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In cooperation with the
RAVALLI COUNTY BOARD OF COMMISSIONERS and the
BITTERROOT CONSERVATION DISTRICT

Hydrogeology and Aquifer Sensitivity of the Bitterroot Valley, Ravalli County, Montana

Water-Resources Investigations Report 99-4219

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

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By David W. Briar and DeAnn M. Dutton

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BRUCE BABBITT, Secretary

U.S. Geological Survey

Charles G. Groat, Director

Helena, Montana
February 2000

For additional information write to:

District Chief
U.S. Geological Survey
3162 Bozeman Avenue
Helena, MT 59601-6456

Copies of this report may be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, CO 80225-0286

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Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
inch (in.)	25.40	millimeter (mm)
mile (mi)	1.609	kilometer
	Area	
acre	4,047	square meter
square mile (mi^2)	2.590	square kilometer
	Volume	
acre-foot (acre-ft)	1,233	cubic meter
	Flow	
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year
gallon per minute (gal/min)	0.06309	liter per second (L/s)
inch per year (in/yr)	25.40	millimeter per year
	Hydraulic Conductivity	
foot per day [$(ft^3/d)/ft^2$ or ft/d]	0.3048	meter per day
	Specific Capacity	
gallon per minute per foot [(gal/min)/ft]	0.2070	liter per second per meter
	Transmissivity	
foot squared per day (ft^2/d) [$((ft^3/d)/ft^2)$ ft or ft^2/d]	0.0929	meter squared per day

Temperature can be converted to degrees Celsius (°C) or degrees Fahrenheit (°F) by the equations:

$$°C = 5/9(°F - 32)$$

$$°F = 9/5(°C)+32$$

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.

Abbreviated water-quality units used in this report:

µg/L	micrograms per liter
µS/cm	microsiemens per centimeter at 25 °C
mg/L	milligrams per liter
pCi/L	picocuries per liter

Acronyms used in this report:

GIS	Geographic Information System
GWIC	Montana Ground Water Information Center
MBMG	Montana Bureau of Mines and Geology
MCL	Maximum Contaminant Level
NWQL	USGS National Water Quality Laboratory
SMCL	Secondary Maximum Contaminant Level
UM	University of Montana
USGS	U.S. Geological Survey

HYDROGEOLOGY AND AQUIFER SENSITIVITY OF THE BITTERROOT VALLEY, RAVALLI COUNTY, MONTANA

By David W. Briar and DeAnn M. Dutton

Abstract

The population of the Bitterroot Valley in western Montana increased rapidly in the 1990s, creating concern about the potential for degradation of water in local aquifers. From August 1994 through October 1997, the U.S. Geological Survey, in cooperation with the Ravalli County Board of Commissioners and the Bitterroot Conservation District, conducted a study of the aquifers underlying the Bitterroot Valley. This report describes the hydrogeology and assesses the sensitivity of the aquifers to degradation.

The 7-mile wide by 52-mile long Bitterroot Valley is drained by the north-flowing Bitterroot River, whose flood plain extends the length of the valley and is bounded by high terraces on the east and west. The valley is situated in a structural basin surrounded by intrusive, metasedimentary, metamorphic, and volcanic rocks. Tertiary sediments overlie bedrock and occur as two distinct geological units--the ancestral Bitterroot River deposits, which generally are coarse grained, well sorted, and as much as 2,400 feet thick, and the overlying alluvial-fan deposits, which are composed of locally derived, poorly sorted erosional debris of the adjacent mountains. The bedrock and Tertiary sediments are overlain by Quaternary till, alluvial-fan deposits, alluvium, and terrace deposits.

Most wells in the Bitterroot Valley are completed in unconfined to semiconfined aquifers contained in Quaternary and Tertiary basin-fill deposits. On the basis of data from 9,424 wells, the shallowest static-water levels and the largest values for yield and specific capacity typically are associated with wells completed in Quaternary deposits. Conversely, the deepest static-water levels and smallest values for yield and specific capacity typically are associated with wells completed in Tertiary alluvial-fan deposits. Hydraulic characteristics of the ancestral Bitterroot River deposits are between these extremes. The hydraulic characteristics of the aquifers did not vary significantly between the eastern and western sides of the valley.

Regionally, the direction of ground-water flow is from the mountain fronts along the basin margins toward the center of the basin and diagonally downvalley. Hydraulic gradients are steepest in the principal recharge areas near the mountain fronts and more gradual in discharge areas along the flood plain of the Bitterroot River. The basin-fill aquifers are recharged by infiltration of streamflow and irrigation water, subsurface inflow from bedrock, and direct infiltration of precipitation and snowmelt. Greater precipitation on the western side of the valley results in greater recharge there than on the eastern side of the valley. Ground-water discharge is by seepage to springs and streams, evapotranspiration, and withdrawals from wells.

Water in the basin-fill aquifers is primarily a calcium bicarbonate type. The median specific conductance of 240 ground-water samples was 246 microsiemens per centimeter at 25 degrees Celsius and the median nitrate concentration in 239 samples was 0.63 milligrams per liter as N. Samples from 20 wells had nitrate concentrations exceeding 3 milligrams per liter. The largest nitrate concentration was 5.9 milligrams per liter. Specific-conductance values and nitrate concentrations generally were greater on the east side of the valley. Nitrate concentration varied seasonally in water from 16 wells that were sampled approximately bimonthly for 1 year. The median radon concentration in 43 ground-water samples was 810 picocuries per liter; the concentration in 38 samples exceeded 300 picocuries per liter.

Although the relatively small nitrate concentrations indicate that the total nitrate load to the sampled aquifers has not resulted in nitrate concentrations that exceed recommended standards to date, some parts of the study area are more sensitive to degradation than others. The sensitivity of the area aquifers to nitrate loading is most strongly related to the total ground-water recharge--the greater the recharge, the less sensi-

tive is the aquifer to nitrate loading. Ground-water recharge is directly related to the average annual precipitation and inversely related to the occurrence of low permeability surface deposits, such as Tertiary alluvial-fan deposits, in the respective area.

INTRODUCTION

The Bitterroot Valley is located in Ravalli County of western Montana (fig. 1). During the early 1990s, the estimated population of Ravalli County increased at the fastest rate in the State (38 percent), changing from 25,075 in 1990 to 34,554 in 1997 (U.S. Bureau of the Census, issued annually). Most of the residents of Ravalli County live on the Bitterroot Valley floor within a few miles of the river. Much of the increase in population has been outside of established cities and towns and is generally concentrated in housing areas where each dwelling has its own well and septic system. Under unfavorable conditions, the local aquifers have the potential to become degraded owing to continued growth. However, sufficient data were not available to determine the effects of this growth and to identify the areas where the aquifer may be sensitive to potential degradation.

From August 1994 through October 1997, the U.S. Geological Survey (USGS), in cooperation with the Ravalli County Board of Commissioners and the Bitterroot Conservation District, conducted a study of the aquifers underlying the Bitterroot Valley. The study was designed to expand knowledge of the ground-water system through a systematic program of data collection, research, and analysis. The results of the study will be useful in developing a comprehensive management program for the use and protection of the ground-water resources of the Bitterroot Valley.

Purpose and Scope

This report describes the hydrogeology of the Bitterroot Valley and assesses the sensitivity of the aquifers underlying the benches along the west and east sides of the valley to degradation. Specific objectives were to:

1. Establish a ground-water-level and ground-water-quality monitoring network to obtain base-line information and to document changes in water levels and quality since previous studies.

2. Implement a geographically indexed, computer-based data framework to provide a basis for future assessment of effects from various ground-water management options.

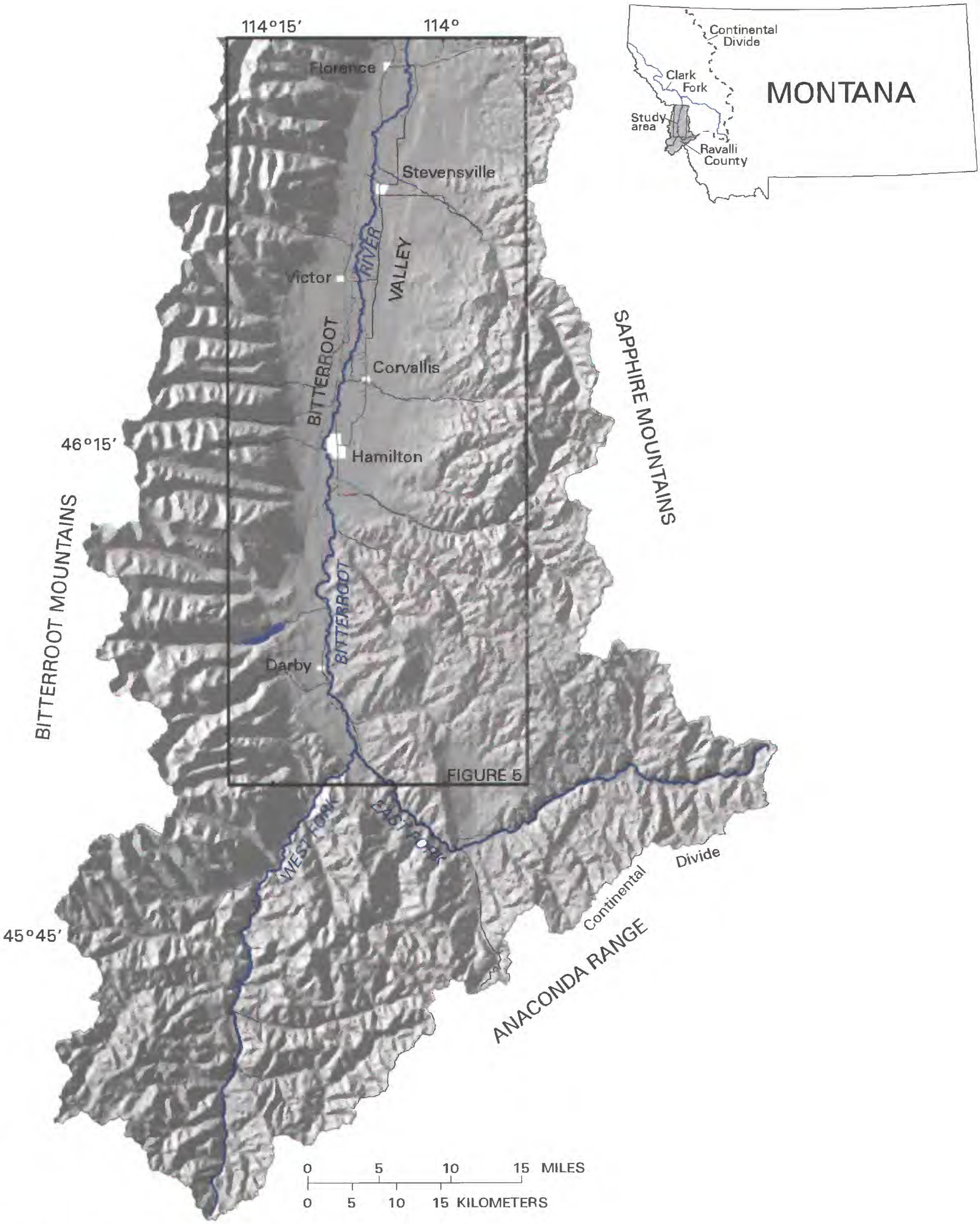
3. Define ground-water flow paths, ground-water-recharge sources, and ground-water-discharge areas.

4. Characterize any potential sources of ground-water-quality degradation and identify areas with existing degradation.

The study was conducted at two different scales: a reconnaissance-level investigation of most of the valley floor and bench areas along the east and west margins of the valley, and a more detailed investigation of three "focus areas" on the benches. The reconnaissance-level investigation was designed to obtain base-line data in the valley where existing hydrologic data were sparse. Detailed investigations were aimed at areas undergoing development or likely to undergo development in the near future. The three focus areas, which were selected to be representative of specific hydrologic and physiographic settings in the valley, are all undergoing rapid residential development.

To determine the geometry and hydraulic properties of the basin-fill aquifers, and to identify any spatial trends in the data, a retrieval from the Montana Ground Water Information Center (GWIC) data base (Ground-water Information Center, Montana Bureau of Mines and Geology, unpub. data, 1996) was converted to geographic-information-system (GIS) format. This data base contains well-completion reports supplied by drillers for 9,424 wells in the study area. Water levels in 25 of these wells have been monitored quarterly by the Montana Bureau of Mines and Geology (MBMG) for the period 1993-96.

A total of 263 wells were inventoried for this study and the information was entered into the USGS National Water Information System data base. When possible, data for these wells were cross-referenced with the GWIC data base. Water levels were measured in 221 of the wells. Fifty-four of the wells were selected a monitoring network, in which water levels were measured approximately bimonthly during the study. Specific conductance and water temperature were measured onsite at 240 wells, and water-quality samples were collected and analyzed for nitrate, chloride, and sulfate at 239 of these wells during the study. Additional data collected prior to this study and by



Base from Defense Mapping Agency digital data, 1:250,000, 1975, and
U.S. Geological Survey digital data, 1:100,000, 1983. Albers Equal Area
Conic Projection Standard parallels 44°00', and 48°00', central meridian -114°00'.

Figure 1. Location of study area within the Bitterroot River drainage basin, Ravalli County, Montana.

MBMG are included in tables 4-7 in the Supplemental Data section at the back of this report.

Water samples were collected from 43 wells, 3 streams, 1 irrigation canal, and 1 spring for laboratory analysis of major-ion and trace-element concentrations. Forty-three samples collected from wells were analyzed for radon. Results of an additional 24 water-quality analyses were obtained from MBMG for 22 of the 25 wells that they monitor in the study area and results of 26 analyses from previous USGS studies in the valley were included in the data tables.

Digital GIS datasets were compiled for the study area. Thematic layers compiled include hydrography, transportation, precipitation, public land survey, and digital elevation models. In addition, all project data were entered into the GIS data base to allow spatial analysis of the various data.

Previous Investigations

The USGS and MBMG conducted a study of the geology and water resources of the Bitterroot Valley from Florence south to Darby from 1955 to 1960 (McMurtrey and others, 1972). The study included a detailed annual budget for surface water and a complete hydrologic budget for 1958 and 1959. Information compiled as part of the study included records of wells, multiple water-level measurements in about 30 wells, water-quality analyses for 20 wells, and maps of basin-fill geology, water-table surface, and potential yield of wells. Norbeck (1980) presented a preliminary evaluation of deep aquifers in the valley based on test drilling of five wells in the valley, the deepest of which was 2,700 ft. Two recent University of Montana master's theses (Finstick, 1986; Uthman, 1988) have addressed the hydrogeology of parts of the Bitterroot Valley. These theses include information on monthly water levels in a series of observation wells and analyses of water samples collected from a network of wells. During 1991 and 1992, additional information collected by the USGS as part of a regional study (Clark and Dutton, 1996) included water levels in about 100 wells and water-quality analyses for samples from 26 wells. Water levels in five wells in the area have been measured at various intervals since 1960 as part of the USGS statewide monitoring network. Reports of additional investigations of the Bitterroot Valley are listed in the "Selected References" section at the back of this report.

Previous studies in the Bitterroot Valley provide information on the geologic history, surface-water quantity, and water-level fluctuations. However, the data are not sufficient to achieve the objects of this study.

Location-Numbering System

In this report, wells, one spring, and surface-water measurement sites are numbered according to geographic position within the rectangular grid system used for the subdivision of public lands (fig. 2). The location consists of as many as 14 characters. The first three characters specify the township and its position north (N) of the Montana Base Line. The next three characters specify the range and its position west (W) of the Montana Principal Meridian. The next two characters are the section number. The next three or four characters sequentially designate the quarter section (160-acre tract), quarter-quarter section (40-acre tract) quarter-quarter-quarter section (10-acre tract), and quarter-quarter-quarter-quarter section (2 1/2-acre tract), respectively, in which the well, spring, or surface-water site is located. The locations of subdivisions within a section are designated A, B, C, and D in a counterclockwise direction, beginning in the northeast quadrant. The final two characters are a sequence number assigned to differentiate multiple wells at a single site; for example, well 10N20W02ABBC01 (fig. 2) is the first well inventoried in the SW1/4NW1/4 NW1/4NE1/4 of sec. 2, T. 10 N., R. 20 W.

Acknowledgments

The authors thank the members of the Bitterroot Water Forum--a citizens' group addressing water-resource issues in the Bitterroot Valley--for their support and interest during this study. In addition, we acknowledge the contribution of Ann M. Stewart, a graduate student from the University of Montana Department of Geology, who conducted much of the field work in the Eightmile focus area and assisted with water-quality sampling throughout the study area. Finally, we acknowledge the cooperation of the many landowners who provided access to their land and contributed valuable information about the occurrence and use of water resources in the Bitterroot Valley.

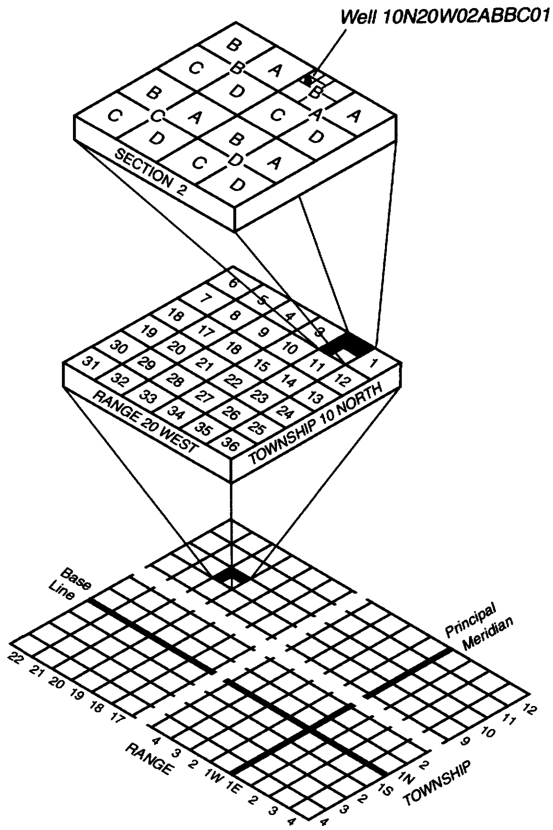


Figure 2. Location-numbering system.

DESCRIPTION OF STUDY AREA

The Bitterroot Valley is situated in a north-trending intermontane basin in the Northern Rocky Mountains physiographic province (Fenneman, 1931). The valley is bordered on the west by the Bitterroot Mountains, on the east by the Sapphire Mountains, and on the southeast by the Anaconda Range (fig. 1). The valley averages about 7 mi wide and is about 52 mi long in the study area. Basin-fill sediments extend from near the confluence of the East and West Forks of the Bitterroot River in the southern part of the study area to the Ravalli County line north of Florence and encompass about 380 mi^2, or about 16 percent of the 2,400 mi^2 part of the drainage basin in Ravalli County.

Land use in the Bitterroot Valley historically has been dominated by irrigated agriculture with some dryland farming along the eastern margin. Most farms also have beef or dairy cattle and are smaller than 50 acres (McMurtrey and others, 1972). Currently, hay and pasture and some apple orchards are the main irrigated crops. Dryland wheat and barley are grown on the eastern benches which are also used for rangeland (Kendy and Tresch, 1996). The conversion of agricultural land for residential development is the major land use change occurring in the Bitterroot Valley today.

Physiography and Drainage

The Bitterroot Valley contains two principal topographic features and related aquifers. In the center of the valley is the flood plain of the Bitterroot River, which generally is 1 to 2 mi wide and extends the length of the valley. Adjacent to the flood plain along the west and east sides of the valley are extensive high benches that range in width from 3 to 6 mi. These benches typically slope toward the flood plain at from 4° or 5° near the basin margins to less than 1° near the flood plain. Benches on the east side of the basin have smooth topography and generally end in 50- to 150-ft scarps at the flood plain, whereas benches on the west side of the basin are dissected and merge gently with the flood plain. This report refers to all sediments east of the Bitterroot River flood plain as east-side sediments and all sediments west of the Bitterroot River flood plain as west-side sediments. The Bitterroot Valley in the study area ranges in altitude from about 3,200 ft where the Bitterroot River flows out of the study area on the north to about 5,500 ft on the highest terrace.

The major surface-water artery of the Bitterroot Valley is the Bitterroot River, which originates in the southern Bitterroot Mountains and the Anaconda Range and flows northward to its confluence with the Clark Fork about 15 mi north of the study area. About 4 times as many tributaries join the river from the Bitterroot Mountains on the west as from the drier Sapphire Mountains on the east. Natural flows of the Bitterroot River and its tributaries typically peak in the spring, decline through the summer, and remain relatively stable through the winter. About 55 percent of the total annual streamflow in the river discharges in May and June in response to snowmelt and rainfall (McMurtrey and others, 1972). During the summer, irrigation withdrawals significantly reduce flow in the Bitterroot River and some of its tributaries; some reaches downstream from Hamilton routinely approach the minimum flows required to support fisheries (Nunnallee and Botz, 1976). However, part of the diverted water eventually drains back into the river system as irrigation return flow. The U.S. Soil Conservation Service (1947) estimated irrigation return flow to the Bitterroot River was about 280,000 acre-ft/yr when precipitation is normal, and about 216,000 acre-ft/yr when precipitation is below normal.

McMurtrey and others (1972) calculated water budgets for the Bitterroot River south of the Ravalli County line for water years 1958 and 1959. On average, 1,772,000 acre-ft/yr flowed into the basin. Of this total entry, 52 percent was from the west, 37 percent was from the south, and 11 percent was from the east. The average discharge of the Bitterroot River as it left the study area near Florence was 1,540,000 acre-ft/yr; thus, an estimated 232,000 acre-ft/yr, or 13 percent of the total surface-water inflow, was lost to irrigation, evapotranspiration, and other consumptive uses. Average annual streamflow at USGS gaging station 12344000, Bitterroot River near Darby, was about 8 percent greater during the present study period (water years 1994-97) than during the period analyzed by McMurtrey and others (1972).

Climate

The climate of the Bitterroot Valley is typical of mid-altitude intermontane basins of the Northern Rocky Mountains west of the Continental Divide, with cold winters, mild summers, and varied precipitation. On the basis of the 1961-90 period of record, the average annual precipitation at Hamilton (altitude 3,640 ft) is 13.28 in., and the average annual temperature is 44.8 °F (National Oceanic and Atmospheric Administration, 1992). The average last occurrence of freezing temperatures is May 30, and the average first occurrence is September 10 (Natural Resources Conservation Service, U.S. Department of Agriculture, unpub. data., 1994). Thus, the average growing season is about 103 days long. Precipitation at higher altitudes of the Bitterroot Mountains along the western margin of the drainage basin is about 45 in/yr in the south and central parts of the valley and more than 80 in/yr in the north (fig. 3). In contrast, precipitation along the crest of the Sapphire Mountains on the eastern margin of the drainage basin is about 25 to 35 in/yr. Monthly precipitation for the study period and mean monthly precipitation for the period 1961-90 at Hamilton are shown in figure 4.

Delineation of Focus Areas

To provide a more in-depth investigation of selected parts of the study area, three focus areas were chosen on the basis of physiography, geology, climate, effect of irrigation, and development pressure. These focus areas are referred to in this report as the Eightmile, Hamilton West, and Hamilton Heights areas (fig. 5).

The Eightmile area is located east of Florence and encompasses about 6.8 mi^2 of the lower part of the Eightmile Creek drainage basin. The physiography of the area is dominated by the alluvial plain of Eightmile Creek, which is bounded on the north and south by low hills of Tertiary sediments. The geologic source area for the near-surface sediments in the Eightmile area is the Sapphire Mountains, which are composed predominantly of metasedimentary rocks (Tuck and others, 1996). Precipitation in the area averages about 14 in/yr. The maximum precipitation in the drainage area upgradient from the Eightmile Creek area is less than 30 in/yr, making it the driest of the three focus areas. Limited diversion of Eightmile Creek locally supplies

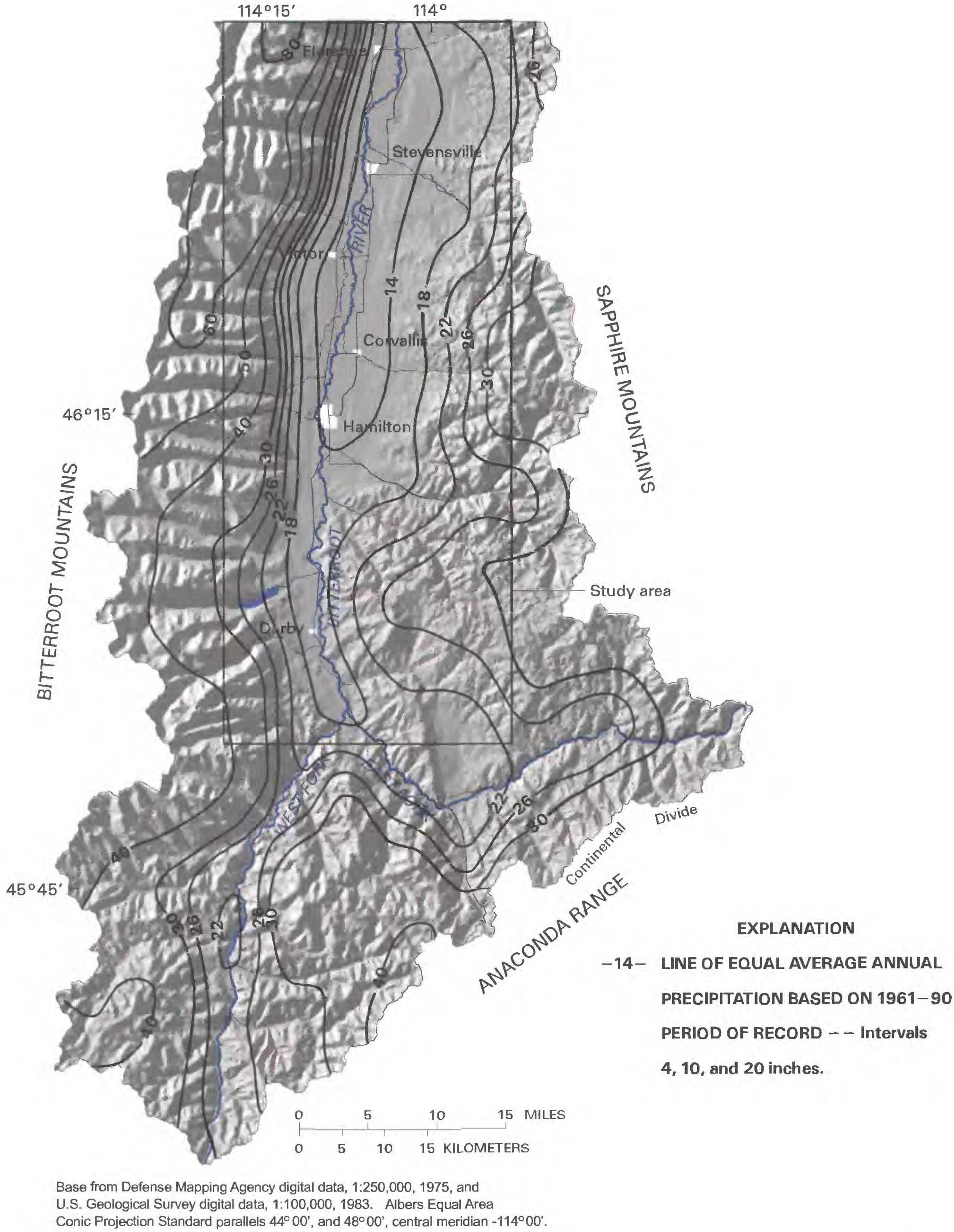


Figure 3. Average annual precipitation in Ravalli County. Digital precipitation data compiled by Oregon State University Climate Center (George Taylor, unpublished data, 1995).

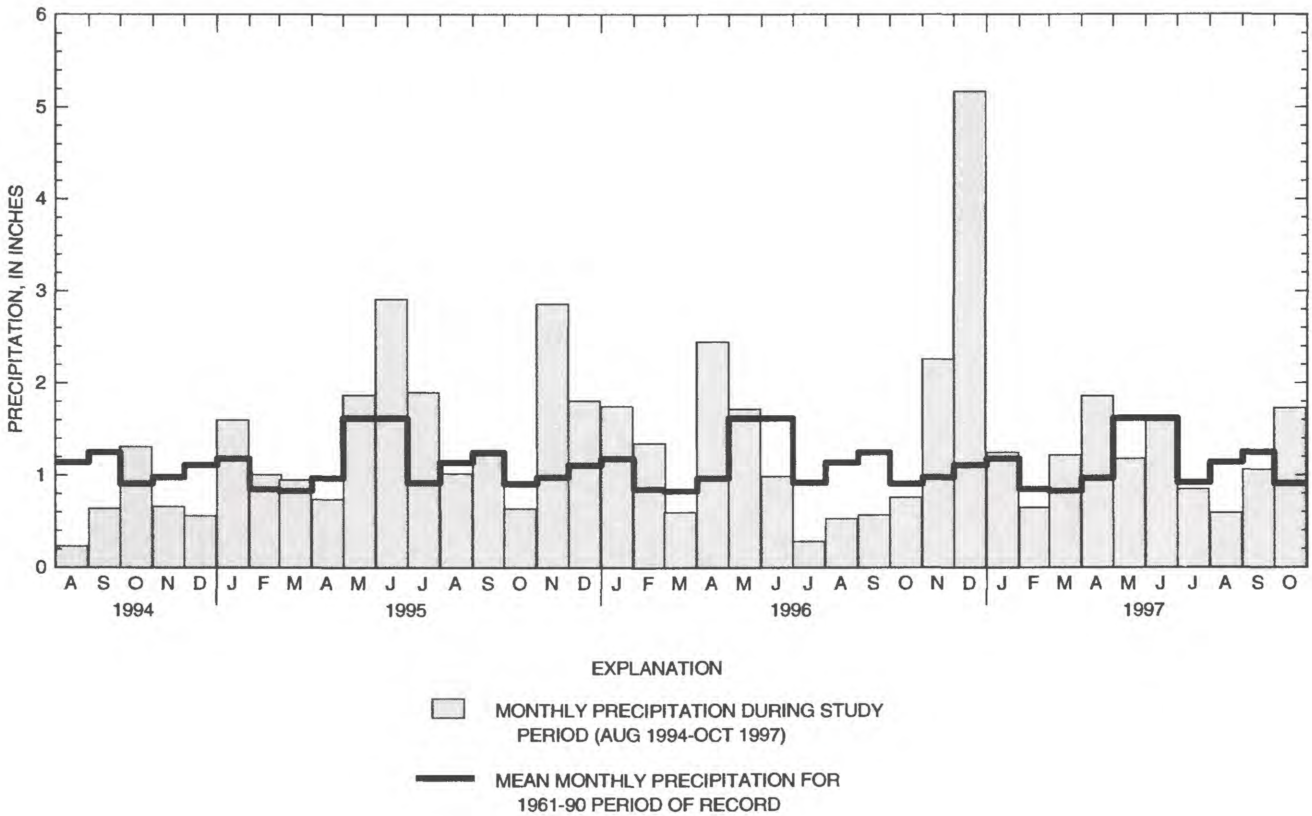
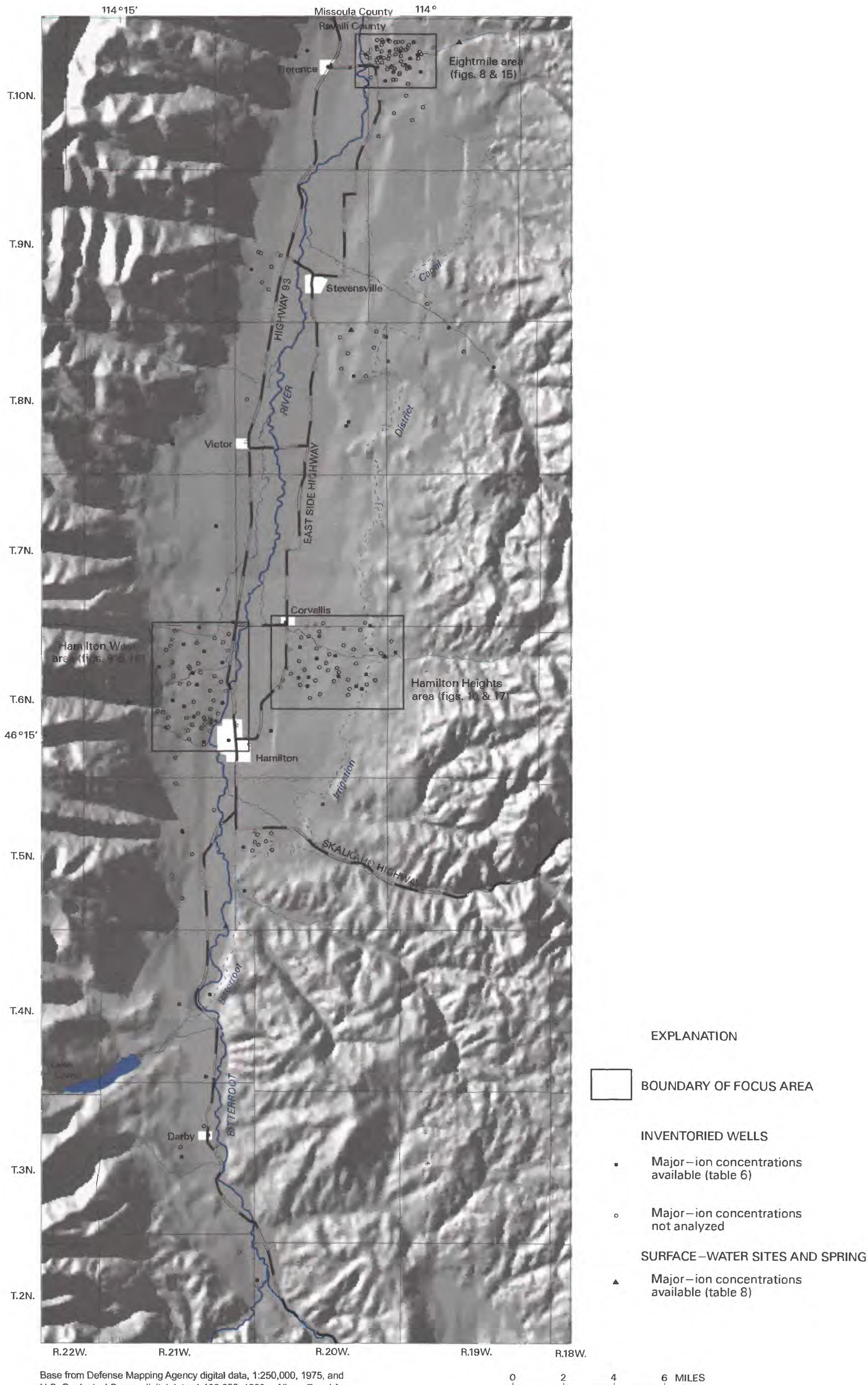


Figure 4. Monthly precipitation for the study period and the mean monthly precipitation for the 1961-90 period of record at Hamilton, Montana. Data from the Western Regional Climate Center, Desert Research Institute, Reno, Nev., 1999.

some water for irrigation. The Bitterroot Irrigation District Canal terminates south of, and therefore does not provide irrigation water to, the Eightmile area.

The Hamilton West area is located just northwest of Hamilton and encompasses about 19.4 mi^2. The Tertiary benches in the Hamilton West area have been intensively dissected by streams emanating from the Bitterroot Mountains, and the resulting valleys contain Quaternary alluvial-fan deposits and glacial outwash. The principal geologic source area for the near-surface sediments in the Hamilton West area is igneous rocks of the Bitterroot Mountains (Tuck and others, 1996). Precipitation in the area ranges from about 14 in/yr near the flood plain of the Bitterroot River to about 26 in/yr at the mountain front. Precipitation in parts of the drainage area upgradient from the Hamilton West area is more than 60 in/yr. During the irrigation season nearly all water from local streams is diverted for growing crops.

The Hamilton Heights area is located northeast of Hamilton and encompasses about 19.2 mi^2. The Tertiary benches in the Hamilton Heights area are less dissected by streams than those in the Hamilton West area, and large areas of the gently sloping bench surface remains. The geologic source area for most of the near-surface sediments underlying the area is the Sapphire Mountains, which are composed primarily of metasedimentary rocks. Precipitation in the area ranges from about 14 in/yr near the flood plain of the Bitterroot River to about 18 in/yr along the Sapphire Mountains to the east of the area. Maximum precipitation in the drainage area upgradient from the Hamilton Heights area is about 35 in/yr. The Hamilton Heights area is the only focus area that receives irrigation water from outside its natural drainage area. Water for irrigation is supplied primarily by the Bitterroot Irrigation District Canal (fig. 5), which transports water from Lake Como in the Bitterroot Mountains northwest of Darby to most of the benches on the east side of the valley. Water for irrigation is also supplied by the Republican and Hedge Ditches (fig. 17), which divert water from the Bitterroot River south of Hamilton. The



Base from Defense Mapping Agency digital data, 1:250,000, 1975, and U.S. Geological Survey digital data, 1:100,000, 1983. Albers Equal Area Conic Projection Standard parallels 44° 00′, and 48° 00′, central meridian -114° 00′.

Figure 5. Locations of focus areas, inventoried wells, and surface-water sites, and corresponding availability of water-quality analyses.

canals transport water from about mid-April through October.

HYDROGEOLOGY

Ground-water flow in the Bitterroot Valley is strongly controlled by the depositional history, topographic setting, and hydraulic character of the geologic units in the area. Recent work by Lonn and Sears (1998) indicates that the basin-fill geology of the Bitterroot Valley includes extensive coarse-grained, water-yielding deposits that are not found in other basins in southwest Montana.

General Geology

The Bitterroot Valley is situated in a structural basin most probably formed by crustal extension during the middle Eocene Epoch (Hodges and Applegate, 1993). Gravity data indicate a distinct, relatively straight western basin margin along the Bitterroot Mountains, in contrast to an irregular eastern margin along the Sapphire Mountains (Noble and others, 1982). Gravity and magnetic data indicate that basin-fill sediments attain a maximum thickness of at least 3,000 ft near Corvallis and Hamilton (Noble and others, 1982; Crosby, 1976). A surficial geology map of the study area is presented as figure 6.

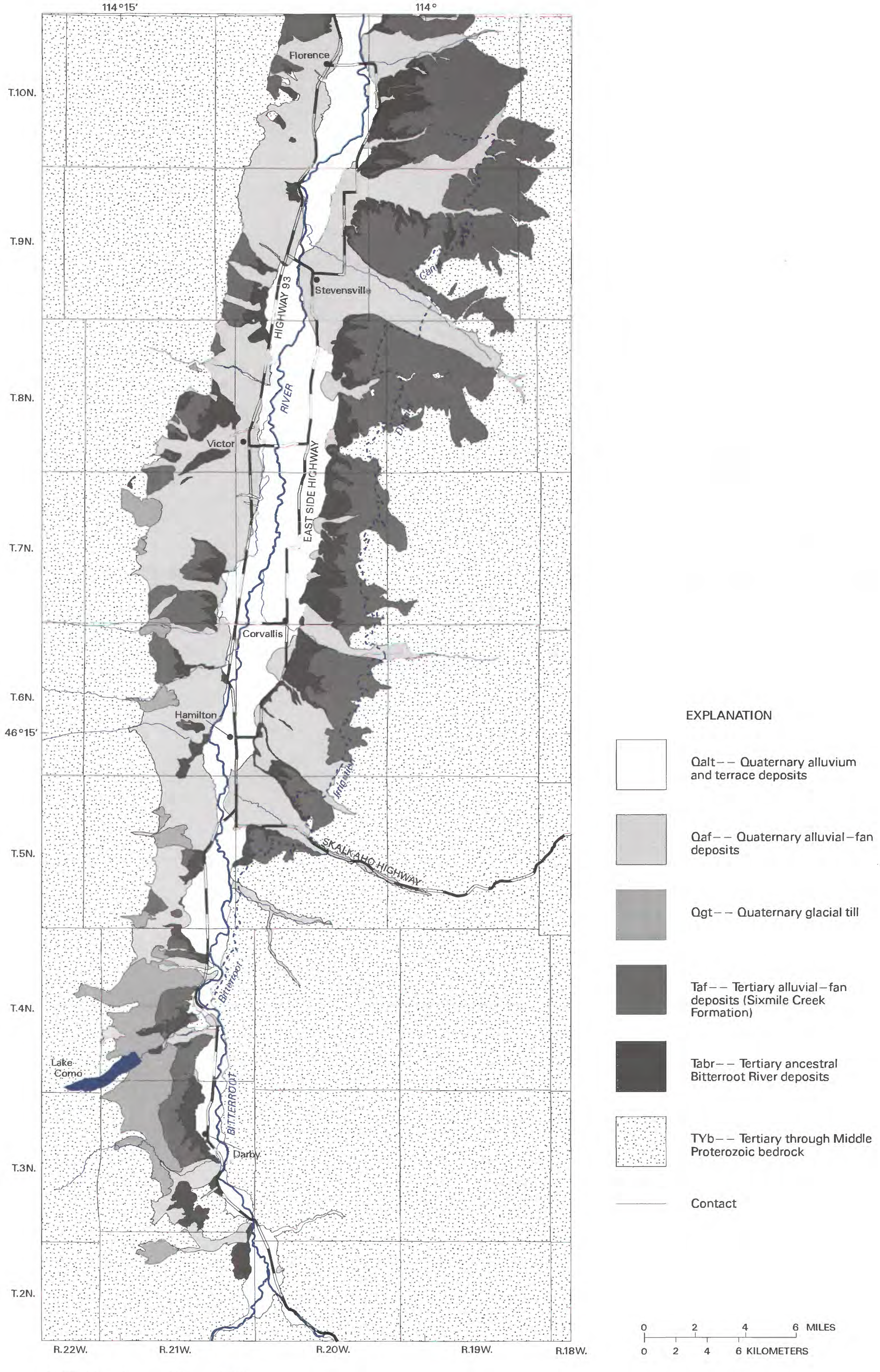
Intrusive, metasedimentary, metamorphic, and volcanic rocks border the Bitterroot Valley. West and south of the basin, the Bitterroot, Anaconda, and southern Sapphire Mountains are composed of Cretaceous granitic rocks associated with the Idaho Batholith. These rocks are mostly gray quartz monzonite with some granodiorite and anorthite. Along the western basin margin, the granitic rocks are bordered by gneiss, which averages about 2,000 ft thick. East of the basin, the Sapphire Mountains are composed mostly of metasedimentary rocks of the Middle Proterozoic Belt Supergroup that include quartzites, quartzitic and calcareous argillite, and argillaceous limestone. Tertiary volcanic rocks, ranging in composition from acidic to basic, crop out locally near fault zones along basin margins (McMurtrey and others, 1972).

