	330MSSP	380	1983
405120091500401	070N09W24A	1972	Stockport 1	360OVCB	1880	1983
404418091575201	069N10W36BBAD	1979	Keosauqua 3	371JRDN	1855	1983
			Wapello County			
410907092375101	073N15W06CADD	1970	Eddyville 2	111ALVM	30	1986, 87, 88 (3), 89 (2), 90, 91, 93, 94
410905092375901	073N15W06CACD	1952	Eddyville 1	111ALVM	36.5	1983, 92, 95, 96
405500092121501	071N12W26CBAD	1961	Eldon 8	360OVCB	1901	1983, 92, 93
			Warren County			
413040093290501	078N23W34DDBD	1979	Carlisle 5	111ALVM	30	1990, 91, 92, 94, 95, 96
413031093285501	077N23W03AAAA	1951	Carlisle 2	111ALVM	43	1993
412220093441801	076N25W21DBAC	1976	Martensdale 2	111ALVM	45	1984, 86
413035093285501	077N23W03DDDD	--	Carlisle No 3	111ALVM	48	1982
413037093290301	078N23W34DDCA	1971	Carlisle 4	111ALVM	50	1985, 87
411820093441201	075N25W16ABA	1959	Saint Marys 1	112PLSC	29	1984, 93, 94, 95
411342093432601	074N25W10BDC	1969	New Virginia 2	112PLSC	48	1982
411336093433101	074N25W10CAC	1979	New Virginia 4	112PLSC	51	1987
411806093440501	075N25W16ADCA	1979	Saint Marys 2	112PLSC	55	1987, 88 (3), 89 (2), 90
412736093241301	077N22W21BCBD	1978	Hartford 4	367PRDC	2135	1985, 91
			Washington County			
412856091430601	077N08W13AABB	1972	Kalona 3	112PLSC	58	1983, 89
412855091430001	077N08W13AABA	1963	Kalona 2	112PLSC	110	1983

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Washington County—Continued			
412849091343301	077N06W17BBDD	1973	Riverside 6	112PLSC	225	1983, 88, 91, 94
412850091342901	077N06W17BBA	1961	Riverside 5	112PLSC	250	1992, 93, 95, 96
412750091495201	077N09W24AAD	1934	Wellman 1	339WSVL	110	1990
412013091485701	076N08W31DDCC	1957	West Chester 1	339WSVL	243	1983, 89, 90, 92, 93, 95
411735091333801	075N06W21BBBB	1977	Ainsworth 5	360OVCB	1820	1983, 87
412740091500001	077N09W24ACBD	1955	Wellman 3	371JRDN	1715	1983
			Wayne County			
			None			
			Webster County			
422128094030101	087N28W12DACD	1963	Lehigh 3	112PLSC	35	1986
423517094010403	090N27W22DBCC	1978	Vincent 3	112PLSC	100	1984
423512094202201	090N30W25BBAA	1956	Clare 1	210CRCS	232	1984, 89
423650094085501	090N28W15BBCB	1973	Badger 3	330MSSP	548	1983
423028094115101	089N28W19CAA	1931	Fort Dodge 12	339KDRK	541	1992, 93, 95
423018094120101	089N28W19CACC	1930	Fort Dodge 9	339KDRK	553	1984, 91
422615094175801	088N30W14AAAD	1957	Moorland 1	339KDRK	730	1984, 91
423517094010401	090N27W22DCC	1960	Vincent 2	340DVNN	745	1984, 86
422803093591601	088N27W03BBC	1945	Duncombe 2	340DVNN	974	1984
422132094030401	087N28W12DACA	1937	Lehigh 2	340DVNN	1005	1991
422521094090902	088N28W19ACBA	1978	Otho 3	340DVNN	1050	1985
421552094103702	086N29W13BACC	1955	Harcourt 1	340DVNN	1245	1985, 91
421600094042001	086N28W14AB	1952	Dayton 3	340DVNN	1250	1984
423019094214301	089N30W23CBC	1964	Barnum 1	341LMCK	850	1985
423043094120401	089N28W19BDBB	1962	Fort Dodge 16	360OVCB	1830	1991
423014094114902	089N28W19CAAD	1949	Fort Dodge 15	360OVCB	2307	1984
422132094030402	087N28W12DACA	1978	Lehigh 4	371JRDN	1923	1984
			Winnebago County			
431556093375401	098N24W26DDCC	1934	Forest City 2	344CDVL	142	1982, 85, 89, 90, 92, 93
432851093551801	100N26W16ABCD	1939	Rake 1	360ODVC	200	1982, 86
431616093383501	098N24W26DCDC	1973	Forest City 3	360ODVC	305	1985
432016093380301	098N24W01BCBD	1972	Leland 1	360ODVC	322	1983, 91, 92
432218093462301	099N25W23CCCC	1915	Thompson 1	361MQKT	249	1983, 87
432323093571601	099N26W18DACD	1964	Buffalo Center 2	364GLEN	465	1985
			Winneshiek County			
431814091474501	098N08W16CACA	1948	Decorah 1	111ALVM	62	1988
431816091474401	098N08W16CABD	1957	Decorah 2	111ALVM	67	1982, 86
431829091472001	098N08W16ACAD	1980	Decorah 7	111ALVM	72	1990
431828091473201	098N08W16ACBC	1972	Decorah 6	111ALVM	82	1992, 93, 94, 95, 96
431103091515501	097N09W26	1963	Calmar 2	340DVNN	700	1986

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Winneshiek County—Continued			
431747091592601	098N10W23ABCA	1930	Ridgeway 1	344CDVL	192	1986, 88
431818091474301	098N08W16CAAB	1962	Decorah 3	364STPR	63	1991
430843091555601	096N09W09DBCC	1961	Fort Atkinson 2	364STPR	480	1986
			Woodbury County			
422831095465101	089N42W34DDDD	1927	Correctionville 1 E	111ALVM	26	1987
422831095465102	089N42W34DDDD	1927	Correctionville 1 W	111ALVM	26	1992, 93, 94, 95, 96
423242095521501	089N43W12BADB	1920	Pierson 1	111ALVM	26	1984, 86, 88 (3), 89 (3), 90
423237095521101	089N43W12BADD	1956	Pierson 2	111ALVM	34	1991
422759095402502	088N42W01ADCC	1959	Cushing 2	111ALVM	36	1987, 88 (3), 89 (3)
422924096042001	089N44W29CCDC	1924	Moville 1	111ALVM	36	1991
422759095402501	088N42W01ADCC	1950	Cushing 1	111ALVM	40	1984, 86, 90
422838095470501	089N42W34DDBC	1979	Correctionville 3	111ALVM	48	1990
422924096041801	089N44W29CCDD	1934	Moville 2	111ALVM	49	1985, 88, 90, 94
421405095433001	086N42W27BCDA	1939	Danbury (3) 1	111ALVM	61.5	1987, 88 (3), 89 (3), 90
421705095533601	086N43W06DCCB	1954	Oto 2	111ALVM	65	1984, 90, 94
421705095533602	086N43W06DCCD	1984	Oto 3	111ALVM	65	1986, 91
421406095433701	086N42W27BCCA	1955	Danbury (4) 2	111ALVM	68	1984, 86, 94
422927096252901	089N47W29CCDA	1976	Sioux City River 6	111ALVM	90	1990
421406096134501	086N46W29CBAB	1981	Sloan (4) 3	111ALVM	104	1982, 85, 87, 91, 92, 94
422414096212601	088N47W30DCAB	1981	Sergeant Bluff 5	111ALVM	110	1990
422403096212101	088N47W30DCDD	1981	Sergeant Bluff 4	111ALVM	120	1991, 94
421351095555001	086N44W26DBCA	1952	Smithland 1	112PLSC	65	1987, 94
421352096054801	086N45W28CBCC	1924	Hornick 1	112PLSC	127	1994
421352096054802	086N45W28CBCC	1951	Hornick 2	112PLSC	127	1987
422317095522201	088N43W32DCBC	1973	Anthon (4,1) 3	112PLSC	160	1984, 86, 90, 94
422441096124001	088N46W28BCBA	1971	Bronson 1	112PLSC	235	1984, 87, 90, 94
422927096253801	089N47W29CCDB	1983	Sioux City River 10	217DKOT	155.5	1994
421834096171301	087N47W35BCDB	1970	Salix 2	217DKOT	168	1984, 86
421834096171501	087N47W35BCDB	1949	Salix 1	217DKOT	170	1994
422833095463301	089N42W34CDC	1957	Correctionville 2	217DKOT	187	1985
422848096104301	089N45W32DBDA	1971	Lawton 4	217DKOT	205	1984, 89
422837096104301	089N45W32DCAD	1963	Lawton 3	217DKOT	280	1994
422929096254501	089N47W29CCCA	1971	Sioux City River 4	217DKOT	297	1992, 93, 95
422931096250901	089N47W29DCCB	1971	Sioux City River 1	217DKOT	308	1991
422848096210701	089N47W35DADD	1957	Sioux City S.Park 1	217DKOT	390	1985
422400096212501	088N47W30DCAB	1938	Sergeant Bluff 2	340DVNN	455	1988

Table 1. Municipal water-supply wells sampled from October 1, 1981, through September 30, 1996—Continued

Station number	Legal description[1]	Year drilled	Local name	Geologic unit[2]	Total well depth (feet)	Water years sampled[3]
			Worth County			
432642093132101	100N20W29DDDC	1931	Northwood North, 1	344CDVL	158	1983
432642093132102	100N20W29DDDC	1931	Northwood South, 2	344CDVL	158	1986
431943093041801	098N19W03DCDC	1938	Grafton 1	344CDVL	172	1982, 86, 90
431558093250401	098N22W35BCBB	1980	Fertile 1	344CDVL	242	1987
432109093124501	099N20W33BDAB	1966	Kensett 2	344CDVL	303	1985, 91
431713093121402	098N20W21DDAA	1920	Manly 2	344CDVL	439	1985
			Wright County			
423954093535801	091N26W27CAAD	1952	Eagle Grove 3	112PLSC	70	1982, 85, 90, 92, 93, 94, 95, 96
423958093535701	091N26W27DBAB	1980	Eagle Grove 5	112PLSC	70	1987
424135093362801	091N23W18DBCA	1945	Galt 1	112PLSC	155	1982 (2), 85, 89
424405093551511	092N26W33DCBB	1915	Goldfield 1	112PLSC	200	1983, 86, 91
424415093500101	092N25W31DADA	1946	Holmes 1	330MSSP	230	1983, 86, 89
423359093503001	090N25W31ACC	1952	Woolstock 1	333STLS	120	1982, 86
424349093440001	091N24W06BBBD	1958	Clarion 3	339GLMC	300	1983
425058093363901	093N23W19CDCC	1958	Belmond 2	339HMPN	208	1983, 89
424352093435901	091N24W06BBBA	1905	Clarion 1	339HMPN	281	1983
425058093364001	093N23W19CDCC	1911	Belmond 1	339HMPN	520	1983
424422093324001	092N23W34ACC	1947	Rowan 1	339KDRK	225	1983, 85, 89
423923093300701	091N23W36AAC	1948	Dows 4	344CDVL	751	1985

[1]See text on page 6 for explanation of legal description usage.

[2]See table 2 for geologic units associated with the geologic unit abbreviations.

[3]Number in parentheses is the number of times the well was sampled during the water year if the well was sampled more than once.