Tertiary sediments overlie bedrock throughout the basin and crop out on the eastern and, to a lesser extent, western benches. Tertiary sediments also occur at depth beneath the benches, beneath a veneer of Quaternary alluvium along the Bitterroot River flood plain, and beneath Quaternary alluvial fans along the floors of tributary valleys. These unconsolidated to semiconsolidated Tertiary deposits are composed of gravel, sand, silt, and clay that occur as two distinct geologic units: the ancestral Bitterroot River deposits and the Sixmile Creek Formation (Lonn and Sears, 1998).

The ancestral Bitterroot River deposits--the lower of the two Tertiary units in the basin--are composed of well-sorted, well-rounded, well-stratified, light-gray to white cobbles, gravel, and sand that are locally interbedded with silt and clay (Lonn and Sears, 1998). Clast lithologies are representative of rocks from the entire drainage basin, with several distinctive clast types indicating transport from the far southwestern end of the basin and possibly even beyond. The remote source area for many of the rocks, the well-sorted and well-stratified nature of the deposit, and the age dates of ash and gneiss pebbles of 39 and 45 million years, respectively, indicate that the ancestral Bitterroot River deposits were most likely deposited by a northward through-flowing river of regional scale during the middle Eocene to middle Miocene Epochs (James Sears, Department of Geology, University of Montana, written commun., 1997). Deep drill holes show that unconsolidated sediments similar to the ancestral Bitterroot River deposits are as much as 2,400 ft thick in places (Norbeck, 1980).

The Sixmile Creek Formation, which overlies the ancestral Bitterroot River deposits, is composed of brown, unconsolidated to weakly lithified, poorly sorted, moderately stratified, subangular to rounded boulders and cobbles in a sandy silt and clay matrix deposited in alluvial-fan environments. These sediments represent the locally derived, poorly sorted erosional debris of the adjacent mountains deposited in arid conditions during the late Miocene and Pliocene Epochs, when flash floods are thought to have transported loose rock and soil from adjacent canyons in massive mud-rock slurries. This formation is identified as Tertiary alluvial-fan deposits in figure 6. The Sixmile Creek Formation contains abundant brown, massive, micaceous silt beds and clasts commonly coated by iron oxide or caliche (Lonn and Sears, 1998). Bedding typically dips more steeply than the present surfaces of these deposits; therefore, the present surfaces represent erosional pediment surfaces.

Quaternary glacial till underlies many of the high benches along the Bitterroot Mountains, especially in the southern part of the study area west of Darby.



Modified from Lonn and Sears (1998)

Figure 6. Generalized surficial geology in the study area.

These unsorted, unstratified deposits consist of boulders, cobbles, gravel, sand, silt, and a large amount of clay (Lonn and Sears, 1998). Moraines indicate at least three stages of glaciation beginning in early Pleistocene (Weber, 1972).

Quaternary alluvial-fan deposits are present along much of the western side of the valley and along the larger tributary streams on the eastern side of the valley. These unconsolidated deposits are composed of well-rounded, unweathered cobbles and boulders in a matrix of sand and gravel that were locally derived from bedrock and the reworking of older unconsolidated sediments (Lonn and Sears, 1998). These fans were deposited in braided stream environments and are generally less than 40 ft thick (McMurtrey and others, 1972). Sorting and grain size decrease with distance from the mouths of tributary canyons. On the western side of the valley, Quaternary alluvial-fan deposits include abundant glacial outwash.

Quaternary alluvium and terrace deposits occur along the present flood plain of the Bitterroot River. Alluvium underlies the flood plain of the Bitterroot River and the channels of its major tributaries. Well logs indicate the alluvium has an average thickness of 40 ft (McMurtrey and others, 1972). Quaternary terraces occur adjacent to and 10 to 30 ft above the Bitterroot River flood plain. Both the alluvium and the terrace deposits are composed of material essentially indistinguishable from reworked material of the ancestral Bitterroot River deposits (Lonn and Sears, 1998).

Hydraulic Characteristics of Basin-Fill Deposits

Most wells in the Bitterroot Valley are completed in basin-fill deposits of Quaternary and Tertiary age. The bedrock surrounding and underlying the basin is not a major aquifer, although wells completed in bedrock may yield small amounts of water from fractures and weathered zones.

Aquifers in the various basin-fill deposits are either unconfined, semiconfined, or confined. Most aquifers in Quaternary alluvium, terrace deposits, and alluvial-fan deposits are unconfined to semiconfined and yield abundant water to wells. These deposits can best be described as a sequence of complexly stratified lenses of cobbles, gravel, and sand with varying amounts of intercalcated silt and clay. The greater the percentage of silt and clay, the greater the likelihood that the aquifer will be semiconfined. In some parts of the study area, aquifers in Quaternary alluvial-fan deposits are confined by overlying till.

Abundant fine-grained layers within Tertiary alluvial-fan deposits of the Sixmile Creek Formation confine water in more permeable layers. With depth, these fine-grained layers become more consolidated and, therefore, less permeable. Aquifers in the Tertiary ancestral Bitterroot River deposits range from unconfined where exposed at the surface to confined where overlain by till or Tertiary alluvial-fan deposits. Although present in relatively small percentages in the ancestral Bitterroot River deposits, silt and clay form confining layers at depths greater than a few hundred feet.

Although some Tertiary deposits contain productive aquifers, knowledge of the extent and hydraulic character of these water-yielding zones is limited. Aquifers in Quaternary and Tertiary deposits within the basin generally are assumed to be hydraulically connected, with local exceptions.

To assess certain hydraulic characteristics of the geologic units in the valley, the GWIC data base for the study area (9,424 wells as of 1994) was input to a GIS and combined with the geologic map data shown in figure 6 to enable the assignment of a geologic unit to each well. Several assumptions were made during the process of assignment. Wells that were deeper than 40 ft and located in map areas identified as Quaternary alluvium and terrace deposits, Quaternary alluvial-fan deposits, or Quaternary glacial till were assumed to be completed in the underlying ancestral Bitterroot River deposits. Likewise, wells that were deeper than 300 ft and located in map areas identified as Tertiary alluvial-fan deposits were assumed to be completed in the underlying ancestral Bitterroot River deposits. The resulting GIS data base was used to produce statistics characterizing the depth to static-water level, yield, and specific capacity of wells completed in various geologic units and in various areas of the valley (fig. 7).

Depth to static-water level represents the depth to the water table in an unconfined aquifer and the pressure head in a confined aquifer. An unconfined aquifer with a shallow depth to water is generally more economical to develop given the shallow well-completion depth required, but is also more vulnerable to contamination from surface sources than an aquifer with a greater depth to water. The depth to static-water level

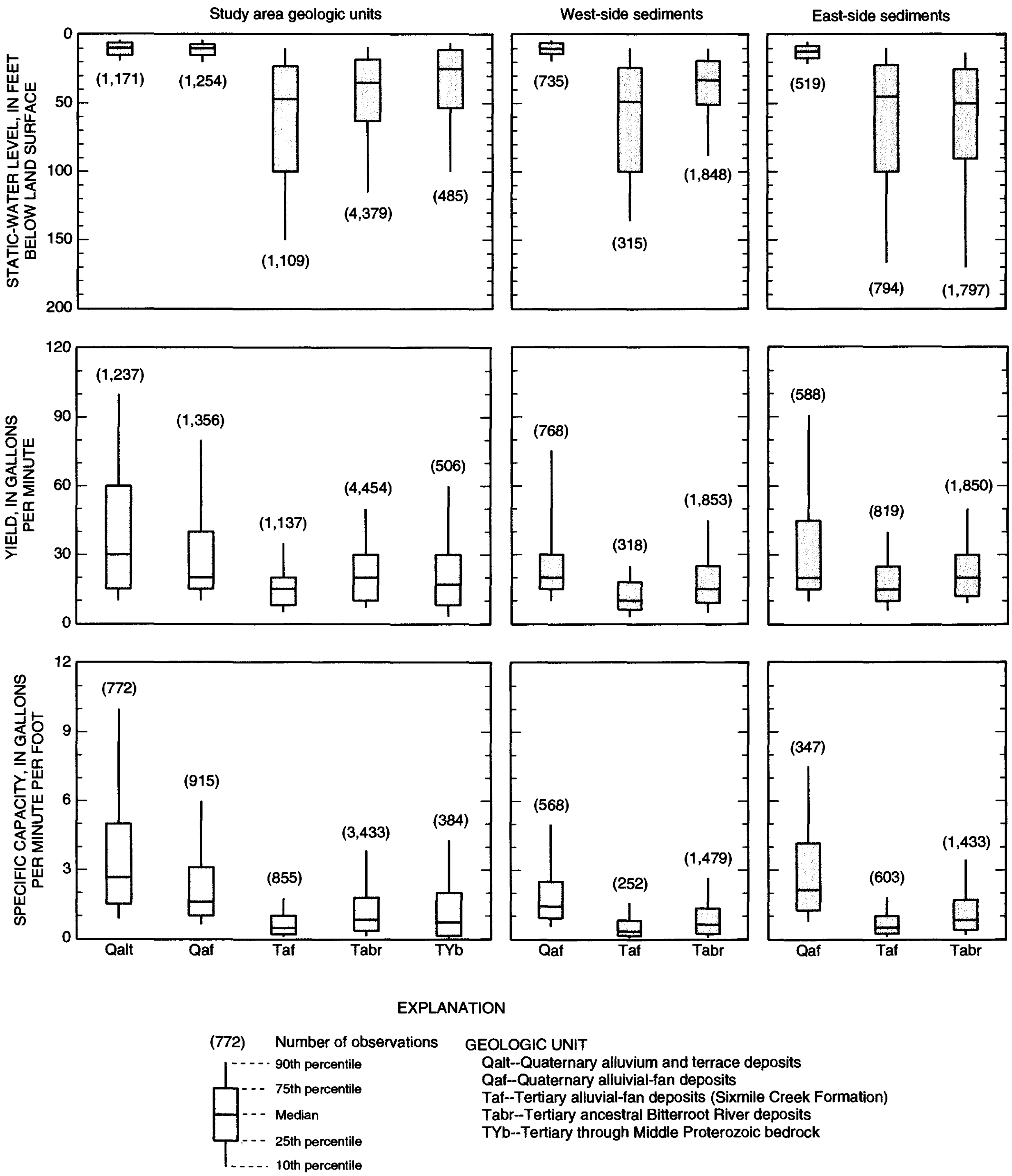


Figure 7. Range of static-water levels, yields, and specific capacities of wells based on geologic unit and location.

in a confined aquifer generally is not definitively related to the depth of the water-bearing strata.

Well yield is dependent on the capacity of the installed pump, the efficiency of the well, and the ability of the aquifer to supply water to the well. Domestic well yields of less than 10 gal/min are probably indicative of poor aquifers.

Specific capacity is an expression of the productivity of a well obtained by dividing the well yield by the pumping-induced drawdown in the well. For example, a well that yielded 10 gal/min with 5 ft of drawdown would have a specific capacity of 2 gal/min per foot of drawdown. This well would be twice as productive as a well that yielded the same 10 gal/min but had a pumping-induced drawdown of 10 ft resulting in a specific capacity of 1 gal/min per foot. Specific capacity is dependent on both the efficiency of the well and the ability of the aquifer to supply water to the well. Assuming that most domestic wells in the study area have similar efficiencies and that variations in well efficiency are randomly distributed throughout the study area, differences in specific-capacity values reported in this analysis could be attributed to differences in the water-yielding capability of the various basin-fill deposits in which the wells are completed.

One limitation of this analysis deserves noting. The GWIC data base contains information about the vast majority of wells completed in the study area but does not contain information about "dry holes" or wells that were never completed because insufficient yield made them unsuitable for their intended use. Therefore, statistics shown in figure 7 for wells completed in geologic units that are relatively poor aquifers such as the Tertiary alluvial-fan deposits might overestimate the median yield and specific capacity of the aquifer.

Wells completed in Quaternary alluvium and terrace deposits had the shallowest static-water levels and the largest values of yield and specific capacity of all geologic units analyzed. These conditions are most likely due to the well-sorted, coarse-grained character of the deposits and their occurrence along the main Bitterroot River flood plain, which is the primary ground- and surface-water discharge area for the valley. On the basis of 12 aquifer tests for Quaternary alluvium and terrace deposits, McMurtrey and others (1972) calculated transmissivity values ranging from 2,000 to 38,000 ft^2/d.

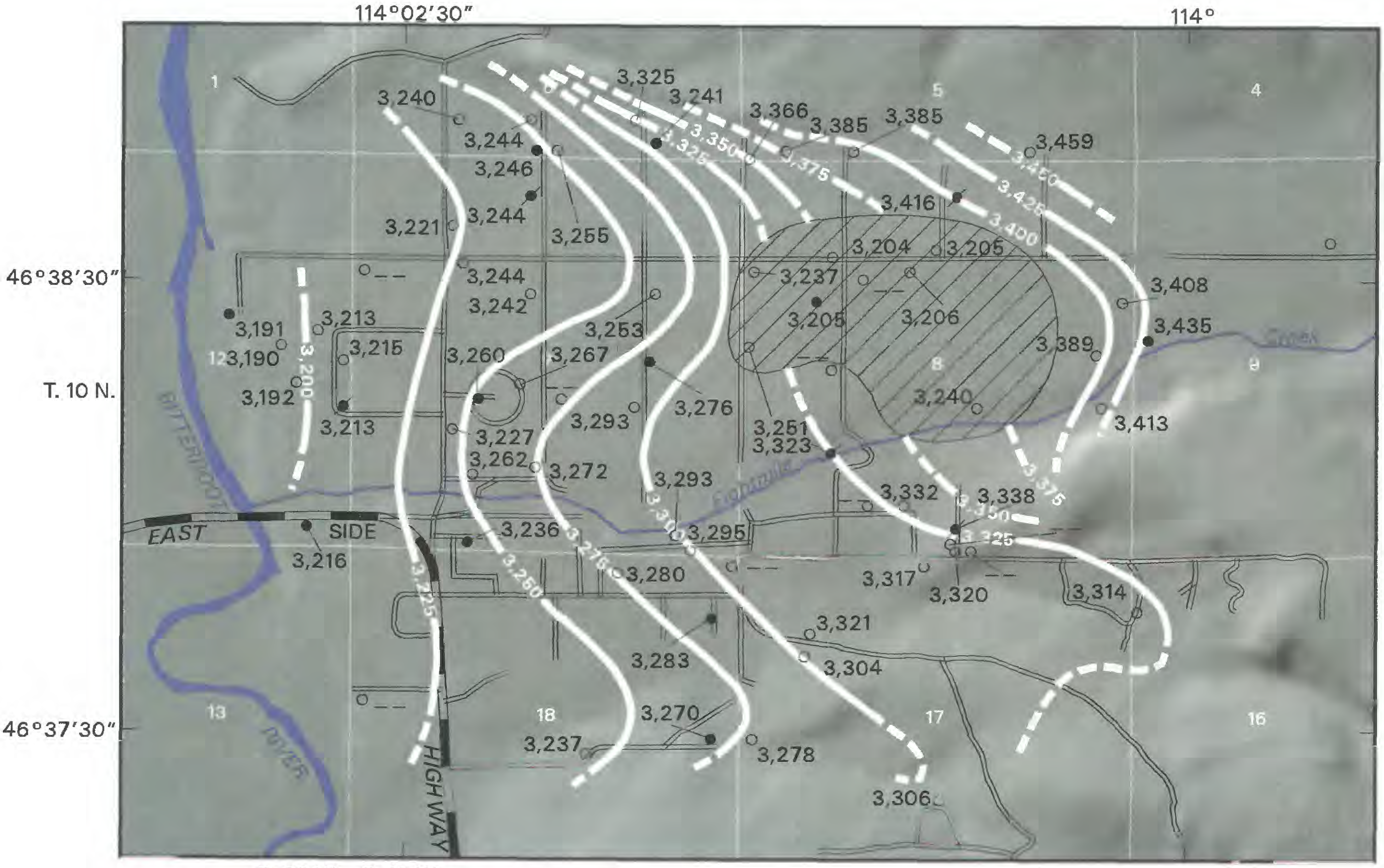
Wells completed in Quaternary alluvial-fan deposits had static-water levels essentially identical to those for Quaternary alluvium and terrace deposits, but had smaller values for yield and specific capacity. These smaller values are most likely related to the Quaternary alluvial-fan deposits being less well-sorted and finer grained than the alluvium and terrace deposits.

In contrast to wells completed in Quaternary deposits, wells completed in Tertiary alluvial-fan deposits had the deepest static-water levels and smallest values of yield and specific-capacity of all geologic units analyzed. The deep static-water levels in the Tertiary alluvial-fan deposits are due largely to their present topographic position high on the basin margins above the altitude of tributary streams that supply recharge to the Quaternary deposits. The small values for yield and specific capacity of wells completed in Tertiary alluvial-fan deposits result from their fine-grained, poorly sorted character and substantial post-deposition compaction, cementation, and weathering, which further reduce permeability.

Wells completed in the ancestral Bitterroot River deposits had values for static-water level, yield, and specific capacity between those for Quaternary deposits and those for Tertiary alluvial-fan deposits. The range in static-water levels in these wells can largely be explained by the topographic position of the parts of the formation that wells penetrate--generally higher in altitude than the Quaternary deposits but lower in altitude than the Tertiary alluvial-fan deposits. The range in values for yield and specific capacity is due largely to the permeability of the deposits which, owing to compaction with time, is less than the permeability of Quaternary deposits but greater than the permeability of the poorly sorted, silt- and clay-rich Tertiary alluvial-fan deposits. Hydraulic-conductivity values for five aquifer tests presented by Norbeck (1980) for two deep test wells (2,627 and 1,110 ft) completed in the ancestral Bitterroot River deposits range from 2.6 to 6.2 ft/d, which are within the range of expected values for silty to clean sand (Freeze and Cherry, 1979). Based on the geologic origin of these sediments, the deep test-well data, and the extensive statistical summary provided by the GWIC data base analysis, the ancestral Bitterroot River deposits are likely to be a productive aquifer at most locations or depths in the study area.

Ground-Water Occurrence and Movement

Regionally, the direction of ground-water flow in the Bitterroot Valley is from the mountain front along



R. 20 W. R. 19 W.

Base from U.S. Geological Survey digital data, 1:24,000, 1979 to present.
Albers Equal Area Conic Projection Standard parallels 44° 00', and 48° 00',
central meridian -114° 00'.

0 0.25 0.5 0.75 1 MILE

0 0.25 0.5 0.75 1 KILOMETER

EXPLANATION

GENERAL WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells completed in various unconsolidated geologic units, August-December 1995 (table 4). Dashed where approximately located. Contour interval 25 feet. Datum is sea level

SHALLOW WATER-YIELDING ZONES ABSENT

INVENTORIED WELL

- ● Well in water-level monitoring network
- Well in water-level and nitrate monitoring networks
- ○ Well not in monitoring network

3,413 MEASURED ALTITUDE OF WATER LEVEL; --, no data for August-December 1995.

Figure 8. Altitude of the water-level surface and location of monitoring wells in the Eightmile area, 1995.

the basin margins toward the center of the basin and diagonally downvalley (Briar and others, 1996). The configuration of the water-level surface generally reflects topography, with steeper hydraulic gradients in the recharge areas along the mountain front than in discharge areas along the flood plain of the Bitterroot River. The direction of flow in deeper aquifers might be somewhat different owing to confining strata, faulting, or other deep structural controls (Briar and others, 1996).

Water levels were measured approximately bimonthly in most of the 54 wells of the monitoring network (table 5 and figure 21 in the Supplemental Data section at the back of this report). The altitudes of monitoring wells in the Eightmile area were determined to within ± 0.5 ft by instrument leveling from points of known altitude. The altitude of land surface at monitoring wells in the Hamilton West and Hamilton Heights areas was determined from 1:24,000-scale topographic maps and is accurate to within about one-half the contour interval (± 10 ft).

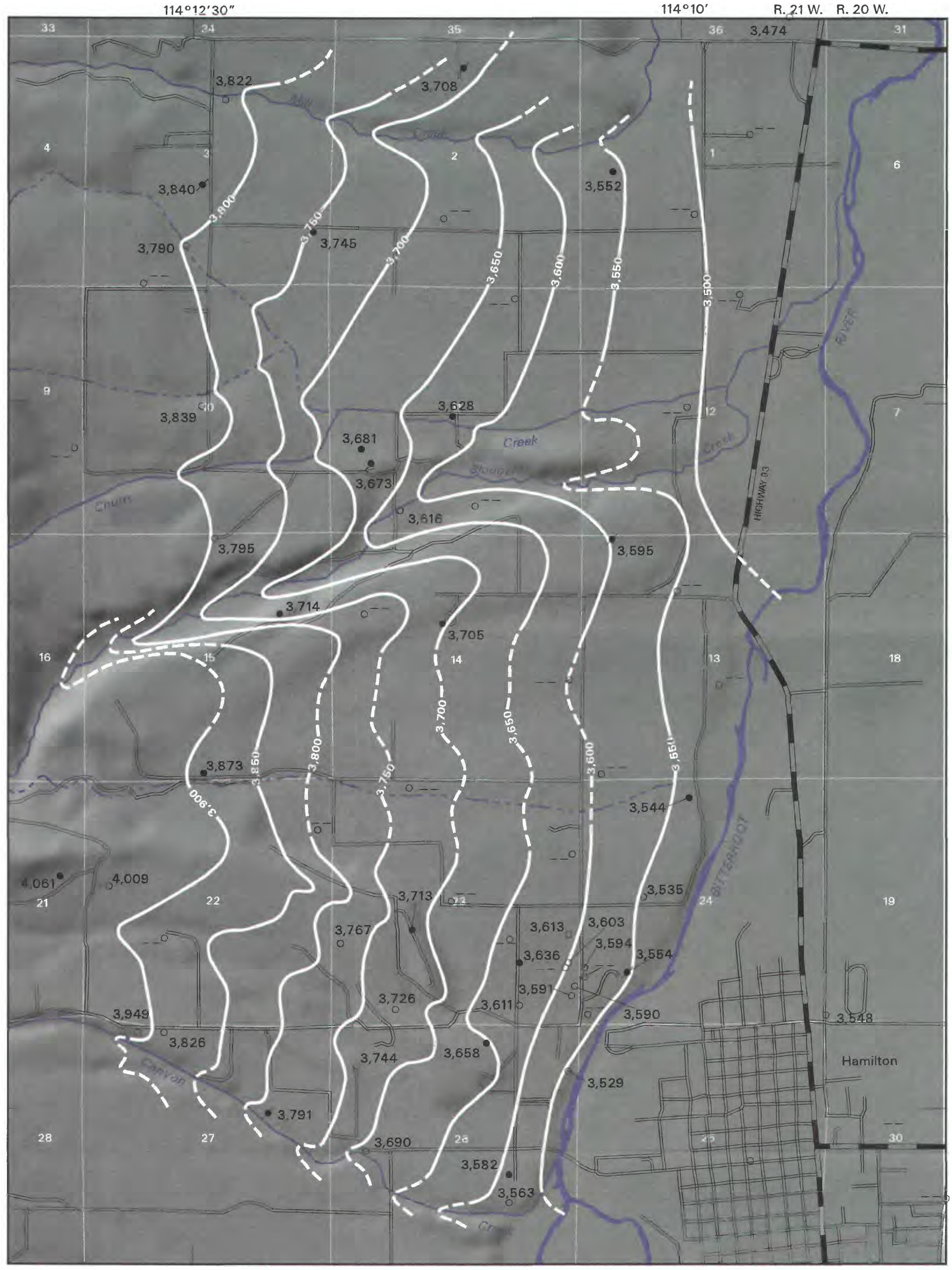
The configuration of the water-level surface in the three focus areas was determined from water levels measured from August through December 1995 (figs. 8-10). Water-levels were manually contoured at a scale of 1:24,000. Topography and the altitude of streams and springs were used to position contours between data points. The direction of ground-water flow is perpendicular to the water-level contours and downgradient.

The contours shown in figures 8-10 represent water levels in the depth interval of basin fill in which most wells in the area are completed. Water levels vary with well depth in areas having a vertical component of ground-water flow. Recharge areas along the basin margins commonly have a downward component of flow, whereas discharge areas near streams and rivers in the central parts of the basin have an upward component of flow. Consequently, water-level measurements in individual wells might differ from water levels shown in the figures by tens of feet in some areas. In addition, wells may be completed at different depths and open to different water-yielding zones. For example, well 10N19W06DDCC01 has a water-level altitude in figure 8 of 3,241 feet which differs from the adjacent contours by 60-80 feet. This well is completed in a deeper water-yielding zone than adjacent wells.

Water-level contours reflect recent hydrologic conditions and development. Seasonal water-level fluctuations in most wells typically range from a few feet to a few tens of feet but do not significantly change the location or shape of the water-level contours at the scale shown. Quarterly water-level data dating back to the late 1950's for three wells (10N20W13ABA01, 08N20W19BAAD03, 08N19W07CBBD01) in the Bitterroot River flood plain near Florence and Hamilton are not significantly different from present conditions. However, changes in irrigation practices and increased withdrawals for domestic use have probably had some effect on water levels in the bench areas. Unfortunately, insufficient data are available to determine long-term changes in ground-water levels throughout most of the study area.

Basin-fill aquifers in the Bitterroot Valley are recharged by infiltration of streamflow and irrigation water, subsurface inflow from surrounding bedrock (which is primarily recharged by melting snowpack), and direct infiltration of precipitation and snowmelt. Discharge from basin-fill aquifers is by seepage to springs and streams, evapotranspiration, withdrawals by wells, and subsurface flow to the north out of the basin.

The potential for natural ground-water recharge to an area is dependent upon the quantity of precipitation that falls on and upgradient from the area. For this discussion, the total area receiving precipitation which could potentially recharge an aquifer through direct infiltration, inflow from bedrock, and leakage from streams, is referred to as the "potential recharge source area." As shown in figure 3, the west side of the Bitterroot Valley receives significantly more precipitation than the east side. The potential recharge source area on the west side is 415,673 acres; this area includes upgradient bedrock and sedimentary deposits on the western side of the valley (areas A and B in fig. 11) and extends from near the confluence of the East and West Forks of the Bitterroot River in the south to the Ravalli County line in the north. This potential recharge source area was combined with the precipitation data presented in figure 3 using a GIS. The analysis indicates that west-side sediments and bedrock receive a total of 1,462,586 acre-ft/yr of precipitation, for an average annual rate of 3.52 ft (42.22 in.) (table 1). In contrast, the potential recharge source area on the east side is 333,560 acres; this area includes upgradient bedrock



Base from U.S. Geological Survey digital data, 1:24,000, 1979 to present. Albers Equal Area Conic Projection Standard parallels 44° 00', and 48° 00', central meridian -114° 00'.

0 0.25 0.5 0.75 1 MILE

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EXPLANATION

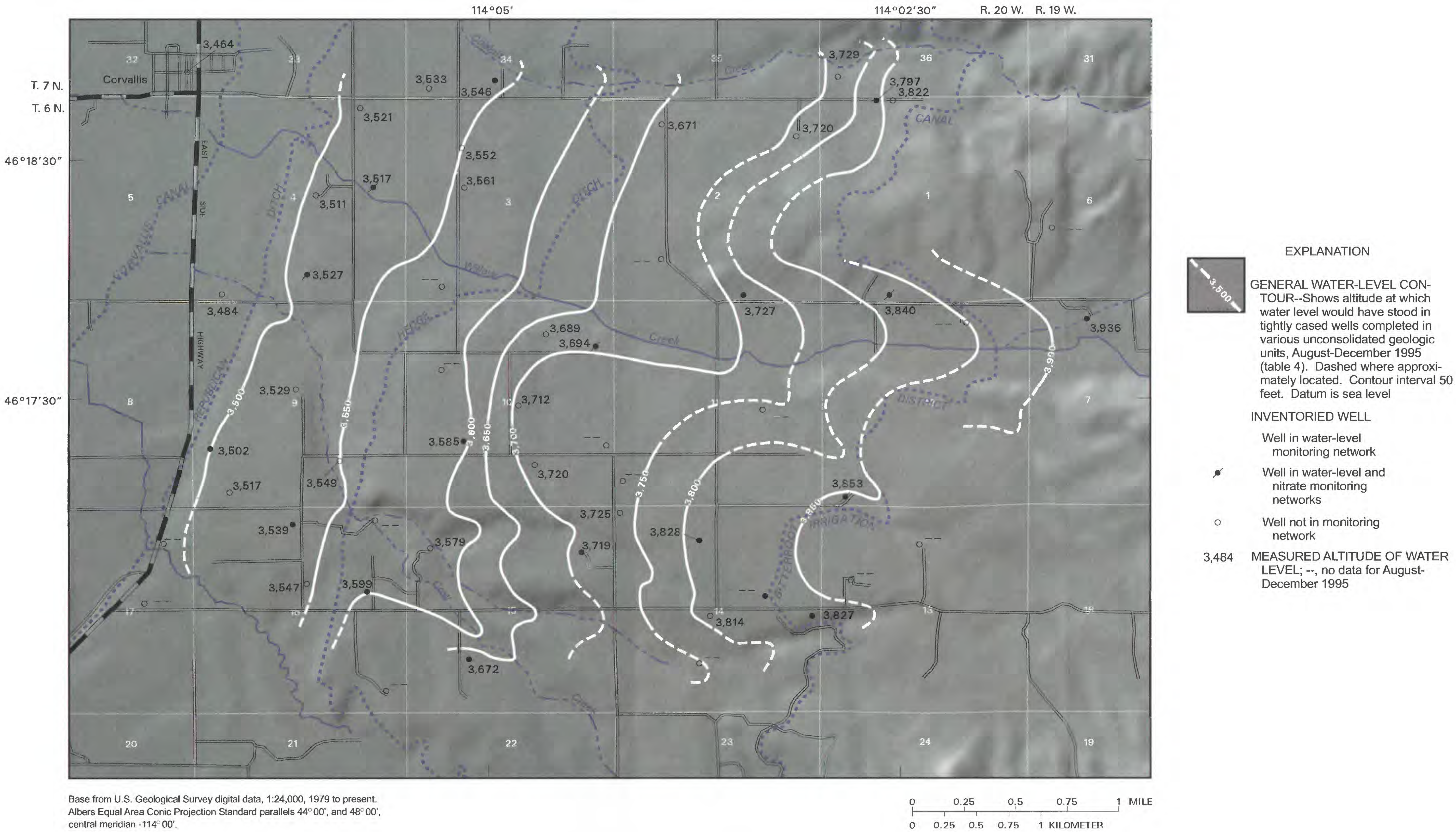
GENERAL WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells completed in various unconsolidated geologic units, August-December 1995 (table 4). Dashed where approximately located. Contour interval 50 feet. Datum is sea level

INVENTORIED WELL

- ● Well in water-level monitoring network
- Well in water-level and nitrate monitoring networks
- ○ Well not in monitoring network

3,563 MEASURED ALTITUDE OF WATER LEVEL; --, no data for August-December 1995

Figure 9. Altitude of the water-level surface and location of monitoring wells in the Hamilton West area, 1995.



Base from U.S. Geological Survey digital data, 1:24,000, 1979 to present. Albers Equal Area Conic Projection Standard parallels 44° 00', and 48° 00', central meridian -114° 00'.

Figure 10. Altitude of the water-level surface and location of monitoring wells in the Hamilton Heights area, 1995.

Table. 1 Total annual precipitation in selected areas

Area (see fig. 11)	Combined surface area (acres)	Total annual precipitation volume (acre-feet)	Average annual precipitation (inches)
West-side sediments and bedrock (A + B)	415,673	1,462,586	42.22
East-side sediments and bedrock (C + D)	333,560	612,310	22.03
Eightmile focus area plus upgradient area (1 + E)	25,259	41,449	19.69
Hamilton West focus area plus upgradient area (2 + F)	50,703	174,671	41.34
Hamilton Heights focus area plus upgradient area (3 + G)	36,532	64,750	21.27

and sedimentary deposits on the eastern side of the valley (areas C and D in fig. 11) and extends from near the Skalkaho Highway in the south to the Ravalli County line in the north. East-side sediments and bedrock are calculated to receive a total of 612,310 acre-ft/yr of precipitation, for an average annual rate of 1.84 ft (22.03 in.). The almost two-fold difference in the quantity of precipitation falling on the western as opposed to the eastern sides of the valley is probably the most significant factor affecting the quantity and quality of ground water in the study area.

The potential recharge source area upgradient from and including each of the three focus areas is also shown in figure 11. The drainage area, total annual precipitation volume, and average annual precipitation in each of the three focus areas is presented in table 1. As shown in the table, average annual precipitation in the area upgradient from and including the Hamilton West area is about twice that of the Eightmile and Hamilton Heights area.

The quantity of precipitation falling in an area represents the upper limit, or maximum potential for natural recharge, not the actual quantity of recharge to underlying aquifers. The percentage of the total available water that actually recharges a specific aquifer is dependent on many complex and interrelated factors whose precise determination is beyond the scope of this study. For example, most precipitation in the areas shown in table 1 occurs at higher altitudes in the mountainous bedrock parts of the drainage. Water that is not lost to evaporation, transpiration by trees and mountain vegetation, or sublimation of snow will either flow overland to mountain streams or will infiltrate fractures in the bedrock. Water that infiltrates bedrock will eventually either flow back into mountain streams or recharge basin-fill sediments along the mountain front. As the mountain streams flow onto the valley floor, they commonly lose flow to infiltration into basin-fill sediments, thereby recharging basin-fill aquifers. Diversion of streamflow for irrigation essentially spreads water over a larger area, further increasing recharge to the basin-fill aquifers.

Sediments along the east side of the valley are also recharged by the diversion of irrigation water from surface-water sources outside their natural drainage area. The Bitterroot Irrigation District Canal transports water to most of the eastern benches from Lake Como, which is located about 4 mi northwest of Darby. The canal facilitates a net transfer of about 70,000 to 75,000 acre-ft/yr of water from the west side of the valley to the eastern benches (Gary Shatzer, Bitterroot Irrigation District, oral commun., 1998). The Bitterroot Irrigation Canal supplies about 7,500 acre-ft/yr of water to the eastern upgradient end of the Hamilton Heights area (Gary Shatzer, written commun., 1998). The Republican and Hedge Ditches supply about 4,400 acre-ft/yr of water diverted from the Bitterroot River to the western downgradient one-third of the Hamilton Heights area (Barry Persson, Daly Ditches Irrigation District, written commun., 1998).

The largest component of discharge from basin-fill aquifers is most likely seepage to streams and springs--primarily in lower altitude, downgradient parts of bench areas and along the flood plain of the Bitterroot River. Evapotranspiration from these discharge areas is probably the second largest component of discharge during the growing season. Withdrawals by wells, primarily domestic, is also a discharge component from basin-fill aquifers, although much of the water is returned to aquifers through septic systems.

Water-level contours in the Eightmile area (fig. 8) display several features pertinent to recharge and

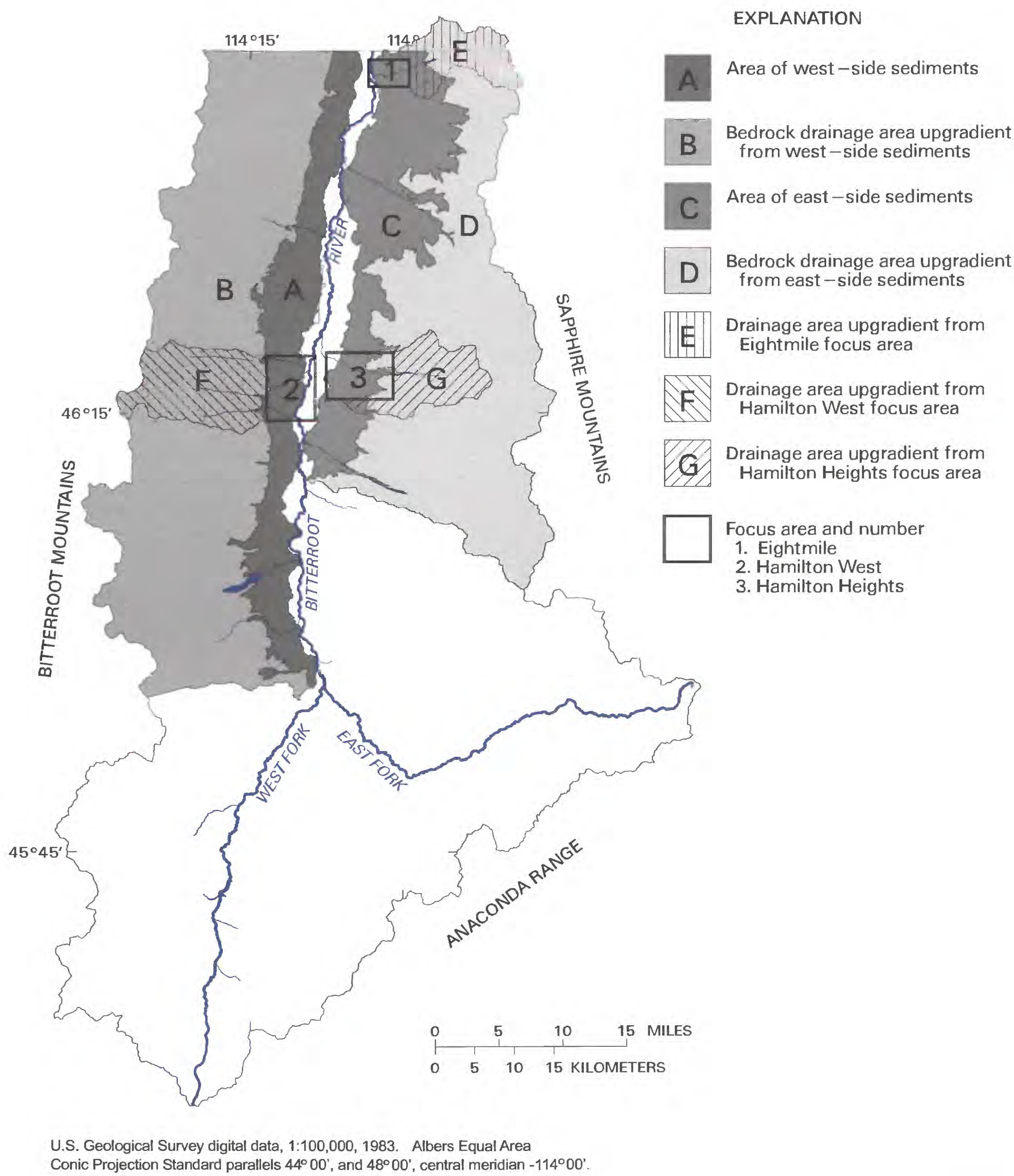


Figure 11. Location of sediments, focus areas, and drainage areas upgradient from sediment and focus areas.

discharge in that area. The downgradient bulge (convex westward) in the 3,250, 3,275, and 3,300 ft contours near Eightmile Creek indicates that the creek is losing water to the underlying aquifer and thereby creating a ground-water mound in that area. Also, the orientation of the water-level contours near the northern and eastern boundaries of the area indicate a direction of ground-water flow from the hills north and east of the area toward the southwest, thereby providing subsurface recharge to the alluvial-fan deposits underlying the Eightmile area. Lastly, the altitude of water levels in the northeast part of the area, where shallow water-yielding zones are absent (fig. 8) and wells are completed in a deep, confined aquifer, are on average more than 100 ft deeper than water levels in nearby wells completed in the shallower aquifer. The water-level altitude in these deep wells is nearly the same as the altitude of the Bitterroot River 2 miles to the west indicating that the direction of ground-water flow in the deep aquifer may not be to the west as it is in the shallower aquifer. This study could not determine from the available data whether the deep aquifer is actually a discontinuous gravel lens that does not discharge to the Bitterroot River or represents a gravel layer that extends under the hills north of the Eightmile area and allows ground water to flow to the northwest and eventually discharge to the Bitterroot River north and downgradient from the study area.

Water-level contours in the Hamilton West area are strongly affected by topography (fig. 9). The three major streams--Mill Creek, Blodgett Creek, and Canyon Creek--are all deeply incised into the basin-fill deposits as they emanate from the mountain front. Water-level contours indicate a general direction of ground-water flow from the mountain front eastward toward the Bitterroot River. Locally the direction of ground-water flow is toward the incised streams, indicating that these streams do not directly recharge the adjacent alluvial-fan deposits. The alluvial-fan deposits are most likely recharged by smaller streams emanating from the mountain front, flow from the major streams diverted for irrigation, subsurface inflow from the mountain bedrock, and precipitation and snowmelt directly on the fan deposits.

Water-level contours in the Hamilton Heights area are also strongly affected by topography (fig. 10). The contours indicate a general direction of ground-water flow from the high benches along the mountain front westward toward the Bitterroot River. Locally the direction of ground-water flow is toward the incised channels of Coalpit, Willow, and Cow Creeks, indicating that these streams do not directly recharge the near-surface Tertiary sediments underlying the benches. Recharge to the benches is most likely from irrigation water derived from the Bitterroot Irrigation District Canal and the Republican and Hedge Ditches, and from subsurface inflow from the mountain bedrock. Although snowmelt on the benches may at times contribute a minor amount of recharge, precipitation during the growing season is probably insufficient to exceed evapotranspiration and the soil-moisture deficit.

Ground-Water Quality

Water samples were collected from 240 wells in the study area for onsite determination of specific conductance and temperature (table 4 in the Supplemental Data section at the back of this report). Water samples also were collected from 239 wells (fig. 5) in accordance with guidelines described by Knapton (1985) and analyzed in the laboratory for sulfate, chloride, and nitrate concentration. Of these wells, 63 were in the Eightmile area, 60 were in the Hamilton West area, 51 were in the Hamilton Heights area, and the remaining 65 were distributed in other parts of the study area. Results of these analyses are presented in table 6 in the Supplemental Data section at the back of this report. Values and statistics presented in the remainder of this section pertain to the samples collected during this study and do not include data in table 6 that were collected by MBMG or previous USGS investigations.

Specific conductance is a measure of the ability of water to transmit an electric current, which is related to the concentration and electrical charge of ions present in the water. In natural waters, specific conductance typically is proportional to the dissolved-solids concentration of the water--the larger the dissolved-solids concentration, the larger the specific conductance. The median ratio of specific conductance to dissolved-solids concentration for 62 analyses in table 6 is 1.5:1. The distribution of specific-conductance values for ground water in various locations in the study area is shown in figure 12. The median specific-conductance value for water from all 240 wells measured was 246 μS/cm. The highest specific-conductance value measured in the study area was 864 μS/cm; 54 samples had

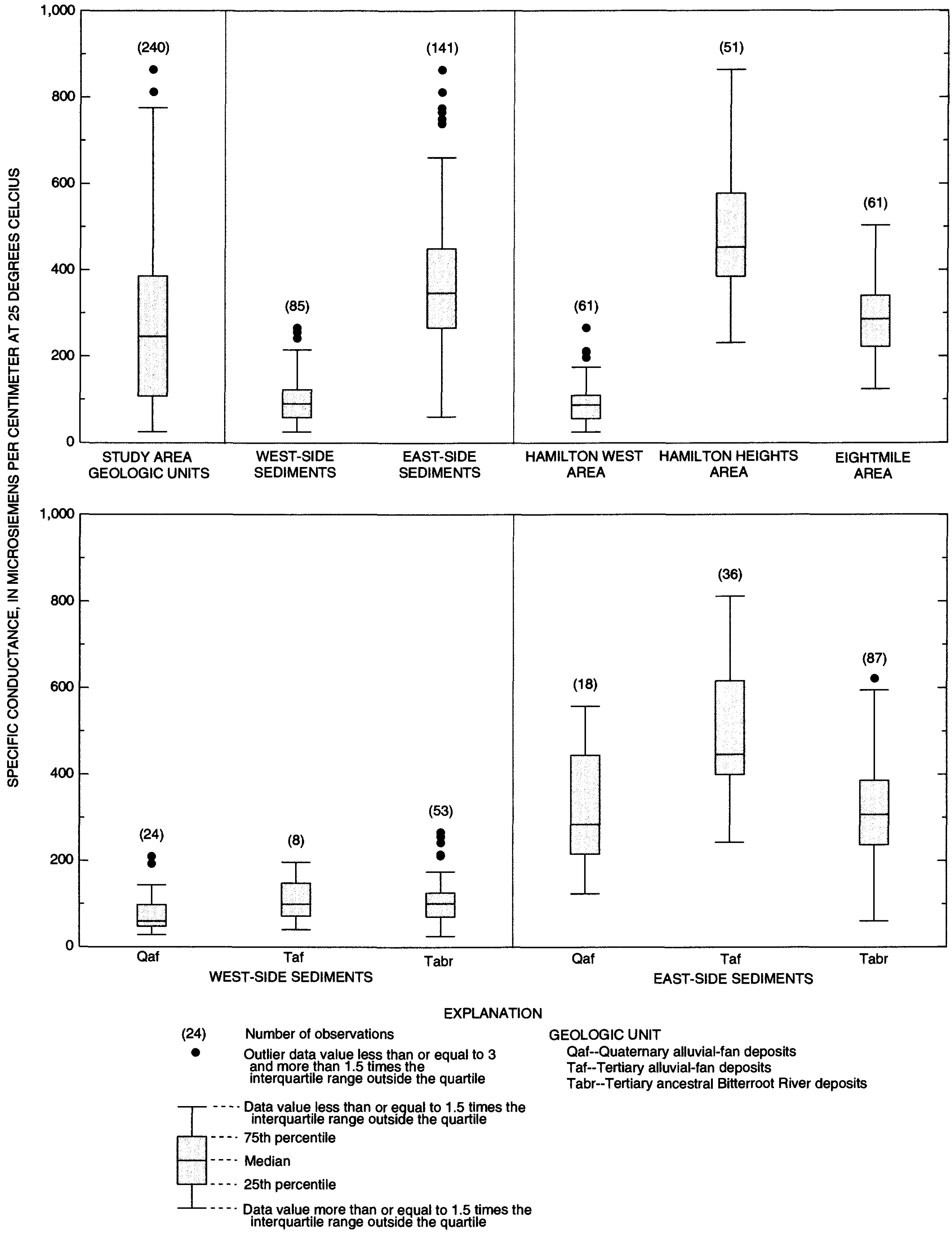


Figure 12. Specific conductance in well water grouped by location and geologic unit.

specific-conductance values less than 100 μS/cm. The median specific-conductance value obtained from water samples from the 85 wells completed in west-side sediments was 90 μS/cm and from the 141 wells completed in east-side sediments was 347 μS/cm. Thus, the median specific-conductance value for water from wells completed in east-side sediments was almost 4 times the median value for west-side sediments.

The difference in the median specific-conductance values between west-side and east-side sediments is also reflected in the three focus areas (fig. 12). The median specific-conductance value obtained from water in 61 wells in the Hamilton West area was 87 μS/cm--almost identical to the median specific-conductance value obtained from water in all wells completed in west-side sediments. In contrast, the median specific-conductance values obtained from water in 51 wells in the Hamilton Heights area and 61 wells in the Eightmile area--both of which are located on east-side sediments--were 453 and 286 μS/cm, respectively.

The range of specific-conductance values for water samples from wells completed in selected geologic units in the study area is also shown in figure 12. The limited number of measurements from water in wells completed in Quaternary alluvium and terraces (3), Quaternary glacial till (1), and Tertiary through Middle Proterozoic bedrock (5) are too small to be statistically significant and are not shown. As shown in figure 12, the specific conductance of ground water is more dependent on which side of the valley the well is located than on the geologic unit in which the well is completed. When each side of the valley is considered separately, the median specific-conductance value for water from wells completed in Tertiary alluvial-fan deposits is slightly larger than the median specific-conductance values obtained from water in wells completed in the other two geologic units. The slightly larger specific-conductance values for Tertiary alluvial-fan deposits could be the result of the geochemical characteristics of the sediments, but more probably is due to the smaller permeability of that unit, which thereby limits recharge and its diluting effects. Likewise, the difference in median specific-conductance concentration in water from wells completed in Tertiary alluvial-fan deposits on the east versus the west side of the valley could in part be due to the different geochemical characteristics of the source rock for the sediments but more probably is due to the more limited quantity of precipitation and therefore recharge available on the east versus the west side of the valley.

The concentration of nitrate can be used as an indicator of the effects of human activities on water quality. Except in rare instances, nitrate is not available as a soluble compound in rocks and minerals. Nitrate concentrations in natural waters typically are less than 2 mg/L (Mueller and others, 1995). Nitrate concentrations that exceed background levels commonly are due to human activities such as sewage disposal and fertilizer application.

Large concentrations of nitrate in ground water are cause for concern. Studies have shown that infants can be seriously harmed, sometimes fatally, by continual ingestion of water containing more than 10 mg/L of nitrate, expressed as elemental nitrogen (National Academy of Sciences and National Academy of Engineering, 1974). The U.S. Environmental Protection Agency (1996) Primary Drinking-Water Regulations specify a Maximum Contaminant Level (MCL) of 10 mg/L for nitrate (as nitrogen) in public drinking-water supplies. Large concentrations of nitrate also can be indicative of other undesirable contaminants, which may include fertilizers, pesticides, or pathogenic bacteria and viruses from sewage.

The median nitrate concentration for the 239 wells sampled during this study was 0.63 mg/L (fig. 13). Water from 20 wells sampled during this study had nitrate concentrations exceeding 3 mg/L. The largest nitrate concentration sampled in the study area was 5.9 mg/L; 57 samples had nitrate concentrations below the minimum reporting level of 0.15 mg/L. The median nitrate concentration for samples collected from the 83 wells completed in west-side sediments was 0.17 mg/L. The median nitrate concentration for samples collected from the 143 wells completed in east-side sediments was 1.05 mg/L--or about 6 times larger than the median for west-side sediments.

The difference in the median nitrate concentration between west-side and east-side sediments is also reflected in the three focus areas. The median nitrate concentration for samples collected from 60 wells completed in west-side sediments of the Hamilton West area was identical to the median for all samples collected on the west side of the valley, 0.17 mg/L. In contrast, the median nitrate concentrations for 51 wells sampled in the Hamilton Heights area and 63 wells sampled in the Eightmile area--both areas containing

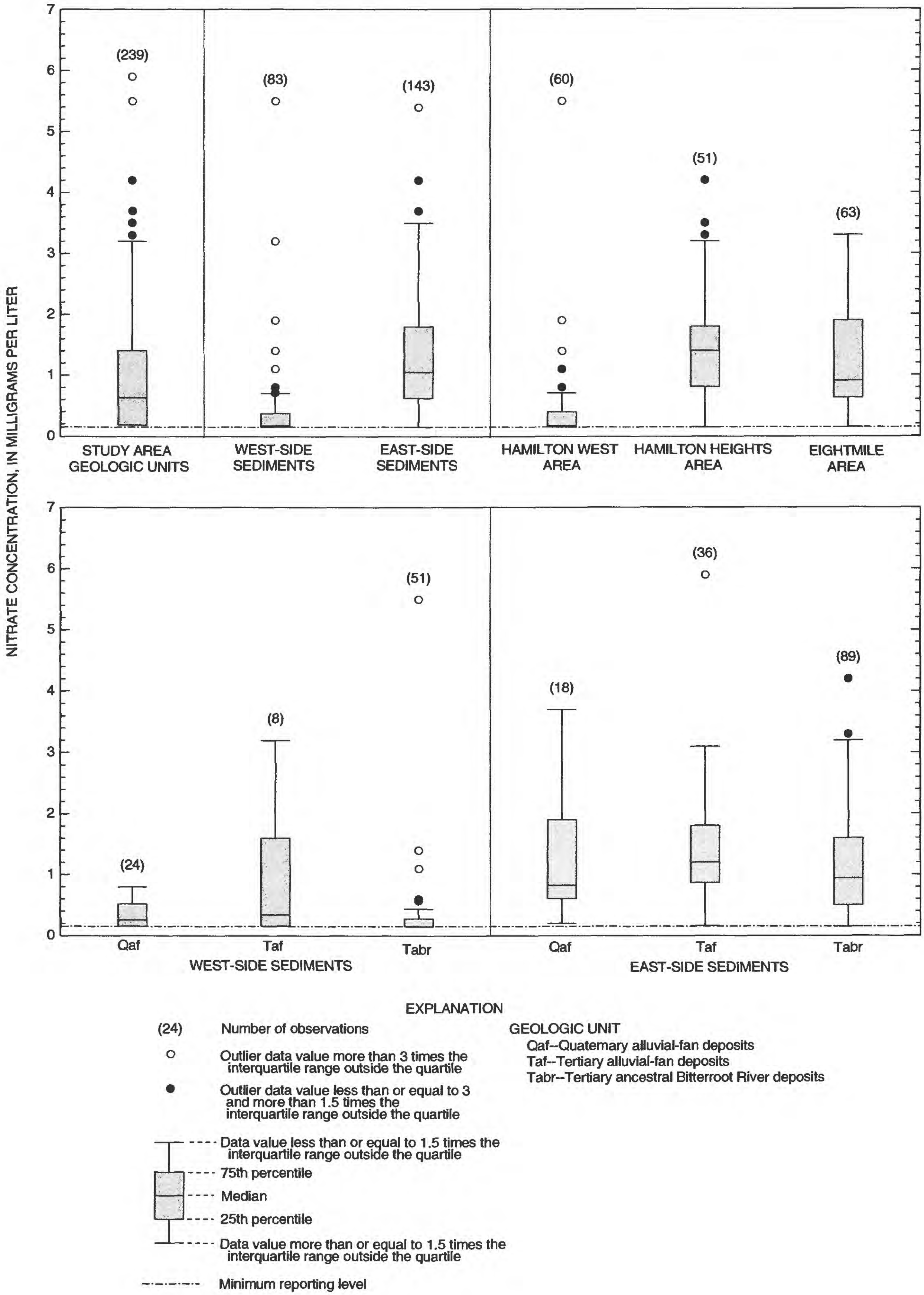


Figure 13. Nitrate concentration in well water grouped by location and geologic unit.

east-side sediments--were 1.40 and 0.91 mg/L, respectively.

The range of nitrate concentrations in water from wells completed in selected geologic units in the study area is also shown in figure 13. As with specific conductance, the concentration of nitrate in ground water is more dependent on which side of the valley the well is located than on the geologic unit in which the well is completed. Also similar to the distribution of specific conductance, the median nitrate concentration for samples from wells completed in Tertiary alluvial-fan deposits is slightly larger than the median for the other two geologic units when each side of the valley is considered separately. The slightly larger nitrate concentrations in Tertiary alluvial-fan deposits is most likely also due to the lower permeability of that unit, which limits the diluting effects of recharge on nitrate concentration.

The relation between nitrate concentration and shallowest well open interval is presented in figure 14. Data for 43 wells that lack depth information are not shown. The percentage of wells with nitrate concentrations exceeding 3 mg/L--fifty percent greater than the assumed background concentration for the area--was 5.6 for all 195 wells, 8.0 for the 144 wells with depth to top of open interval less than 125 feet, and 16.2 for the 37 wells with depth to top of open interval less than 40 feet.

The occurrence of larger nitrate concentrations at shallower well depths is probably best understood by the fact that nitrate enters the ground-water system primarily from surface sources and slowly moves deeper into the aquifer if the vertical component of the hydraulic gradient is downward. Nitrate can be removed from an aquifer through the process of denitrification, which involves microbial conversion of nitrate to nitrogen gas in reducing (anoxic) environments--a condition more common in deeper parts of an aquifer. However, data are insufficient to determine the extent of denitrification in the study area. The general relation between nitrate concentration and well depth does not seem to be dependent on sample location in the valley.

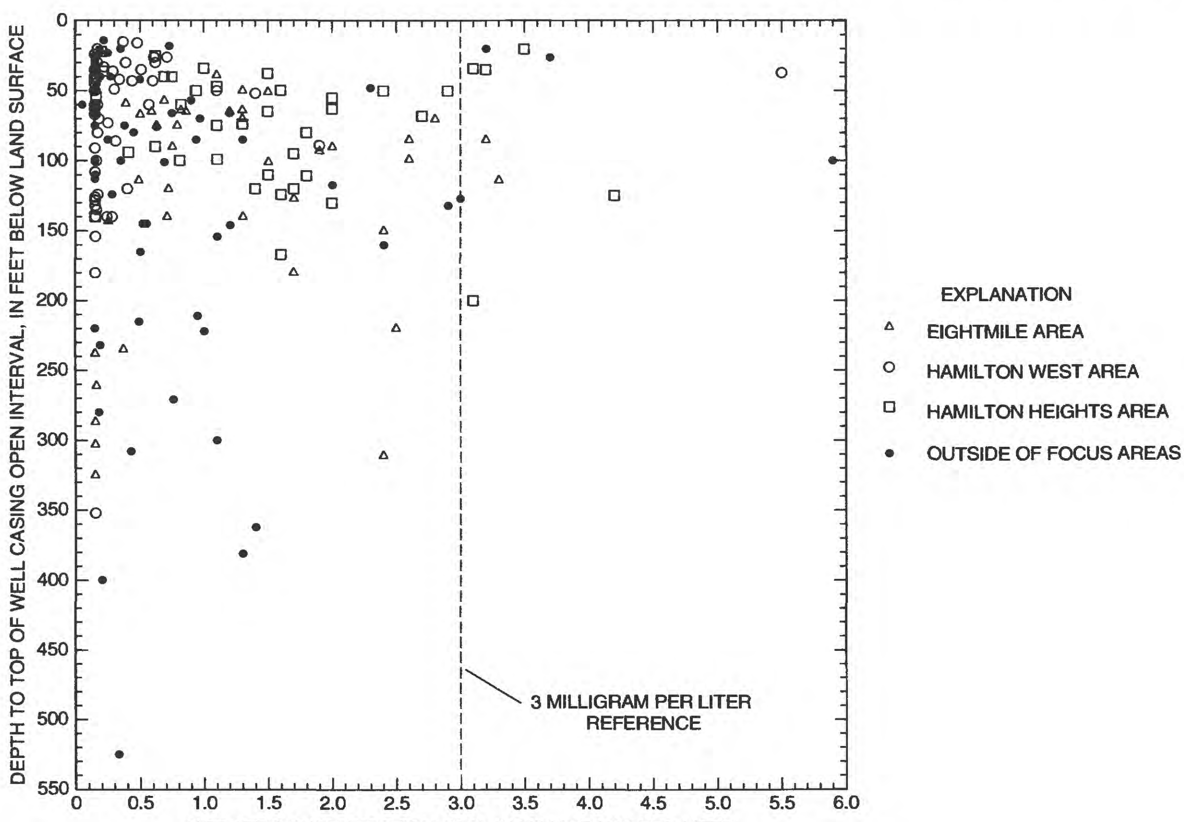


Figure 14. Nitrate concentration in well water versus depth to top of well casing open interval.

The distribution of nitrate concentrations in water from wells in each of the three focus areas is shown in figures 15-17. To determine the timing and magnitude of any seasonal fluctuation in the concentration of nitrate in ground water, 16 wells were sampled approximately bimonthly from November 1996 through October 1997. The changes in nitrate concentration of samples from the 15 wells located in the three focus areas are shown in figure 18. Of the three areas, samples from the five wells in the Eightmile area show the clearest pattern of nitrate concentration fluctuations with season; the smallest concentrations occur in April-June and the largest in January. Whereas the magnitude of change in nitrate concentration in the Hamilton West and Hamilton Heights areas can be as large as in the Eightmile area, samples from the five wells in each of the Hamilton West and Hamilton Heights areas do not show the same pattern as in the Eightmile area.

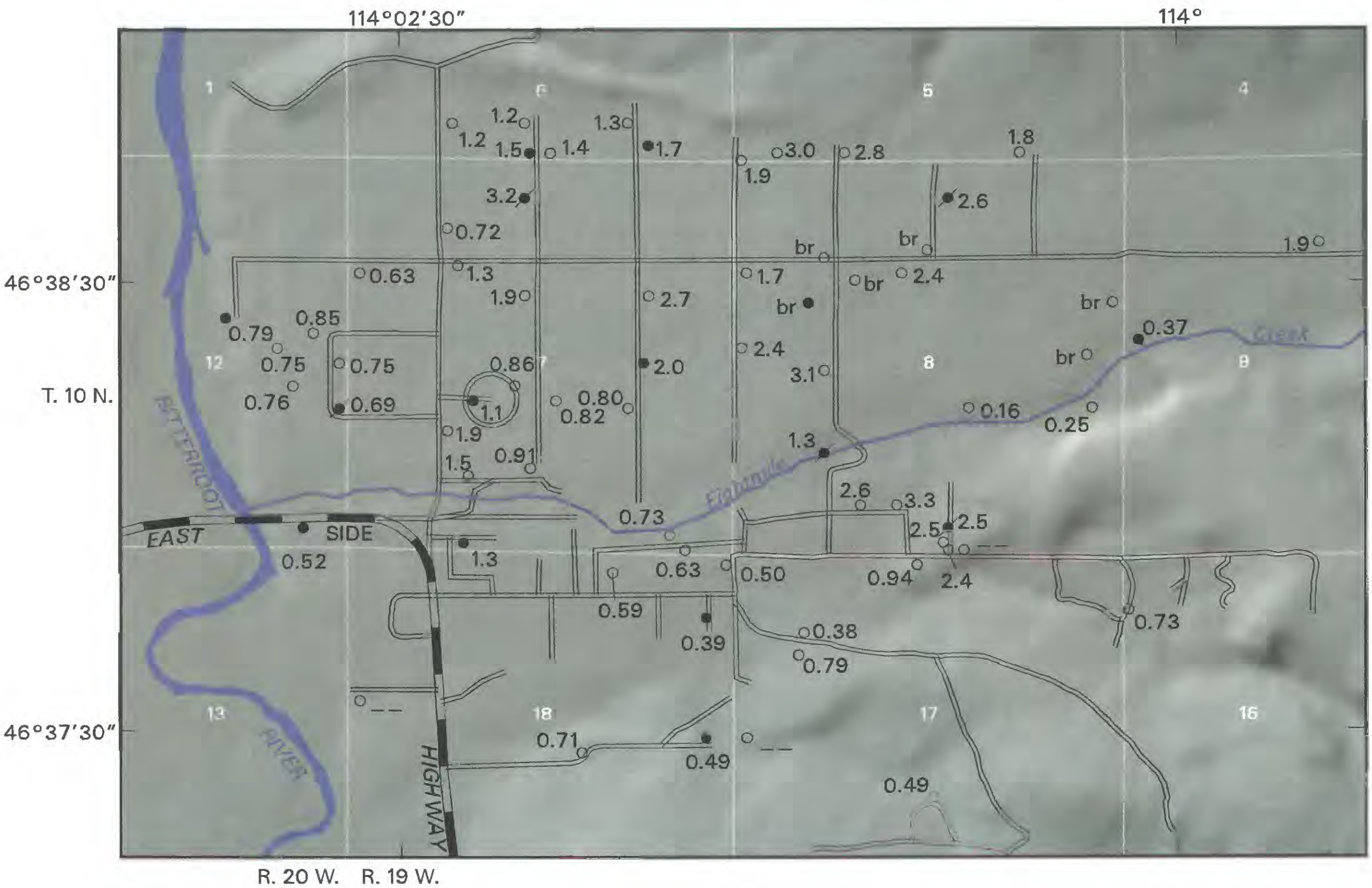
The precise cause of the seasonal variability in nitrate concentration cannot be determined from the available data. However, it is important to note the seasonal variability when interpreting the data or attempting long-term trend analysis. The nitrate data presented in figures 15-17 are based on samples collected at different times in the 1994, 1995, and 1996 field seasons; therefore, the data contain both seasonal variability and spatial differences. For example, on the basis of August 1994 samples, water from well 10N19W07BAAD01 is shown in figure 15 as having a nitrate concentration of 3.2 mg/L, which is noticeably larger than the nitrate concentrations shown for nearby wells. When the well was resampled in August, 3 years later, the water had a similar nitrate concentration of 3.1 mg/L. However, when the well was sampled in April 1997, the nitrate concentration was 1.9 mg/L. If the data presented for well 10N19W07BAAD01 in figure 15 had by chance been based on an April rather than August sample, the relation of nitrate concentration in nearby wells would probably have been different from that shown.

In addition to the variability caused by actual environmental conditions, uncertainty is introduced during the course of sample collection and laboratory analysis. In an attempt to assess the degree to which these uncertainties are present in the data, 48 blind replicate samples were collected and submitted concurrently from the field along with 391 separate samples collected from the 239 wells. Results are included in table 6. An additional replicate sample listed in table 6 (07N21W13BBAD01) was from a previous study which did not include nitrate. The median difference in nitrate concentration between replicates of 48 samples was 0.01 mg/L. The 5 largest differences in nitrate concentration between replicates were 1.0, 0.9, 0.5, 0.5, and 0.4 mg/L, and 23 replicates had no difference (0.0 mg/L). The median difference for the 48 replicates was 2 percent, and 33 replicates (68 percent of the total) had a 10 percent or smaller difference.

The use of these data in the interpretation of long-term trends should proceed only with a full understanding of the temporal variability and procedural uncertainty presented above. Any attempts at long-term trend analysis of nitrate concentration in the study area should be based on an extensively quality-assured dataset of sufficient temporal and spatial continuity to allow for a statistically significant separation of analytical and seasonal variability from long-term trends in the data.

Additional water samples were collected from 43 wells, 3 streams, 1 irrigation canal, and 1 spring for laboratory analysis of major-ion and trace-element concentrations. Water samples from the 43 wells were also analyzed for radon concentration. The locations of surface-water sites and the one spring are listed in table 2. Major-ion and trace-element concentrations in water samples collected during this and previous studies are presented in tables 6-9 in the Supplemental Data section at the back of this report. The dominant cations and anions in samples from the three focus areas are graphically summarized in figure 19. On the basis of the data presented, water from wells in all three focus areas is primarily a calcium bicarbonate type. However, water in the Hamilton West and Hamilton Heights areas tends to have a slightly larger percentage of sodium than does water in the Eightmile area, with one sample in the Hamilton West area and two samples in the Hamilton Heights area being classified as sodium bicarbonate type.

The suitability of water for public drinking-water supply is established by the U.S. Environmental Protection Agency Primary and Secondary Drinking-Water Regulations (table 12). National Primary Drinking-Water Regulations are established for contaminants which, if present in drinking water, may cause adverse human health effects. Either an MCL or a treatment technique is specified by these regulations for regulated contaminants. MCL's are health based and



Base from U.S. Geological Survey digital data, 1:24,000, 1979 to present. Albers Equal Area Conic Projection Standard parallels 44° 00', and 48° 00', central meridian -114° 00'.

0 0.25 0.5 0.75 1 MILE

0 0.25 0.5 0.75 1 KILOMETER

EXPLANATION

INVENTORIED WELL

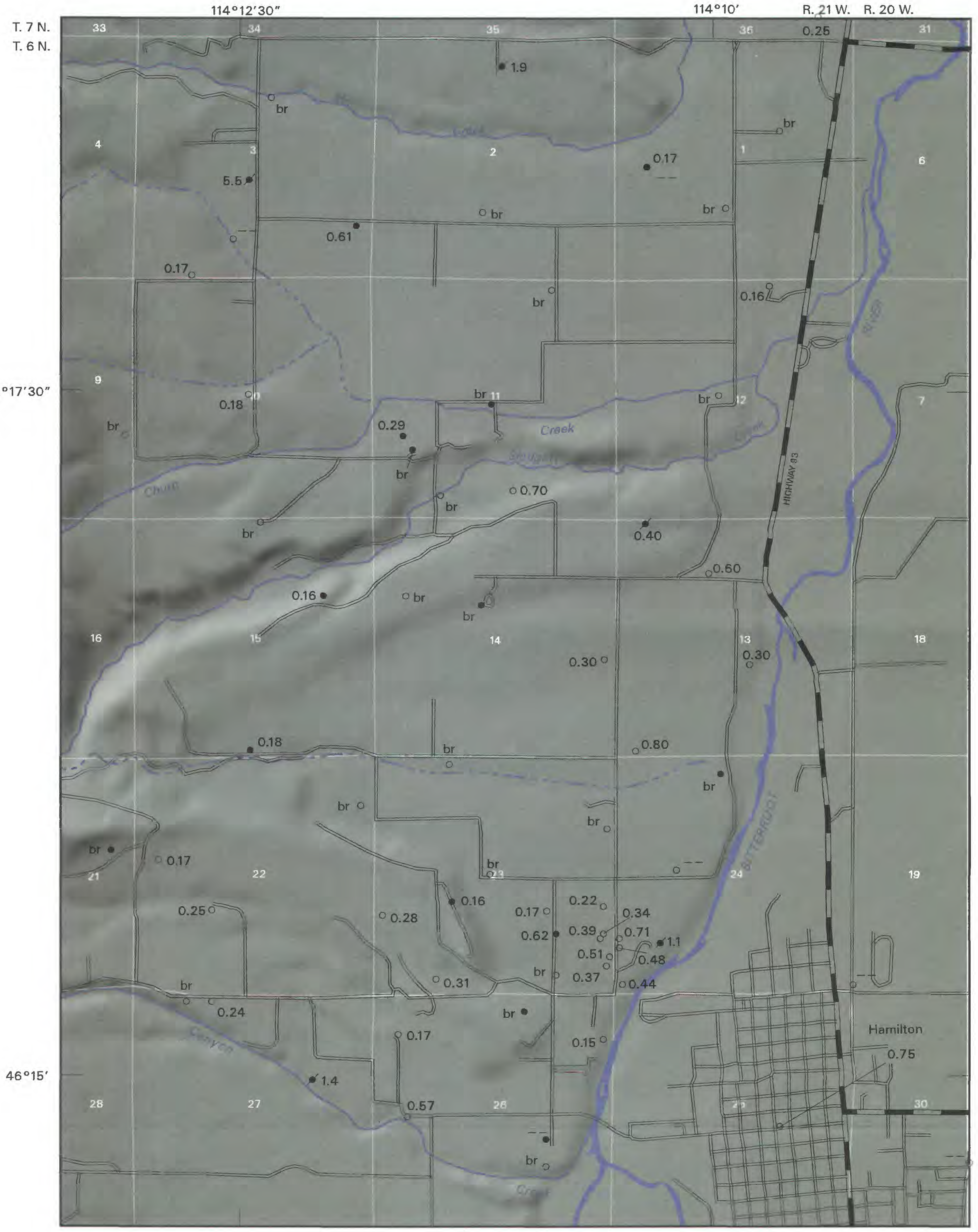
● Well in water-level monitoring network

Well in water-level and nitrate monitoring networks

○ Well not in monitoring network

0.75 NITRATE CONCENTRATION, IN MILLIGRAMS PER LITER; --, no data; br, below minimum reporting level

Figure 15. Distribution of nitrate concentration in well water from the Eightmile area, 1994-96.



Base from U.S. Geological Survey digital data, 1:24,000, 1979 to present. Albers Equal Area Conic Projection Standard parallels 44°00', and 48°00', central meridian -114°00'.

0 0.25 0.5 0.75 1 MILE

0 0.25 0.5 0.75 1 KILOMETER

EXPLANATION

INVENTORIED WELL

- ● Well in water-level monitoring network
- ● Well in water-level and nitrate monitoring networks
- ○ Well not in monitoring network

0.75 NITRATE CONCENTRATION, IN MILLIGRAMS PER LITER; --, no data; br, below minimum reporting level

Figure 16. Distribution of nitrate concentration in well water from the Hamilton West area, 1994-96.

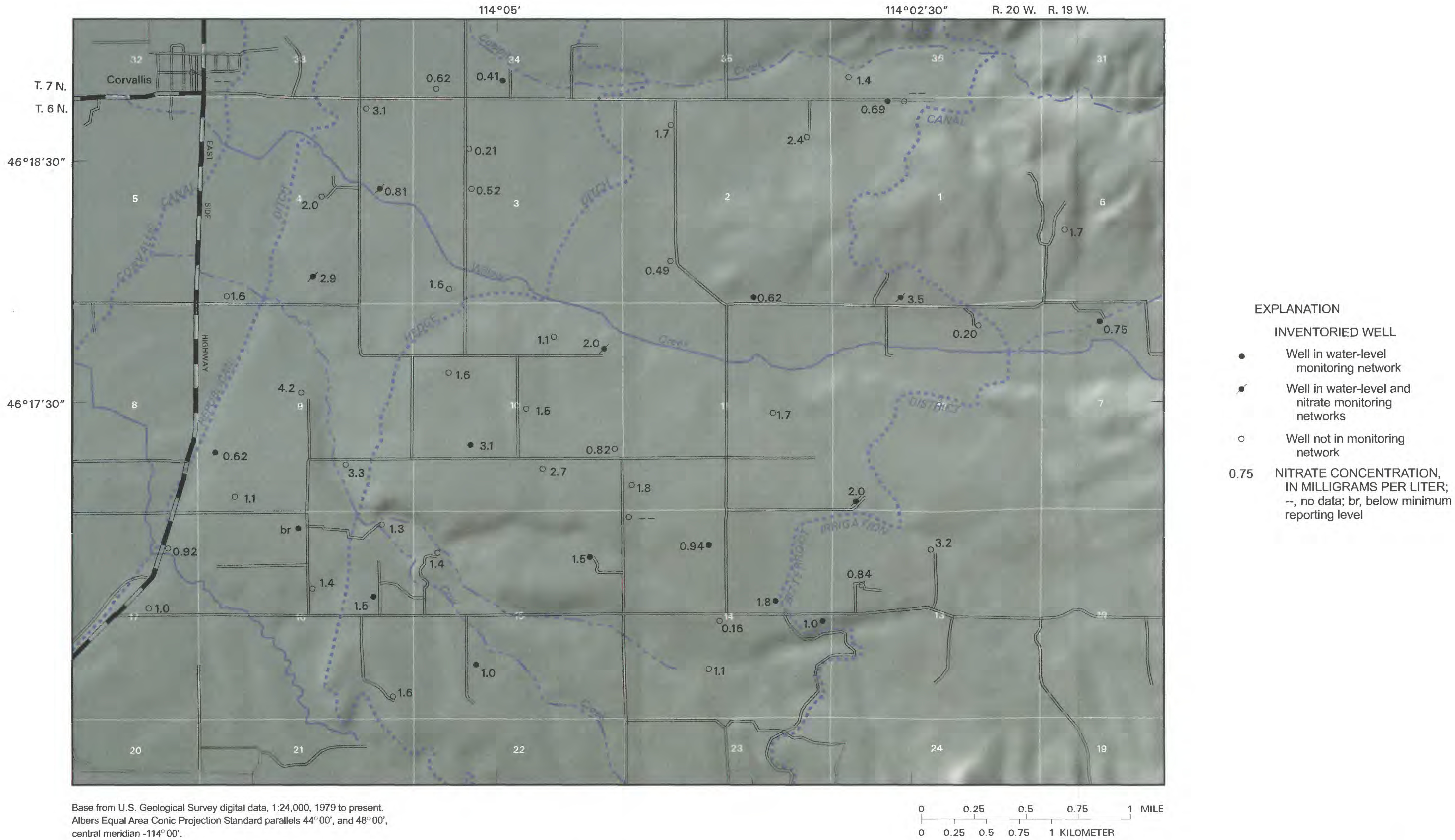


Figure 17. Distribution of nitrate concentration in well water from the Hamilton Heights area, 1994-96.

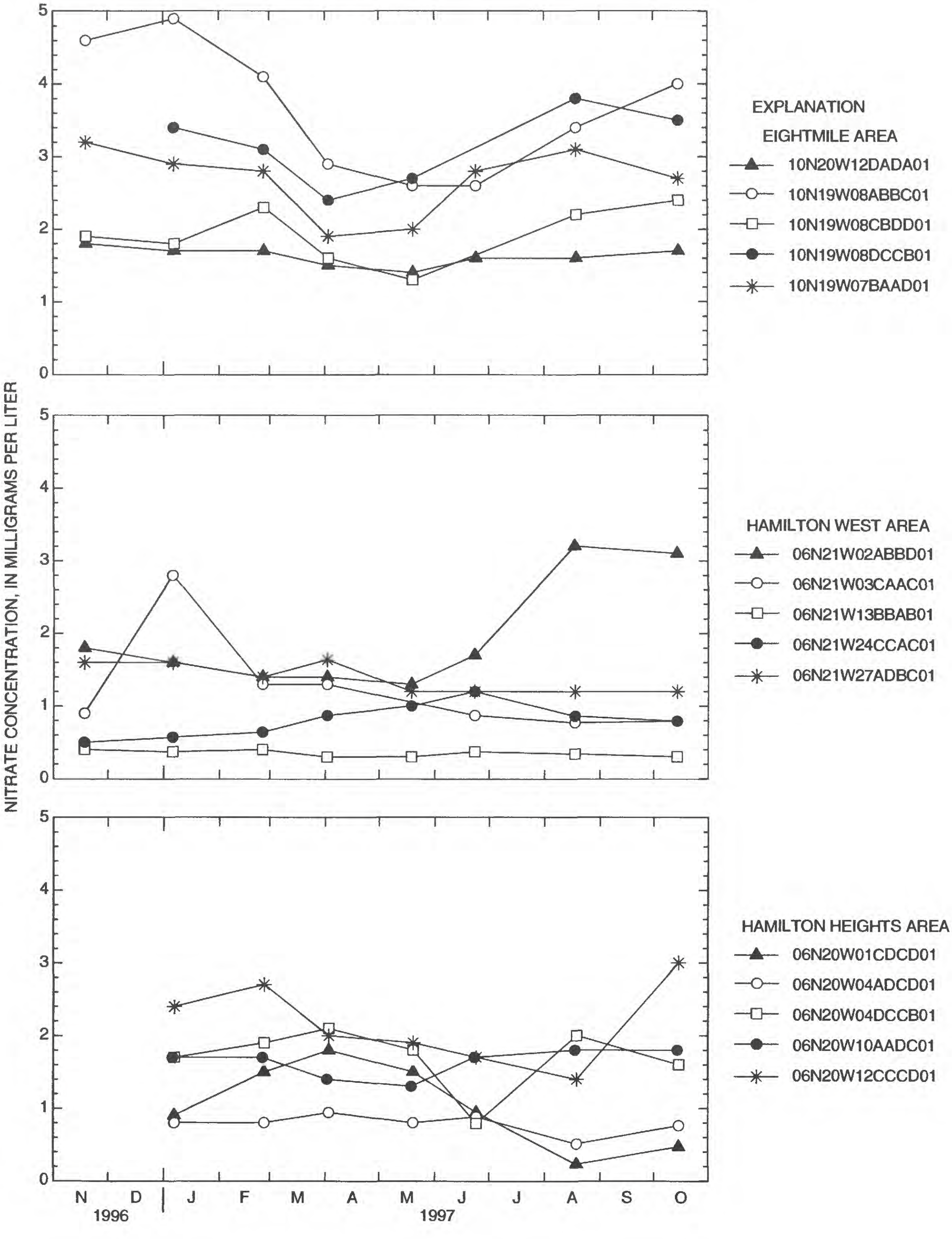
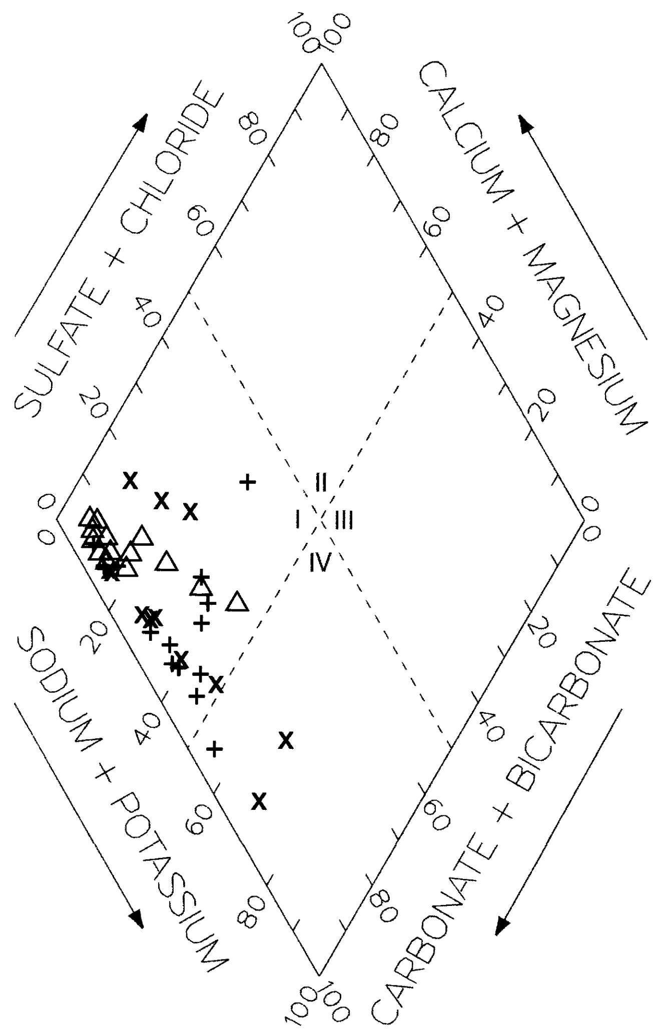


Figure 18. Monthly variation in nitrate concentration in well water.



EXPLANATION

FOCUS AREA
△ Eightmile area
+ Hamilton West area
X Hamilton Heights area

WATER TYPE
I Calcium bicarbonate
II Calcium sulfate
III Sodium sulfate
IV Sodium bicarbonate

Figure 19. Modified trilinear diagram showing percentages of major ions in well water from the three focus areas. Data were converted from milligrams per liter to millequivalents per liter, then values for each cation and anion were plotted on the diagram as a percentage of total milliequivalents per liter.

Table 2. Location and description of surface-water sites and one spring (shown in downvalley order)

Location number	Site description
06N21W20AABB01	Blodgett Creek on west side of Blodgett Canyon Campground Bridge, about 5 miles west of Hamilton
06N20W12AACD01	Bitterroot Irrigation District Canal where it crosses Willow Creek, about 5 miles southeast of Corvallis
06N20W12AACD02	Willow Creek east of where the Bitterroot Irrigation District Canal crosses, about 5 miles southeast of Corvallis
08N20W02ACBD01	Spring at 373 Pine Hollow Road, about 2 miles southeast of Stevensville
10N19W03DCCD01	Eightmile Creek where Granite Creek Road crosses on northeast side, about 6 miles east of Florence

enforceable (U.S. Environmental Protection Agency, 1996). National Secondary Drinking-Water Regulations are established for contaminants that can adversely affect the odor or appearance of water and result in discontinuation of use of the water. These regulations specify Secondary Maximum Contaminant Levels (SMCLs) that are esthetically based and nonenforceable (U.S. Environmental Protection Agency, 1996).

The major-ion and trace-element concentrations shown in tables 6-9 are all less than the MCL's except for one occurrence of cadmium equal to the MCL of 5 μg/L. One sample has a fluoride concentration larger than the SMCL of 2 μg/L, six samples have iron concentrations larger than the SMCL of 300 μg/L, and five samples have manganese concentrations larger than the SMCL of 50 μg/L.