Table 2. Geologic unit abbreviations and definitions

Geologic unit abbreviation (see table 1)	Geologic unit	Geologic unit abbreviation (see table 1)	Geologic unit
	Alluvial aquifers		
110QRCU	Quaternary-Cretaceous, undifferentiated	111HLCN	Holocene Series
110QRNR	Quaternary System	111MPRV	Maple River alluvial aquifer
111ALVM	Holocene alluvium	111SDRV	Soldier River alluvial aquifer
111BRRV	Boyer River alluvial aquifer	111SRRV	South Raccoon River alluvial aquifer
111ENRV	East Nishnabotna River alluvial aquifer	111WNRV	West Nishnabotna River alluvial aquifer
	Pleistocene aquifers		
112AFNN	Aftonian interglacial deposits	112KNSN	Pre-Illinoian glacial deposits
112BLPC	Basal Pleistocene aquifer	112PLSC	Pleistocene Series
112BVCL	Beaver Channel aquifer	112RLCL	Ralston Channel aquifer
112HCKC	Hardin Creek Channel aquifer	112WSCS	Wisconsin glacial deposits
	Cretaceous aquifers		
210CRCS	Cretaceous System	217DKOT	Dakota Group
	Carboniferous aquifers		
320PSLV	Pennsylvanian System	338KKUK	Keokuk Formation
325CHRK	Cherokee Group	338OSGE	Osagean Series
325DSMS	Des Moinesian Series	339CHPN	Chapin Member of Hampton Formation
330MDVU	Mississippian-Devonian, undifferentiated	339GLMC	Gilmore City Limestone
330MSSP	Mississippian System	339HMPN	Hampton Formation
333MRMC	Meramecian Series	339KDRK	Kinderhookian Series
333STLS	St. Louis Limestone	339PPCH	Prospect Hill Formation
338HGCK	Haight Creek Member of Burlington Limestone	339WSVL	Wassonville Member of Hampton Formation
	Silurian-Devonian aquifers		
340DVNN	Devonian System	344WPPC	Wapsipinicon Formation
340DVSL	Devonian-Silurian Systems	347DVSL	Devonian-Silurian Systems
341APLG	Aplington Formation	350SLRN	Silurian System
341LMCK	Lime Creek Formation	355GOWR	Gower Dolomite
344CDVL	Cedar Valley Limestone	355HPKN	Hopkinton Dolomite
344CLVL	Coralville Member of Cedar Valley Formation	355NIGR	Niagaran Series
344DVNNM	Devonian, middle	358ALXD	Alexandrian Series
344RPID	Rapid Member of Cedar Valley Formation	358EDGD	Edgewood Formation
344SOLN	Solon Member of Cedar Valley Formation	358KNKK	Kankakee Formation
	Cambrian-Ordovician aquifers		
360ODVC	Ordovician System	367PRDC	Prairie Du Chien Formation
360OVCB	Ordovician-Cambrian Systems	370CMBR	Cambrian System
361MQKT	Maquoketa Formation	371CMBRU	Cambrian, upper
361ODVCU	Ordovician, upper	371DRBC	Dresbach Group
364GLEN	Galena Formation	371GLVL	Galesville Sandstone
364ODVCM	Ordovician, middle	371JRDN	Jordan Sandstone
364PLVL	Platteville Formation	371MSMN	Mount Simon Sandstone
364PRSR	Prosser Member of Galena Formation	371SLRC	St. Lawrence Formation
364STPR	St. Peter Sandstone	371TMPL	Trempealeau Group
	Precambrian aquifers		
400PCMB	Precambrian Erathem		

Table 3. Statistical summary of analytical results by aquifer

[WATSTORE, Water Data Storage and Retrieval System of the U.S. Geological Survey; MRL, most frequently used minimum reporting level; MCL, Maximum Contaminant Level (U.S. Environmental Protection Agency 1996a, b); *HAL*, health advisory level (U.S. Environmental Protection Agency, 1996a, b); >=, greater than or equal to; <, less than; --, not applicable; µS/cm, microsciemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; pCi/L, picocuries per liter]