In an attempt to assess the degree of uncertainty in the major-ion, trace-element, and radon data due to sample collection and laboratory analysis, five blind replicate samples and two field blanks were processed and submitted concurrently from the field. Results of the replicate analyses are included in tables 6 and 7. Agreement between constituent concentrations in replicate samples generally was good, with several exceptions: one instance of a 13-percent difference in chloride concentration, one instance of a 25-percent difference in potassium concentration, and one instance of a 58-percent difference in iron concentration and 33-percent difference in manganese concentration at magnitudes near the minimum reporting levels for these constituents. Results of the field-blank analyses are shown in tables 10 and 11 in the Supplemental Data section at the back of this report. All analyzed constituents in field blanks were below the minimum reporting level, except for one instance of potassium concentration at 0.19 mg/L and silica concentrations of 20 mg/L in two blanks. The silica present in the blank samples has been recognized previously as being due to contamination by the deionizing filters used to prepare the blank in the laboratory. Silica contamination of well-water samples due to sample preparation is probably minimal and was not of concern for this study.

Radon is a naturally occurring, odorless, tasteless, inert gas formed by the natural radioactive decay of uranium, which is present to some extent in nearly all rocks. Granitic rocks such as those surrounding much of the Bitterroot Valley commonly contain uranium. The presence of radon is a cause for concern because inhalation of its radioactive decay products at sufficiently elevated concentrations is known to cause lung cancer. The average overall world indoor radon concentration in air is about 0.4 pCi/L. However, indications are that average concentrations in the United States are higher (Cothern, 1987). To minimize exposure and possible health risks, the U.S. Environmental Protection Agency (1992) recommends that the average radon concentration in indoor air not exceed 4.0 pCi/L.

The primary source of radon in indoor air is the soil; radon from the soil can infiltrate houses through cracks, vents, joints, or other openings in basement floors and walls. The next largest source of radon in indoor air is from degassing from well water used for household purposes. A radon concentration of 10,000 pCi/L in water is estimated to produce a 1 pCi/L increase in radon concentration in air, given the typical usage and household characteristics in the United States (Cothern, 1987). To keep radon concentrations in indoor air to a minimum, the U.S. Environmental Protection Agency (1996) established an MCL for radon in water of 300 pCi/L but subsequently withdrew the regulation in July 1997 at the direction of the U.S. Congress (U.S. Environmental Protection Agency, 1997). Congress has directed the U.S. Environmental Protection Agency to propose new regulations for radon-222 by August 1999 and promulgate a final regulation by August 2000.

The 43 radon concentrations shown in table 7 range from 150 to 3,700 pCi/L and have a median of 810 pCi/L. By focus area, the median radon concentration was 710 pCi/L for 15 samples in the Eightmile area, was 1,205 pCi/L for 10 samples in the Hamilton West area, and was 215 pCi/L for 8 samples in the Hamilton Heights area. Effective treatments for the removal of radon from ground water are available (U.S. Environmental Protection Agency, 1992).

AQUIFER SENSITIVITY

Water contamination can include any chemical, physical, or biological constituent, compound, or characteristic that is considered to be undesirable for an intended use of the water. Dissolved contaminants generally are transported in the direction of ground-water flow, although some transport can occur by diffusion. However, contaminants that do not dissolve in water can move in directions that differ from the direction of ground-water flow, although some transport can occur by diffusion. For example, compounds that are more dense than water can move downward through the aquifer, even in areas where the vertical component of hydraulic gradient and vertical component of flow are upward. Compounds that are less dense than water can mound on the water table and move in directions other than the direction of ground-water flow. The contaminants considered in this study generally are dissolved chemical constituents or compounds.

Aquifers in many parts of the study area are relatively susceptible to potential contamination from surface or near-surface sources because the coarse-grained character of the near-surface sediments could allow contaminants to readily infiltrate. In these areas, the underlying aquifers are commonly unconfined and can be contaminated by septic-system overflow or failure, fuel from surface spills or leaking underground storage tanks and pipe lines, leachate from landfills and sewage lagoons, agricultural and residential chemicals, and other sources of inorganic and organic compounds. For example, part of the alluvial aquifer in the northern part of the study area has been affected by leachate from a landfill, resulting in contamination of water in the area of several downgradient wells (Ravalli County Sanitarian's Office, written commun., 1998). Other potential sources of contamination include urban storm-water runoff, effluent from municipal waste water disposal, and dry sumps. Most of the documented and potential sources of contamination to the aquifers are point specific and affect only relatively localized areas. This study focused on characterizing the overall water quality in the Bitterroot Valley and did not address known point-source water-quality problems.

Rapid and continued population growth and the resulting widespread residential development probably represent the greatest potential for change to water quality in the study area. As shown in figure 20, population growth in Ravalli County has been greatest since 1990, and most of this growth has occurred within the rural parts of the study area. The nitrate concentration data collected by this study can, with certain limitations, serve as a surrogate to measure human effects on the aquifers underlying the study area.

Although rural septic input, residential fertilizers, and domestic animal waste can all contribute to nitrate loading of an aquifer and may be expected to increase with increased rural population, most of the study area currently undergoing new residential development was previously used for agriculture. Agricultural activity also can be a source of nitrate loading, primarily from inorganic fertilizers and animal manure. Therefore, the nitrate-concentration data presented in this report probably reflect nitrate loading from multiple sources. Analytical techniques using nitrogen isotopes can potentially differentiate between animal waste--which includes septic effluent--and inorganic fertilizer sources but employment of those analytical techniques was beyond the resources available for this study.

Although the dominant source of nitrate loading cannot be uniquely identified at most sample sites, the relatively small nitrate concentrations in the 239 wells sampled for this study indicate that the total nitrate load to the sampled aquifers has not resulted in nitrate concentrations that exceed the U.S. Environmental Protection Agency (1996) MCL to date. Localized areas of some aquifers might have nitrate concentrations larger than those reported in this study, but no areas were identified from the data.

Two qualifications are worth noting with respect to the relation between the relatively small nitrate concentrations presented in this report and the potential water-quality effects resulting from increased popula-

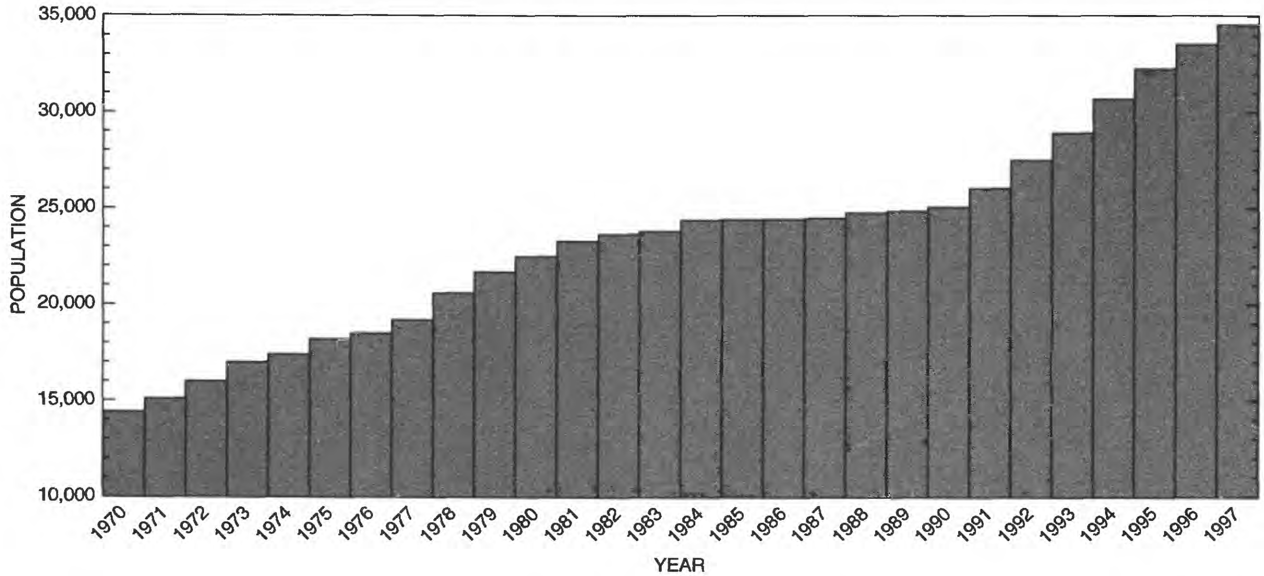


Figure 20. Population of Ravalli County by year, 1970-97. Numbers are estimates, except for 1970, 1980, and 1990, which are from the decennial census. Data from U.S. Bureau of the Census (issued annually; issued decennially).

tion and development in the study area. Whereas the nitrate data do not indicate any widespread problems at the time the samples were collected, the lag between the time when a change in land use causes a change in nitrate loading to an area and the time when any resulting change in nitrate concentration can be detected at a downgradient sample site cannot be determined from the available data. Given this uncertainty, the samples collected during this study might be the result of the nitrate loading patterns dominant many years prior to sample collection. If this were true, changes in nitrate loading patterns due to present land use changes might not be detectable in samples until some time in the future.

The second qualification is that the response of the aquifers to nitrate loading, as measured by nitrate concentration in well water, is not necessarily directly proportional to the total nitrate load to the aquifer. As a hypothetical example, if nitrogen uptake by plants in a shallow ground-water area just downgradient from a small residential subdivision using septic systems is capable of removing just enough nitrate to maintain a concentration in ground water of 0.5 mg/L, doubling the size of the subdivision and the resulting nitrate load could potentially more than double the downgradient nitrate concentration if the capacity of the plants to remove nitrate were exceeded by the additional loading. A "threshold effect" similar to the one described could apply to other chemical constituents and buffering mechanisms as well.

Although the specific conductance and nitrate concentrations in ground water sampled in the study area were generally small, differences were significant between different parts of the study area, which is pertinent to the sensitivity of the aquifers in those areas to contamination. The Hamilton West area had the smallest median values for specific conductance and nitrate concentration of the three focus areas even though it had the largest population, and presumably septic-tank density, indicated by the density of wells (table 3). Conversely, the Hamilton Heights area had the largest median values for specific conductance and nitrate concentration and the smallest population density indicated by the density of wells. Specific conductance and nitrate concentration in the Eightmile area fell in between these two extremes.

The sensitivity of the focus-area aquifers to nitrate loading is most strongly related to the total ground-water recharge to each area--the greater the recharge (and hence dilution), the less sensitive is the aquifer (as measured by nitrate concentration in water from wells) to a given nitrate load. The quantity of ground-water recharge in the three areas is primarily controlled by two factors--the average annual precipi-

Table 3. Summary of specific conductance, nitrate concentration, well density, average precipitation, and percentage of wells completed in Tertiary alluvial-fan deposits in the three focus areas. Table ordered by increasing values of specific conductance and nitrate concentration

[Abbreviations: µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter]

Focus area	Median specific conductance in (µS/cm)	Median nitrate concentration (mg/L)	Average number of wells per square mile	Average precipitation (inches)	Percentage of sampled wells completed in Tertiary alluvial-fan deposits
Hamilton West	87	0.17	62	41.28	6.3
Eightmile	286	.91	51	19.68	0
Hamilton Heights	453	1.40	31	21.24	43.3

tation and, to a lesser degree, the percentage of Tertiary alluvial-fan deposits in the respective area.

The difference in average annual precipitation in and upgradient of the three areas and the resulting quantity of water available for recharge is most probably the cause of the substantially smaller values for specific conductance and nitrate concentration in the Hamilton West area as compared to the Eightmile and Hamilton Heights areas (table 3). The drainage area of the Hamilton West area receives about twice the annual precipitation of the other two focus areas. Thus, the larger quantity of water available for recharge in the Hamilton West area probably has a diluting effect on the specific conductance and nitrate concentration.

The extensive Tertiary alluvial-fan deposits in the Hamilton Heights area are probably the cause of the larger specific conductance and nitrate concentrations as compared to the Eightmile area (table 3). Because the Tertiary alluvial-fan deposits are generally less permeable, recharge to the Hamilton Heights area is more limited than in the Eightmile area. The smaller quantity of recharge to the Tertiary alluvial-fan deposits limits dilution in those areas.

Although aquifers in west-side sediments have smaller values for specific conductance and nitrate concentration than those on the east side of the valley, the west-side sediments might contribute more constituent loading to the Bitterroot River than the east-side sediments. The total constituent load to a system is a function of the concentration of a constituent in the source water multiplied by the total volume of that water that recharges the system. Even though constituent concentrations in ground water on the west side of the valley are generally much smaller than those on the east side, data presented in this report indicate that the rate of ground-water flow through the west-side sediments and eventually discharging to the Bitterroot River is considerably larger than that of the east side. However, data of sufficient precision to accurately determine the extent of loading in the study area are not available.

SUMMARY AND CONCLUSIONS

The Bitterroot Valley is located in Ravalli County of western Montana. During the early 1990s, the Ravalli County estimated population increased at the fastest rate in the State, with much of the increase occurring outside of established cities and towns. The potential for degradation of local aquifers due to continued growth is large. This study was initiated to establish a ground-water monitoring network, implement a geographically indexed computer-based data framework, define ground-water flow paths, describe ground-water recharge sources and discharge areas, characterize any potential sources of ground-water degradation, and identify any areas with existing degradation.

The Bitterroot Valley is situated in a 7-mi wide by 52-mi long north-trending intermontane basin in the Northern Rocky Mountains physiographic province. The Bitterroot Valley contains two principal topographic features and related aquifers--the flood plain of the Bitterroot River, which extends the length of the valley, and the adjacent extensive high benches along the east and west sides of the valley.

The major surface-water artery of the Bitterroot Valley is the Bitterroot River, which originates in the southern Bitterroot Mountains and the Anaconda Range and flows northward through the basin to its confluence with the Clark Fork about 15 mi north of the study area. About 4 times as many tributaries join the river from the Bitterroot Mountains on the west as from the drier Sapphire Mountains on the east.

To provide a more in-depth investigation of selected areas of the valley, three focus areas were selected on the basis of physiography, geology, climate, effect of irrigation, and development pressure. The three areas are referred to as the Eightmile, Hamilton West, and Hamilton Heights areas.

The Bitterroot Valley is situated in a structural basin most probably formed by crustal extension during the middle Eocene Epoch. Intrusive, metasedimentary, metamorphic, and volcanic rocks border the valley and Tertiary sediments overlie bedrock and crop out on the eastern, and to a lesser extent, western benches. Tertiary sediments also occur at depth beneath the benches, beneath a veneer of Quaternary alluvium along the Bitterroot River flood plain, and beneath Quaternary alluvial fans along the floors of tributary valleys. These unconsolidated to semiconsolidated Tertiary deposits are composed of gravel, sand, silt, and clay that occur as two distinct geological units: the ancestral Bitterroot River deposits and the Sixmile Creek Formation.

The ancestral Bitterroot River deposits--the lower of the two Tertiary units in the basin--are composed of rocks derived from the entire drainage basin, with several distinctive clast types indicating transport from the far southwestern end of the basin and possibly even beyond. The ancestral Bitterroot River deposits most likely result from deposition by a northward through-flowing river of regional scale during the middle Eocene to middle Miocene epochs. The Sixmile Creek Formation overlies the ancestral Bitterroot River deposits and is composed of locally derived, poorly sorted erosional debris of the adjacent mountains.

Quaternary glacial till underlies many of the high benches along the Bitterroot Mountains, especially in the southern part of the study area west of Darby. Quaternary alluvial-fan deposits are present along much of the western side of the valley and along the larger tributary streams on the eastern side of the valley. Quaternary alluvium and terrace deposits occur along the present flood plain of the Bitterroot River. The configuration of the water-level surface in the three focus areas was determined from water levels measured from August through December 1995.

Most wells in the Bitterroot Valley are completed in unconfined to semiconfined aquifers contained in basin-fill deposits of Quaternary and Tertiary age. These deposits can best be described as a sequence of complexly stratified lenses of cobbles, gravel, and sand with varying amounts of intercalcated silt and clay.

Data for 9,424 wells were combined with the geologic map information to produce statistics characterizing the depth to static-water level, yield, and specific capacity of wells completed in various geologic units and in various areas of the valley. Wells completed in Quaternary alluvium and terrace deposits had the shallowest static-water levels and the largest values for yield and specific-capacity. Wells completed in Quaternary alluvial-fan deposits had similar static-water levels but smaller values for yield and specific capacity. Wells completed in Tertiary alluvial-fan deposits had the deepest static-water levels and smallest yield and specific-capacity values of all basin-fill units analyzed. Hydraulic characteristics of the ancestral Bitterroot River deposits are between those of Quaternary deposits and Tertiary alluvial-fan deposits.

Regionally, the direction of ground-water flow in the Bitterroot Valley is from the mountain front along the basin margins toward the center of the basin and diagonally downvalley. The configuration of the water-level surface generally reflects topography, with steep hydraulic gradients in the recharge areas along the mountain front and more gradual gradients in discharge areas along the flood plain of the Bitterroot River. The configuration of the water-level surface in the three focus areas was determined from water levels measured from August through December 1995.

Basin-fill aquifers in the Bitterroot Valley are recharged by infiltration of streamflow and irrigation water, subsurface inflow from surrounding bedrock, and direct infiltration of precipitation and snowmelt. The western side of the valley receives about twice as much precipitation as the eastern side of the valley, which is probably the most significant factor affecting the quantity of recharge in those areas. Sediments along the east side of the valley are also recharged by the diversion of irrigation water from surface-water sources outside their natural drainage area.

The largest component of discharge from basin-fill aquifers is most likely seepage to streams and springs which occurs primarily in lower altitude, down-gradient parts of bench areas and along the flood plain of the Bitterroot River. Evapotranspiration is probably the second largest component of discharge during the growing season. Withdrawals by wells, primarily domestic, also discharge basin-fill aquifers, although much of the water is returned to the aquifers through septic systems.

The median specific-conductance value for water from the 240 wells measured in the study area was 246 μS/cm. The largest specific-conductance value measured was 864 μS/cm; 54 wells had specific-conductance values less than 100 μS/cm. The median specific-conductance value obtained from water samples from 141 wells on the east-side sediments of the valley was 347 μS/cm, which was about 4 times as large as the median specific-conductance value of 90 μS/cm obtained from the 85 wells measured on the west-side sediments side of the valley. The specific conductance of ground water is more dependent on which side of the valley the well is located than on the geologic unit in which the well is completed.

The median nitrate concentration for the 239 wells sampled in the study area was 0.63 mg/L. Water from 20 wells sampled had nitrate concentrations exceeding 3 mg/L. The largest nitrate concentration was 5.9 mg/L; 57 samples had nitrate concentrations below the minimum reporting level. The median nitrate concentration for samples collected from the 143 wells in the east-side sediments of the valley was 1.05 mg/L--or about 6 times larger than the median of 0.17 mg/L for samples from the 83 wells completed in west-side sediments. The concentration of nitrate in ground water is more dependent on which side of the valley the well is located than on the geologic unit in which the well is completed. Data for 16 wells sampled approximately bimonthly from November 1996 through October 1997 indicate a significant seasonal variability in nitrate concentration in those wells.

On the basis of water samples collected from 43 wells, ground water in the three focus areas is primarily a calcium bicarbonate type. However, one sample in the Hamilton West area and two samples in the Hamilton Heights area are a sodium bicarbonate type. All constituent concentrations were less than MCL's except for one occurrence of cadmium equal to the MCL of 5 μg/L. One sample had a fluoride concentration larger than the SMCL of 2 μg/L, six samples had iron concentrations larger than the SMCL of 300 μg/L, and five samples had manganese concentrations larger than the SMCL of 50 μg/L. Radon concentrations for samples from 43 wells range from 150 to 3,700 pCi/L and have a median of 810 pCi/L.

Rapid and continued population growth and the resulting widespread residential development probably represent the greatest potential for change to water quality in the study area. Although the relatively small nitrate concentrations in the 239 wells sampled for this study indicate that the total nitrate load to the sampled aquifers has not resulted in nitrate concentrations that exceed recommended standards to date, significant differences exist between different parts of the study area which are pertinent to the sensitivity of the aquifers in those areas to contamination. The sensitivity of the focus-area aquifers to nitrate loading is most strongly related to the total ground-water recharge to each area--the greater the recharge, the less sensitive the aquifer is to nitrate loading. The quantity of recharge is directly related to the average annual precipitation and inversely related to the occurrence of low-permeability surface deposits, such as Tertiary alluvial-fan deposits in the area.

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SUPPLEMENTAL DATA

Table 4. Records of selected wells

Location number--numbering system described in text.

Altitude of land surface--in feet above sea level.

Geologic unit--Qaf, Quaternary alluvial-fan deposits; Qalt, Quaternary alluvium and terrace deposits; Tabr, Tertiary ancestral Bitterroot River deposits; Taf, Tertiary alluvial-fan deposits; TYb, Tertiary through Middle Proterozoic bedrock.

Depth of well--in feet below land surface.

Casing diameter--in inches.

Type of finish--O, open end; P, perforated or slotted; S, screen.

Depth to top of open interval--in feet below land surface.

Type of log available--D, driller.

Primary use of water--C, commercial; F, fire; H, domestic; I, irrigation; P, public supply; S, stock; U, unused.

Depth to water--in feet below land surface; flowing, water level above land surface.

Yield--in gallons per minute, reported to nearest whole number.

Specific capacity--in gallons per minute per foot of drawdown in a well.

Source of yield data--D, driller; O, owner; R, Reported; S, USGS.

Abbreviations-- °C, degrees Celsius; ft, feet; gal/min, gallons per minute; [(gal/min)/ft], gallons per minute per foot; in., inch; µS/cm, microsiemens per centimeter at 25 °C.

Symbols: <, less than; --, no data or not applicable.

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
10N20W02ABBC01	3,225	Qaf	--	--	-	--	--	-	H
10N20W10ACBC01	3,540	Tabr	193	6.0	O	--	09-21-77	D	H
10N20W10CBBD01	3,555	Tabr	50	6.0	P	30	06-30-86	D	H
10N20W11CDCD01	3,250	Tabr	339	6.0	P	113	08-28-80	D	F
10N20W12ACDB01	3,214	Tabr	75	6.0	O	--	11-06-84	D	H
10N20W12ADCB01	3,226	Tabr	90	--	-	--	--	-	H
10N20W12ADDC01	3,236	Qaf	--	--	-	--	--	D	H
10N20W12DAAA01	3,244	Qaf	--	--	-	--	--	-	H
10N20W12DABD01	3,226	Qaf	--	--	-	--	--	-	H
10N20W12DADA01	3,243	Tabr	57	6.0	O	--	10-07-77	D	H
10N20W12DDDC01	3,220	Qaf	--	--	-	--	--	-	H
10N20W13BBA 01	3,204	Tabr	51	6.0	O	--	05-14-59	-	U
10N19W05CCCC01	3,380	Qaf	--	--	-	--	--	-	H
10N19W05CCCD01	3,388	Qaf	--	60.0	-	--	--	-	I
10N19W05CDCC01	3,399	Tabr	80	6.0	P	70	04-27-92	D	H
10N19W05DCDD01	3,470	Qaf	--	--	-	--	--	-	H
10N19W06CDCB01	3,288	Tabr	80	6.0	P	65	06-26-90	D	H
10N19W06CDDA01	3,306	Qaf	--	--	-	--	--	-	H
10N19W06CDDD01	3,310	Tabr	109	6.0	P	101	10-10-84	D	H
10N19W06DCCC01	3,314	Qaf	--	--	-	--	--	-	H
10N19W06DCDA01	3,340	Tabr	71	6.0	P	50	10-27-83	D	H
10N19W06DDCC01	3,352	Tabr	135	6.0	S	127	09-17-91	D	H
10N19W07ADBC01	3,346	Qaf	--	--	-	--	--	-	H
10N19W07BAAD01	3,306	Tabr	85	6.0	O	--	04-06-82	D	H
10N19W07BACB01	3,283	Tabr	120	6.0	O	--	11-19-78	D	H
10N19W07BCBB01	3,262	Tabr	75	6.0	O	--	11-06-84	D	H
10N19W07BDAD01	3,306	Qaf	--	--	-	--	--	-	H
10N19W07BDBB01	3,292	Tabr	104	6.0	P	70	03-04-94	D	H
10N19W07CAAB01	3,300	Tabr	73	6.0	P	65	07-09-89	D	H
10N19W07CABD01	3,282	Qaf	39	6.0	O	--	09-04-78	D	H
10N19W07CACC01	3,273	Tabr	110	6.0	P	93	09-01-93	D	H
10N19W07CDAA01	3,296	Qaf	--	--	-	--	--	-	H
10N19W07CDBA01	3,282	Tabr	59	6.0	P	51	09-10-85	D	H
10N19W07CDCC01	3,268	Tabr	140	--	-	--	--	-	H
10N19W07DABB01	3,340	Tabr	120	6.0	P	90	01-29-91	D	H
10N19W07DBBC01	3,310	Qaf	--	--	-	--	--	-	H
10N19W07DBDA01	3,330	Tabr	72	6.0	S	64	09-02-91	D	H
10N19W07DDCD01	3,326	Qaf	--	--	-	--	--	-	H
10N19W07DDDC01	3,334	Qaf	--	--	-	--	--	-	H
10N19W08ABBC01	3,448	Tabr	120	6.0	P	85	02-02-93	D	H
10N19W08ADAD01	3,500	Tabr	340	6.0	P	325	01-06-90	D	H
10N19W08ADDC01	3,490	Tabr	287	6.0	S	238	10-17-92	D	H
10N19W08BADD01	3,442	Qaf	--	--	-	--	--	-	H
10N19W08BBDD01	3,408	Qaf	--	--	-	--	--	-	H
10N19W08BCAD01	3,402	Tabr	320	6.0	P	303	04-28-94	D	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conductance, field (µS/cm)	pH, field (standard units)	Water temperature, field (°C)	Location number
Date of measurement	Depth to water (ft)								
08-03-94	31.62	--	-	--	08-03-94	138	--	14.5	10N20W02ABBC01
07-26-91	40.21	20	D	0.1	07-25-91	110	7.0	12.0	10N20W10ACBC01
12-19-95	11.39	25	D	2.1	10-25-95	63.0	6.6	11.0	10N20W10CBBD01
12-19-95	48.16	75	D	1.1	10-25-95	143	7.2	14.0	10N20W11CDCD01
11-17-95	23.44	30	D	2.5	08-22-94	264	--	13.5	10N20W12ACDB01
11-17-95	35.71	--	-	--	08-28-95	354	--	12.5	10N20W12ADCB01
11-19-95	23.05	--	-	--	08-16-94	338	--	13.0	10N20W12ADDC01
11-17-95	29.43	--	-	--	08-15-94	286	--	13.5	10N20W12DAAA01
08-24-95	33.67	--	-	--	08-24-95	283	--	14.0	10N20W12DABD01
11-18-95	30.13	25	D	2.5	08-15-94	292	--	13.0	10N20W12DADA01
11-17-95	4.04	--	-	--	09-28-94	216	--	13.5	10N20W12DDDC01
12-13-95	4.95	--	-	--	--	--	--	--	10N20W13BBA 01
11-18-95	13.90	--	-	--	08-18-95	297	--	11.0	10N19W05CCCC01
11-18-95	3.04	--	-	--	08-28-95	443	--	16.0	10N19W05CCCD01
11-18-95	13.54	30	D	1.3	08-04-94	340	--	11.5	10N19W05CDCC01
11-17-95	10.63	--	-	--	08-02-94	504	--	10.5	10N19W05DCDD01
11-17-95	47.61	25	D	1.3	08-18-94	306	--	13.5	10N19W06CDCB01
09-18-95	61.54	--	-	--	08-17-95	421	--	12.5	10N19W06CDDA01
11-17-95	64.09	10	D	--	08-09-94	404	--	12.0	10N19W06CDDD01
11-18-95	58.58	--	-	--	08-10-94	409	--	11.0	10N19W06DCCC01
11-19-95	15.48	30	D	2.0	08-09-94	419	--	11.5	10N19W06DCDA01
11-18-95	111.48	30	D	6.0	08-10-94	277	--	12.5	10N19W06DDCC01
11-19-95	92.72	--	-	--	08-04-94	359	--	12.5	10N19W07ADBC01
11-17-95	62.10	30	D	.9	08-08-94	386	--	12.0	10N19W07BAAD01
11-17-95	61.67	50	D	--	08-18-94	306	--	13.5	10N19W07BACB01
--	--	30	D	2.5	08-24-94	366	--	13.5	10N19W07BCBB01
11-17-95	64.34	--	-	--	08-23-94	351	--	14.0	10N19W07BDAD01
11-17-95	48.03	15	D	--	08-10-94	353	--	12.5	10N19W07BDBB01
11-18-95	33.22	15	D	.6	08-15-94	267	--	12.5	10N19W07CAAB01
11-19-95	22.04	22	D	2.4	08-16-94	272	--	12.0	10N19W07CABD01
11-18-95	46.07	20	D	--	08-18-94	327	--	12.0	10N19W07CACC01
11-18-95	23.56	--	-	--	08-24-94	214	--	11.0	10N19W07CDAA01
11-17-95	20.32	30	D	.9	08-16-94	228	--	11.5	10N19W07CDBA01
11-17-95	31.72	--	-	--	08-28-94	276	--	11.5	10N19W07CDCC01
11-18-95	63.93	30	D	1.4	08-17-95	334	--	12.0	10N19W07DABB01
--	--	--	-	--	08-15-94	263	--	13.0	10N19W07DBBC01
11-19-95	37.38	10	D	.4	08-17-95	199	--	11.5	10N19W07DBDA01
11-17-95	33.33	--	-	--	08-22-94	124	--	11.0	10N19W07DDCD01
11-17-95	38.99	--	-	--	08-19-94	185	--	10.5	10N19W07DDDC01
11-18-95	31.84	20	D	1.1	08-03-94	274	--	12.0	10N19W08ABBC01
11-18-95	91.93	20	D	2.2	08-02-94	339	--	14.0	10N19W08ADAD01
11-18-95	100.52	8	D	.1	08-02-94	343	--	12.5	10N19W08ADDC01
11-17-95	236.79	--	-	--	08-23-94	337	--	15.5	10N19W08BADD01
09-20-95	204.02	--	-	--	08-03-94	315	--	15.5	10N19W08BBDD01
11-18-95	196.85	20	D	1.0	08-15-94	271	--	16.5	10N19W08BCAD01

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
10N19W08BCBB01	3,382	Tabr	200	6.0	P	180	06-26-90	D	H
10N19W08BCCC01	3,380	Tabr	158	6.0	P	150	07-06-89	D	H
10N19W08BDAB01	3,433	Tabr	319	6.0	S	311	04-30-90	D	H
10N19W08BDBB01	3,416	Tabr	295	6.0	P	287	06-23-89	D	H
10N19W08CBAA01	3,400	Qaf	--	--	-	--	--	-	H
10N19W08CBDD01	3,374	Tabr	69	6.0	P	64	02-23-84	D	H
10N19W08CDAC01	3,406	Tabr	124	6.0	P	114	09-14-89	D	H
10N19W08CDBD01	3,397	Tabr	107	6.0	P	99	08-17-88	D	H
10N19W08DAAC01	3,482	Tabr	210	6.0	S	143	06-20-91	D	H
10N19W08DBBD01	3,438	Tabr	261	--	-	--	--	-	H
10N19W08DCCB01	3,454	Tabr	220	--	-	--	--	-	H
10N19W08DCCC01	3,462	Tabr	--	--	-	--	--	-	H
10N19W08DCCC02	3,460	Tabr	168	6.0	P	160	06-04-91	D	H
10N19W08DCCD01	3,468	Tabr	187	6.0	S	182	11-12-92	D	H
10N19W09ABCC01	3,575	Qaf	--	--	-	--	--	-	H
10N19W09BCCC01	3,492	Tabr	290	6.0	S	235	04-24-92	D	H
10N19W16BBBC01	3,518	Tabr	--	--	-	--	--	-	H
10N19W17BAAA01	3,436	Tabr	--	--	-	--	--	-	H
10N19W17BBDA01	3,412	Tabr	--	--	-	--	--	-	H
10N19W17BCAB01	3,388	Tabr	--	--	-	--	--	-	H
10N19W17BCCC01	3,372	Tabr	--	--	-	--	--	-	H
10N19W17DBBC01	3,485	Tabr	215	6.0	O	--	09-14-78	D	H
10N19W18AAAA01	3,342	Tabr	75	6.0	P	67	07-04-89	D	I
10N19W18AADB01	3,326	Tabr	95	6.0	P	59	06-01-83	D	H
10N19W18ABAD01	3,310	Tabr	65	--	-	--	--	-	H
10N19W18ADDC01	3,352	Tabr	122	6.0	S	114	07-23-91	D	H
10N19W18BCCB01	3,220	Tabr	50	--	-	--	--	-	H
10N19W18DBBA01	3,306	Tabr	140	--	-	--	--	-	H
10N19W19BDAD01	3,280	Tabr	65	6.0	P	57	09-27-77	D	H
10N19W19DDAA01	3,490	Tabr	--	--	-	--	--	-	H
10N19W20BAAD01	3,490	Tabr	400	6.0	-	--	00-00-93	-	H
10N19W21CBBA01	3,595	Tabr	389	6.0	P	381	05-24-95	D	H
10N19W29ABAC01	3,672	Tabr	356	6.0	P	300	10-25-77	D	H
10N19W30CACD01	3,470	Tabr	211	6.0	O	--	03-26-79	D	H
09N20W19ADCA01	3,870	Taf	90	6.0	P	20	01-01-78	D	H
09N20W20ACAB01	3,492	Tabr	60	6.0	P	20	01-01-69	-	H
09N20W20ACAD01	3,475	Tabr	198	6.0	P	40	05-24-93	D	H
09N20W20CDCD01	3,500	Tabr	160	6.0	P	60	08-08-87	D	H
09N20W21ACCB01	3,330	Qaf	37	--	-	--	--	-	H
09N20W21CCAC01	3,348	Tabr	125	6.0	P	100	04-20-93	D	S
09N20W26BACC02	3,363	Tabr	552	6.0	P	310	04-28-90	D	U
09N20W28CCBB01	3,190	Qaf	40	--	-	--	--	-	H
09N20W29ADCC01	3,390	Tabr	75	6.0	-	--	00-00-89	-	H
09N19W33BDBC01	3,812	Qaf	228	6.0	P	60	10-21-78	D	H
08N21W27DCBC01	3,650	Qaf	30	6.0	P	22	05-24-78	D	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conductance, field (µS/cm)	pH, field (standard units)	Water temperature, field (°C)	Location number
Date of measurement	Depth to water (ft)								
11-18-95	144.77	10	D	.5	08-16-94	294	--	15.0	10N19W08BCBB01
11-19-95	128.79	30	D	1.5	08-10-94	386	--	12.0	10N19W08BCCC01
11-17-95	227.08	15	D	.7	08-08-94	243	--	15.0	10N19W08BDAB01
08-08-94	214.34	18	D	.7	08-08-94	291	--	15.5	10N19W08BDBB01
08-03-94	61.22	--	-	--	08-03-94	306	--	11.0	10N19W08CBAA01
11-17-95	51.01	30	D	1.8	08-16-94	198	--	10.0	10N19W08CBDD01
11-17-95	74.39	30	D	.8	08-09-94	338	--	10.5	10N19W08CDAC01
--	--	30	D	3.0	08-18-95	257	--	10.0	10N19W08CDBD01
11-17-95	68.53	5	D	--	08-23-94	168	--	13.5	10N19W08DAAC01
11-17-95	198.23	--	-	--	08-28-95	195	--	13.5	10N19W08DBBD01
11-17-95	115.69	--	-	--	08-28-95	274	--	11.0	10N19W08DCCB01
08-19-94	136.80	--	-	--	08-19-94	280	--	11.0	10N19W08DCCC01
12-19-95	139.97	20	D	.3	10-26-95	258	7.2	11.0	10N19W08DCCC02
06-06-95	150.85	50	D	1.4	--	--	--	--	10N19W08DCCD01
--	--	--	-	--	08-02-94	341	--	11.0	10N19W09ABCC01
11-17-95	56.95	9	D	26.7	08-18-94	201	--	11.0	10N19W09BCCC01
11-18-95	203.84	--	-	--	08-24-94	184	--	13.5	10N19W16BBBC01
11-17-95	119.35	--	-	--	08-08-94	237	--	11.5	10N19W17BAAA01
11-17-95	90.62	--	-	--	08-19-94	182	--	9.5	10N19W17BBDA01
11-17-95	84.35	--	-	--	08-19-94	193	--	10.5	10N19W17BCAB01
11-17-95	93.95	--	-	--	--	--	--	--	10N19W17BCCC01
12-11-95	179.32	15	D	.4	12-11-95	210	7.3	12.0	10N19W17DBBC01
08-24-94	45.23	30	D	1.5	08-24-94	168	--	11.5	10N19W18AAAA01
11-17-95	42.91	40	D	3.3	08-28-95	175	--	11.0	10N19W18AADB01
11-17-95	30.28	--	-	--	--	--	--	--	10N19W18ABAD01
11-17-95	81.93	40	D	2.0	--	--	--	--	10N19W18ADDC01
01-21-95	26.95	--	-	--	--	--	--	--	10N19W18BCCB01
11-19-95	68.82	--	-	--	09-13-95	186	6.9	10.0	10N19W18DBBA01
10-25-95	50.60	12	D	.8	10-25-95	214	7.0	10.5	10N19W19BDAD01
10-25-95	167.94	--	-	--	10-25-95	210	7.3	14.0	10N19W19DDAA01
10-24-95	205.56	--	-	--	10-24-95	191	7.1	13.5	10N19W20BAAD01
10-24-95	362.63	10	D	.5	10-24-95	243	7.0	14.5	10N19W21CBBA01
10-24-95	312.98	12	D	.6	10-24-95	274	7.4	13.5	10N19W29ABAC01
--	--	10	D	5.0	10-24-95	236	7.2	11.0	10N19W30CACD01
10-23-95	16.38	3	-	.1	10-23-95	141	6.4	12.0	09N20W19ADCA01
10-11-95	32.95	2	O	.1	10-11-95	118	6.5	11.0	09N20W20ACAB01
12-19-95	27.39	4	D	.3	06-03-96	128	6.5	10.0	09N20W20ACAD01
09-14-95	22.13	10	D	.1	09-14-95	230	8.3	10.0	09N20W20CDCD01
10-11-95	10.51	--	-	--	10-11-95	42.9	6.2	12.5	09N20W21ACCB01
12-14-95	.21	15	D	--	12-14-95	287	7.4	10.5	09N20W21CCAC01
12-19-95	79.14	218	D	4.8	--	--	--	--	09N20W26BACC02
--	--	--	-	--	10-11-95	193	6.6	10.5	09N20W28CCBB01
10-23-95	47.29	--	-	--	10-23-95	256	6.8	10.5	09N20W29ADCC01
--	--	8	D	--	08-22-95	177	7.4	18.0	09N19W33BDBC01
12-19-95	7.11	40	D	2.5	06-03-96	70.6	6.6	8.5	08N21W27DCBC01

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
08N20W01ACCB01	3,762	Taf	135	6.0	P	127	04-15-89	D	H
08N20W01DAAD01	3,828	Taf	70	6.0	O	--	08-10-77	D	U
08N20W01DABD01	3,822	Taf	132	6.0	O	--	01-27-78	D	H
08N20W02CBDB01	3,535	Taf	222	6.0	-	--	00-00-80	-	H
08N20W11BDAA01	3,585	Tabr	279	6.0	P	271	11-25-77	D	H
08N20W11CCAD01	3,610	Tabr	308	6.0	O	--	08-06-85	D	H
08N20W12BAAA01	3,810	Taf	108	6.0	P	100	01-01-89	D	H
08N20W13BBDB01	3,802	Tabr	525	6.0	O	--	01-01-69	-	H
08N20W14ABDB01	3,690	Tabr	367	6.0	P	362	01-01-88	-	H
08N20W19BAAD03	3,393	Tabr	52	6.0	O	--	06-20-57	D	U
08N20W23CDDD01	3,545	Taf	232	6.0	O	--	07-20-84	D	H
08N20W26BAAC01	3,510	Tabr	440	6.0	P	145	09-30-92	D	H
08N20W30CDAB01	3,407	Qaf	39	6.0	P	34	08-09-89	D	P
08N19W04BDAA01	3,950	Tabr	56	6.0	P	51	02-28-85	D	H
08N19W07CBBD01	3,893	Taf	117	48	O	--	00-00-56	-	H
08N19W10BBCA01	4,079	Tabr	70	6.0	O	--	02-15-45	-	H
08N19W11CDBB01	4,260	Tabr	50	6.0	P	42	12-21-79	D	H
07N21W13BBAD01	3,590	Tabr	100	6.0	O	--	06-13-79	D	H
07N21W25CABC01	3,489	Tabr	48	6.0	P	35	10-17-87	D	H
07N21W36DDDC01	3,487	Qalt	31	6.0	P	23	10-20-76	D	H
07N20W32DDDA02	3,473	Qalt	40	8.0	O	--	00-00-62	-	F
07N20W34CCCD01	3,546	Tabr	90	6.0	O	--	06-09-80	D	H
07N20W34CDDB01	3,568	Tabr	94	6.0	O	--	03-05-94	D	H
07N20W36CCCA01	3,741	Taf	--	--	-	--	--	-	H
06N21W01ACDA01	3,520	Qaf	35	8.0	-	--	00-00-30	D	H
06N21W01CADD01	3,547	Tabr	63	6.0	O	--	10-25-78	D	H
06N21W01CBAB01	3,590	Tabr	80	6.0	-	--	00-00-92	-	H
06N21W01CBAB02	3,590	Qaf	--	--	-	--	--	-	U
06N21W02ABBD01	3,750	Taf	89	4.0	-	--	--	-	H
06N21W02CADD01	3,692	Tabr	137	5.5	S	108	10-24-77	D	H
06N21W03ACBA01	3,839	Tabr	42	6.0	O	--	10-29-73	D	H
06N21W03CAAC01	3,852	Tabr	42	6.0	P	37	11-16-71	D	H
06N21W03CCDD01	3,965	Taf	40	6.0	S	20	04-01-91	D	H
06N21W03CDAC01	3,825	Tabr	320	6.0	P	--	03-07-78	D	U
06N21W03DDAA01	3,760	Qaf	34	6.0	P	26	04-10-78	D	H
06N21W09DADA01	4,045	Tabr	412	6.0	P	352	09-04-81	D	H
06N21W10BDDD01	3,885	Taf	--	--	-	--	--	-	H
06N21W11ABAA01	3,632	Tabr	136	6.0	P	128	02-08-79	D	H
06N21W11CAAA01	3,632	Tabr	60	6.0	-	--	--	-	H
06N21W11CBCA01	3,695	Qaf	36	6.0	O	--	07-26-78	D	H
06N21W11CBDC01	3,705	Tabr	180	6.0	O	--	04-22-94	D	H
06N21W11CDCB01	3,630	Tabr	75	6.0	P	67	09-22-90	D	H
06N21W11DCCA01	3,630	Qaf	--	--	-	--	--	-	H
06N21W12ABAB01	3,502	Tabr	42	4.0	-	--	06 -- 53	-	H
06N21W12BDDD01	3,545	Tabr	270	6.0	P	45	06-22-76	D	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conduct-ance, field (µS/cm)	pH, field (stand-ard units)	Water temper-ature, field (°C)	Location number
Date of measure-ment	Depth to water (ft)								
04-15-89	35.00	50	D	--	08-23-95	648	7.6	10.5	08N20W01ACCB01
07-26-91	64.40	5	D	.2	--	--	--	--	08N20W01DAAD01
07-26-91	52.32	25	D	.4	10-26-95	626	7.7	9.5	08N20W01DABD01
08-23-95	205.15	--	-	--	08-23-95	306	7.7	13.5	08N20W02CBDB01
08-23-95	264.30	15	D	.5	08-23-95	564	7.6	15.0	08N20W11BDAA01
08-06-85	270.00	15	D	.6	08-23-95	60.9	7.6	14.0	08N20W11CCAD01
10-10-95	54.99	25	D	--	10-10-95	812	7.9	11.0	08N20W12BAAA01
--	--	6	O	.3	10-10-95	622	7.3	11.5	08N20W13BBDB01
10-23-95	329.72	--	-	--	09-15-95	579	7.5	14.5	08N20W14ABDB01
12-19-95	14.10	--	-	--	--	--	--	--	08N20W19BAAD03
12-11-95	199.35	10	D	.3	12-11-95	384	7.9	12.0	08N20W23CDDD01
12-19-95	180.49	15	D	--	06-05-96	416	7.2	16.0	08N20W26BAAC01
12-19-95	18.01	20	D	1.0	--	--	--	--	08N20W30CDAB01
12-19-95	15.39	15	D	.6	08-22-95	169	7.9	8.5	08N19W04BDAA01
12-19-95	98.17	--	-	--	08-22-95	766	8.0	10.0	08N19W07CBBD01
08-23-95	38.70	20	O	--	08-23-95	288	7.8	13.5	08N19W10BBCA01
07-26-91	36.22	15	D	.8	10-26-95	233	7.3	8.5	08N19W11CDBB01
12-14-95	24.46	10	D	.2	12-14-95	82.2	7.6	9.5	07N21W13BBAD01
12-12-95	11.90	30	D	1.2	12-12-95	89.5	6.9	10.0	07N21W25CABC01
12-19-95	12.52	20	D	1.5	08-24-95	48.9	6.7	14.0	07N21W36DDDC01
12-19-95	8.97	--	-	--	--	--	--	--	07N20W32DDDA02
11-10-95	13.38	10	D	.2	07-25-95	473	7.6	10.5	07N20W34CCCD01
11-10-95	22.23	20	D	.4	07-26-95	417	7.6	12.0	07N20W34CDDB01
12-12-95	12.14	--	-	--	12-12-95	313	7.8	12.0	07N20W36CCCA01
--	--	--	-	--	04-19-95	28.0	6.6	10.0	06N21W01ACDA01
--	--	10	D	.4	04-18-95	71.0	6.9	11.0	06N21W01CADD01
--	--	--	-	--	04-19-95	74.0	7.0	10.0	06N21W01CBAB01
10-20-95	38.15	--	-	--	--	--	--	--	06N21W01CBAB02
12-19-95	42.18	--	-	--	08-15-95	90.3	7.4	15.0	06N21W02ABBD01
--	--	7	D	.2	04-20-95	25.8	6.7	10.0	06N21W02CADD01
10-20-95	16.55	25	D	1.7	04-20-95	25.4	6.8	9.0	06N21W03ACBA01
10-20-95	12.09	15	D	1.2	04-20-95	88.6	6.5	9.5	06N21W03CAAC01
--	--	10	D	.4	04-20-95	197	7.3	8.5	06N21W03CCDD01
12-19-95	34.87	--	-	--	--	--	--	--	06N21W03CDAC01
10-20-95	15.11	25	D	1.6	04-20-95	87.5	6.5	10.0	06N21W03DDAA01
04-20-95	flowing	8	D	--	04-20-95	266	8.6	7.5	06N21W09DADA01
10-20-95	45.75	--	-	--	04-20-95	109	7.2	6.5	06N21W10BDDD01
--	--	30	D	--	04-20-95	102	7.5	9.5	06N21W11ABAA01
10-20-95	4.06	--	-	--	04-18-95	136	6.8	8.5	06N21W11CAAA01
10-20-95	14.03	6	D	.4	04-19-95	144	7.0	6.5	06N21W11CBCA01
10-20-95	32.10	5	D	--	04-19-95	161	7.8	11.0	06N21W11CBDC01
10-20-95	14.40	12	D	.3	06-12-95	121	7.2	12.0	06N21W11CDCB01
--	--	--	-	--	10-26-94	210	7.8	10.0	06N21W11DCCA01
--	--	--	-	--	04-18-95	59.0	6.6	10.0	06N21W12ABAB01
--	--	25	D	.3	04-18-95	149	6.9	9.5	06N21W12BDDD01

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
06N21W13BADC01	3,582	Tabr	43	6.0	-	--	00-00-86	-	H
06N21W13BBAB01	3,662	Tabr	138	6.0	P	120	05-19-92	D	H
06N21W13CCCD01	3,622	Qaf	--	--	-	--	--	-	H
06N21W13DBBD01	3,542	Qaf	--	--	-	--	--	-	H
06N21W14BCBD01	3,818	Tabr	99	6.0	P	91	01-11-79	D	H
06N21W14BDAC01	3,718	Tabr	48	6.0	P	40	06-25-92	D	H
06N21W14DAAD01	3,630	Tabr	54	6.0	P	49	04-28-69	D	H
06N21W15ABBB01	3,885	Taf	132	6.0	-	--	09-19-62	-	H
06N21W15ADBC01	3,850	Tabr	300	6.0	P	100	07-12-80	D	H
06N21W15CDDD01	3,918	Tabr	120	6.0	P	70	10-01-79	D	H
06N21W21ADDB01	4,190	Tabr	162	6.0	P	154	12-13-90	D	H
06N21W22AADC01	3,820	Tabr	41	6.0	-	--	04-12-55	-	H
06N21W22BCCA01	4,100	Tabr	132	6.0	P	124	05-10-89	D	H
06N21W22CACA01	3,985	Tabr	81	6.0	P	73	02-07-83	D	H
06N21W23ADAA01	3,638	Qaf	40	--	-	--	00-00-38	-	H
06N21W23BABB01	3,750	Qaf	--	--	-	--	--	-	H
06N21W23BDDD01	3,705	Qaf	29	6.0	P	24	08-03-73	D	H
06N21W23CABC01	3,815	Tabr	135	6.0	O	--	06-10-85	D	H
06N21W23CBCB01	3,862	Tabr	160	6.0	P	140	08-16-78	D	H
06N21W23CDCB01	3,775	Tabr	86	6.0	O	--	01-16-80	D	H
06N21W23DADA01	3,618	Qaf	33	6.0	-	--	--	-	H
06N21W23DADD01	3,610	Tabr	42	6.0	-	--	--	-	H
06N21W23DBDA01	3,665	Qaf	30	--	-	--	--	-	H
06N21W23DDAA01	3,610	Qaf	38	6.0	P	30	07-01-91	D	H
06N21W23DDAD01	3,598	Qaf	35	6.0	-	--	07 -- 47	-	H
06N21W23DDBB01	3,641	Qaf	38	6.0	P	30	04-14-89	D	H
06N21W23DDCB01	3,615	Qaf	40	6.0	O	--	08-14-68	D	H
06N21W23DDDA01	3,595	Qaf	15	12.0	-	--	06 -- 54	-	H
06N21W24BAAC01	3,562	Qaf	40	6.0	O	--	11-27-78	D	H
06N21W24BDCC01	3,590	Tabr	112	4.0	-	--	00-00-43	-	H
06N21W24CCAC01	3,575	Tabr	50	6.0	O	--	04-27-77	D	H
06N21W24CCBB01	3,599	Tabr	16	6.0	-	--	--	-	U
06N21W24CCBB02	3,601	Qaf	33	6.0	P	26	08-04-73	D	U
06N21W24CCCB01	3,588	Qaf	43	6.0	O	--	--	-	H
06N21W25DBAA01	3,570	Tabr	66	12.0	-	--	04-10-46	-	P
06N21W26AADD01	3,565	Tabr	50	6.0	O	--	08-12-68	D	H
06N21W26ABAD01	3,695	Tabr	128	6.0	O	--	09-27-67	D	H
06N21W26BBCA01	3,779	Tabr	60	6.0	-	--	00-00-83	-	H
06N21W26CBAB01	3,705	Tabr	60	--	-	--	--	-	H
06N21W26DBAD01	3,613	Tabr	79	6.0	P	74	01-15-81	D	I
06N21W26DBDD01	3,601	Tabr	174	6.0	P	140	04-22-94	D	I
06N21W27ADBC01	3,835	Tabr	60	6.0	P	52	09-26-77	D	H
06N21W27BABA01	3,892	Tabr	278	6.0	P	140	08-16-83	D	H
06N21W27BBAA01	4,030	Tabr	126	6.0	O	--	06-12-75	D	H
06N21W34ABCD01	3,762	Qaf	39	--	-	--	00-00-81	-	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conductance, field (µS/cm)	pH, field (standard units)	Water temperature, field (°C)	Location number
Date of measurement	Depth to water (ft)								
--	--	--	-	--	04-18-95	143	7.8	11.5	06N21W13BADC01
10-20-95	66.68	25	D	3.1	04-18-95	90.0	7.6	11.0	06N21W13BBAB01
--	--	--	-	--	10-26-94	89.9	6.2	11.5	06N21W13CCCD01
--	--	--	-	--	05-01-95	106	6.4	11.0	06N21W13DBBD01
--	--	15	D	.8	04-19-95	57.3	7.0	10.0	06N21W14BCBD01
10-20-95	13.39	22	D	.8	10-26-94	82.2	7.1	12.0	06N21W14BDAC01
10-26-94	4.14	20	D	4.0	10-26-94	58.3	6.1	9.0	06N21W14DAAD01
10-20-95	89.85	50	O	--	04-19-95	75.8	6.7	10.0	06N21W15ABBB01
10-20-95	135.60	5	D	.1	06-12-95	101	7.7	12.0	06N21W15ADBC01
10-20-95	44.87	9	S	2.0	10-26-94	50.3	6.4	9.5	06N21W15CDDD01
10-20-95	129.19	10	D	.7	10-25-94	122	7.2	11.0	06N21W21ADDB01
--	--	60	O	--	04-20-95	40.1	6.7	9.5	06N21W22AADC01
10-20-95	91.49	12	D	--	08-29-94	124	7.0	11.0	06N21W22BCCA01
--	--	4	D	.2	08-29-94	120	6.4	13.5	06N21W22CACA01
--	--	--	-	--	10-25-94	47.2	6.2	11.5	06N21W23ADAA01
--	--	--	-	--	10-25-94	28.4	6.1	11.5	06N21W23BABB01
--	--	20	D	1.0	08-30-94	36.2	6.3	12.5	06N21W23BDDD01
10-20-95	102.25	10	D	.2	06-12-95	79.0	7.1	10.0	06N21W23CABC01
10-20-95	94.92	10	D	.2	09-13-94	110	7.1	11.0	06N21W23CBCB01
10-20-95	48.52	12	D	1.2	08-30-94	105	6.6	12.0	06N21W23CDCB01
10-20-95	5.22	--	-	--	09-01-94	48.4	6.1	10.5	06N21W23DADA01
10-20-95	6.78	--	-	--	08-31-94	54.0	6.1	11.0	06N21W23DADD01
--	--	--	-	--	07-10-95	43.9	6.7	11.0	06N21W23DBDA01
--	--	50	D	1.7	08-31-94	50.8	6.3	14.5	06N21W23DDAA01
10-20-95	8.14	--	-	--	08-31-94	51.7	6.3	12.5	06N21W23DDAD01
10-20-95	4.69	50	D	1.9	08-31-94	51.4	6.3	10.0	06N21W23DDBB01
10-20-95	3.52	40	D	1.3	08-31-94	73.3	6.6	10.0	06N21W23DDCB01
10-20-95	4.38	--	-	--	08-31-94	59.2	6.2	11.0	06N21W23DDDA01
10-20-95	17.71	7	D	.4	10-25-94	92.9	6.6	9.0	06N21W24BAAC01
10-20-95	54.92	--	-	--	04-19-95	175	9.4	11.0	06N21W24BDCC01
10-20-95	20.83	15	D	.9	08-31-94	63.3	6.2	12.5	06N21W24CCAC01
08-31-94	9.36	--	-	--	08-31-94	60.2	6.3	14.0	06N21W24CCBB01
10-20-95	7.41	15	D	15.0	08-31-94	57.3	6.5	14.5	06N21W24CCBB02
--	--	15	R	--	08-30-94	69.3	6.3	11.0	06N21W24CCCB01
--	--	480	R	--	12-14-95	293	7.2	12.0	06N21W25DBAA01
10-20-95	35.98	40	D	4.0	08-19-94	90.3	6.6	10.0	06N21W26AADD01
10-20-95	36.58	8	D	.1	08-18-94	212	7.2	11.5	06N21W26ABAD01
10-20-95	34.54	--	-	--	08-30-94	45.3	6.3	10.5	06N21W26BBCA01
10-20-95	15.14	--	-	--	08-30-94	97.9	6.7	11.5	06N21W26CBAB01
12-19-95	31.37	10	D	.2	--	--	--	--	06N21W26DBAD01
10-20-95	37.74	30	D	.3	09-13-94	107	7.2	13.0	06N21W26DBDD01
10-20-95	44.38	20	D	1.7	08-29-94	108	6.4	10.0	06N21W27ADBC01
10-20-95	66.34	5	D	--	08-30-94	99.2	6.7	12.0	06N21W27BABA01
12-19-95	81.27	9	D	.8	08-15-95	83.9	7.8	11.0	06N21W27BBAA01
08-04-95	16.46	--	-	--	08-04-95	100	6.6	11.0	06N21W34ABCD01

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
06N20W01BABA01	3,830	Taf	45	6.0	O	--	04-18-69	D	H
06N20W01BABB01	3,810	Taf	265	6.0	P	40	03-10-78	D	H
06N20W01CDCD01	3,845	TYb	120	8.0	P	20	06-21-79	D	H
06N20W02AADC01	3,765	TYb	115	6.0	P	50	08-03-91	D	H
06N20W02BBDA01	3,679	Taf	--	--	-	--	--	-	H
06N20W02CCAA01	3,682	Qaf	--	--	-	--	--	-	H
06N20W02DCDC01	3,735	TYb	25	6.0	-	--	00-00-20	-	H
06N20W03BDBB01	3,570	Tabr	43	6.0	P	36	07-10-73	D	H
06N20W03BDCC01	3,585	Qaf	--	--	-	--	--	-	H
06N20W03CCDB01	3,625	Tabr	--	--	-	--	--	-	H
06N20W04AABC01	3,528	Qaf	34	6.0	O	--	01-04-75	D	H
06N20W04ACCD01	3,545	Tabr	55	6.0	O	--	03-04-93	D	H
06N20W04ADCD01	3,542	Tabr	100	6.0	O	--	05-09-77	D	H
06N20W04CCCD01	3,504	Tabr	50	6.0	O	--	04-06-83	D	H
06N20W04DCCB01	3,562	Tabr	58	6.0	P	50	12-13-91	D	H
06N20W09BDDD01	3,578	Tabr	125	6.0	-	--	--	-	H
06N20W09CBCC01	3,562	Tabr	90	--	-	--	--	-	H
06N20W09CCDB01	3,585	Tabr	99	6.0	O	--	08-01-90	D	H
06N20W09DCAB01	3,585	Tabr	--	--	-	--	--	-	H
06N20W10AADC01	3,722	Taf	160	6.0	P	130	05-27-88	D	H
06N20W10ABDB01	3,705	Taf	66	6.0	P	47	04-28-87	D	H
06N20W10BCAC01	3,690	Taf	167	6.0	O	--	--	D	H
06N20W10CACB01	3,722	Taf	200	6.0	O	--	11-07-74	D	H
06N20W10DADD01	3,772	Taf	60	6.0	-	--	--	-	H
06N20W10DBBB01	3,730	Taf	46	6.0	P	38	07-07-93	D	H
06N20W10DCAB01	3,742	Taf	68	6.0	-	--	--	-	H
06N20W11CCBD01	3,788	Taf	174	6.0	S	111	04-27-95	D	H
06N20W11DBAA01	3,790	Taf	135	6.0	P	95	11-22-77	D	H
06N20W12ABDB01	3,875	Qaf	22	--	-	--	--	-	H
06N20W12CCCD01	3,883	Taf	63	6.0	O	--	09-26-73	D	I
06N20W13BADD01	3,945	TYb	35	--	-	--	--	-	H
06N20W13BCAC01	3,948	Taf	--	--	-	--	--	-	H
06N20W14ACDD01	3,884	Taf	120	6.0	P	80	03-22-83	D	S
06N20W14BADB01	3,842	Taf	80	6.0	P	50	06-24-76	D	H
06N20W14BBBB01	3,792	Tabr	1,110	4.0	P	209	04-06-79	D	U
06N20W14CAAA01	3,830	Taf	78	6.0	S	54	05-13-93	D	H
06N20W14CDAB01	3,775	Taf	75	6.0	-	--	00-00-82	-	H
06N20W14DAAA01	3,922	Taf	--	--	-	--	00-00-79	-	H
06N20W15AACD01	3,750	Taf	65	--	-	--	--	-	H
06N20W15BBCC01	3,640	Tabr	--	--	-	--	--	-	H
06N20W15CACC01	3,694	Taf	59	6.0	S	34	05-13-93	D	H
06N20W16AABD01	3,591	Tabr	74	6.0	O	--	06-23-77	D	H
06N20W16ACCB01	3,622	Tabr	150	6.0	P	120	08-28-79	D	H
06N20W16ADCB01	3,672	Tabr	110	6.0	O	--	01-12-78	D	S
06N20W16BAAD01	3,626	Tabr	180	6.0	P	140	04-07-78	D	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conductance, field (µS/cm)	pH, field (standard units)	Water temperature, field (°C)	Location number
Date of measurement	Depth to water (ft)								
08-24-95	8.08	3	D	.1	--	--	--	--	06N20W01BABA01
11-10-95	13.20	2	D	--	07-26-95	396	8.0	14.5	06N20W01BABB01
11-10-95	4.55	15	D	.2	06-14-95	395	7.4	10.5	06N20W01CDCD01
11-10-95	45.25	3	D	--	07-24-95	453	7.3	15.0	06N20W02AADC01
11-10-95	7.93	--	-	--	07-11-95	661	7.9	12.5	06N20W02BBDA01
07-27-95	1.34	--	-	--	07-26-95	558	7.6	10.5	06N20W02CCAA01
11-10-95	8.23	--	-	--	07-12-95	532	7.5	12.0	06N20W02DCDC01
11-10-95	17.52	25	D	1.1	07-24-95	328	7.7	12.0	06N20W03BDBB01
12-19-95	23.68	--	-	--	07-12-95	505	7.2	11.5	06N20W03BDCC01
--	--	--	-	--	05-04-95	463	7.6	10.5	06N20W03CCDB01
11-10-95	7.26	12	D	--	07-24-95	449	7.3	11.5	06N20W04AABC01
11-10-95	34.02	15	D	--	07-27-95	385	7.4	12.5	06N20W04ACCD01
06-14-95	24.93	8	D	.2	06-14-95	359	7.6	12.0	06N20W04ADCD01
11-10-95	19.67	50	D	2.2	05-04-95	363	7.5	10.5	06N20W04CCCD01
11-10-95	35.00	18	D	1.5	06-14-95	436	7.5	13.0	06N20W04DCCB01
11-10-95	49.44	--	-	--	07-26-95	595	7.4	12.0	06N20W09BDDD01
11-10-95	60.35	--	-	--	08-03-95	332	7.5	13.0	06N20W09CBCC01
11-10-95	67.74	20	D	--	05-02-95	375	7.5	12.5	06N20W09CCDB01
11-10-95	36.00	--	-	--	05-03-95	588	7.2	12.0	06N20W09DCAB01
11-10-95	27.80	15	D	.1	07-12-95	775	7.6	12.5	06N20W10AADC01
11-10-95	15.68	35	D	1.5	05-04-95	419	8.0	10.0	06N20W10ABDB01
--	--	--	-	--	07-12-95	429	7.8	12.0	06N20W10BCAC01
11-10-95	137.32	20	D	.7	06-14-95	600	7.9	13.0	06N20W10CACB01
--	--	20	O	--	07-25-95	420	7.7	13.0	06N20W10DADD01
11-10-95	18.22	10	D	.8	07-25-95	411	7.9	12.0	06N20W10DBBB01
11-10-95	22.24	--	-	--	07-25-95	384	8.0	10.5	06N20W10DCAB01
--	--	30	D	.3	06-13-95	598	7.8	12.5	06N20W11CCBD01
05-03-95	43.24	20	D	.4	05-03-95	582	7.5	11.5	06N20W11DBAA01
06-14-95	6.48	--	-	--	06-14-95	232	7.8	11.0	06N20W12ABDB01
11-10-95	29.54	10	D	.3	05-04-95	750	7.6	11.5	06N20W12CCCD01
--	--	--	-	--	06-13-95	864	7.3	12.0	06N20W13BADD01
--	--	--	-	--	07-12-95	637	7.6	12.5	06N20W13BCAC01
--	--	25	D	.6	05-03-95	578	7.6	9.5	06N20W14ACDD01
11-10-95	14.21	20	D	.6	05-02-95	440	7.6	11.0	06N20W14BADB01
12-19-95	66.80	32	D	.7	--	--	--	--	06N20W14BBBB01
11-10-95	15.56	20	D	.5	06-12-95	248	7.3	10.0	06N20W14CAAA01
08-01-95	flowing	--	-	--	08-01-95	555	7.5	14.5	06N20W14CDAB01
08-21-95	94.59	--	-	--	08-21-95	517	8.1	18.0	06N20W14DAAA01
11-10-95	30.62	--	-	--	06-13-95	580	7.6	12.0	06N20W15AACD01
11-10-95	61.15	--	-	--	05-04-95	481	7.5	11.5	06N20W15BBCC01
11-10-95	21.73	20	D	.9	07-25-95	505	7.5	11.5	06N20W15CACC01
--	--	35	D	1.8	08-03-95	526	7.5	15.0	06N20W16AABD01
11-10-95	74.80	10	D	.2	05-02-95	484	7.5	11.5	06N20W16ACCB01
11-10-95	73.19	10	D	.3	07-27-95	577	7.5	14.5	06N20W16ADCB01
11-10-95	87.33	15	D	.2	05-04-95	364	7.5	10.0	06N20W16BAAD01

Table 4. Records of selected wells (Continued)

Location number	Altitude of land surface (ft)	Geologic unit	Depth of well (ft)	Casing diameter (in.)	Type of finish	Depth to top of open interval	Well completion date	Type of log available	Primary use of water
06N20W16DDDB01	3,702	Taf	124	6.0	O	--	03-24-77	D	H
06N20W17AACA01	3,539	Tabr	--	--	-	--	--	-	H
06N20W17ADCC01	3,602	Qaf	--	--	-	--	--	-	H
06N20W19CCCC02	3,560	Qalt	40	6.0	O	--	09-04-70	-	U
06N20W29BADB01	3,610	Qaf	85	6.0	O	--	05-16-84	D	C
06N20W30DBCC01	3,581	Qalt	109	12.0	P	87	06-18-75	D	P
06N19W06CBCA01	4,100	TYb	420	6.0	P	120	02-23-77	D	H
06N19W07BABC01	3,965	Tabr	220	6.0	P	40	05-01-86	D	H
05N21W03ACBA01	3,818	Tabr	55	6.0	S	50	09-17-91	D	H
05N21W12BCAB01	3,655	Tabr	67	--	-	--	--	-	H
05N21W15AABD01	3,925	Tabr	301	6.0	P	220	09-08-72	D	H
05N21W15AADB01	3,900	Qgt	25	--	-	--	--	-	S
05N21W22CDAD01	4,085	Tabr	110	--	-	--	--	-	H
05N21W23BBAA01	3,882	Taf	54	6.0	P	28	06-26-84	D	H
05N21W27DDBD01	3,770	Tabr	129	6.0	P	124	04-27-92	D	H
05N21W36DCC 02	3,702	Qalt	29	8.0	P	14	06-28-85	D	I
05N20W10BAAC01	3,998	Taf	80	6.0	O	--	08-23-77	D	S
05N20W17BADC01	3,805	Tabr	260	6.0	P	145	07-30-87	D	H
05N20W17CBAB01	3,825	Taf	26	6.0	P	18	07-21-91	D	H
05N20W17CDDB01	3,942	Taf	78	6.0	P	66	12-18-92	D	H
05N20W18ABDA01	3,810	Taf	154	6.0	S	146	03-07-90	D	H
05N20W18ADBA01	3,846	Taf	269	6.0	P	154	00-00-78	-	H
05N20W18CACC01	3,678	Tabr	75	6.0	-	--	01-27-64	D	S
05N20W18DACA01	3,905	Taf	85	--	-	--	--	-	H
05N20W18DBAA01	3,885	Taf	93	6.0	S	85	07-13-91	D	H
05N20W18DCDB01	3,880	Taf	88	6.0	P	76	04-29-83	D	H
05N20W30BDCD01	3,728	Qaf	36	6.0	P	26	09-12-83	D	H
04N21W14CBAA01	3,795	Tabr	56	6.0	P	48	01-18-89	D	H
04N21W16DDDD01	4,085	Taf	165	6.0	-	--	--	-	H
04N21W35CCBA01	3,844	Tabr	100	6.0	-	--	--	-	I
03N21W10DADD01	3,888	Tabr	70	8.0	P	40	09-03-73	D	P
03N21W14BBAC01	3,880	Tabr	85	--	-	--	--	-	P
03N21W14CAAA01	3,895	Tabr	80	8.0	P	61	11-12-81	D	P
03N21W15CBBB01	4,095	Taf	124	6.0	P	116	06-06-82	D	U
03N21W15CCCD01	4,140	Taf	111	6.0	P	101	08-08-76	D	H
02N21W01CACD01	4,120	Tabr	280	6.0	-	--	--	-	H
02N20W07BCCC01	4,055	Tabr	60	6.0	O	--	05-03-78	D	U
02N20W07CABC01	4,045	Qalt	--	6.0	-	--	--	-	H

Water level		Yield (gal/min)	Source of yield data	Specific capacity [(gal/min)/ft]	Date of field water-quality parameter measurement	Specific conductance, field (µS/cm)	pH, field (standard units)	Water temperature, field (°C)	Location number
Date of measurement	Depth to water (ft)								
--	--	75	D	.8	05-03-95	453	7.5	9.5	06N20W16DDDB01
--	--	--	-	--	05-03-95	284	6.9	10.0	06N20W17AACA01
05-02-95	69.97	--	-	--	05-02-95	307	7.2	10.5	06N20W17ADCC01
12-13-95	12.09	--	-	--	--	--	--	--	06N20W19CCCC02
12-19-95	16.81	40	D	1.0	08-21-95	409	7.8	12.5	06N20W29BADB01
07-16-91	4.97	500	D	6.9	--	--	--	--	06N20W30DBCC01
07-27-95	229.51	9	D	--	07-27-95	739	7.0	14.5	06N19W06CBCA01
12-19-95	28.88	10	D	.1	07-26-95	391	7.6	12.0	06N19W07BABC01
08-04-95	24.38	20	D	.7	08-04-95	106	6.3	9.0	05N21W03ACBA01
12-12-95	50.05	--	-	--	08-03-95	42.1	6.4	11.0	05N21W12BCAB01
07-15-91	156.96	16	D	.1	12-14-95	158	8.0	11.0	05N21W15AABD01
12-14-95	8.21	5	S	--	12-14-95	40.3	6.8	7.5	05N21W15AADB01
08-03-95	91.76	--	-	--	08-03-95	95.8	7.3	13.5	05N21W22CDAD01
12-12-95	17.04	5	D	.2	08-03-95	40.0	6.3	11.5	05N21W23BBAA01
08-03-95	20.50	30	D	.3	08-03-95	108	6.6	11.5	05N21W27DDBD01
06-04-96	4.65	99	D	9.0	06-04-96	102	6.4	7.5	05N21W36DCC 02
12-12-95	25.98	20	D	.7	12-12-95	622	7.9	9.0	05N20W10BAAC01
08-02-95	26.29	12	D	.1	08-02-95	424	7.8	13.5	05N20W17BADC01
08-02-95	2.11	18	D	1.8	08-02-95	427	7.1	15.0	05N20W17CBAB01
08-21-95	36.64	16	D	.7	08-21-95	435	8.0	11.0	05N20W17CDDB01
08-02-95	120.49	20	D	.8	08-02-95	426	7.7	14.5	05N20W18ABDA01
--	--	--	-	--	08-02-95	415	7.5	13.5	05N20W18ADBA01
12-14-95	50.20	30	O	--	12-14-95	244	7.2	10.0	05N20W18CACC01
08-02-95	26.65	--	-	--	08-02-95	310	7.8	12.5	05N20W18DACA01
08-02-95	70.00	12	D	.6	08-02-95	288	7.6	11.5	05N20W18DBAA01
08-02-95	57.76	9	D	.5	08-02-95	243	7.7	13.0	05N20W18DCDB01
12-19-95	22.42	100	D	7.7	12-14-95	188	6.8	10.0	05N20W30BDCD01
12-13-95	30.79	30	D	2.8	12-13-95	284	6.8	10.0	04N21W14CBAA01
12-13-95	66.24	8	S	.4	12-13-95	70.4	6.8	10.0	04N21W16DDDD01
07-12-91	10.92	--	-	--	--	--	--	--	04N21W35CCBA01
07-12-91	11.77	500	D	--	--	--	--	--	03N21W10DADD01
--	--	--	-	--	08-19-92	159	6.5	10.5	03N21W14BBAC01
07-12-91	7.53	250	D	--	--	--	--	--	03N21W14CAAA01
12-19-95	69.84	10	D	.1	--	--	--	--	03N21W15CBBB01
06-04-96	68.11	8	D	.3	06-04-96	151	6.8	9.5	03N21W15CCCD01
12-19-95	24.00	--	-	--	12-13-95	215	7.1	9.5	02N21W01CACD01
07-11-91	29.48	20	D	1.0	--	--	--	--	02N20W07BCCC01
12-13-95	35.65	--	-	--	12-13-95	69.9	6.8	9.0	02N20W07CABC01

Table 5. Records of water levels in wells

[*; Asterisk following well number indicates well that is in the monitoring network. Water-level data shown in a hydrograph in figure 21 (following). Water level--Depth, in feet below land surface. MS, conditions of measurement. First column (M) is method of measurement--R, reported; S, steel tape; T, electric tape. Second column (S) is site status -P, pumping; R, recently pumped; S, nearby pumping; Z, other]

10N20W10CBBD01

DATE	WATER LEVEL	MS
08-27-93	10.16	R
12-06-93	12.27	R
03-10-94	12.66	R
06-16-94	7.79	R
09-27-94	12.19	R
12-20-94	13.01	R
03-23-95	12.27	R
06-27-95	9.14	R
09-28-95	11.70	R
12-19-95	11.39	R
03-14-96	10.65	R
06-18-96	7.12	R
09-24-96	11.17	R
12-19-96	11.58	R
06-17-97	8.93	R
09-04-97	10.75	R

10N20W11CDCD01

DATE	WATER LEVEL	MS
08-26-93	48.26	R
12-06-93	51.82	R
03-10-94	58.24	R
06-16-94	52.24	R
09-27-94	53.17	R
03-23-95	55.16	R
06-27-95	47.18	R
09-28-95	40.16	R
12-19-95	48.16	R
03-14-96	52.04	R
06-18-96	51.73	R
12-19-96	52.99	R
06-17-97	46.81	R
09-04-97	45.81	R

10N20W12ACDB01*

DATE	WATER LEVEL	MS
08-22-94	25.13	S
10-30-94	24.47	S
01-16-95	24.37	S
03-31-95	24.28	S
06-03-95	21.45	S
08-19-95	24.37	S
09-22-95	24.28	S
11-17-95	23.44	S
02-25-96	23.22	SR
05-16-96	20.29	S
07-24-96	23.79	T
09-24-96	23.84	T
11-19-96	24.05	S
01-07-97	23.41	S
02-26-97	23.79	S
04-03-97	40.52	S
05-20-97	18.92	S
06-24-97	20.99	S
08-19-97	23.66	S
10-15-97	24.63	S

10N20W12ADCB01

DATE	WATER LEVEL	MS
08-19-95	36.52	S
11-17-95	35.71	S

10N20W12ADCB01 cont.

DATE	WATER LEVEL	MS
02-26-96	35.49	S
05-15-96	32.80	S

10N20W12ADDC01

DATE	WATER LEVEL	MS
10-30-94	24.04	S
01-19-95	23.55	S
03-26-95	23.39	S
06-03-95	24.20	S
08-22-95	25.28	SR
09-22-95	23.46	S
11-19-95	23.05	S
05-17-96	21.32	S

10N20W12DAAA01

DATE	WATER LEVEL	MS
10-25-94	30.08	S
01-18-95	30.08	S
03-31-95	29.99	S
06-03-95	30.30	S
08-19-95	30.34	S
09-22-95	29.97	S
11-17-95	29.43	S
02-24-96	28.48	S
05-15-96	27.66	S

10N20W12DABD01

DATE	WATER LEVEL	MS
08-24-95	33.67	S
09-22-95	33.58	S
11-18-95	32.88	S
02-26-96	32.42	S
05-15-96	29.82	S

10N20W12DADA01*

DATE	WATER LEVEL	MS
08-15-94	30.76	S
10-30-94	30.66	S
01-18-95	30.43	S
03-31-95	30.42	S
06-03-95	30.38	S
08-19-95	30.34	S
09-22-95	30.35	S
11-18-95	30.13	S
02-25-96	26.73	S
05-15-96	26.73	S
07-24-96	36.97	TP
09-24-96	28.90	T
11-19-96	28.73	S
01-07-97	28.28	S
02-26-97	23.53	S
04-03-97	23.33	S
05-20-97	24.20	S
06-24-97	24.49	S
08-19-97	16.59	S
10-15-97	26.12	S

10N20W12DDDC01*

DATE	WATER LEVEL	MS
09-28-94	5.69	S
03-31-95	5.05	S
06-03-95	4.39	S
08-19-95	4.87	S
09-15-95	4.74	S
11-17-95	4.04	S
02-24-96	2.84	S
05-17-96	1.09	S
07-24-96	4.26	T
09-24-96	3.19	T
11-19-96	2.92	S
01-07-97	2.44	S
02-26-97	2.29	S
04-03-97	1.16	S
05-20-97	.04	S
06-24-97	.08	S
08-19-97	1.31	S
10-15-97	.30	S

10N20W13BBA 01

DATE	WATER LEVEL	MS
05-14-59	5.42	--
06-15-59	2.48	--
07-11-59	4.64	--
08-19-59	5.60	--
09-10-59	4.79	--
10-16-59	4.52	--
11-18-59	5.69	--
12-16-59	5.95	--
01-25-60	6.49	--
02-09-60	6.39	--
03-06-60	6.89	--
04-11-60	5.54	--
05-02-60	6.05	--
06-17-60	3.21	--
07-24-60	5.56	--
08-25-60	5.27	--
09-05-60	4.90	--
10-14-60	5.19	--
11-14-60	6.50	--
12-14-60	6.78	--
01-06-61	6.95	--
02-15-61	6.47	--
03-22-61	6.78	--
04-08-61	6.38	--
05-15-61	6.00	--
06-05-61	3.04	--
07-07-61	4.87	--
08-12-61	6.00	--
09-05-61	5.00	--
10-10-61	6.08	--
11-22-61	6.37	--
12-06-61	6.20	--
01-10-62	6.24	--
02-15-62	6.00	--
03-16-62	6.69	--
04-27-62	5.09	--
05-26-62	4.09	--
06-17-62	3.70	--
07-24-62	5.24	--
08-15-62	5.43	--
09-17-62	4.60	--
10-16-62	4.50	--
11-19-62	6.01	--
12-20-62	5.50	--
01-10-63	6.23	--
03-19-63	6.29	--

Table 5. Records of water levels in wells (Continued)

10N20W13BBA 01 cont.

DATE	WATER LEVEL	MS
04-15-63	6.40	--
05-24-63	4.05	--
06-05-63	3.38	--
07-01-63	4.22	--
07-23-63	5.41	--
09-06-63	5.23	--
10-01-63	6.07	--
11-04-63	6.32	--
12-03-63	6.34	--
03-13-64	7.03	--
03-05-65	5.96	--
09-03-65	5.00	--
03-08-66	6.55	--
09-07-66	5.26	--
11-30-66	6.50	--
03-06-67	6.70	--
06-05-67	3.75	--
09-11-67	6.44	--
11-30-67	6.10	--
03-07-68	5.94	--
05-28-68	4.92	--
08-21-68	5.30	--
12-11-68	5.79	--
06-10-69	4.00	--
09-04-69	6.31	--
12-16-69	6.47	--
03-11-70	6.19	--
06-24-70	3.85	--
11-12-70	5.82	--
02-17-71	5.82	--
06-02-71	3.21	--
09-13-71	5.67	--
12-21-71	6.59	--
03-13-72	5.57	--
06-26-72	3.66	--
09-20-72	5.95	--
12-19-72	6.79	--
03-29-73	7.21	S
06-21-73	5.28	S
09-18-73	6.66	S
12-03-73	6.60	S
03-19-74	6.30	S
06-27-74	2.77	S
10-10-74	6.34	S
01-14-75	7.44	S
04-15-75	7.55	S
06-30-75	4.58	S
08-26-75	5.59	S
11-24-75	5.68	S
02-10-76	6.44	S
05-26-76	4.13	S
08-29-76	6.15	S
11-20-76	6.62	S
02-14-77	8.04	S
06-20-77	6.16	S
09-21-77	7.21	S
12-20-77	6.08	S
02-15-78	6.88	S
05-10-78	5.79	S
08-23-78	6.25	S
11-29-78	6.71	S
02-21-79	6.92	S
05-21-79	5.80	S
09-19-79	6.74	S
03-11-80	6.97	S
06-10-80	5.05	S
10-08-80	6.81	S
01-14-81	6.68	S
04-07-81	6.94	S
07-14-81	5.74	S
05-18-82	5.68	S
08-24-82	6.50	S

10N20W13BBA 01 cont.

DATE	WATER LEVEL	MS
10-03-91	6.26	--
11-12-91	6.36	--
02-04-92	6.55	S
05-06-92	5.45	S
06-17-92	5.39	S
07-29-92	6.25	S
10-19-92	6.32	S
01-12-93	6.63	S
04-06-93	6.18	--
08-13-93	6.00	S
10-21-93	5.86	S
02-02-94	6.42	S
06-01-94	4.86	S
10-04-94	6.39	S
12-27-94	6.52	S
05-10-95	5.86	S
07-05-95	5.54	S
07-25-95	5.54	S
10-18-95	5.62	S
12-13-95	4.95	S
02-13-96	4.70	S
05-16-96	4.28	S
08-08-96	5.91	S
10-04-96	6.12	S
11-26-96	6.23	S
01-07-97	5.49	S
12-13-95	4.95	--
02-19-97	6.15	S
04-15-97	5.52	S
06-19-97	3.46	S
08-20-97	5.87	S
10-16-97	5.68	S

10N19W05CCCC01

DATE	WATER LEVEL	MS
09-21-95	13.27	S
11-18-95	13.90	S
02-23-96	13.50	S
05-16-96	14.96	S

10N19W05CCCD01

DATE	WATER LEVEL	MS
09-21-95	3.26	S
11-18-95	3.04	S
02-23-96	3.44	S
05-16-96	4.85	S

10N19W05CDCC01

DATE	WATER LEVEL	MS
10-30-94	15.44	S
01-19-95	15.19	S
04-03-95	18.03	S
06-05-95	11.59	S
08-18-95	11.77	S
09-22-95	13.89	SR
11-18-95	13.54	S
02-23-96	15.34	S
05-15-96	16.40	S

10N19W05DCDD01

DATE	WATER LEVEL	MS
10-30-94	11.47	S

10N19W05DCDD01 cont.