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
72008	Total well depth	feet	Alluvial	1,048	100	43	17	200	--
	(--)		Pleistocene	530	100	90	20	480	--
			Cretaceous	139	100	215	65	759	--
			Carboniferous	187	100	207	75	940	--
			Silurian-Devonian	447	100	205	49	1,350	--
			Cambrian-Ordovician	177	100	880	63	2,801	--
			Precambrian	1	100	1,211	1,211	1,211	--
			Properties						
00095	Specific conductance	µS/cm	Alluvial	1,043	100	753	268	2,310	--
	(--)		Pleistocene	521	100	760	265	3,410	--
			Cretaceous	136	100	905	320	3,290	--
			Carboniferous	186	100	760	400	3,980	--
			Silurian-Devonian	437	100	625	257	2,540	--
			Cambrian-Ordovician	176	100	738	320	2,620	--
			Precambrian	1	100	1,650	1,650	1,650	--
00400	pH	standard	Alluvial	1,036	100	7.2	5.8	11.4	--
	(--)	units	Pleistocene	523	100	7.3	4.5	9.4	--
			Cretaceous	138	100	7.2	6.4	10.1	--
			Carboniferous	186	100	7.2	6.6	8.8	--
			Silurian-Devonian	443	100	7.3	6.4	8.5	--
			Cambrian-Ordovician	175	100	7.4	6.4	8.7	--
			Precambrian	1	100	7.3	7.3	7.3	--
00010	Water temperature	degrees	Alluvial	1,046	100	12.0	4.0	28.0	--
	(--)	Celsius	Pleistocene	527	100	12.0	6.0	25.0	--
			Cretaceous	139	100	12.0	6.5	25.0	--
			Carboniferous	186	100	12.0	9.0	25.0	--
			Silurian-Devonian	446	100	11.5	8.0	21.0	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Properties—Continued						
00010	Water temperature—Continued		Cambrian-Ordovician	176	100	13.0	9.0	26.0	--
			Precambrian	1	100	15.0	15.0	15.0	--
00300	Dissolved oxygen	mg/L	Alluvial	288	100	1.4	0.1	12.8	--
	(--)		Pleistocene	99	96.0	.5	0	9.4	--
			Cretaceous	33	100	.4	.1	2.6	--
			Carboniferous	19	94.7	.5	0	3.4	--
			Silurian-Devonian	40	95.0	.55	0	8.7	--
			Cambrian-Ordovician	14	100	1.1	0.2	7.1	--
			Precambrian	0	--	--	--	--	--
00900	Hardness as $CaCO_3$	mg/L	Alluvial	825	100	390	100	1,600	--
	(--)		Pleistocene	445	100	360	130	3,300	--
			Cretaceous	133	100	460	160	1,500	--
			Carboniferous	173	100	360	84	1,500	--
			Silurian-Devonian	385	100	310	130	1,400	--
			Cambrian-Ordovician	175	100	320	110	1,600	--
			Precambrian	1	100	52	52	52	--
90410	Alkalinity (laboratory),	mg/L	Alluvial	813	100	282	57	558	--
	total as $CaCO_3$		Pleistocene	431	100	311	81	815	--
	(--)		Cretaceous	133	100	316	108	456	--
			Carboniferous	172	100	354	147	574	--
			Silurian-Devonian	364	100	260	147	479	--
			Cambrian-Ordovician	170	100	263	106	1,040	--
			Precambrian	1	100	73	73	73	--
			Dissolved solids						
00500	Residue, total at 105 °C	mg/L	Alluvial	290	100	495	171	3,260	--
	(--)		Pleistocene	211	100	500	176	3,140	--
			Cretaceous	62	100	702	229	3,170	--
			Carboniferous	92	100	459	191	3,450	--
			Silurian-Devonian	166	100	380	188	2,400	--
			Cambrian-Ordovician	111	100	474	214	2,010	--
			Precambrian	1	100	810	810	810	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Dissolved solids—Continued						
70300	Dissolved solids, residue at 180 °C (--)	mg/L	Alluvial	524	100	454	128	2,040	--
			Pleistocene	227	100	452	150	2,950	--
			Cretaceous	63	100	526	188	1,640	--
			Carboniferous	80	100	462	108	2,850	--
			Silurian-Devonian	191	100	360	112	1,880	--
			Cambrian-Ordovician	63	100	382	208	1,890	--
			Precambrian	1	100	806	806	806	--
			Major ions						
00915	Calcium, dissolved (Ca) (--)	mg/L	Alluvial	691	100	100	10	440	--
			Pleistocene	397	100	94	21	460	--
			Cretaceous	127	100	120	45	400	--
			Carboniferous	173	100	93	19	360	--
			Silurian-Devonian	383	100	79	35	340	--
			Cambrian-Ordovician	174	100	77	13	300	--
			Precambrian	1	100	18	18	18	--
00925	Magnesium, dissolved (Mg) (--)	mg/L	Alluvial	691	100	30	6.8	132	--
			Pleistocene	397	100	31	9.8	150	--
			Cretaceous	127	100	36	12	140	--
			Carboniferous	173	100	33	8.9	140	--
			Silurian-Devonian	384	100	27	11	150	--
			Cambrian-Ordovician	174	100	32	17	87	--
			Precambrian	1	100	1.8	1.8	1.8	--
00930	Sodium, dissolved (Na) (<0.5 mg/L)	mg/L	Alluvial	691	100	13	2.3	340	--
			Pleistocene	397	100	18	2.3	370	--
			Cretaceous	127	100	42	5.3	377	--
			Carboniferous	173	100	29	4.2	880	--
			Silurian-Devonian	384	100	11	1.1	260	--
			Cambrian-Ordovician	174	99.4	32	<.5	410	--
			Precambrian	1	100	300	300	300	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Major ions—Continued						
00935	Potassium, dissolved (K)	mg/L	Alluvial	671	93.4	2.7	<1.0	39	--
	(<1.0 mg/L)		Pleistocene	390	97.4	3.2	<1.0	29	--
			Cretaceous	124	97.6	5.1	<1.0	20	--
			Carboniferous	173	98.8	3.5	<1.0	56	--
			Silurian-Devonian	384	93.0	2.1	<1.0	49	--
			Cambrian-Ordovician	174	97.7	6.6	<1.0	40	--
			Precambrian	1	100	1.2	1.2	1.2	--
00945	Sulfate, dissolved (SO_4)	mg/L	Alluvial	658	99.5	74	<1.0	1,800	3 >= 500 mg/L
	(<1.0 mg/L)		Pleistocene	390	99.5	66	<1.0	1,800	30 >= 500 mg/L
			Cretaceous	125	100	160	4.0	1,700	30 >= 500 mg/L
			Carboniferous	173	97.7	61	<1.0	1,900	19 >= 500 mg/L
			Silurian-Devonian	380	99.5	36	<1.0	1,500	27 >= 500 mg/L
			Cambrian-Ordovician	174	100	62	3.0	1200	28 >= 500 mg/L
			Precambrian	1	100	110	110	110	0 >= 500 mg/L
00940	Chloride, dissolved (Cl)	mg/L	Alluvial	691	99.6	19	<.5	330	--
	(<0.5 mg/L)		Pleistocene	397	95.0	9.0	<.5	120	--
			Cretaceous	128	94.5	4.0	<.5	49	--
			Carboniferous	172	93.6	3.8	<.5	220	--
			Silurian-Devonian	385	93.8	6.5	<.5	190	--
			Cambrian-Ordovician	175	96.6	12	<.5	370	--
			Precambrian	1	100	340	340	340	--
00950	Fluoride, dissolved (F)	mg/L	Alluvial	689	98.4	.25	<.10	2.7	0 >=4 mg/L
	(<0.10 mg/L)		Pleistocene	393	99.0	.30	<.10	4.6	1 >=4 mg/L
			Cretaceous	125	100	.35	.17	2.2	0 >=4 mg/L
			Carboniferous	171	99.4	.35	<.10	5.2	1 >=4 mg/L
			Silurian-Devonian	381	98.4	.30	<.10	20	1 >=4 mg/L
			Cambrian-Ordovician	174	99.4	.53	<.10	36	1 >=4 mg/L
			Precambrian	1	100	4.6	4.6	4.6	1 >=4 mg/L

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Major ions—Continued						
00955	Silica, dissolved (SiO_2)	mg/L	Alluvial	678	100	22	3.8	44	--
	(<0.10 mg/L)		Pleistocene	393	100	22	5.7	39	--
			Cretaceous	127	100	21	8.3	46	--
			Carboniferous	173	99.4	16	<.10	32	--
			Silurian-Devonian	384	100	13	2.1	51	--
			Cambrian-Ordovician	175	100	10	2.4	26	--
			Precambrian	1	100	8.0	8.0	8.0	--
			Nutrients						
00631	Nitrite plus nitrate,	mg/L	Alluvial	1,043	80.0	2.50	<.10	53.0	150 >= 10 mg/L
	dissolved as N		Pleistocene	523	56.6	<.10	<.10	26.0	17 >= 10 mg/L
	(<0.10 mg/L)		Cretaceous	139	48.9	<.10	<.10	22.0	4 >= 10 mg/L
			Carboniferous	184	57.6	<.10	<.10	12.0	4 >= 10 mg/L
			Silurian-Devonian	445	59.3	.10	<.10	27.0	23 >= 10 mg/L
			Cambrian-Ordovician	175	45.1	<.10	<.10	8.10	0 >= 10 mg/L
			Precambrian	1	0	<.10	<.10	<.10	0 >= 10 mg/L
00608	Nitrogen, ammonia,	mg/L	Alluvial	803	48.8	<.10	<.10	6.40	--
	dissolved as N		Pleistocene	369	66.7	.40	<.10	7.50	--
	(<0.10 mg/L)		Cretaceous	85	84.7	.50	<.10	4.90	--
			Carboniferous	109	77.1	.80	<.10	11.0	--
			Silurian-Devonian	299	53.5	<.10	<.10	4.80	--
			Cambrian-Ordovician	84	83.3	.44	<.10	3.10	--
			Precambrian	1	100	.34	.34	.34	--
00607	Nitrogen, dissolved organic as N	mg/L	Alluvial	732	66.8	.10	<.10	4.9	--
	(<0.10 mg/L)		Pleistocene	295	55.9	.10	<.10	12	--
			Cretaceous	69	52.2	.10	<.10	2.1	--
			Carboniferous	89	56.2	.10	<.10	4.7	--
			Silurian-Devonian	243	42.4	<.10	<.10	4.1	--
			Cambrian-Ordovician	61	44.3	<.10	<.10	2.8	--
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Nutrients—Continued						
00623	Nitrogen, dissolved ammonia plus organic, as N (<0.10 mg/L)	mg/L	Alluvial	720	83.1	0.20	<0.10	6.5	--
			Pleistocene	295	83.1	.60	<.10	18	--
			Cretaceous	69	94.2	.60	<.10	4.9	--
			Carboniferous	89	88.8	1.0	<.10	12	--
			Silurian-Devonian	243	71.2	.20	<.10	8.9	--
			Cambrian-Ordovician	60	93.3	.50	<.10	5.8	--
			Precambrian	0	--	--	--	--	--
00671	Phosphorus, dissolved orthophosphate as P (<0.10 mg/L)	mg/L	Alluvial	805	46.2	<.10	<.10	1.50	--
			Pleistocene	369	51.8	<.10	<.10	1.10	--
			Cretaceous	85	43.5	<.10	<.10	.65	--
			Carboniferous	109	33.9	<.10	<.10	1.50	--
			Silurian-Devonian	297	27.6	<.10	<.10	.40	--
			Cambrian-Ordovician	85	29.4	<.10	<.10	1.50	--
			Precambrian	1	0	<.10	<.10	<.10	--
			Trace elements						
01046	Iron, dissolved as Fe (<20 µg/L)	µg/L	Alluvial	691	69.5	170	<20	34,000	--
			Pleistocene	395	82.0	1,100	<20	26,000	--
			Cretaceous	127	83.5	730	<20	12,000	--
			Carboniferous	173	85.0	530	<20	9,900	--
			Silurian-Devonian	384	69.0	210	<20	15,000	--
			Cambrian-Ordovician	174	83.3	230	<20	5,200	--
			Precambrian	1	100	40	40	40	--
01056	Manganese, dissolved as Mn (<20 µg/L)	µg/L	Alluvial	691	76.6	210	<20	9,500	--
			Pleistocene	396	80.8	120	<20	3,900	--
			Cretaceous	127	91.3	240	<20	2,900	--
			Carboniferous	173	79.8	60	<20	750	--
			Silurian-Devonian	384	46.9	<20	<20	510	--
			Cambrian-Ordovician	174	41.4	<20	<20	370	--
			Precambrian	1	100	20	20	20	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Radionuclides						
09503	Radium-226, dissolved	pCi/L	Alluvial	120	90.8	0.4	<0.2	7.2	2 >= 5 pCi/L[1]
	(<0.2 pCi/L)		Pleistocene	63	98.4	.9	<.2	12	9 >= 5 pCi/L[1]
			Cretaceous	46	100	2.2	.1	9.4	12 >= 5 pCi/L[1]
			Carboniferous	49	100	2.3	.6	8.7	11 >= 5 pCi/L[1]
			Silurian-Devonian	70	94.3	1.4	<.2	6.7	8 >= 5 pCi/L[1]
			Cambrian-Ordovician	124	98.4	3.6	<.2	45	58 >= 5 pCi/L[1]
			Precambrian	0	--	--	--	--	--
81366	Radium-228, dissolved	pCi/L	Alluvial	104	57.7	.7	<.4	3.8	2 >= 5 pCi/L[1]
	(<0.4 pCi/L)		Pleistocene	58	67.2	.9	<.4	5.6	9 >= 5 pCi/L[1]
			Cretaceous	42	76.2	1.5	<.4	5.9	12 >= 5 pCi/L[1]