DATE	WATER LEVEL	MS
01-19-95	12.53	S
03-26-95	13.58	S
06-04-95	14.20	S
08-18-95	11.68	S
09-12-95	10.57	S
11-17-95	10.63	S
02-23-96	11.79	S
05-16-96	11.01	S

10N19W06CDCB01

DATE	WATER LEVEL	MS
10-30-94	47.82	S
01-18-95	47.58	S
03-31-95	47.76	S
06-03-95	48.12	S
08-17-95	48.40	S
09-18-95	48.18	S
11-17-95	47.61	S
02-23-96	46.18	S

10N19W06CDDA01

DATE	WATER LEVEL	MS
09-18-95	61.54	S
11-18-95	60.73	S
02-23-96	59.40	S
05-15-96	58.93	S

10N19W06CDDD01*

DATE	WATER LEVEL	MS
08-09-94	65.66	S
10-30-94	65.23	S
01-19-95	64.69	S
04-03-95	64.80	S
06-05-95	65.40	S
08-17-95	65.93	S
09-18-95	65.21	S
11-17-95	64.09	S
02-23-96	62.84	S
05-15-96	62.27	S
07-24-96	63.58	TR
09-24-96	61.26	T
11-19-96	59.86	S
01-07-97	59.34	S
02-26-97	58.70	S
04-03-97	58.25	S
05-21-97	57.71	S
06-24-97	52.62	S
08-19-97	48.89	S
10-15-97	46.90	S

10N19W06DCCC01

DATE	WATER LEVEL	MS
10-30-94	60.52	S
04-03-95	60.01	S
06-05-95	60.72	S
08-17-95	61.05	S
09-20-95	59.95	S
11-18-95	58.58	S
02-23-96	57.44	S
05-15-96	57.35	S

Table 5. Records of water levels in wells (Continued)

10N19W06DCDA01

DATE	WATER LEVEL	MS
10-27-94	16.52	S
01-19-95	17.27	S
03-31-95	17.58	S
06-05-95	18.09	S
08-18-95	13.41	S
09-12-95	14.00	S
11-19-95	15.48	S
02-23-96	15.52	SR
05-15-96	16.36	S

10N19W06DDCC01*

DATE	WATER LEVEL	MS
08-10-94	111.87	S
10-31-94	111.44	S
01-19-95	111.88	S
03-31-95	111.52	S
06-05-95	111.94	S
08-17-95	112.50	S
09-20-95	112.32	S
11-18-95	111.48	S
02-23-96	110.40	S
05-15-96	109.97	S
07-24-96	110.47	TR
09-24-96	109.59	T
11-19-96	112.31	S
01-07-97	108.09	S
02-26-97	106.86	S
04-03-97	106.65	S
05-20-97	106.44	S
06-24-97	106.22	S
08-19-97	105.05	S
10-15-97	104.92	S

10N19W07ADBC01

DATE	WATER LEVEL	MS
10-30-94	95.47	S
01-19-95	95.82	S
04-05-95	96.37	S
06-06-95	96.94	S
08-17-95	96.95	S
09-13-95	95.39	S
11-19-95	92.72	S
02-24-96	92.45	SR
05-16-96	92.70	SR

10N19W07BAAD01*

DATE	WATER LEVEL	MS
09-08-94	63.60	S
10-20-94	63.40	S
01-19-95	62.94	S
03-26-95	63.07	S
06-05-95	63.58	S
08-17-95	64.09	S
09-18-95	63.57	S
11-17-95	62.10	S
02-23-96	60.83	S
05-15-96	60.07	S
07-24-96	62.35	TR
09-24-96	59.07	T
11-19-96	58.18	S
01-07-97	56.94	S
02-26-97	56.27	S
04-03-97	58.83	S
05-20-97	54.97	S
06-24-97	53.27	S

10N19W07BACB01

DATE	WATER LEVEL	MS
08-19-97	47.97	S
10-15-97	45.52	S
10-30-94	62.15	S
01-18-95	61.88	S
03-31-95	61.79	SR
06-03-95	64.72	S
08-19-95	62.88	S
09-12-95	63.45	S
11-17-95	61.67	S

10N19W07BDAD01

DATE	WATER LEVEL	MS
10-27-94	65.95	S
01-19-95	65.67	S
06-05-95	66.39	S
08-19-95	66.66	S
09-22-95	65.85	S
11-17-95	64.34	S
02-23-96	62.95	S
05-15-96	62.08	S

10N19W07BDBB01

DATE	WATER LEVEL	MS
10-25-94	48.74	S
01-18-95	48.50	S
04-03-95	48.60	S
06-05-95	49.08	S
08-18-95	49.42	S
09-22-95	48.98	S
11-17-95	48.03	S
02-24-96	47.83	S
05-15-96	46.08	S

10N19W07CAAB01

DATE	WATER LEVEL	MS
10-25-94	33.89	S
01-18-95	34.17	S
04-05-95	34.57	S
06-03-95	35.29	S
08-18-95	34.74	S
09-15-95	34.53	S
11-18-95	33.22	S
02-24-96	30.82	S
05-16-96	29.76	S

10N19W07CABD01*

DATE	WATER LEVEL	MS
08-16-94	24.38	S
10-25-94	22.67	S
01-18-95	22.85	S
06-03-95	24.00	S
08-18-95	22.95	S
11-19-95	22.04	SR
02-24-96	18.30	S
05-16-96	18.31	S
07-24-96	22.52	T
09-24-96	19.15	T
11-19-96	19.27	S
01-07-97	18.23	S
02-26-97	16.78	S
04-03-97	15.84	S
05-20-97	18.45	S

10N19W07CABD01* cont.

DATE	WATER LEVEL	MS
06-24-97	16.42	S
08-19-97	18.69	S
10-15-97	15.72	S

10N19W07CACC01

DATE	WATER LEVEL	MS
10-30-94	47.00	S
01-18-95	48.04	S
03-31-95	47.01	S
06-03-95	47.34	S
08-19-95	47.46	SR
09-22-95	46.74	S
11-18-95	46.07	S
02-26-96	44.37	S
05-15-96	43.53	SR

10N19W07CDAA01

DATE	WATER LEVEL	MS
10-31-94	24.53	S
01-19-95	24.98	S
04-05-95	25.49	S
06-03-95	25.12	S
08-18-95	24.54	S
09-22-95	23.91	S
11-18-95	23.56	S
02-25-96	20.04	S
05-15-96	20.23	SR

10N19W07CDBA01

DATE	WATER LEVEL	MS
10-27-94	21.53	S
01-19-95	21.66	S
04-05-95	22.12	S
06-03-95	22.93	SR
08-18-95	21.81	S
09-22-95	21.12	SR
11-17-95	20.32	S
02-25-96	16.59	S
05-15-96	16.34	S

10N19W07CDCC01*

DATE	WATER LEVEL	MS
09-28-94	37.80	SR
01-21-95	34.01	S
03-31-95	33.53	S
06-03-95	36.63	S
08-18-95	32.18	S
09-13-95	33.43	T
11-17-95	31.72	S
02-25-96	30.07	S
05-16-96	29.22	S
07-24-96	39.35	TR
09-24-96	29.52	T
11-19-96	28.84	S
01-07-97	28.37	S
02-26-97	29.44	S
04-03-97	29.43	S
05-20-97		P-
06-24-97	27.01	S
08-19-97	32.25	S
10-15-97	25.04	S

Table 5. Records of water levels in wells (Continued)

10N19W07DABB01*

DATE	WATER LEVEL	MS
08-17-95	64.38	S
09-21-95	63.33	S
11-18-95	63.93	S
05-16-96	59.70	S
07-24-96	58.18	TR
09-24-96	56.46	T
11-19-96	58.07	S
01-07-97	55.35	S
02-26-97	55.85	S
04-03-97	54.57	S
05-20-97	53.93	S
06-24-97	49.47	S
08-19-97		P-
10-15-97	41.70	S

10N19W07DBDA01

DATE	WATER LEVEL	MS
09-21-95	37.67	S
11-19-95	37.38	S
02-24-96	35.59	S
05-16-96	31.48	S

10N19W07DDCD01

DATE	WATER LEVEL	MS
11-02-94	35.25	S
01-18-95	38.63	S
06-06-95	36.15	S
08-18-95	33.76	S
09-20-95	33.04	S
11-17-95	33.33	S
02-24-96	29.50	SR
05-16-96	26.47	S

10N19W07DDDC01

DATE	WATER LEVEL	MS
11-02-94	42.12	S
01-18-95	44.36	S
04-05-95	43.64	S
06-06-95	41.29	S
08-19-95	39.39	S
09-18-95	38.86	S
11-17-95	38.99	S
02-24-96	35.19	S
05-16-96	32.17	S

10N19W08ABBC01*

DATE	WATER LEVEL	MS
08-03-94	30.60	S
10-31-94	36.52	S
01-18-95	33.17	S
04-05-95	37.34	S
06-03-95	28.66	S
08-18-95	28.72	S
09-20-95	31.24	S
11-18-95	31.84	S
02-24-96	34.80	S
05-15-96	35.40	S
07-24-96	26.46	T
09-24-96	26.53	T
11-19-96	29.41	S
01-07-97	35.55	SR
02-26-97	31.67	S

10N19W08ABBC01* cont.

DATE	WATER LEVEL	MS
04-03-97	28.18	S
05-20-97	21.19	S
06-24-97	21.12	S
08-19-97	22.56	S
10-15-97	28.48	S

10N19W08ADAD01

DATE	WATER LEVEL	MS
10-25-94	103.56	S
01-14-95	89.95	S
03-26-95	86.92	S
06-03-95	102.81	S
08-15-95	108.19	SR
09-20-95	100.82	S
11-18-95	91.93	S
02-23-96	93.78	SR
05-15-96	86.11	SR

10N19W08ADDC01

DATE	WATER LEVEL	MS
10-25-94	117.44	SR
01-18-95	100.63	S
04-03-95	92.15	S
06-03-95	115.97	SR
08-15-95	113.36	S
09-12-95	110.65	T
11-18-95	100.52	S
02-26-96	101.14	SR
05-17-96	98.31	SR

10N19W08BADD01

DATE	WATER LEVEL	MS
10-31-94	237.01	S
01-16-95	237.26	S
03-27-95	237.13	S
06-04-95	237.21	S
08-15-95	238.92	S
09-22-95	237.26	S
11-17-95	236.79	S
02-23-96	235.95	S
05-15-96	235.75	S

10N19W08BBDD01

DATE	WATER LEVEL	MS
01-18-95	203.48	S
06-05-95	203.70	S
08-15-95	205.41	S
09-20-95	204.02	S
05-17-96	202.51	S

10N19W08BCAD01*

DATE	WATER LEVEL	MS
08-15-94	200.02	S
10-31-94	197.42	S
01-18-95	196.78	S
04-05-95	196.85	S
06-06-95	196.68	S
08-15-95	200.40	S
09-13-95	198.07	T
11-18-95	196.85	S

10N19W08BCAD01* cont.

DATE	WATER LEVEL	MS
02-26-96	196.57	S
05-15-96	195.98	SR
07-25-96	204.27	TR
09-24-96	197.74	T
11-19-96	198.02	S
01-07-97	199.83	S
02-26-97	199.90	S
04-03-97	195.68	S
05-20-97		P-
06-24-97	204.99	S
08-19-97	204.99	S
10-15-97	201.16	S

10N19W08BCBB01

DATE	WATER LEVEL	MS
10-27-94	145.18	S
01-16-95	144.38	S
03-26-95	144.93	S
06-05-95	144.40	S
08-16-95	145.75	S
09-22-95	145.57	S
11-18-95	144.77	S
02-24-96	147.08	S
05-15-96	142.82	S

10N19W08BCCC01

DATE	WATER LEVEL	MS
10-31-94	129.60	S
01-19-95	130.22	S
03-31-95	130.10	S
06-05-95	130.40	S
08-17-95	130.45	S
09-20-95	130.35	S
11-19-95	128.79	S
02-23-96	126.82	S
05-15-96	125.98	S

10N19W08BDAB01

DATE	WATER LEVEL	MS
10-30-94	228.10	SR
01-16-95	227.77	S
03-27-95	227.29	S
06-05-95	227.26	S
08-15-95	229.19	S
09-22-95	227.42	S
11-17-95	227.08	S
02-24-96	227.32	SR
05-17-96	226.32	S

10N19W08CBDD01*

DATE	WATER LEVEL	MS
08-23-94	51.75	S
10-31-94	56.08	S
01-18-95	57.68	S
03-27-95	55.83	S
06-06-95	52.30	S
08-16-95	49.79	S
09-22-95	49.48	S
11-17-95	51.01	S
02-25-96	47.73	S
05-16-96	45.67	S
07-25-96	43.72	T

Table 5. Records of water levels in wells (Continued)

10N19W08CBDD01* cont.

DATE	WATER LEVEL	MS
09-24-96	43.95	T
11-19-96	46.88	S
01-07-97	44.54	S
02-26-97	43.53	S
04-03-97	43.47	S
05-20-97	42.52	S
06-24-97	35.81	S
08-19-97	32.00	S
10-15-97	34.95	S

10N19W08CDAC01

DATE	WATER LEVEL	MS
10-31-94	77.50	S
01-19-95	79.02	S
03-27-95	78.91	S
06-06-95	77.99	S
08-16-95	72.99	S
09-13-95	73.48	S
11-17-95	74.39	S
02-25-96	72.48	S
05-17-96	71.48	S

10N19W08DAAC01

DATE	WATER LEVEL	MS
11-02-94	71.58	S
01-18-95	68.05	SR
03-27-95	66.96	S
06-04-95	77.19	S
08-17-95	73.15	S
09-22-95	73.04	S
11-17-95	68.53	S
02-25-96	65.83	S
05-16-96	65.46	S

10N19W08DBBD01

DATE	WATER LEVEL	MS
08-15-95	199.75	S
11-17-95	198.23	S
02-26-96	198.77	S
05-17-96	196.68	S

10N19W08DCCB01*

DATE	WATER LEVEL	MS
08-19-95	115.90	S
11-17-95	115.69	S
02-23-96	117.79	S
05-16-96	114.14	S
07-25-96	113.03	T
09-24-96	112.33	T
11-19-96	111.94	S
01-07-97	112.18	S
02-26-97	111.73	S
04-03-97	111.78	S
05-20-97	110.79	S
06-24-97	107.97	S
08-19-97	106.55	S
10-15-97	107.01	S

10N19W08DCCC01

DATE	WATER LEVEL	MS
08-19-94	136.80	--
10-31-94	136.73	S
01-16-95	137.81	S

10N19W08DCCC02

DATE	WATER LEVEL	MS
08-26-93	150.52	R
12-06-93	141.15	R
03-10-94	140.82	R
06-16-94	140.84	R
09-27-94	141.84	R
12-20-94	143.32	R
03-23-95	143.05	R
06-27-95	141.87	R
09-28-95	140.19	R
12-19-95	139.97	R
03-14-96	138.39	R
06-18-96	136.82	R
09-24-96	135.56	R
12-19-96	135.35	R
06-17-97	133.94	R
09-04-97	128.30	R

10N19W09BCCC01*

DATE	WATER LEVEL	MS
01-14-95	51.59	S
03-26-95	49.13	S
06-03-95	79.13	S
08-17-95	77.78	S
11-17-95	56.95	SR
02-24-96	48.87	S
05-16-96	47.25	S
07-24-96	57.21	TR
09-24-96	59.03	T
11-19-96	54.77	S
01-07-97	48.94	S
02-26-97	47.97	S
04-03-97	36.71	S
05-20-97	60.69	S
06-24-97	53.22	S
08-19-97	81.95	S
10-15-97	52.34	S

10N19W16BBBC01

DATE	WATER LEVEL	MS
10-31-94	204.12	S
01-14-95	204.10	S
03-27-95	205.04	S
06-06-95	204.44	S
08-16-95	204.73	S
09-15-95	204.56	SR
11-18-95	203.84	S
02-25-96	203.62	SR
05-16-96	201.76	S

10N19W17BAAA01

DATE	WATER LEVEL	MS
10-31-94	121.44	S
01-14-95	122.96	S
03-27-95	123.18	S
06-06-95	121.20	S
08-16-95	119.81	S

10N19W17BAAA01 cont.

DATE	WATER LEVEL	MS
09-21-95	119.64	S
11-17-95	119.35	S
02-23-96	117.03	S
05-18-96	115.44	S

10N19W17BBDA01

DATE	WATER LEVEL	MS
11-02-94	93.22	S
01-16-95	94.99	S
03-27-95	94.29	S
06-06-95	91.64	S
08-16-95	90.45	S
09-18-95	90.84	SR
11-17-95	90.62	SR
02-25-96	88.01	SR
05-17-96	84.89	S

10N19W17BCAB01

DATE	WATER LEVEL	MS
11-02-94	90.49	S
01-16-95	91.71	S
03-27-95	89.54	S
06-06-95	89.54	S
08-17-95	88.37	S
09-18-95	88.40	S
11-17-95	84.35	SR

10N19W17BCCC01

DATE	WATER LEVEL	MS
08-19-95	94.95	S
09-18-95	94.18	S
11-17-95	93.95	S
02-24-96	91.86	SR
05-17-96	88.74	S

10N19W18AAAA01

DATE	WATER LEVEL	MS
08-24-94	45.23	S
11-02-94	46.45	S
01-19-95	48.53	S
03-26-95	48.03	S
06-06-95	45.17	S

10N19W18AADB01*

DATE	WATER LEVEL	MS
08-16-95	42.98	SR
09-13-95	42.58	T
11-17-95	42.91	S
02-25-96	39.36	S
05-16-96	35.28	S
07-25-96	40.94	TR
09-24-96	36.18	T
11-19-96	37.17	S
01-07-97	37.79	S
02-26-97	34.31	S
04-03-97	33.38	S
05-20-97	38.69	S
06-24-97	29.48	S
08-19-97	35.73	S
10-15-97	31.23	S

Table 5. Records of water levels in wells (Continued)

10N19W18ABAD01

DATE	WATER LEVEL	MS
08-16-95	30.30	S
09-18-95	29.68	S
11-17-95	30.28	S
02-23-96	26.09	S
05-16-96	22.67	S

10N19W18ADDC01*

DATE	WATER LEVEL	MS
01-21-95	85.66	S
06-06-95	87.59	S
08-22-95	81.84	S
09-18-95	81.37	S
11-17-95	81.93	S
02-26-96	78.86	SR
05-17-96	75.65	S
07-25-96	76.27	T
09-24-96	76.86	T
11-19-96	79.47	S
01-07-97	78.86	S
02-26-97	75.65	S
04-03-97	74.33	S
05-20-97	73.85	S
06-24-97	70.58	S
08-19-97	71.38	S
10-15-97	74.32	S

10N19W18DBBA01

DATE	WATER LEVEL	MS
01-21-95	71.09	S
06-08-95	70.74	S
08-22-95	67.77	S
09-13-95	67.45	T
11-19-95	68.82	S
02-26-96	67.36	S
05-17-96	64.40	S

09N20W20ACAD01

DATE	WATER LEVEL	MS
08-22-95	27.26	R
09-28-95	25.17	R
12-19-95	27.39	R
03-14-96	24.57	R
06-18-96	24.83	R
09-24-96	22.70	R
12-19-96	22.25	R
06-17-97	22.96	R
09-04-97	20.69	R

09N20W26BACC02

DATE	WATER LEVEL	MS
08-26.93	80.08	R
12-07-93	81.45	R
03-09-94	60.76	R
06-16-94	79.65	R
09-27-94	80.80	R
12-20-94	80.52	R
03-23-95	80.31	R
06-27-95	79.02	R
09-28-95	79.68	R
12-19-95	79.14	R
03-14-96	79.68	R
06-03-96	79.54	T

09N20W26BACC02 cont.

DATE	WATER LEVEL	MS
06-18-96	78.80	R
09-24-96	78.17	R
12-19-96	79.91	R
06-17-97	78.45	R
09-04-97	79.70	R

08N21W27DCBC01

DATE	WATER LEVEL	MS
08-26-93	6.56	R
12-07-93	11.70	R
03-13-94	11.88	R
06-16-94	2.75	R
09-27-94	13.65	R
12-20-94	12.95	R
03-23-95	10.80	R
06-27-95	2.39	R
09-28-95	8.46	R
12-19-95	7.11	R
03-14-96	4.36	R
06-03-96	4.66	T
06-18-96	2.47	R
09-24-96	8.08	R
12-19-96	11.53	R
06-17-97	1.78	R
09-04-97	8.62	R

08N20W12BAAA01*

DATE	WATER LEVEL	MS
10-10-95	54.99	S
11-19-96	46.46	S
01-07-97	47.73	S
02-26-97	45.18	S
04-03-97	51.46	S
05-20-97	45.32	S
06-24-97	42.29	S
08-19-97	40.77	S
10-15-97	40.47	S

08N20W19BAAD03

DATE	WATER LEVEL	MS
07-03-57	14.64	--
08-13-57	14.98	--
09-05-57	15.50	--
11-06-57	15.64	--
12-06-57	16.04	--
01-02-58	16.32	--
02-11-58	16.54	--
03-07-58	16.21	--
04-01-58	16.35	--
05-06-58	14.81	--
06-17-58	14.27	--
07-03-58	14.01	--
08-05-58	14.26	--
09-03-58	14.68	--
00-02-58	14.53	--
01-03-58	15.13	--
02-09-58	15.11	--
01-02-59	15.30	--
02-06-59	16.22	--
03-05-59	16.29	--
04-01-59	16.49	--
04-10-59	16.14	--
05-10-59	14.28	--
06-05-59	13.52	--
07-10-59	13.76	--

08N20W19BAAD03 cont.

DATE	WATER LEVEL	MS
08-05-59	13.76	--
09-16-59	12.74	--
00-05-59	13.65	--
01-20-59	14.70	--
02-10-59	15.07	--
01-10-60	15.95	--
02-10-60	16.37	--
03-16-60	17.03	--
04-08-60	16.58	--
05-24-60	13.03	--
06-06-60	13.54	--
07-07-60	12.97	--
08-02-60	12.91	--
09-01-60	13.61	--
10-10-60	14.13	--
11-16-60	14.16	--
12-18-60	15.42	--
01-02-61	15.61	--
02-06-61	16.15	--
03-03-61	15.84	--
04-02-61	16.28	--
05-02-61	13.93	--
06-06-61	13.23	--
07-07-61	12.69	--
08-13-61	12.88	--
09-02-61	12.39	--
10-09-61	13.15	--
11-22-61	14.68	--
12-30-61	15.06	--
03-02-62	16.86	--
08-27-62	14.12	--
03-04-63	15.60	--
09-06-63	13.92	--
03-13-64	16.47	--
03-05-65	16.20	--
09-03-65	14.65	--
03-08-66	18.03	--
09-07-66	15.32	--
11-30-66	15.90	--
03-06-67	16.87	--
06-05-67	14.35	--
09-11-67	15.08	--
11-30-67	15.70	--
03-07-68	16.70	--
05-28-68	14.56	--
08-21-68	14.48	--
12-11-68	16.36	--
06-10-69	14.48	--
09-04-69	15.58	--
12-17-69	17.21	--
03-11-70	18.09	--
06-24-70	15.14	--
09-10-70	14.71	--
11-12-70	16.01	--
02-17-71	17.07	--
06-02-71	14.52	--
09-13-71	15.07	--
12-21-71	16.52	--
03-13-72	16.67	--
06-26-72	16.23	--
09-20-72	16.34	--
03-29-73	19.76	--
06-21-73	15.87	--
12-03-73	17.71	--
03-19-74	18.86	--
06-27-74	16.48	--
10-09-74	16.87	--
01-14-75	19.02	--
04-15-75	18.19	--
06-30-75	16.14	--
08-26-75	15.90	--
11-24-75	17.86	S
02-10-76	19.22	--

Table 5. Records of water levels in wells (Continued)

08N20W19BAAD03 cont.

DATE	WATER LEVEL	MS
05-26-76	16.12	--
08-29-76	16.67	--
11-10-76	17.00	--
02-14-77	19.69	--
06-20-77	16.26	--
09-21-77	16.58	--
12-20-77	17.19	--
02-15-78	18.67	--
05-10-78	17.01	--
08-23-78	16.29	--
11-29-78	17.68	--
02-21-79	18.18	--
05-21-79	15.71	S
09-19-79	15.71	S
03-11-80	17.38	S
06-10-80	14.20	S
07-14-81	15.10	S
05-18-82	15.78	S
08-24-82	14.36	S
10-12-83	14.58	S
10-11-84	15.09	S
10-30-86	14.86	S
10-25-89	14.80	S
09-13-90	14.42	S
04-25-91	16.12	S
09-17-91	14.34	S
09-09-92	14.78	S
03-10-94	16.62	R
06-16-94	14.07	R
09-27-94	15.15	R
12-20-94	15.63	R
03-23-95	17.02	R
06-27-95	13.57	R
09-28-95	13.25	R
12-19-95	14.10	R
03-14-96	14.61	R
06-04-96	14.99	T
06-18-96	13.39	R
09-24-96	13.92	R
12-19-96	14.55	R
06-17-97	13.50	R
09-04-97	13.68	R

08N20W26BAAC01

DATE	WATER LEVEL	MS
08-26-93	189.26	R
12-07-93	179.82	R
03-10-94	180.41	R
06-16-94	186.26	R
09-27-94	189.83	R
12-20-94	182.76	R
03-23-95	181.69	R
06-27-95	182.01	R
09-28-95	179.91	R
12-19-95	180.49	R
03-14-96	180.59	R
06-18-96	185.70	R
09-24-96	177.69	R
12-19-96	180.85	R
09-04-97	202.81	R

08N20W30CDAB01

DATE	WATER LEVEL	MS
08-26-93	16.05	R
12-07-93	18.25	R
03-09-94	22.30	R
06-16-94	16.35	R

08N20W30CDAB01 cont.

DATE	WATER LEVEL	MS
09-27-94	19.09	R
12-20-94	22.62	R
03-23-95	26.06	R
06-27-95	18.58	R
09-28-95	16.58	R
12-19-95	18.01	R
03-14-96	19.17	R
06-18-96	16.14	R
09-24-96	15.94	R
12-19-96	18.89	R
06-17-97	15.46	R
09-04-97	15.08	R

08N19W04BDAA01

DATE	WATER LEVEL	MS
08-26-93	18.61	R
12-07-93	17.63	R
03-09-94	22.10	R
06-16-94	14.85	R
09-27-94	22.16	R
12-20-94	22.25	R
03-23-95	13.03	R
06-27-95	13.28	RR
09-28-95	18.01	R
12-19-95	15.39	R
03-14-96	17.78	R
06-18-96	10.65	R
09-24-96	17.94	R
12-19-96	19.94	R
06-17-97	9.72	R
09-04-97	17.80	R

08N19W07CBBD01

DATE	WATER LEVEL	MS
04-18-56	91.76	--
05-07-56	92.38	--
06-05-56	93.20	--
07-06-56	94.16	--
08-06-56	92.63	--
09-10-56	89.34	--
10-01-56	87.68	--
11-06-56	85.74	--
12-05-56	83.51	--
03-11-57	84.65	--
04-12-57	86.36	--
04-30-57	87.66	--
06-11-57	89.80	--
07-05-57	89.49	--
08-13-57	88.72	--
09-13-57	87.50	--
10-04-57	86.63	--
11-06-57	85.31	--
12-06-57	84.44	--
01-13-58	84.66	--
02-03-58	84.97	--
03-10-58	87.08	--
04-02-58	88.37	--
05-16-58	90.88	--
05-30-58	92.03	--
06-20-58	92.80	--
06-28-58	92.69	--
07-03-58	93.05	--
07-11-58	94.04	--
07-17-58	94.03	--
07-25-58	93.27	--
08-01-58	92.98	--
08-08-58	92.47	--

08N19W07CBBD01 cont.

DATE	WATER LEVEL	MS
08-15-58	92.17	--
08-22-58	91.80	--
08-29-58	91.06	--
09-05-58	90.68	--
09-12-58	89.70	--
09-19-58	89.57	--
09-26-58	89.63	--
10-03-58	89.25	--
10-10-58	88.85	--
10-17-58	88.21	--
10-24-58	88.72	-P
10-31-58	87.70	--
11-07-58	87.79	--
11-14-58	87.47	--
11-24-58	87.00	--
11-28-58	87.52	--
12-05-58	88.26	--
12-12-58	87.17	--
12-19-58	87.04	--
12-26-58	87.62	--
01-02-59	86.92	--
01-09-59	87.18	--
01-23-59	87.31	--
01-30-59	88.48	--
02-06-59	87.63	--
02-13-59	88.59	--
02-20-59	89.30	--
02-27-59	88.83	--
03-13-59	91.04	-P
03-20-59	89.88	--
03-27-59	90.01	--
04-02-59	90.70	--
04-17-59	91.47	--
04-24-59	91.19	--
05-08-59	92.04	-P
05-15-59	92.37	--
05-22-59	93.17	--
06-05-59	93.82	-P
06-12-59	94.06	--
06-19-59	94.50	--
06-26-59	94.64	--
07-10-59	95.49	--
07-17-59	95.65	--
07-23-59	95.70	--
07-31-59	95.83	--
08-07-59	95.73	--
08-21-59	94.90	--
08-28-59	95.01	--
09-04-59	94.47	--
09-18-59	93.76	--
09-25-59	93.38	--
10-02-59	93.23	--
10-09-59	92.79	--
10-16-59	92.92	--
10-23-59	93.00	--
11-27-59	91.46	--
12-04-59	91.33	--
12-11-59	90.78	--
12-18-59	90.96	--
12-26-59	91.14	--
12-31-59	90.65	--
01-29-60	91.65	--
02-05-60	91.77	--
02-12-60	92.27	--
02-19-60	92.39	--
02-26-60	92.62	--
03-11-60	93.23	--
03-18-60	93.75	--
03-25-60	94.35	--
04-01-60	94.92	--
04-08-60	94.82	--
04-15-60	95.23	--
04-22-60	95.40	--

Table 5. Records of water levels in wells (Continued)

08N19W07CBBD01 cont.

DATE	WATER LEVEL	MS
05-20-60	96.22	--
05-27-60	97.65	--
06-03-60	97.94	--
06-17-60	98.06	--
06-24-60	98.82	--
07-01-60	99.32	-P
07-08-60	100.66	--
07-15-60	100.84	--
07-29-60	100.06	--
08-05-60	99.87	--
09-09-60	98.14	--
10-07-60	96.15	--
11-04-60	95.57	--
12-02-60	93.85	--
02-06-61	93.89	--
03-03-61	95.00	--
03-31-61	96.32	--
05-02-61	98.38	--
06-02-61	99.60	--
07-05-61	100.60	--
08-04-61	99.86	--
03-02-62	97.87	--
08-27-62	102.16	--
03-04-63	95.87	--
09-11-63	95.77	--
03-13-64	91.87	--
11-29-78	95.09	--
02-21-79	94.56	--
05-21-79	99.80	--
09-19-79	97.66	--
03-11-80	95.24	--
06-10-80	100.65	S
10-08-80	95.49	S
01-14-81	88.53	S
04-07-81	90.97	S
07-14-81	96.82	S
01-05-82	84.35	S
05-18-82	89.87	S
08-24-82	88.45	S
10-12-83	79.25	S
10-11-84	80.79	S
10-30-86	93.68	S
10-25-89	101.40	S
09-13-90	99.15	S
09-17-91	99.30	S
09-09-92	104.14	S
06-16-94	105.91	R
09-27-94	101.81	R
12-20-94	101.39	R
03-23-95	101.34	R
06-27-95	106.88	R
08-22-95	107.04	S
09-28-95	102.45	R
12-19-95	98.17	R
03-14-96	97.14	R
06-18-96	99.97	R
09-24-96	90.60	R
12-19-96	82.27	R
06-17-97	83.33	R
09-04-97	76.49	R

07N21W36DDDC01

DATE	WATER LEVEL	MS
08-27-93	9.05	R
12-07-93	12.01	R
03-09-94	12.53	R
06-16-94	8.46	R
09-27-94	12.30	R
12-20-94	12.28	R
03-23-95	12.75	R

07N21W36DDDC01 cont.

DATE	WATER LEVEL	MS
06-27-95	8.78	R
09-28-95	12.40	R
12-19-95	12.52	R
03-14-96	13.04	R
06-18-96	7.74	R

07N20W32DDDA02

DATE	WATER LEVEL	MS
06-26-72	5.94	S
09-20-72	5.10	S
12-20-72	9.40	S
03-29-73	11.79	S
06-21-73	5.53	S
09-18-73	5.13	S
12-03-73	8.52	S
03-19-74	11.53	S
06-27-74	5.76	S
10-10-74	6.39	S
01-14-75	10.54	S
04-15-75	12.33	S
06-30-75	5.93	S
08-26-75	5.01	S
11-24-75	8.44	S
02-10-76	11.41	S
05-26-76	8.24	S
08-29-76	4.94	S
11-10-76	8.19	S
02-14-77	11.56	S
06-20-77	5.54	S
09-21-77	4.93	S
12-20-77	9.68	S
05-10-78	10.72	S
08-23-78	4.03	S
11-29-78	9.48	S
02-21-79	11.52	S
05-21-79	8.28	S
09-19-79	5.90	S
03-11-80	11.68	S
06-10-80	7.92	S
10-07-80	6.48	S
01-14-81	10.91	S
04-07-81	13.21	S
07-14-81	6.14	S
01-05-82	9.46	S
05-18-82	11.05	S
08-24-82	5.41	S
07-23-91	7.03	S
08-25-93	4.16	R
12-07-93	8.47	R
03-09-94	12.20	R
06-16-94	7.04	R
09-27-94	5.99	R
12-20-94	10.10	R
03-23-95	12.75	R
06-27-95	6.62	R
08-21-95	5.85	S
09-28-95	5.37	R
12-19-95	8.97	R
03-14-96	11.12	R
06-18-96	7.44	R
09-24-96	5.49	R
12-19-96	9.40	R
06-17-97	6.51	R
09-04-97	4.67	R

07N20W34CCCD01

DATE	WATER LEVEL	MS
08-23-95	10.33	S
11-10-95	13.38	S

07N20W34CDDB01*

DATE	WATER LEVEL	MS
08-24-95	21.14	SR
11-10-95	22.23	S
02-21-96	28.17	S
04-02-96	30.26	S
05-15-96	31.70	TR
07-23-96	20.56	T
09-23-96	18.09	T
11-19-96	23.13	S
01-07-97	24.34	S
02-26-97	27.50	S
04-03-97	29.13	S
05-20-97	32.39	S
06-24-97	22.81	S
08-19-97	28.57	S
10-15-97	19.94	S

06N21W01CBAB02*

DATE	WATER LEVEL	MS
04-19-95	38.13	S
05-26-95	37.81	S
10-20-95	38.15	S
02-21-96	37.79	S
04-02-96	38.05	S
05-14-96	38.08	T
07-23-96	37.73	T
09-23-96	38.17	T
11-18-96	39.29	S
01-06-97	38.01	S
02-25-97	38.35	S
04-02-97	38.53	S
05-19-97	38.12	S
06-23-97	38.09	S
08-18-97	38.32	S
10-14-97	38.41	S

06N21W02ABBD01*

DATE	WATER LEVEL	MS
08-25-93	38.83	R
12-07-93	49.10	R
03-09-94	53.40	R
06-16-94	43.62	R
09-27-94	47.02	R
12-20-94	52.54	R
03-23-95	54.90	R
06-27-95	39.58	R
09-28-95	42.76	R
12-19-95	42.18	R
02-23-96	57.14	SR
03-13-96	50.89	R
04-02-96	56.38	S
05-14-96	56.21	T
06-18-96	45.58	R
07-24-96	46.41	S
09-23-96	48.64	S
09-24-96	44.81	R
11-18-96	53.56	S
12-19-96	52.03	R
01-06-97	54.76	S
02-25-97	58.11	S
04-02-97		P-

Table 5. Records of water levels in wells (Continued)

06N21W02ABBD01* cont.

DATE	WATER LEVEL	MS
05-19-97	53.56	S
06-17-97	44.39	R
06-23-97	47.16	S
08-18-97	45.37	S
09-04-97	41.98	R
10-14-97	50.75	S

06N21W03ACBA01

DATE	WATER LEVEL	MS
05-26-95	22.80	S
08-11-95	25.20	S
10-20-95	16.55	S

06N21W03CAAC01*

DATE	WATER LEVEL	MS
04-20-95	10.26	S
05-26-95	5.95	S
08-11-95	9.31	SR
10-20-95	12.09	S
02-21-96	8.57	S
04-02-96	11.67	S
05-14-96	7.56	T
07-23-96	7.47	T
09-23-96	11.58	T
11-18-96	12.78	S
01-06-97	5.74	S
02-25-97	10.07	S
04-02-97	10.12	S
05-19-97	8.22	S
06-23-97	8.46	S
08-18-97	6.41	S
10-14-97	12.25	S

06N21W03CDAC01

DATE	WATER LEVEL	MS
08-25-93	34.62	R
12-07-93	34.95	R
03-09-94	35.39	R
06-16-94	34.77	R
09-27-94	35.74	R
12-20-94	35.69	R
03-23-95	35.63	R
06-27-95	34.82	R
09-28-95	35.01	R
12-19-95	34.87	R
03-14-96	34.02	R
06-18-96	34.57	R
09-24-96	33.91	R
12-19-96	35.32	R
06-17-97	34.59	R
09-04-97	34.77	R

06N21W03DDAA01*

DATE	WATER LEVEL	MS
04-20-95	18.13	S
05-26-95	16.68	S
08-11-95	6.87	S
10-20-95	15.11	SR
02-21-96	6.25	S
04-02-96	8.66	S
05-14-96	9.31	T
07-23-96	12.85	T

06N21W03DDAA01* cont.

DATE	WATER LEVEL	MS
09-23-96	14.96	T
11-18-96	19.86	S
01-06-97	18.10	S
02-25-97	11.88	S
04-02-97	6.54	S
05-19-97	16.58	S
06-23-97	8.01	S
08-18-97	11.23	S
10-14-97	16.35	S

06N21W10BDDD01

DATE	WATER LEVEL	MS
05-26-95	44.33	S
08-11-95	42.89	SR
10-20-95	45.75	SR

06N21W11CAAA01*

DATE	WATER LEVEL	MS
04-18-95	6.36	S
05-26-95	3.92	S
08-11-95	3.84	S
10-20-95	4.06	S
02-21-96	2.30	S
04-02-96	3.70	S
05-14-96	2.49	T
07-23-96	3.25	T
09-23-96	3.75	T
11-18-96	3.96	S
01-06-97	2.05	S
02-25-97	4.68	S
04-02-97	3.01	S
05-19-97	2.23	S
06-23-97	2.41	S
08-18-97	2.98	S
10-14-97	5.36	S

06N21W11CBCA01*

DATE	WATER LEVEL	MS
04-19-95	15.39	S
05-26-95	9.13	S
08-11-95	11.86	S
10-20-95	14.03	S
02-21-96	13.89	S
04-02-96	12.78	S
05-14-96	14.54	T
07-23-96	12.58	T
09-23-96	12.98	T
11-18-96	13.62	S
01-06-97	12.75	S
02-25-97	14.53	S
04-02-97	14.28	S
05-19-97	15.40	S
06-23-97	13.11	S
08-18-97	12.88	S
10-14-97	13.53	S

06N21W11CBDC01*

DATE	WATER LEVEL	MS
04-19-95	37.97	S
05-26-95	38.10	S
08-11-95	41.65	SR
10-20-95	32.10	S

06N21W11CBDC01* cont.