			Carboniferous	46	65.2	.9	<.4	5.5	11 >= 5 pCi/L[1]
			Silurian-Devonian	68	39.7	<.4	<.4	6.3	8 >= 5 pCi/L[1]
			Cambrian-Ordovician	124	61.3	1.0	<.4	8.6	58 >= 5 pCi/L[1]
			Precambrian	0	--	--	--	--	--
			Carbon						
00680	Carbon, organic total as C	mg/L	Alluvial	619	71.9	1.3	<1.0	28	--
	(<1.0 mg/L)		Pleistocene	254	71.7	1.5	<1.0	19	--
			Cretaceous	58	70.7	1.4	<1.0	6.8	--
			Carboniferous	85	76.5	1.5	<1.0	9.3	--
			Silurian-Devonian	223	47.1	<1.0	<1.0	6.8	--
			Cambrian-Ordovician	61	34.4	<1.0	<1.0	14	--
			Precambrian	0	--	--	--	--	--
			Organic compound, pesticides						
49259	Acetochlor, total	µg/L	Alluvial	87	0	<.10	<.10	<.10	--
	(<0.10 µg/L)		Pleistocene	32	0	<.10	<.10	<.10	--
			Cretaceous	6	0	<.10	<.10	<.10	--
			Carboniferous	4	0	<.10	<.10	<.10	--
			Silurian-Devonian	8	0	<.10	<.10	<.10	--
			Cambrian-Ordovician	6	0	<.10	<.10	<.10	--
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Organic compound, pesticides—Continued						
77825	Alachlor, total (<0.10 µg/L)	µg/L	Alluvial	819	2.6	<0.10	<0.10	14.0	2 >= 2 µg/L
			Pleistocene	376	4.8	<.10	<.10	4.10	4 >= 2 µg/L
			Cretaceous	64	3.1	<.10	<.10	.10	0 >= 2 µg/L
			Carboniferous	98	2.0	<.10	<.10	.20	0 >= 2 µg/L
			Silurian-Devonian	255	3.1	<.10	<.10	3.30	1 >= 2 µg/L
			Cambrian-Ordovician	47	2.1	<.10	<.10	2.30	1 >= 2 µg/L
			Precambrian	0	--	--	--	--	--
39630	Atrazine, total (<0.10 µg/L)	µg/L	Alluvial	819	28.6	<.10	<.10	21.0	17 >= 3 µg/L
			Pleistocene	376	13.0	<.10	<.10	2.30	0 >= 3 µg/L
			Cretaceous	64	4.7	<.10	<.10	2.70	0 >= 3 µg/L
			Carboniferous	98	19.4	<.10	<.10	1.10	0 >= 3 µg/L
			Silurian-Devonian	255	29.8	<.10	<.10	4.30	1 >= 3 µg/L
			Cambrian-Ordovician	47	6.4	<.10	<.10	1.20	0 >= 3 µg/L
			Precambrian	0	--	--	--	--	--
30236	Butylate, total (<0.10 µg/L)	µg/L	Alluvial	679	0.1	<.10	<.10	.10	*0 >= 350 µg/L*
			Pleistocene	285	0.4	<.10	<.10	.10	*0 >= 350 µg/L*
			Cretaceous	54	0	<.10	<.10	<.10	*0 >= 350 µg/L*
			Carboniferous	82	0	<.10	<.10	<.10	*0 >= 350 µg/L*
			Silurian-Devonian	229	0.4	<.10	<.10	.10	*0 >= 350 µg/L*
			Cambrian-Ordovician	40	0	<.10	<.10	<.10	*0 >= 350 µg/L*
			Precambrian	0	--	--	--	--	--
81757	Cyanazine, total (<0.10 µg/L)	µg/L	Alluvial	819	5.6	<.10	<.10	4.50	*5 >= 1 µg/L*
			Pleistocene	376	2.4	<.10	<.10	.86	*0 >= 1 µg/L*
			Cretaceous	64	4.7	<.10	<.10	.65	*0 >= 1 µg/L*
			Carboniferous	98	1.0	<.10	<.10	.13	*0 >= 1 µg/L*
			Silurian-Devonian	255	2.0	<.10	<.10	.22	*0 >= 1 µg/L*
			Cambrian-Ordovician	47	0	<.10	<.10	<.10	*0 >= 1 µg/L*
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Organic compound, pesticides—Continued						
75981	Deethylatrazine, total (<0.10 µg/L)	µg/L	Alluvial	91	22.0	<0.10	<0.10	0.24	--
			Pleistocene	32	0	<.10	<.10	<.10	--
			Cretaceous	6	0	<.10	<.10	<.10	--
			Carboniferous	4	0	<.10	<.10	<.10	--
			Silurian-Devonian	10	30.0	<.10	<.10	.26	--
			Cambrian-Ordovician	6	0	<.10	<.10	<.10	--
			Precambrian	0	--	--	--	--	--
75980	Deisopropylatrazine, total (<0.10 µg/L)	µg/L	Alluvial	88	2.3	<.10	<.10	.23	--
			Pleistocene	32	0	<.10	<.10	<.10	--
			Cretaceous	6	0	<.10	<.10	<.10	--
			Carboniferous	4	0	<.10	<.10	<.10	--
			Silurian-Devonian	8	0	<.10	<.10	<.10	--
			Cambrian-Ordovician	6	0	<.10	<.10	<.10	--
			Precambrian	0	--	--	--	--	--
39356	Metolachlor, total (<0.10 µg/L)	µg/L	Alluvial	819	7.9	<.10	<.10	200	*1 >= 70 µg/L*
			Pleistocene	376	1.9	<.10	<.10	3.50	*0 >= 70 µg/L*
			Cretaceous	64	3.1	<.10	<.10	1.80	*0 >= 70 µg/L*
			Carboniferous	98	0	<.10	<.10	<.10	*0 >= 70 µg/L*
			Silurian-Devonian	255	3.9	<.10	<.10	1.90	*0 >= 70 µg/L*
			Cambrian-Ordovician	47	2.1	<.10	<.10	3.50	*0 >= 70 µg/L*
			Precambrian	0	--	--	--	--	--
81408	Metribuzin, total (<0.10 µg/L)	µg/L	Alluvial	819	2.3	<.10	<.10	2.1	*0 >= 100 µg/L*
			Pleistocene	376	.5	<.10	<.10	.36	*0 >= 100 µg/L*
			Cretaceous	64	3.1	<.10	<.10	.16	*0 >= 100 µg/L*
			Carboniferous	98	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Silurian-Devonian	255	.4	<.10	<.10	.67	*0 >= 100 µg/L*
			Cambrian-Ordovician	47	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Organic compound, pesticides—Continued						
39056	Prometone (also prometon), total (<0.10 µg/L)	µg/L	Alluvial	91	14.3	<0.10	<0.10	6.30	*0 >= 100 µg/L*
			Pleistocene	31	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Cretaceous	4	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Carboniferous	5	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Silurian-Devonian	11	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Cambrian-Ordovician	6	0	<.10	<.10	<.10	*0 >= 100 µg/L*
			Precambrian	0	--	--	--	--	--
39030	Trifluralin, total (<0.10 µg/L)	µg/L	Alluvial	819	0.2	<.10	<.10	.10	*0 >= 5 µg/L*
			Pleistocene	376	0	<.10	<.10	<.10	*0 >= 5 µg/L*
			Cretaceous	64	1.6	<.10	<.10	.10	*0 >= 5 µg/L*
			Carboniferous	98	0	<.10	<.10	<.10	*0 >= 5 µg/L*
			Silurian-Devonian	255	0	<.10	<.10	<.10	*0 >= 5 µg/L*
			Cambrian-Ordovician	47	0	<.10	<.10	<.10	*0 >= 5 µg/L*
			Precambrian	0	--	--	--	--	--
			Synthetic organic compounds						
34030	Benzene, total (<0.50 µg/L)	µg/L	Alluvial	244	0	<.50	<.50	<.50	0 >= 5 µg/L
			Pleistocene	90	2.2	<.50	<.50	13.0	2 >= 5 µg/L
			Cretaceous	26	0	<.50	<.50	<.50	0 >= 5 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 5 µg/L
			Silurian-Devonian	39	0	<.50	<.50	<.50	0 >= 5 µg/L
			Cambrian-Ordovician	5	0	<.50	<.50	<.50	0 >= 5 µg/L
			Precambrian	0	--	--	--	--	--
32102	Carbon tetrachloride, total (<0.50 µg/L)	µg/L	Alluvial	244	1.2	<.50	<.50	.90	0 >= 5 µg/L
			Pleistocene	90	4.4	<.50	<.50	4.00	0 >= 5 µg/L
			Cretaceous	26	0	<.50	<.50	<.50	0 >= 5 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 5 µg/L
			Silurian-Devonian	39	0	<.50	<.50	<.50	0 >= 5 µg/L
			Cambrian-Ordovician	5	0	<.50	<.50	<.50	0 >= 5 µg/L
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Synthetic organic compounds—Continued						
32103	1,2-Dichloroethane (<0.50 µg/L)	µg/L	Alluvial	244	1.6	<0.50	<0.50	1.50	0 >= 5 µg/L
			Pleistocene	89	3.4	<.50	<.50	2.90	0 >= 5 µg/L
			Cretaceous	26	3.8	<.50	<.50	1.00	0 >= 5 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 5 µg/L
			Silurian-Devonian	39	0	<.50	<.50	<.50	0 >= 5 µg/L
			Cambrian-Ordovician	5	0	<.50	<.50	<.50	0 >= 5 µg/L
			Precambrian	0	--	--	--	--	--
34371	Ethylbenzene, total (<0.50 µg/L)	µg/L	Alluvial	240	2.1	<.50	<.50	1.70	0 >= 700 µg/L
			Pleistocene	90	4.4	<.50	<.50	1.80	0 >= 700 µg/L
			Cretaceous	26	7.7	<.50	<.50	1.20	0 >= 700 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 700 µg/L
			Silurian-Devonian	37	0	<.50	<.50	<.50	0 >= 700 µg/L
			Cambrian-Ordovician	4	0	<.50	<.50	<.50	0 >= 700 µg/L
			Precambrian	0	--	--	--	--	--
34423	Methylene chloride (<1.0 µg/L)	µg/L	Alluvial	242	0	<1.0	<1.0	<1.0	--
			Pleistocene	90	0	<1.0	<1.0	<1.0	--
			Cretaceous	26	0	<1.0	<1.0	<1.0	--
			Carboniferous	14	0	<1.0	<1.0	<1.0	--
			Silurian-Devonian	37	0	<1.0	<1.0	<1.0	--
			Cambrian-Ordovician	4	0	<1.0	<1.0	<1.0	--
			Precambrian	0	--	--	--	--	--
34475	Tetrachlorethylene (<0.50 µg/L)	µg/L	Alluvial	242	2.5	<.50	<.50	6.20	1 >= 5 µg/L
			Pleistocene	89	4.5	<.50	<.50	5.00	1 >= 5 µg/L
			Cretaceous	25	0	<.50	<.50	<.50	0 >= 5 µg/L
			Carboniferous	12	0	<.50	<.50	<.50	0 >= 5 µg/L
			Silurian-Devonian	34	0	<.50	<.50	<.50	0 >= 5 µg/L
			Cambrian-Ordovician	4	0	<.50	<.50	<.50	0 >= 5 µg/L
			Precambrian	0	--	--	--	--	--