DATE	WATER LEVEL	MS
02-21-96	36.82	SR
04-02-96	38.47	S
05-14-96	34.29	T
07-23-96	30.35	T
09-23-96	61.40	TR
11-18-96	36.28	S
01-06-97	36.37	S
02-25-97	44.53	S
04-02-97	37.11	S
05-19-97	36.13	S
06-23-97	30.07	S
08-18-97	31.62	S
10-14-97	40.19	S

06N21W11CDCB01

DATE	WATER LEVEL	MS
08-11-95	14.62	S
10-20-95	14.40	S

06N21W13BBAB01*

DATE	WATER LEVEL	MS
04-18-95	81.73	S
05-26-95	78.28	S
08-11-95	67.99	S
10-20-95	66.68	S
02-21-96	76.17	S
04-02-96	77.62	S
05-14-96	77.50	T
07-23-96	70.79	T
09-23-96	67.80	T
11-18-96	70.38	S
01-06-97	74.66	S
02-25-97	77.09	S
04-02-97	79.39	S
05-19-97	79.06	S
06-23-97	76.72	S
08-18-97	64.77	S
10-14-97	67.87	S

06N21W14BDAC01*

DATE	WATER LEVEL	MS
10-26-94	19.39	S
01-26-95	27.47	S
03-31-95	20.66	S
05-24-95	16.60	S
08-11-95	12.22	S
10-20-95	13.39	S
02-21-96	24.67	S
04-02-96	20.96	S
05-14-96	19.89	T
07-23-96	16.89	TR
09-23-96	15.33	T
11-18-96	16.19	S
01-06-97	19.53	S
02-25-97	25.28	S
04-02-97	21.59	S
05-19-97	19.40	S
06-23-97	17.00	S
08-18-97	12.42	S
10-14-97	13.23	S

Table 5. Records of water levels in wells (Continued)

06N21W15ABBB01

DATE	WATER LEVEL	MS
05-26-95	111.33	S
08-11-95	108.46	SS
10-20-95	89.85	SS

06N21W15ADBC01*

DATE	WATER LEVEL	MS
06-12-95	133.93	S
08-11-95	138.15	SR
10-20-95	135.60	SR
02-21-96	134.49	S
04-02-96	136.09	S
05-14-96	135.69	TR
07-23-96	144.35	TR
09-23-96	131.08	T
11-18-96	136.02	S
01-06-97	136.57	S
02-25-97	134.70	S
04-02-97	132.04	S
05-19-97	126.43	S
06-23-97	124.88	S
08-18-97	131.60	S
10-14-97	146.60	S

06N21W15CDDD01*

DATE	WATER LEVEL	MS
10-26-94	58.08	S
01-26-95	67.65	S
03-31-95	68.58	S
05-24-95	60.32	S
08-11-95	45.14	S
10-20-95	44.87	S
02-21-96	63.89	S
04-02-96	64.33	S
05-14-96	60.77	T
07-23-96	41.48	T
09-23-96	45.16	T
11-18-96	51.91	S
01-06-97	62.31	S
02-26-97	65.87	S
04-02-97	64.92	S
05-19-97	53.37	S
06-23-97	43.11	S
08-18-97	46.31	S
10-14-97	47.04	S

06N21W21ADDB01*

DATE	WATER LEVEL	MS
10-25-94	130.69	S
01-25-95	133.41	S
03-30-95	135.27	S
05-23-95	136.52	S
08-10-95	133.97	S
10-20-95	129.19	S
02-21-96	133.03	S
04-02-96	135.70	SR
05-14-96	133.65	S
07-23-96	134.01	T
09-23-96	128.87	S
11-18-96	127.67	S
01-06-97	130.29	S
02-25-97	131.91	S
04-02-97	133.25	S
05-19-97	133.74	S
06-23-97	133.29	S
08-18-97	129.62	S
10-14-97	124.77	S

06N21W22BCCA01

DATE	WATER LEVEL	MS
01-25-95	98.96	SR
03-30-95	101.83	S
05-24-95	103.28	S
08-10-95	94.23	S
10-20-95	91.49	S

06N21W23CABC01*

DATE	WATER LEVEL	MS
06-12-95	101.99	S
08-10-95	102.48	SR
10-20-95	102.25	S
02-21-96	101.68	S
04-02-96	103.12	S
05-14-96	102.32	T
07-23-96	108.80	TP
09-23-96	103.95	T
11-18-96	106.49	SR
01-06-97	101.71	S
02-25-97	102.38	S
04-02-97	102.22	S
05-19-97	100.80	S
06-23-97	101.28	S
08-18-97	103.19	S
10-14-97	103.00	S

06N21W23CBCB01

DATE	WATER LEVEL	MS
01-25-95	96.59	S
03-30-95	97.04	S
05-24-95	97.47	S
08-10-95	94.82	S
10-20-95	94.92	S

06N21W23CDCB01

DATE	WATER LEVEL	MS
01-25-95	51.76	S
03-30-95	53.23	SR
05-23-95	48.40	S
08-10-95	44.45	S
10-20-95	48.52	SR

06N21W23DADA01

DATE	WATER LEVEL	MS
01-25-95	17.17	S
03-30-95	17.24	S
05-24-95	5.89	S
08-08-95	3.05	S
10-20-95	5.22	S

06N21W23DADD01

DATE	WATER LEVEL	MS
01-26-95	16.04	S
03-30-95	16.17	S
05-24-95	13.25	S
08-08-95	4.89	S
10-20-95	6.78	S

06N21W23DDAD01

DATE	WATER LEVEL	MS
08-08-95	6.10	S
10-20-95	8.14	S

06N21W23DDBB01*

DATE	WATER LEVEL	MS
08-31-94	5.52	S
01-25-95	9.81	S
03-30-95	9.86	S
05-24-95	6.23	S
08-08-95	3.85	S
10-20-95	4.69	S
02-21-96	5.68	S
04-02-96	8.02	S
05-14-96	8.33	T
07-23-96	3.44	T
09-23-96	5.65	T
11-18-96	7.94	S
01-06-97	2.91	T
02-25-97	7.22	S
04-02-97	8.12	S
05-19-97	6.55	S
06-23-97	3.84	S
08-18-97	4.26	S
10-14-97	5.53	S

06N21W23DDCB01

DATE	WATER LEVEL	MS
01-25-95	6.55	S
03-30-95	6.99	S
05-24-95	5.55	S
08-08-95	3.22	S
10-20-95	3.52	SR

06N21W23DDDA01

DATE	WATER LEVEL	MS
01-25-95	9.48	S
03-30-95	9.75	S
05-24-95	7.82	S
08-08-95	3.44	S
10-20-95	4.38	S

06N21W24BAAC01*

DATE	WATER LEVEL	MS
10-25-94	17.77	S
01-25-95	18.65	S
03-31-95	18.97	S
05-24-95	18.07	S
08-11-95	17.86	S
10-20-95	17.71	S
02-21-96	18.41	SR
04-02-96	19.69	SR
05-14-96	18.63	T
07-23-96	17.68	T
09-23-96	17.95	T
11-18-96	18.01	S
01-06-97	16.68	S
02-25-97	18.41	S
04-02-97	18.90	S
05-19-97	17.83	S
06-23-97	20.02	S
08-18-97	17.83	S
10-14-97	17.83	S

Table 5. Records of water levels in wells (Continued)

06N21W24BDCC01

DATE	WATER LEVEL	MS
05-26-95	58.28	S
08-11-95	58.18	S
10-20-95	54.92	S

06N21W24CCAC01*

DATE	WATER LEVEL	MS
08-31-94	21.11	S
01-25-95	25.88	S
03-30-95	26.50	S
05-24-95	27.65	S
08-08-95	19.29	S
10-20-95	20.83	S
02-21-96	22.33	S
04-02-96	23.76	S
05-14-96	24.18	T
07-23-96	19.57	T
09-23-96	22.39	T
11-18-96	23.57	S
01-06-97	20.09	S
02-25-97	20.67	S
04-02-97	23.62	S
05-19-97	23.91	S
06-23-97	19.84	S
08-18-97	20.63	S
10-14-97	22.65	S

06N21W24CCBB02

DATE	WATER LEVEL	MS
01-25-95	15.56	S
03-30-95	15.78	S
05-24-95	16.33	SS
08-08-95	7.37	SS
10-20-95	7.41	S

06N21W26AADD01

DATE	WATER LEVEL	MS
01-26-95	38.89	S
03-30-95	37.98	S
05-24-95	36.26	S
08-10-95	36.67	S
10-20-95	35.98	S

06N21W26ABAD01*

DATE	WATER LEVEL	MS
08-18-94	37.14	S
01-25-95	38.98	S
03-31-95	40.54	S
05-24-95	36.46	S
08-10-95	36.53	S
10-20-95	36.58	S
02-21-96	37.59	S
04-02-96	38.43	S
05-14-96	37.01	T
07-23-96	36.11	T
09-23-96	38.84	S
04-02-97	37.06	S
05-19-97	36.39	S
06-23-97	45.04	S
08-18-97	36.99	S
10-14-97	39.84	S

06N21W26BBCA01

DATE	WATER LEVEL	MS
01-25-95	36.85	S
03-30-95	37.32	S
05-23-95	37.68	S
08-10-95	32.74	S
10-20-95	34.54	S

06N21W26CBAB01

DATE	WATER LEVEL	MS
01-25-95	17.49	S
03-30-95	15.68	S
05-23-95	16.29	SR
08-09-95	14.73	SR
10-20-95	15.14	S

06N21W26DBAD01*

DATE	WATER LEVEL	MS
08-25-93	30.35	R
12-07-93	32.27	R
03-08-94	33.68	R
06-16-94	32.75	R
09-13-94	32.52	S
09-27-94	32.93	R
12-20-94	34.38	R
01-25-95	34.51	S
03-23-95	34.25	R
03-30-95	34.37	S
05-23-95	33.60	S
06-27-95	32.52	R
08-09-95	32.48	S
09-27-95	32.18	R
10-20-95	32.60	S
12-19-95	31.37	R
02-21-96	30.13	S
03-14-96	31.10	R
04-02-96	31.49	S
05-14-96	31.46	S
06-18-96	30.61	R
07-23-96	31.63	S
09-23-96	31.64	S
09-24-96	32.57	R
11-18-96	36.21	S
12-19-96	33.50	R
01-06-97	31.45	T
02-25-97	31.21	S
04-02-97	32.16	S
05-19-97	31.87	S
06-17-97	30.54	R
06-23-97	30.93	S
08-18-97	31.82	S
09-04-97	32.20	R
10-14-97	32.95	S

06N21W26DBDD01

DATE	WATER LEVEL	MS
01-25-95	38.08	S
03-30-95	38.02	S
05-23-95	38.28	S
08-09-95	39.11	SR
10-20-95	37.74	S

06N21W27ADBC01*

DATE	WATER LEVEL	MS
08-29-94	45.04	S
01-25-95	46.39	S
03-30-95	48.23	SZ
05-24-95	47.52	S
08-10-95	46.12	S
10-20-95	44.38	S
02-21-96	44.25	S
04-02-96	45.53	S
05-14-96	44.32	T
07-23-96	42.47	T
09-23-96	44.03	T
11-18-96	44.67	T
01-06-97	45.05	T
02-25-97	43.91	S
04-02-97	43.57	S
05-19-97	44.55	S
06-23-97	43.25	S
08-18-97	43.03	S
10-14-97	42.71	S

06N21W27BABA01

DATE	WATER LEVEL	MS
01-25-95	66.89	S
03-30-95	66.78	S
05-23-95	67.65	S
08-10-95	74.42	SR
10-20-95	66.34	SR

06N21W27BBAA01

DATE	WATER LEVEL	MS
08-25-93	81.23	R
12-07-93	81.10	R
03-08-94	80.76	R
06-16-94	82.17	R
09-27-94	83.99	RP
12-20-94	81.80	R
03-23-95	83.55	R
06-27-95	81.95	R
09-27-95	80.95	R
12-19-95	81.27	R
03-14-96	86.28	R
06-18-96	81.64	R
09-24-96	82.00	R
12-19-96	80.95	R
06-17-97	82.13	R
09-04-97	79.18	R

06N20W01BABA01

DATE	WATER LEVEL	MS
08-24-95	8.08	SR
05-15-96	21.77	T

06N20W01BABB01*

DATE	WATER LEVEL	MS
07-26-95	10.63	S
08-24-95	9.64	S
11-10-95	13.20	S
02-21-96	19.11	S
04-02-96	28.67	SR
05-15-96	37.35	TR
07-23-96	11.13	T
09-23-96	8.42	T

Table 5. Records of water levels in wells (Continued)

06N20W01BABB01* cont.

DATE	WATER LEVEL	MS
01-07-97	16.43	S
02-26-97	17.61	S
04-03-97	19.17	S
05-20-97	29.85	S
06-24-97	15.23	S
08-19-97	10.85	S
10-15-97	11.41	S

06N20W01CDCD01*

DATE	WATER LEVEL	MS
06-14-95	5.49	S
08-23-95	4.05	S
11-10-95	4.55	S
02-22-96	8.31	SR
04-03-96	8.42	S
05-15-96	5.99	T
07-24-96	3.88	T
09-23-96	3.11	T
01-07-97	5.72	S
02-26-97	7.87	S
04-03-97	7.84	S
05-20-97	3.52	S
06-24-97	4.31	S
08-19-97	3.96	S
10-15-97	4.26	S

06N20W02AADC01

DATE	WATER LEVEL	MS
08-23-95	33.87	S
11-10-95	45.25	S

06N20W02BBDA01

DATE	WATER LEVEL	MS
08-23-95	3.64	S
11-10-95	7.93	S

06N20W02DCDC01*

DATE	WATER LEVEL	MS
07-12-95	5.90	S
08-23-95	7.09	S
11-10-95	8.23	S
02-22-96	7.62	S
04-02-96	7.85	S
05-15-96	7.99	T
07-24-96	8.25	T
09-23-96	8.13	T
11-19-96	14.52	S
01-07-97	6.76	S
02-26-97	8.26	S
04-03-97	7.84	S
05-20-97	8.06	S
06-24-97	7.61	S
08-19-97	6.77	S
10-15-97	7.14	S

06N20W03BDBB01

DATE	WATER LEVEL	MS
08-23-95	17.43	S
11-10-95	17.52	S

06N20W03BDCC01

DATE	WATER LEVEL	MS
08-25-93	22.93	R
12-07-93	19.40	R
03-09-94	32.77	R
06-16-94	30.56	R

06N20W03BDCC01

DATE	WATER LEVEL	MS
09-27-94	21.97	R
12-20-94	27.73	R
03-23-95	32.78	R
06-27-95	31.91	RP
08-24-95	24.23	S
09-28-95	21.41	R
11-11-95	22.61	S
12-19-95	23.68	R
03-14-96	29.10	R
06-18-96	28.69	R
09-24-96	20.94	R
12-19-96	25.58	R
06-17-97	27.03	R
09-04-97	19.52	R

06N20W04AABC01

DATE	WATER LEVEL	MS
08-24-95	3.96	S
11-10-95	7.26	S

06N20W04ACCD01

DATE	WATER LEVEL	MS
08-24-95	32.13	S
11-10-95	34.02	S

06N20W04ADCD01*

DATE	WATER LEVEL	MS
06-14-95	24.93	S
02-22-96	23.74	S
04-02-96	25.14	S
05-15-96	25.89	T
07-23-96	20.66	T
09-23-96	18.87	T
11-19-96	21.13	S
01-07-97	21.99	S
02-26-97	23.57	S
04-03-97	24.84	S
05-20-97	26.27	S
06-24-97	19.82	S
08-19-97	19.64	S
10-15-97	21.03	S

06N20W04CCCD01

DATE	WATER LEVEL	MS
08-24-95	15.91	S
11-10-95	19.67	S

06N20W04DCCB01*

DATE	WATER LEVEL	MS
06-15-95	36.94	S
08-24-95	33.09	S
11-10-95	35.00	S
02-21-96	38.00	S
04-02-96	38.05	S
05-15-96	39.49	TR
07-23-96	33.30	T
09-23-96	32.76	T
11-19-96	35.56	S
01-07-97	36.64	S
02-26-97	37.73	S
04-03-97	38.62	S
05-20-97	38.97	S
06-24-97	34.03	S
08-19-97	33.43	S
10-15-97	33.55	S

06N20W09BDDD01

DATE	WATER LEVEL	MS
08-24-95	49.07	S
11-10-95	49.44	S

06N20W09CBCC01*

DATE	WATER LEVEL	MS
08-03-95	55.81	S
08-24-95	54.49	S
11-10-95	60.35	SR
02-21-96	63.83	S
04-02-96	65.99	S
05-15-96	63.89	T
07-23-96	59.18	TR
09-23-96	55.26	T
11-19-96	60.92	S
01-07-97	62.44	S
02-26-97	63.64	S
04-02-97	64.39	S
05-20-97	65.02	S
06-24-97	60.91	S
08-19-97	56.84	S
10-14-97	57.75	S

06N20W09CCDB01

DATE	WATER LEVEL	MS
08-24-95	62.56	S
11-10-95	67.74	S

06N20W09DCAB01

DATE	WATER LEVEL	MS
08-24-95	35.87	S
11-10-95	36.00	S

06N20W10AADC01*

DATE	WATER LEVEL	MS
07-12-95	21.84	S
11-10-95	27.80	S
02-21-96	32.86	S
04-02-96	36.84	SR
05-15-96	32.82	T
07-23-96	21.96	T
09-23-96	15.86	T

Table 5. Records of water levels in wells (Continued)

06N20W10AADC01* cont.

DATE	WATER LEVEL	MS
11-19-96	28.32	S
01-07-97	32.38	S
02-26-97	29.50	S
04-03-97	30.87	S
05-20-97	30.03	S
06-24-97	27.24	S
08-19-97	21.56	S
10-14-97	22.67	S

06N20W10ABDB01

DATE	WATER LEVEL	MS
08-24-95	11.58	S
11-10-95	15.68	S

06N20W10CACB01*

DATE	WATER LEVEL	MS
06-14-95	140.00	S
08-24-95	139.25	S
11-10-95	137.32	S
02-21-96	137.06	S
04-02-96	138.19	S
05-15-96	138.57	S
07-23-96	138.63	S
09-23-96	137.24	S
11-19-96	136.99	S
01-07-97	138.11	S
02-26-97	137.32	S
04-02-97	138.19	S
05-20-97	140.48	S
06-24-97	139.76	S
08-19-97	141.51	S
10-14-97	140.26	S

06N20W10DBBB01

DATE	WATER LEVEL	MS
08-24-95	13.28	S
11-10-95	18.22	S

06N20W10DCAB01

DATE	WATER LEVEL	MS
08-24-95	17.87	S
11-10-95	22.24	S

06N20W12CCCD01*

DATE	WATER LEVEL	MS
05-04-95	38.58	SR
08-23-95	23.10	S
11-10-95	29.54	S
02-22-96	32.86	S
04-02-96	33.67	S
05-15-96	35.36	TR
07-24-96	23.17	T
09-24-96	24.73	T
11-19-96	29.95	S
01-07-97	32.09	S
02-26-97	32.34	S
04-03-97	33.81	S
05-20-97	34.96	S
06-24-97	25.18	S
08-19-97	21.23	S
10-15-97	27.30	S

06N20W14ACDD01*

DATE	WATER LEVEL	MS
02-22-96	67.99	SR
04-02-96	66.45	S
05-15-96	69.70	T
07-24-96	67.23	T
09-24-96	64.90	T
11-19-96	67.58	S
01-07-97	67.19	S
02-26-97	67.35	S
04-03-97	68.13	S
05-20-97	68.98	S
06-24-97	66.82	S
08-19-97	66.86	S
10-15-97	66.00	S

06N20W14BADB01*

DATE	WATER LEVEL	MS
05-02-95	27.26	S
08-23-95	11.17	S
11-10-95	14.21	SR
02-22-96	17.02	S
04-03-96	19.28	S
05-15-96	17.15	T
07-24-96	10.41	T
09-24-96	11.73	T
01-07-97	13.20	S
02-26-97	15.97	S
04-03-97	16.83	S
05-20-97	15.32	S
06-24-97	11.29	S
08-19-97	10.96	S
10-15-97	12.67	S

06N20W14BBBB01

DATE	WATER LEVEL	MS
08-25-93	66.97	R
12-07-93	66.25	R
03-09-94	88.57	R
06-16-94	68.32	R
03-23-95	68.27	R
06-27-95	68.68	R
09-28-95	66.61	R
12-19-95	66.80	R
03-14-96	67.78	R
06-18-96	68.31	R
09-24-96	66.34	R
12-19-96	66.60	R
06-17-97	67.60	R
09-04-97	66.94	R

06N20W14CAAA01

DATE	WATER LEVEL	MS
08-23-95	8.22	S
11-10-95	15.56	SR

06N20W14DAAA01*

DATE	WATER LEVEL	MS
08-21-95	94.59	S
02-22-96	97.68	SR
04-02-96	99.18	S
05-15-96	99.24	T
07-24-96	95.89	T
09-24-96	93.13	T
01-07-97	96.18	S

06N20W14DAAA01* cont.

DATE	WATER LEVEL	MS
02-26-97	96.67	S
04-03-97	98.04	S
05-20-97	98.82	S
06-24-97	96.06	S
08-19-97	90.67	S
10-15-97	90.15	S

06N20W15AACD01*

DATE	WATER LEVEL	MS
08-24-95	29.99	S
11-10-95	30.62	S
02-21-96	31.80	S
04-03-96	33.00	S
05-15-96	33.01	T
07-24-96	30.90	T
09-24-96	30.50	T
11-19-96	30.30	S
01-07-97	31.69	S
02-26-97	31.25	S
04-03-97	31.86	S
05-20-97	32.64	S
06-24-97	25.93	S
08-19-97	31.71	S
10-15-97	32.96	S

06N20W15BBCC01

DATE	WATER LEVEL	MS
08-23-95	62.29	S
11-10-95	61.15	S

06N20W15CACC01*

DATE	WATER LEVEL	MS
07-25-95	21.35	S
08-23-95	19.88	S
11-10-95	21.73	S
02-22-96	25.10	S
04-03-96	26.12	S
05-15-96	26.91	TR
07-24-96	19.91	T
09-24-96	18.30	T
11-19-96	21.87	SR
01-07-97	22.87	S
02-26-97	22.89	S
04-03-97	26.24	S
05-20-97	25.77	S
06-24-97	19.62	S
08-19-97	24.89	S
10-15-97	24.94	S

06N20W16ACCB01

DATE	WATER LEVEL	MS
08-24-95	71.43	S
11-10-95	74.80	SR

06N20W16ADCB01*

DATE	WATER LEVEL	MS
07-27-95	75.01	S
08-23-95	75.09	S
11-10-95	73.19	S
02-22-96	75.00	SR
04-03-96	75.71	S

Table 5. Records of water levels in wells (Continued)

06N20W16ADCB01* cont.

DATE	WATER LEVEL	MS
05-15-96	76.05	TR
07-24-96	76.55	TR
09-24-96	71.52	T
11-19-96	72.97	S
01-07-97	74.18	S
02-26-97	74.47	S
04-03-97	78.30	S
05-20-97	79.36	S
06-24-97	75.86	S
08-19-97	73.12	S
10-15-97	72.26	S

06N20W16BAAD01*

DATE	WATER LEVEL	MS
05-04-95	92.68	S
08-24-95	85.74	S
11-10-95	87.33	S
02-21-96	90.89	S
04-02-96	92.73	SR
05-15-96	91.96	T
07-23-96	86.03	T
09-23-96	84.16	T
11-19-96	85.68	S
01-07-97	89.27	S
02-26-97	88.39	S
04-02-97	91.51	S
05-19-97	91.74	S
06-24-97	87.36	S
08-19-97	85.84	S
10-14-97	88.24	S

06N20W19CCCC02

DATE	WATER LEVEL	MS
09-10-70	5.78	--
09-28-70	7.20	--
10-26-70	10.05	--
11-23-70	12.09	--
12-23-70	13.60	--
01-17-71	15.85	S
01-26-71	14.28	--
02-17-71	14.99	S
02-22-71	15.12	--
03-25-71	15.77	S
04-27-71	15.85	--
05-24-71	8.97	--
06-24-71	6.06	--
07-21-71	6.16	--
08-24-71	6.24	--
09-22-71	6.35	--
10-26-71	9.80	--
11-23-71	11.78	--
12-23-71	13.20	--
01-27-72	13.53	--
02-22-72	14.24	--
03-27-72	14.22	--
04-24-72	14.79	--
05-25-72	10.15	--
06-22-72	6.18	--
07-24-72	5.83	--
08-23-72	5.72	--
09-21-72	6.58	--
10-26-72	9.32	--
11-28-72	11.78	--
12-26-72	13.04	--
01-25-73	14.01	--
02-26-73	15.04	--
03-27-73	15.89	--

06N20W19CCCC02 cont.

DATE	WATER LEVEL	MS
03-29-73	16.01	--
04-26-73	16.87	--
05-25-73	9.59	--
06-26-73	5.94	--
07-24-73	5.57	--
08-27-73	5.88	--
09-18-73	6.95	--
09-26-73	7.44	--
10-24-73	10.48	--
11-27-73	11.77	--
12-03-73	12.05	--
12-20-73	12.85	--
01-28-74	13.17	--
02-25-74	13.60	--
03-19-74	14.27	--
03-25-74	14.47	--
04-24-74	15.40	--
05-29-74	7.57	--
06-19-74	5.95	--
07-24-74	6.45	--
08-26-74	5.41	--
09-25-74	7.60	--
10-23-74	9.72	--
11-20-74	11.80	--
12-20-74	13.60	--
01-22-75	15.27	--
02-24-75	16.20	--
03-25-75	16.72	--
04-23-75	17.39	--
05-21-75	17.42	--
06-21-75	6.52	--
07-28-75	5.77	--
08-22-75	6.01	--
09-24-75	8.16	--
10-28-75	10.20	--
11-21-75	11.82	--
12-22-75	13.27	--
01-22-76	14.42	--
02-23-76	15.54	--
03-24-76	16.16	--
04-20-76	16.68	--
05-24-76	14.66	--
06-21-76	5.19	--
07-22-76	5.60	--
08-20-76	6.03	--
09-23-76	7.42	--
10-21-76	10.20	--
11-18-76	12.40	--
12-22-76	14.32	--
01-24-77	15.70	--
02-22-77	16.60	--
03-28-77	17.35	--
04-26-77	17.86	--
05-25-77	9.74	--
06-21-77	5.80	--
07-26-77	5.55	--
08-23-77	6.00	--
09-20-77	7.14	--
10-20-77	9.74	--
11-17-77	12.28	--
12-20-77	13.81	--
01-20-78	14.85	--
02-15-78	15.68	S
02-22-78	15.88	--
03-23-78	16.60	--
04-24-78	17.12	--
05-10-78	17.08	S
05-24-78	13.78	--
06-26-78	6.51	--
07-20-78	6.28	--
08-23-78	6.19	--
09-21-78	7.01	--
10-19-78	9.72	--

06N20W19CCCC02 cont.

DATE	WATER LEVEL	MS
11-28-78	12.85	--
12-19-78	14.13	--
01-25-79	15.82	--
02-21-79	15.67	--
03-27-79	16.35	--
04-25-79	16.65	--
05-24-79	14.38	--
06-25-79	5.96	--
07-25-79	6.33	--
08-29-79	5.52	--
10-11-79	8.54	S
11-20-79	12.01	S
12-20-79	13.67	--
01-16-80	13.76	S
01-22-80	14.13	--
02-26-80	15.43	S
04-08-80	16.43	S
04-21-80	16.74	--
06-06-80	6.52	S
07-24-80	6.17	S
09-03-80	6.62	S
09-23-80	6.84	--
10-16-80	9.11	S
12-02-80	12.97	S
02-26-81	16.45	--
03-05-81	16.59	S
04-14-81	17.25	S
04-21-81	17.34	--
05-20-81	12.42	--
06-24-81	6.96	S
09-16-81	6.61	S
09-22-81	6.57	--
11-04-81	10.88	S
12-16-81	13.36	S
01-27-82	14.68	S
02-26-82	15.00	--
03-08-82	15.07	S
04-20-82	16.67	S
05-28-82	8.35	S
07-13-82	6.69	S
08-24-82	6.94	S
10-07-82	7.57	S
11-16-82	11.55	S
12-28-82	13.90	S
02-08-83	15.45	S
05-04-83	17.81	S
07-07-83	6.48	S
08-02-83	5.82	S
09-13-83	7.27	S
11-03-83	11.27	S
12-14-83	13.63	S
03-13-84	16.68	S
04-24-84	17.28	S
06-06-84	7.92	S
07-17-84	6.75	S
08-28-84	6.97	S
10-10-84	8.70	S
11-27-84	12.58	S
01-17-85	15.37	S
01-23-85	15.57	S
03-01-85	16.44	S
03-06-85	16.54	S
05-22-85	14.41	S
08-15-85	6.35	--
10-01-85	8.86	S
11-14-85	12.15	S
01-09-86	15.19	S
02-19-86	15.46	S
04-10-86	16.28	S
05-29-86	9.80	S
11-19-86	12.74	S
02-18-87	16.22	S
03-24-87	16.81	S

Table 5. Records of water levels in wells (Continued)

06N20W19CCCC02 cont.

DATE	WATER LEVEL	MS
05-07-87	16.25	S
06-09-87	7.37	S
09-10-87	6.70	S
10-27-87	10.50	S
12-02-87	13.20	S
04-12-88	17.34	S
06-28-88	6.85	S
07-13-88	6.47	S
08-17-88	6.73	S
09-27-88	7.48	S
10-27-88	10.72	S
12-21-88	14.13	S
02-10-89	16.04	S
03-15-89	16.26	S
05-04-89	16.08	S
07-26-89	6.54	S
09-13-89	7.06	S
10-24-89	10.31	S
12-05-89	13.07	S
01-23-90	15.40	S
03-06-90	16.48	S
04-17-90	17.20	S
05-30-90	8.22	S
07-17-90	6.52	S
08-29-90	6.95	S
10-10-90	9.12	S
11-27-90	12.77	S
01-14-91	15.02	S
02-25-91	16.34	S
04-02-91	16.95	S
05-28-91	10.87	S
06-25-91	6.53	S
08-07-91	6.51	S
10-01-91	7.33	S
11-13-91	11.59	S
02-04-92	15.36	S
03-24-92	16.55	S
05-05-92	15.99	S
06-17-92	16.01	S
09-08-92	7.50	S
10-19-92	10.10	S
12-02-92	12.98	--
02-23-93	15.76	--
06-29-93	6.90	S
08-12-93	7.54	S
10-04-93	9.77	S
10-21-93	9.77	S
02-01-94	15.22	S
06-01-94	8.84	S
10-04-94	9.80	S
02-10-95	15.90	S
03-21-95	16.73	S
05-10-95	16.47	S
07-25-95	7.74	S
10-18-95	9.87	S
12-13-95	12.09	S
02-13-96	13.80	S
05-15-96	15.07	S
08-08-96	7.08	S
10-03-96	8.60	S

06N20W19CCCC02 cont.

DATE	WATER LEVEL	MS
11-26-96	12.58	S
01-07-97	12.45	S

06N20W29BADB01

DATE	WATER LEVEL	MS
08-25-93	11.87	R
12-07-93	15.75	R
03-09-94	18.80	RR
06-16-94	15.03	R
09-27-94	13.67	R
12-20-94	17.72	R
03-23-95	17.75	R
06-27-95	15.46	R
09-27-95	13.84	R
12-19-95	16.81	R
03-14-96	18.34	R
06-18-96	15.69	R
09-24-96	12.54	R
12-19-96	15.00	R
06-16-97	13.87	R
09-04-97	14.10	R

06N19W07BABC01*

DATE	WATER LEVEL	MS
03-09-94	28.74	R
06-16-94	23.27	R
09-27-94	26.17	R
12-20-94	28.67	R
03-23-95	29.48	R
06-27-95	26.65	R
08-23-95	23.16	S
09-28-95	26.28	R
11-10-95	26.45	S
12-19-95	28.88	R
02-22-96	31.01	SR
03-14-96	28.50	R
04-03-96	29.55	S
05-15-96	26.97	T
06-18-96	24.38	R
07-24-96	24.32	TR
09-23-96	25.74	T
09-24-96	26.36	R
11-19-96	26.79	S
12-19-96	27.47	R
01-07-97	26.44	S
02-26-97	28.08	S
04-03-97	28.12	S
05-20-97	26.09	S
06-17-97	27.30	R
06-24-97	23.71	S
08-19-97	23.95	S
09-04-97	25.06	R
10-15-97	27.13	S

05N20W30BDCD01

DATE	WATER LEVEL	MS
08-24-93	21.81	R
12-07-93	16.80	R
03-08-94	27.52	R
06-15-94	20.76	R
09-26-94	21.96	R
12-20-94	24.93	R
03-23-95	21.88	R
06-27-95	22.37	RP
09-27-95	20.17	R
12-19-95	22.42	R
03-14-96	23.59	R
06-17-96	22.95	R
09-24-96	22.20	R
12-19-96	24.44	R
06-16-97	22.04	R
09-04-97	22.48	R

03N21W15CBBB01

DATE	WATER LEVEL	MS
08-24-93	67.38	R
12-07-93	70.95	R
03-08-94	75.45	R
06-15-94	72.28	R
09-26-94	68.85	R
12-20-94	75.43	R
03-22-95	77.43	R
06-26-95	72.01	R
09-27-95	66.41	R
12-19-95	69.84	R
03-13-96	71.88	R
06-17-96	70.61	R

03N21W15CBBB01

DATE	WATER LEVEL	MS
09-23-96	65.29	R
12-18-96	71.78	R
06-16-97	67.30	R
09-04-97	63.50	R

02N21W01CACD01

DATE	WATER LEVEL	MS
03-08-94	25.76	R
06-15-94	25.20	R
09-26-94	19.67	R
12-20-94	25.50	R
03-22-95	26.96	R
06-26-95	23.98	R
09-27-95	18.02	R
12-19-95	24.00	R
03-13-96	25.39	R
06-17-96	26.32	R
09-23-96	16.64	R
12-18-96	22.14	R
06-16-97	17.49	R
09-04-97	13.06	R

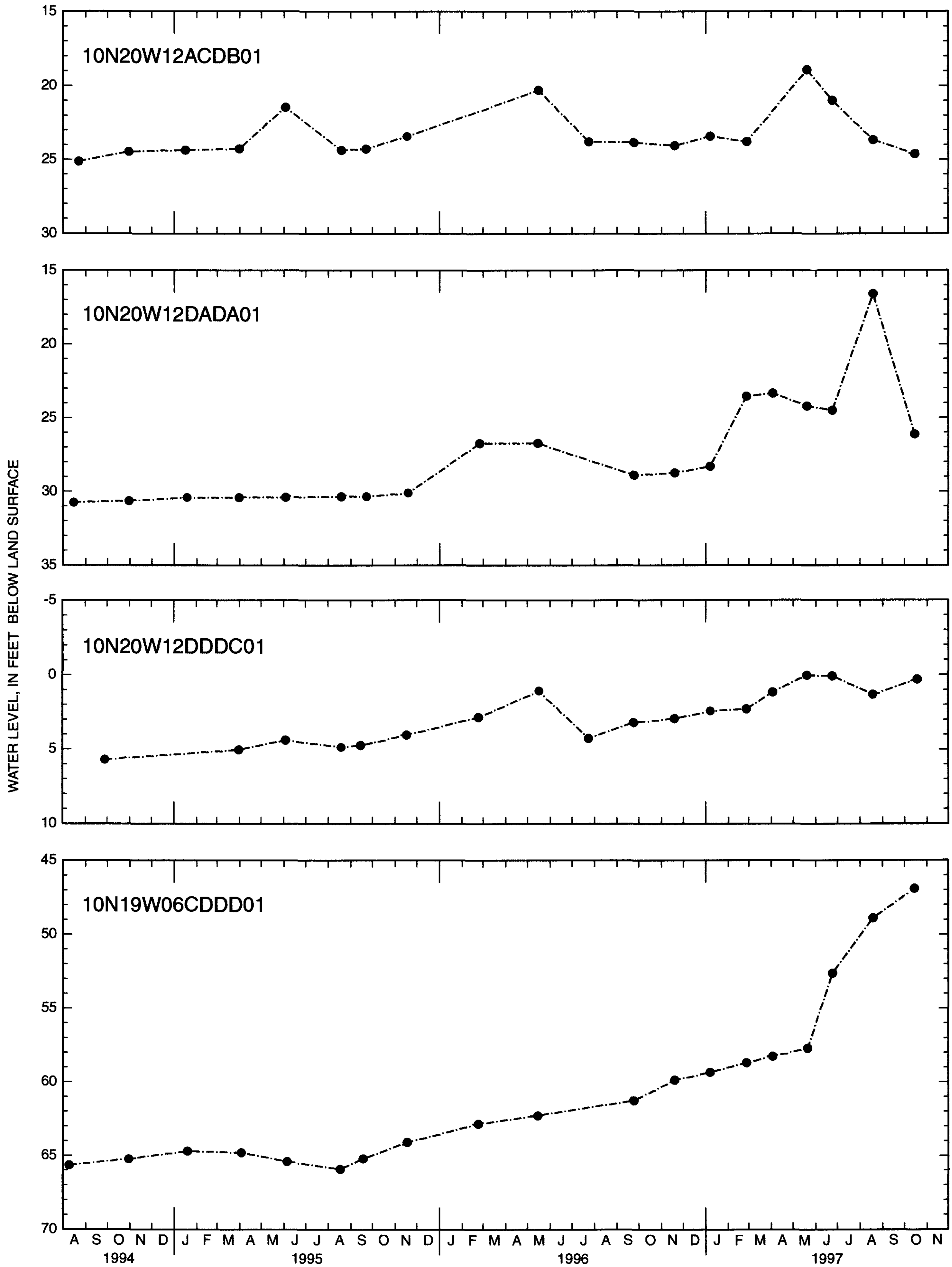

Figure 21. Hydrographs of water levels in wells of the monitoring network.