Table 3. Statistical summary of analytical results by aquifer—Continued

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
			Synthetic organic compounds—Continued						
34010	Toluene, total	µg/L	Alluvial	241	0	<0.50	<0.50	<0.50	0 >= 1,000 µg/L
	(<0.50 µg/L)		Pleistocene	90	0	<.50	<.50	<.50	0 >= 1,000 µg/L
			Cretaceous	26	3.8	<.50	<.50	1.00	0 >= 1,000 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 1,000 µg/L
			Silurian-Devonian	37	0	<.50	<.50	<.50	0 >= 1,000 µg/L
			Cambrian-Ordovician	4	0	<.50	<.50	<.50	0 >= 1,000 µg/L
			Precambrian	0	--	--	--	--	--
34506	1, 1, 1-Trichloroethane, total	µg/L	Alluvial	244	0.4	<.50	<.50	2.00	0 >= 200 µg/L
	(<0.50 µg/L)		Pleistocene	90	0	<.50	<.50	<.50	0 >= 200 µg/L
			Cretaceous	26	0	<.50	<.50	<.50	0 >= 200 µg/L
			Carboniferous	14	0	<.50	<.50	<.50	0 >= 200 µg/L
			Silurian-Devonian	39	0	<.50	<.50	<.50	0 >= 200 µg/L
			Cambrian-Ordovician	5	0	<.50	<.50	<.50	0 >= 200 µg/L
			Precambrian	0	--	--	--	--	--
81551	Xylene	µg/L	Alluvial	221	4.5	<.50	<.50	9.10	0>=10,000µg/L
	(<0.50 µg/L)		Pleistocene	85	5.9	<.50	<.50	10.0	0>=10,000µg/L
			Cretaceous	23	21.7	<.50	<.50	5.90	0>=10,000µg/L
			Carboniferous	10	0	<.50	<.50	<.50	0>=10,000µg/L
			Silurian-Devonian	29	0	<.50	<.50	<.50	0>=10,000µg/L
			Cambrian-Ordovician	4	0	<.50	<.50	<.50	0>=10,000µg/L
			Precambrian	0	--	--	--	--	--

[1]Separate MCL's have not been established for radium-226 and radium-228. The MCL of 5 picocuries per liter is for the sum of the radium-226 and radium-228 values for a specified sample. The reported number of samples with values equal to or exceeding the MCL is for radium-226 plus radium-228. Therefore, the numbers in that column are the same for both constituents.

Table 4. Statistical summary of selected water-quality characteristics for shallow and deep wells

[WATSTORE, Water Data Storage and Retrieval System of the U.S. Geological Survey; MRL, most frequently used minimum reporting level; MCL, Maximum Contaminant Level (U.S. Environmental Protection Agency, 1996a,b); *HAL*, health advisory level (U.S. Environmental Protection Agency, 1996a,b); <=, less than or equal to; >=, greater than or equal to; >, greater than; <, less than; --, not applicable; mg/L milligrams per liter; µg/L, micrograms per liter]

WATSTORE parameter code	Constituent (MRL)	Units	Aquifer group	Number of samples	Percentage of detections	Median	Minimum	Maximum	MCL/*HAL* (samples >=)
72008	Total well depth	feet	<= 150 feet	1,601	--	54	17	150	--
	(--)		> 150 feet	928	--	255	151	2,801	--
00945	Sulfate, dissolved (SO_4)	mg/L	<= 150 feet	1,072	99.7	68	<1.0	1,800	13 >= 500 mg/L
	(<1.0 mg/L)		> 150 feet	829	99.0	53	<1.0	1,900	124 >= 500 mg/L
00631	Nitrite plus nitrate, dissolved as N	mg/L	<= 150 feet	1,586	76.5	2.3	<.1	53.0	183 >= 10 mg/L
	(<0.1 mg/L)		> 150 feet	924	46.9	<.1	<.1	27.0	15 >= 10 mg/L
77825	Alachlor, total	µg/L	<= 150 feet	1,229	3.4	<.10	<.10	14.0	6 >= 2 µg/L
	(<0.10 µg/L)		> 150 feet	430	2.3	<.10	<.10	3.30	2 >= 2 µg/L
39630	Atrazine, total	µg/L	<= 150 feet	1,229	26.7	<.10	<.10	21.0	17 >= 3 µg/L
	(<0.10 µg/L)		> 150 feet	430	13.0	<.10	<.10	4.30	1 >= 3 µg/L
81757	Cyanazine, total	µg/L	<= 150 feet	1,229	4.6	<.10	<.10	4.50	*5 >= 1 µg/L*
	(<0.10 µg/L)		> 150 feet	430	1.6	<.10	<.10	.220	*0 >= 1 µg/L*
34371	Ethylbenzene, total	µg/L	<= 150 feet	313	2.2	<.50	<.50	1.80	0 >= 700 µg/L
	(<0.50 µg/L)		> 150 feet	98	4.1	<.50	<.50	1.70	0 >= 700 µg/L
81551	Xylene	µg/L	<= 150 feet	287	4.9	<.50	<.50	10.0	0 >= 10,000 µg/L
	(<0.50 µg/L)		> 150 feet	85	7.1	<.50	<.50	8.60	0 >= 10,000 µg/L