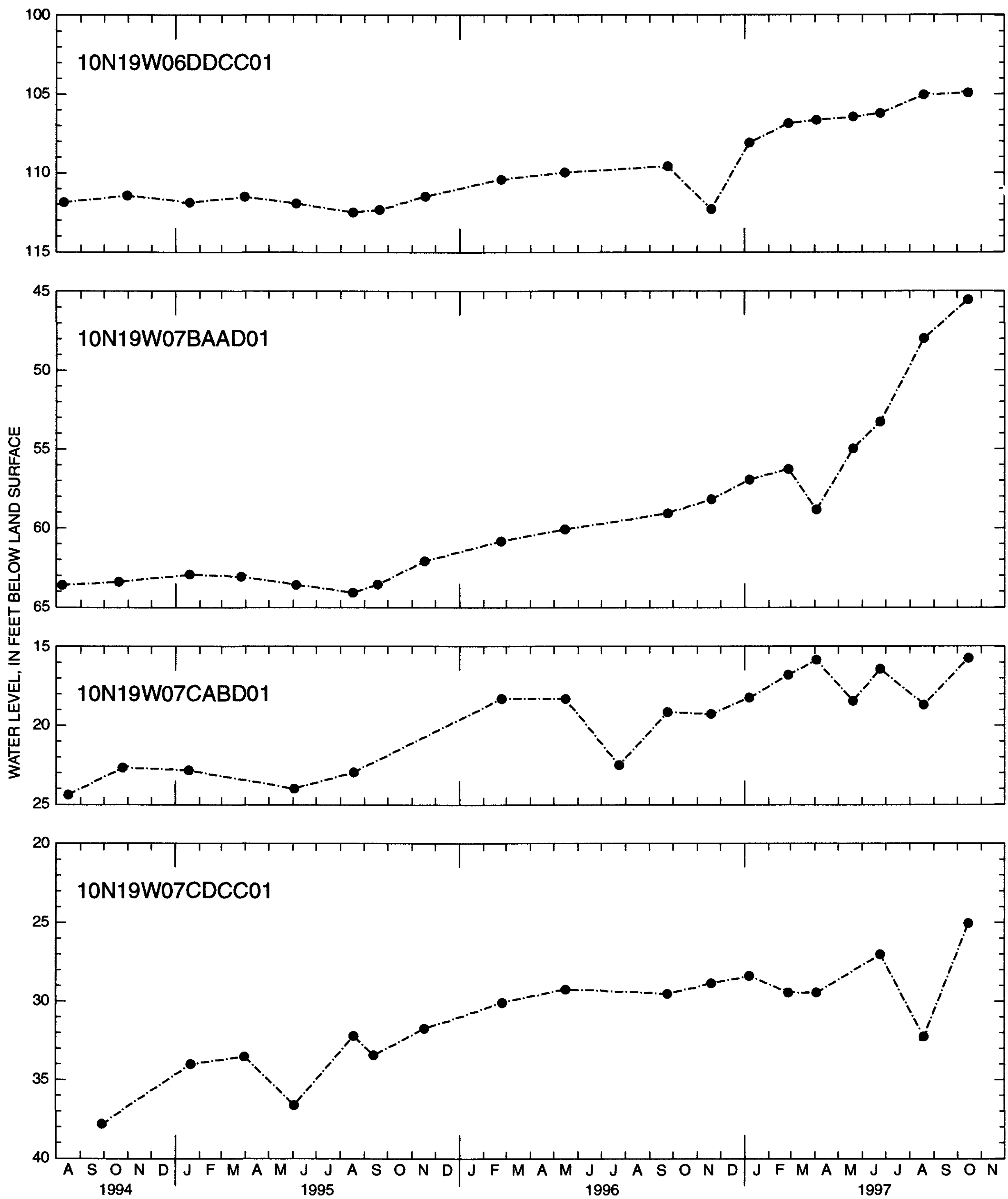

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

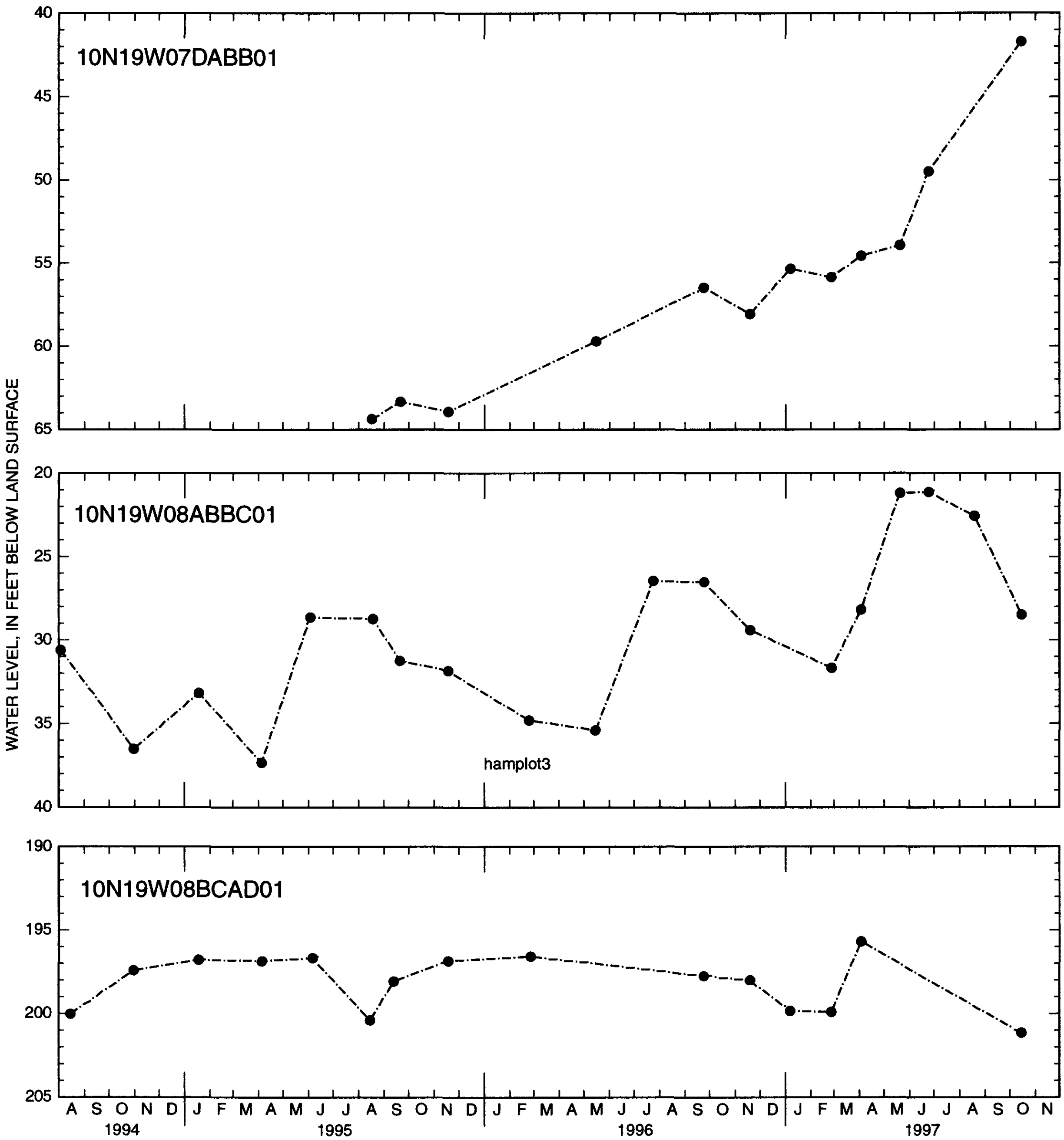

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

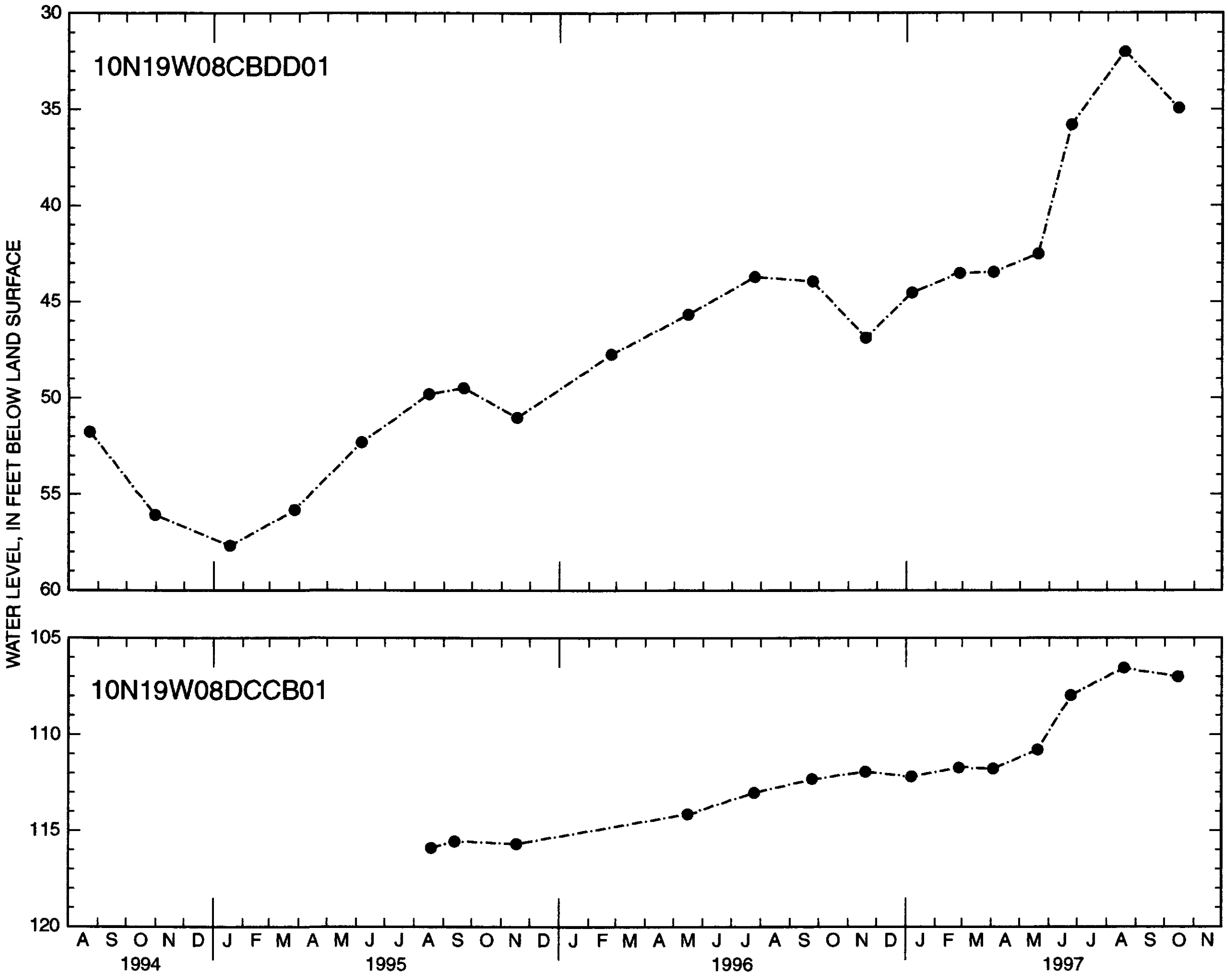

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

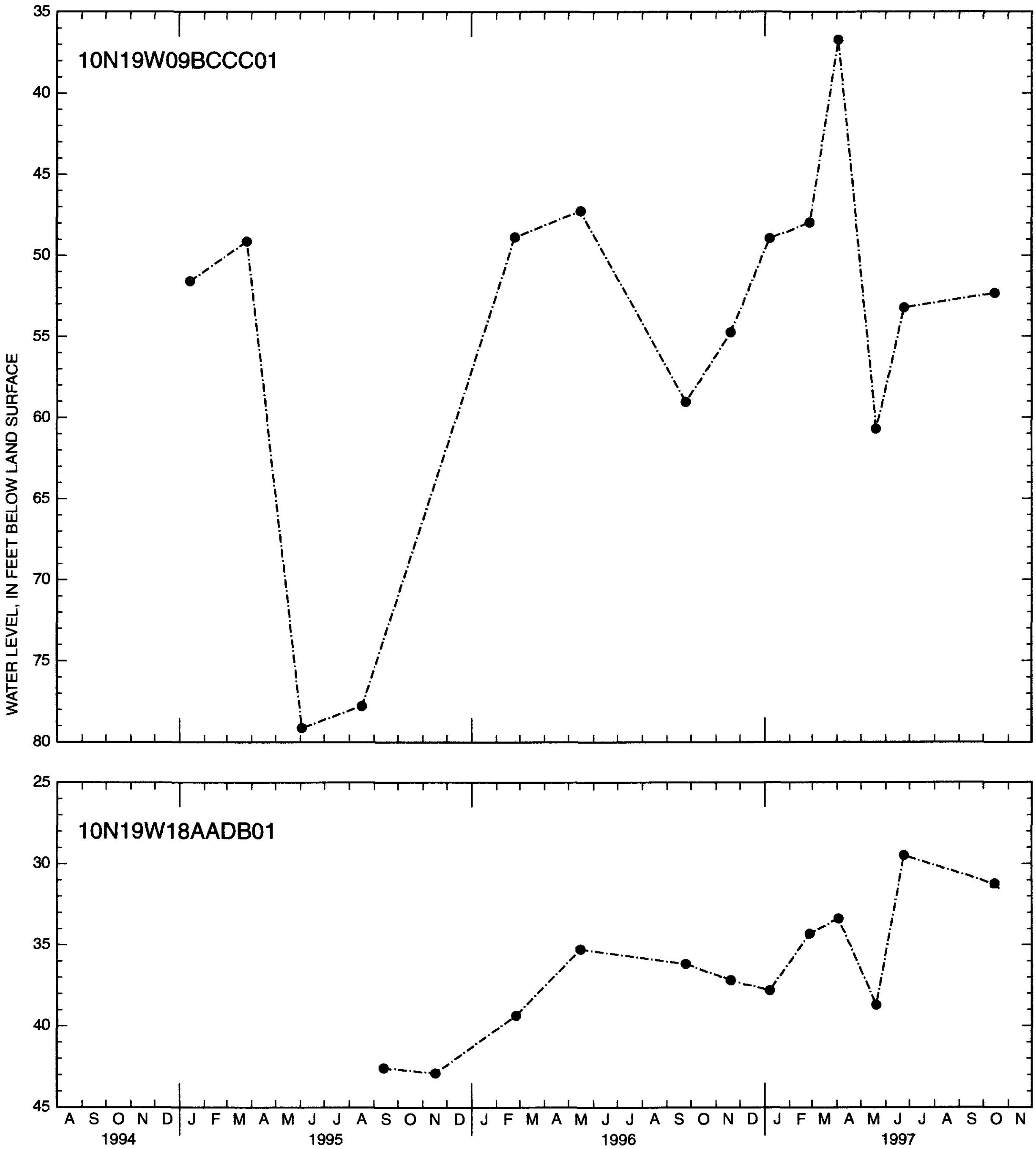

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

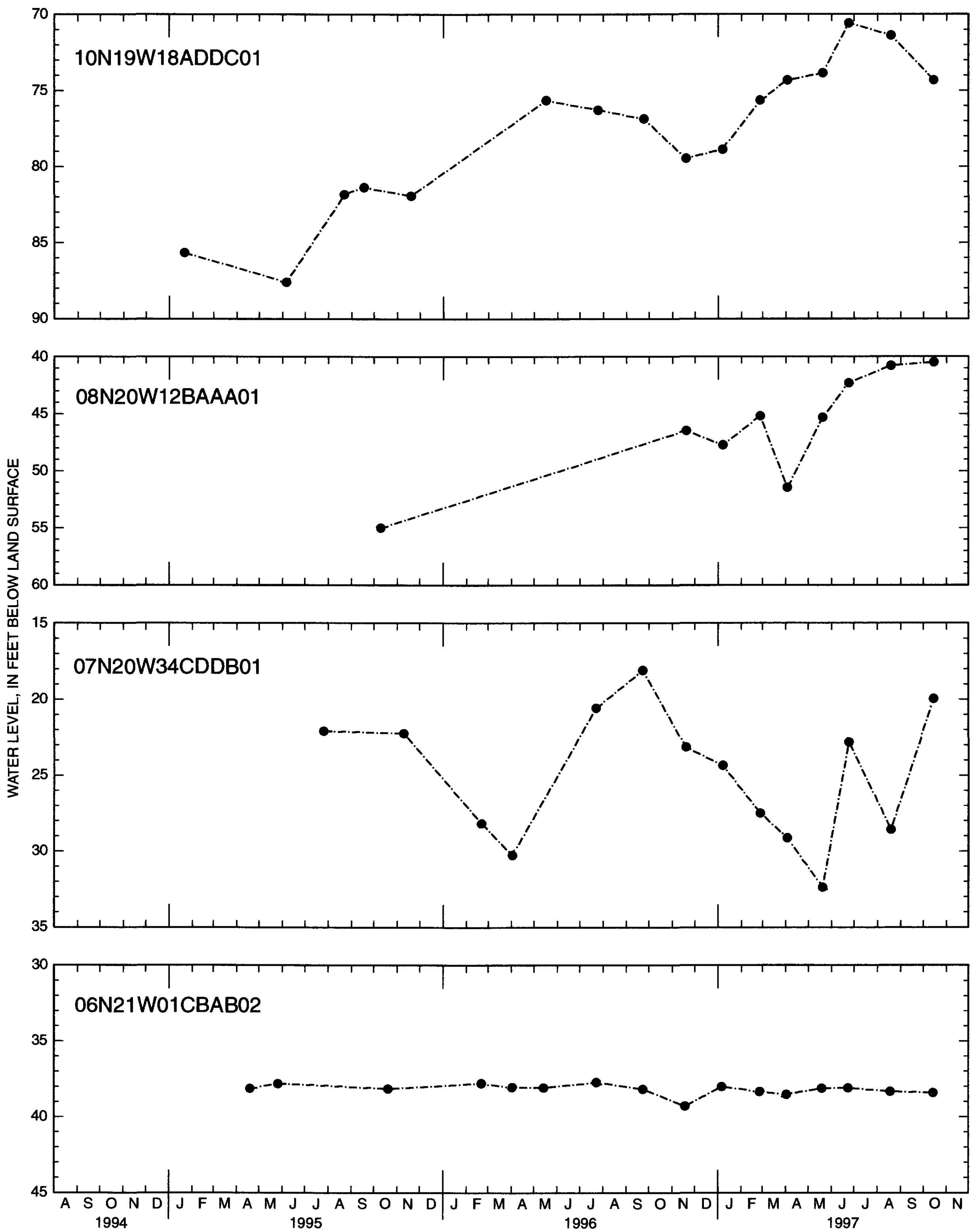

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

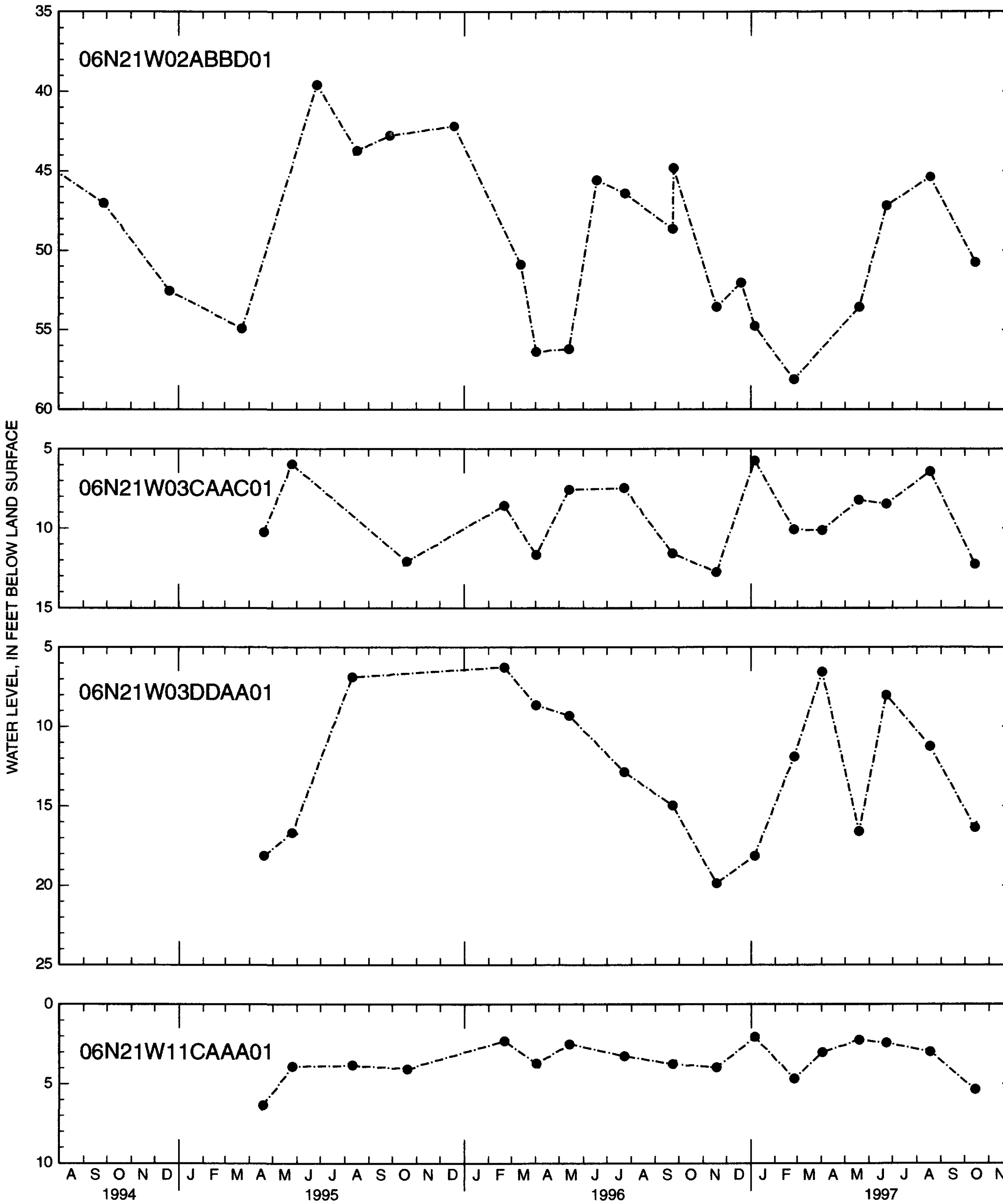

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

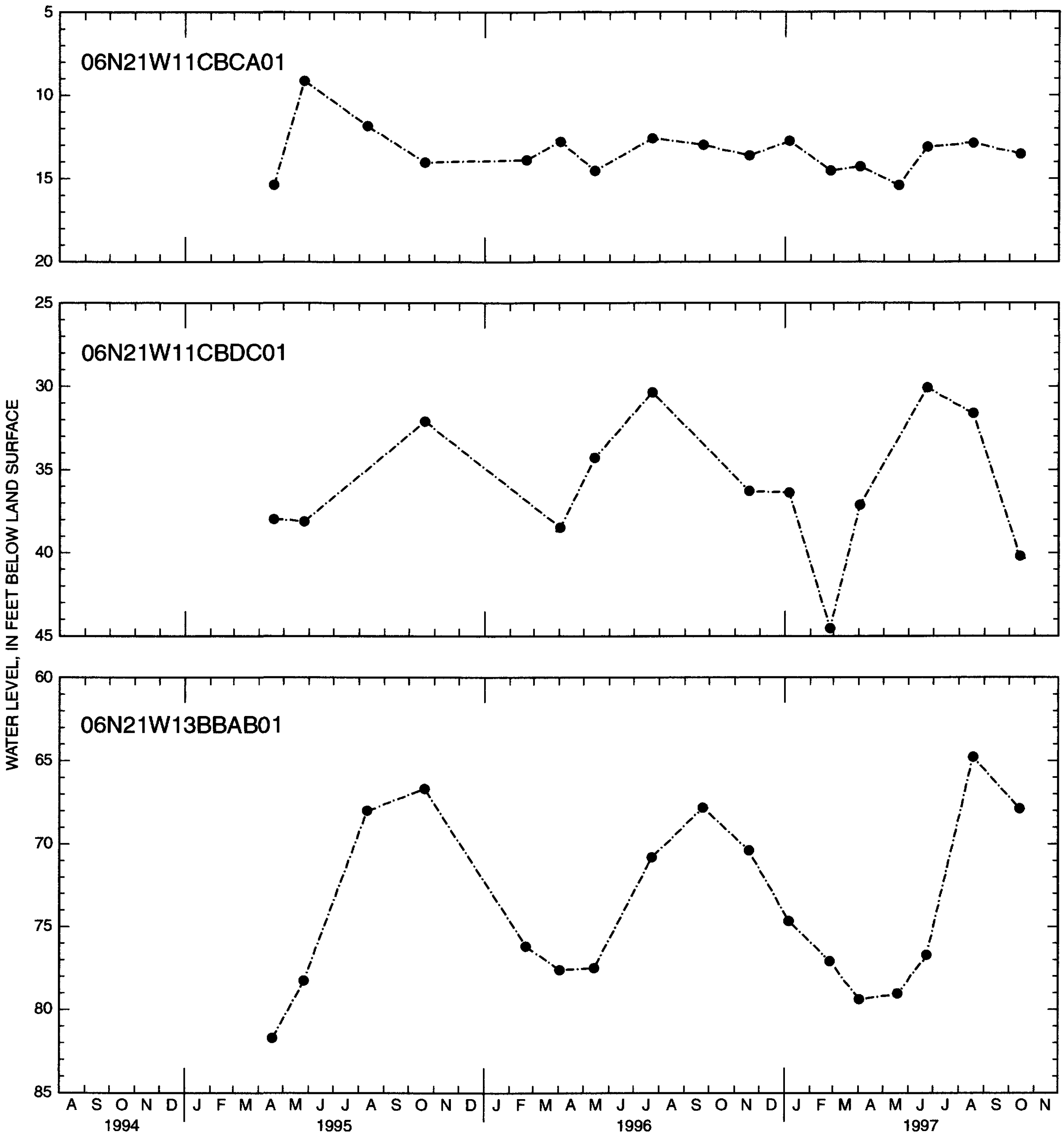

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

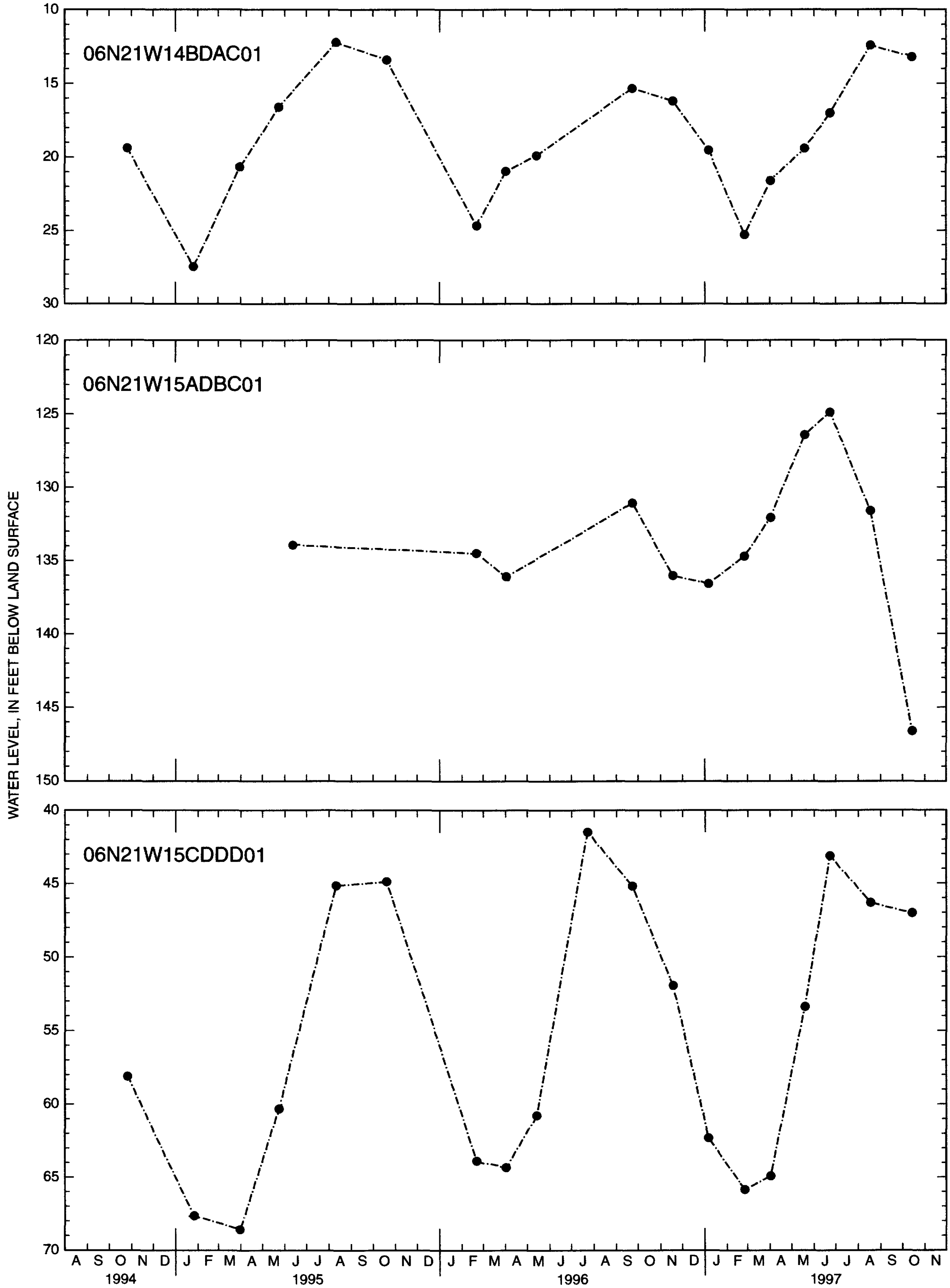

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

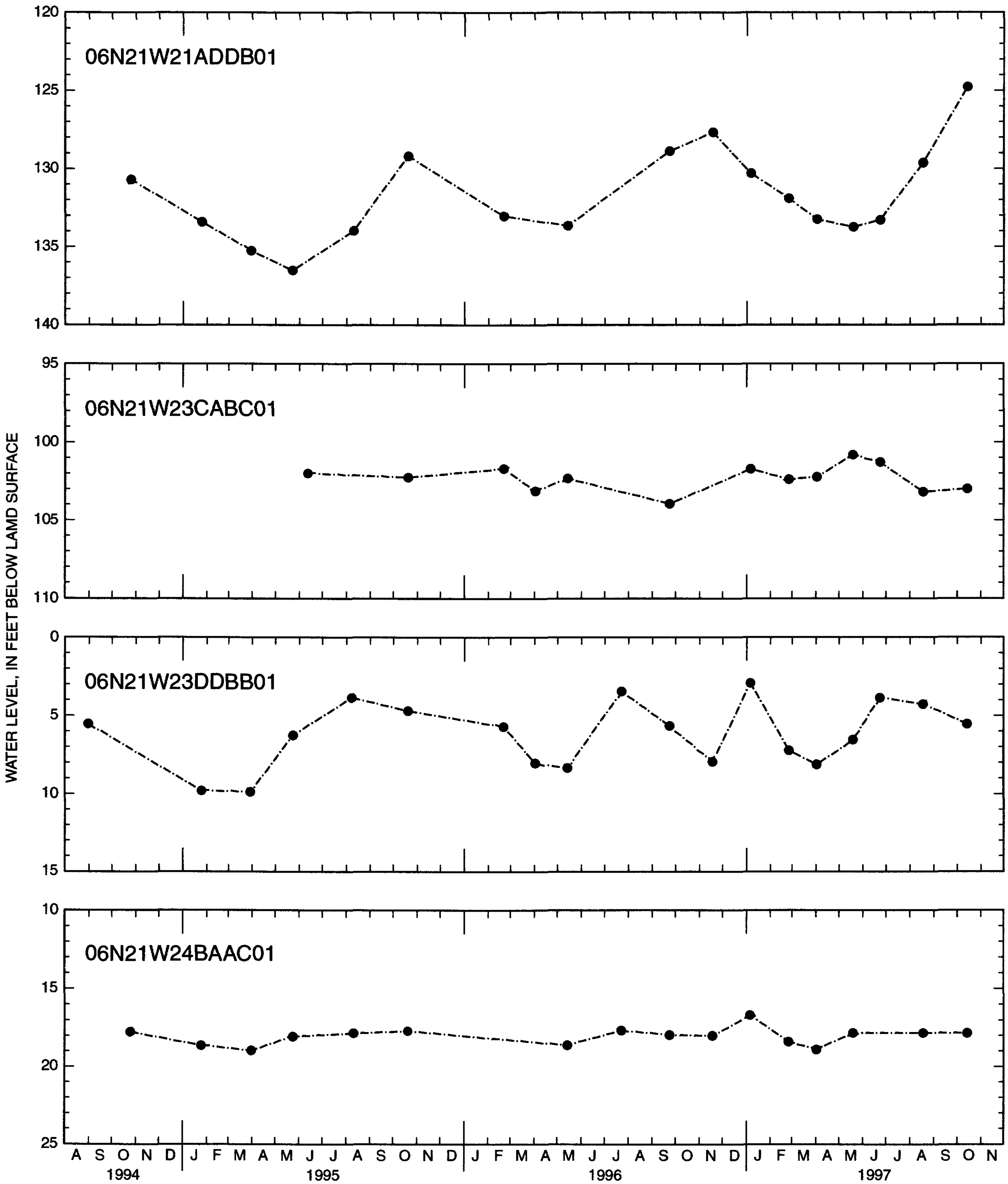

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

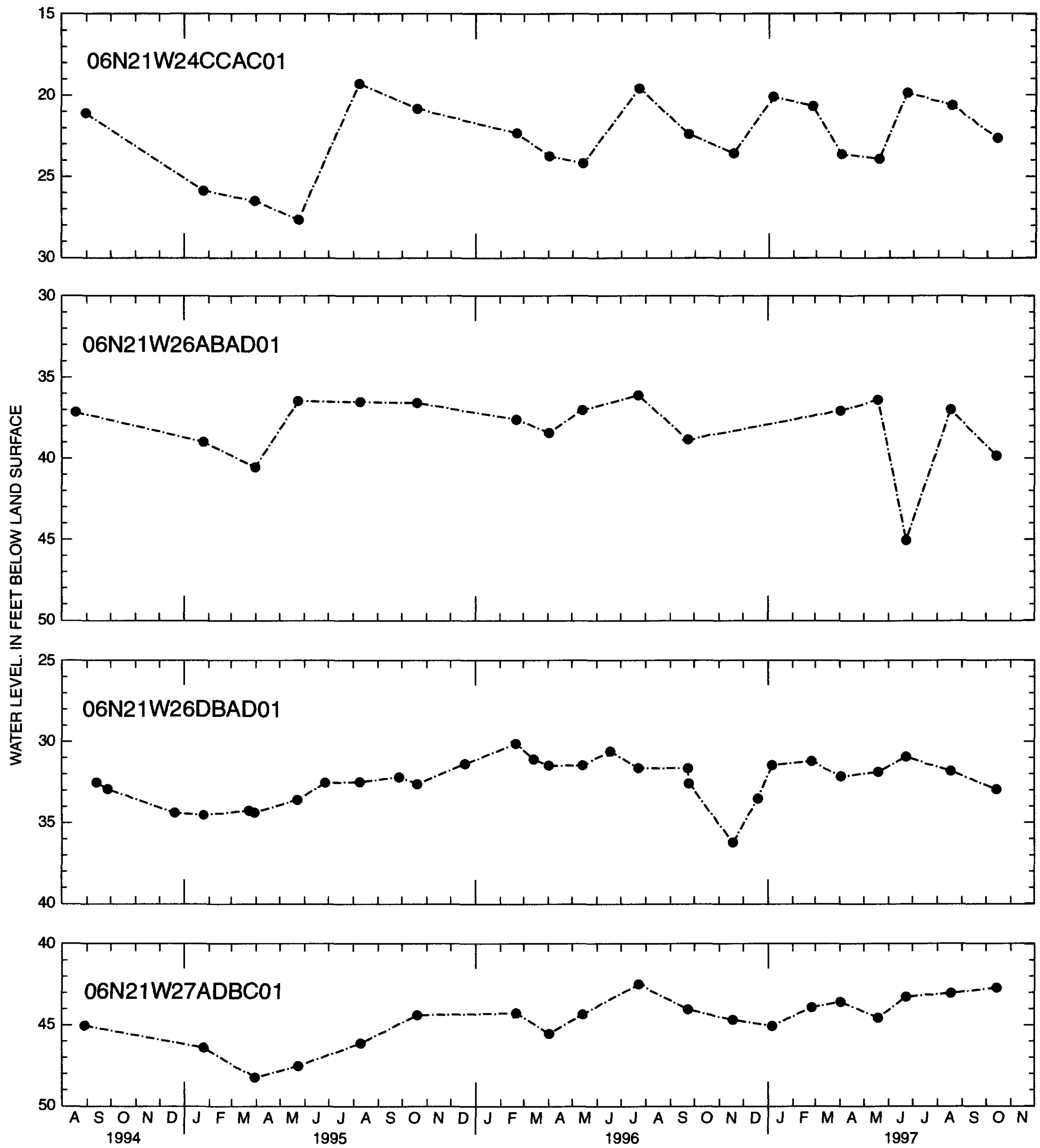

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

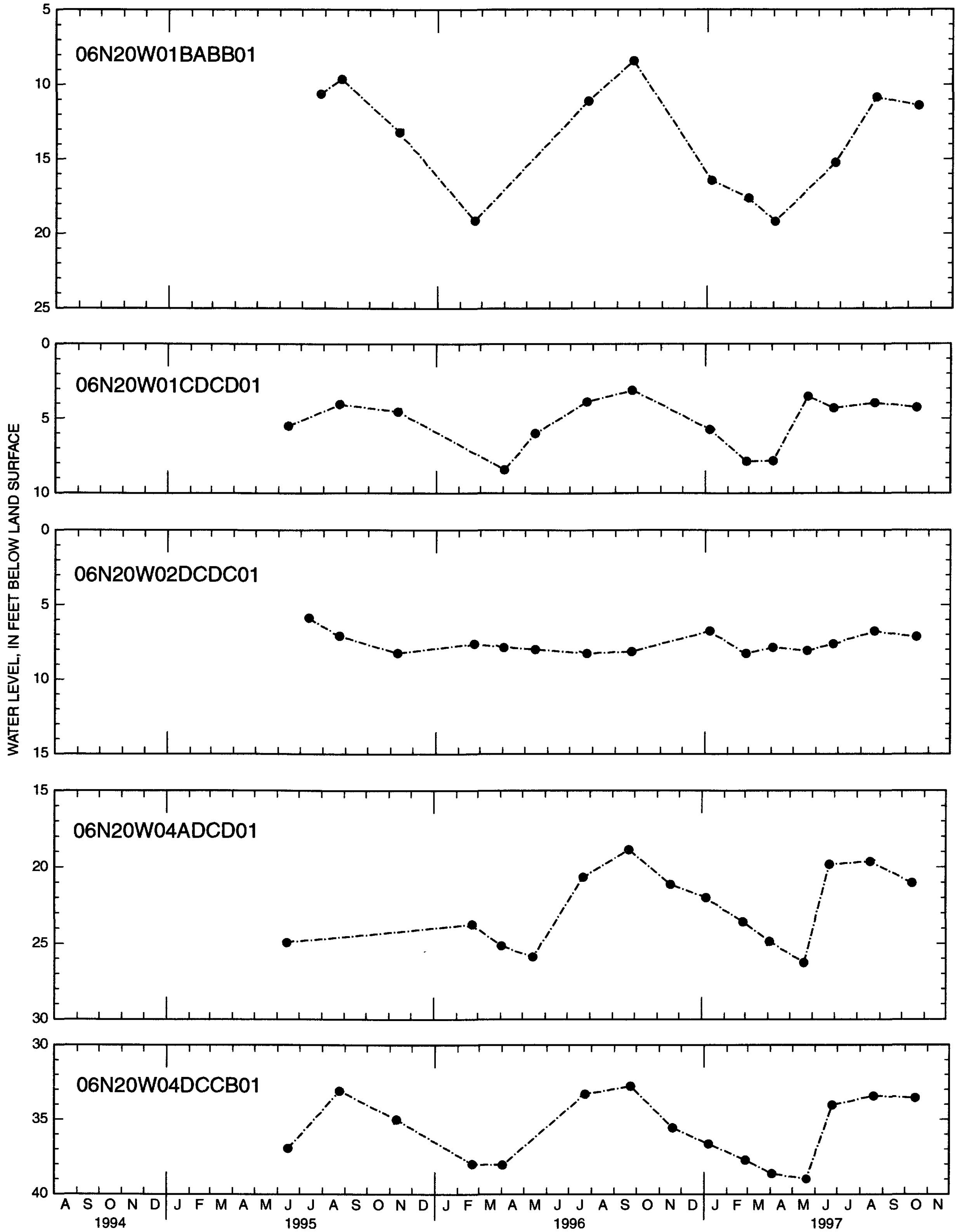

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

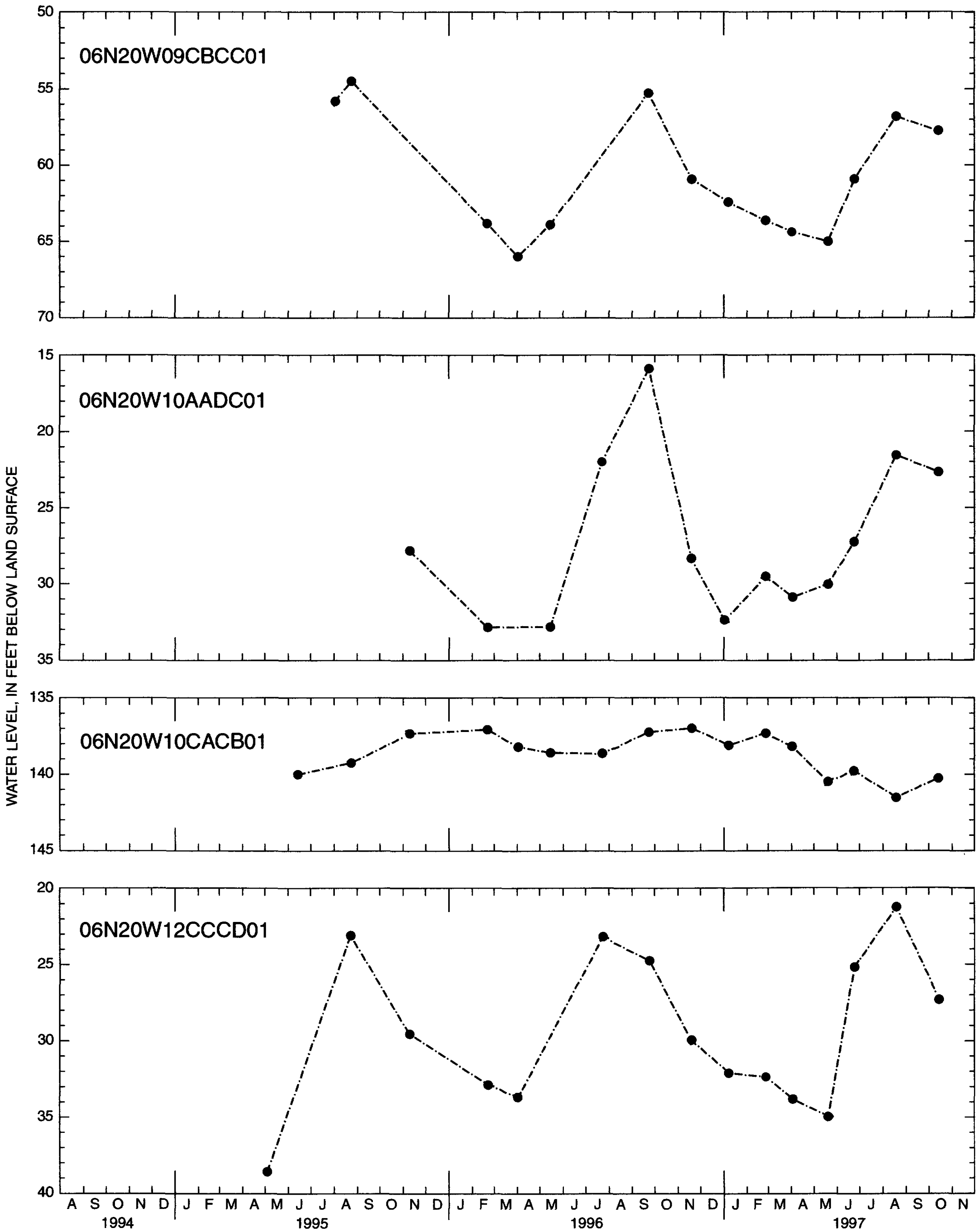

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

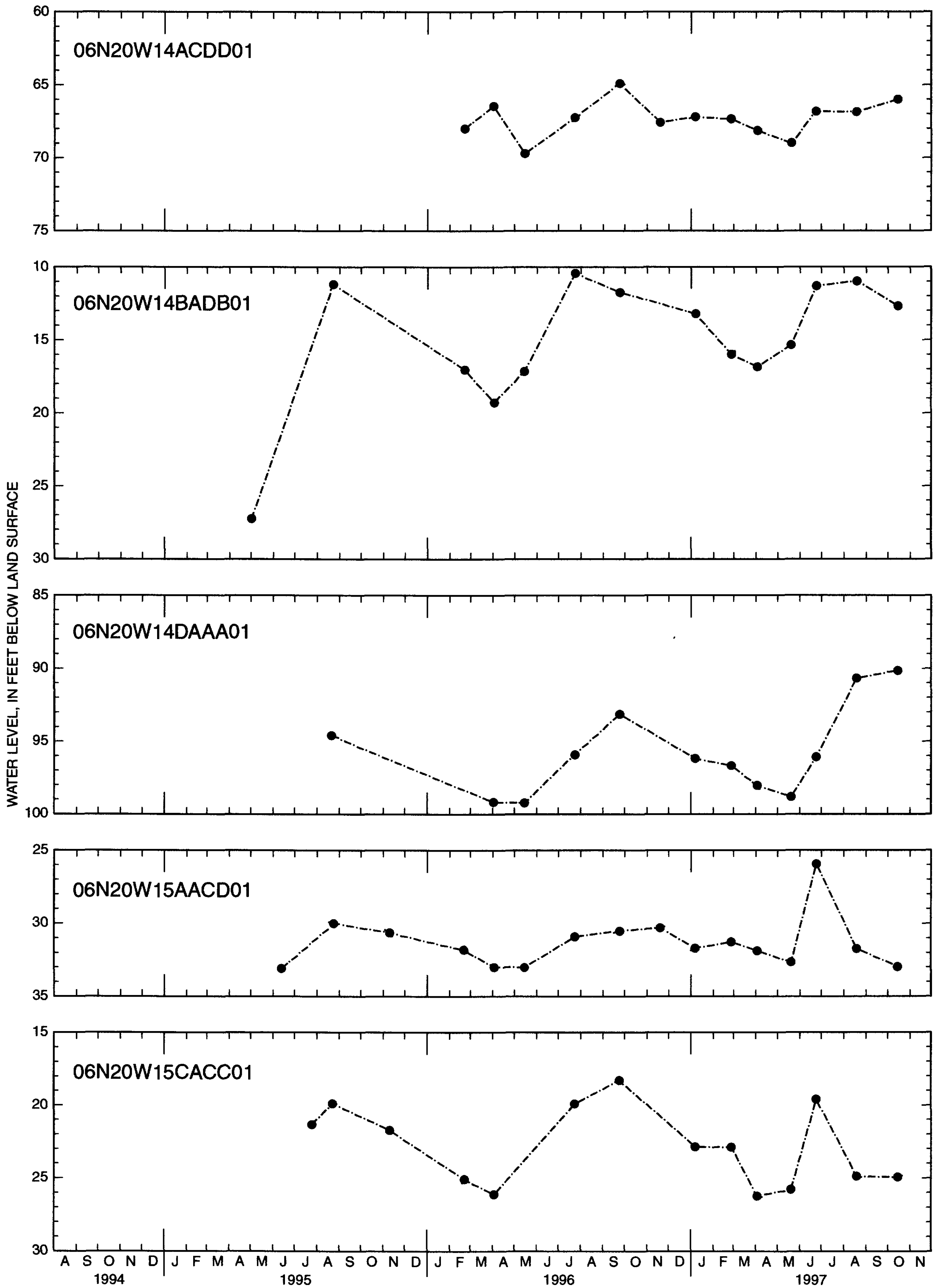

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

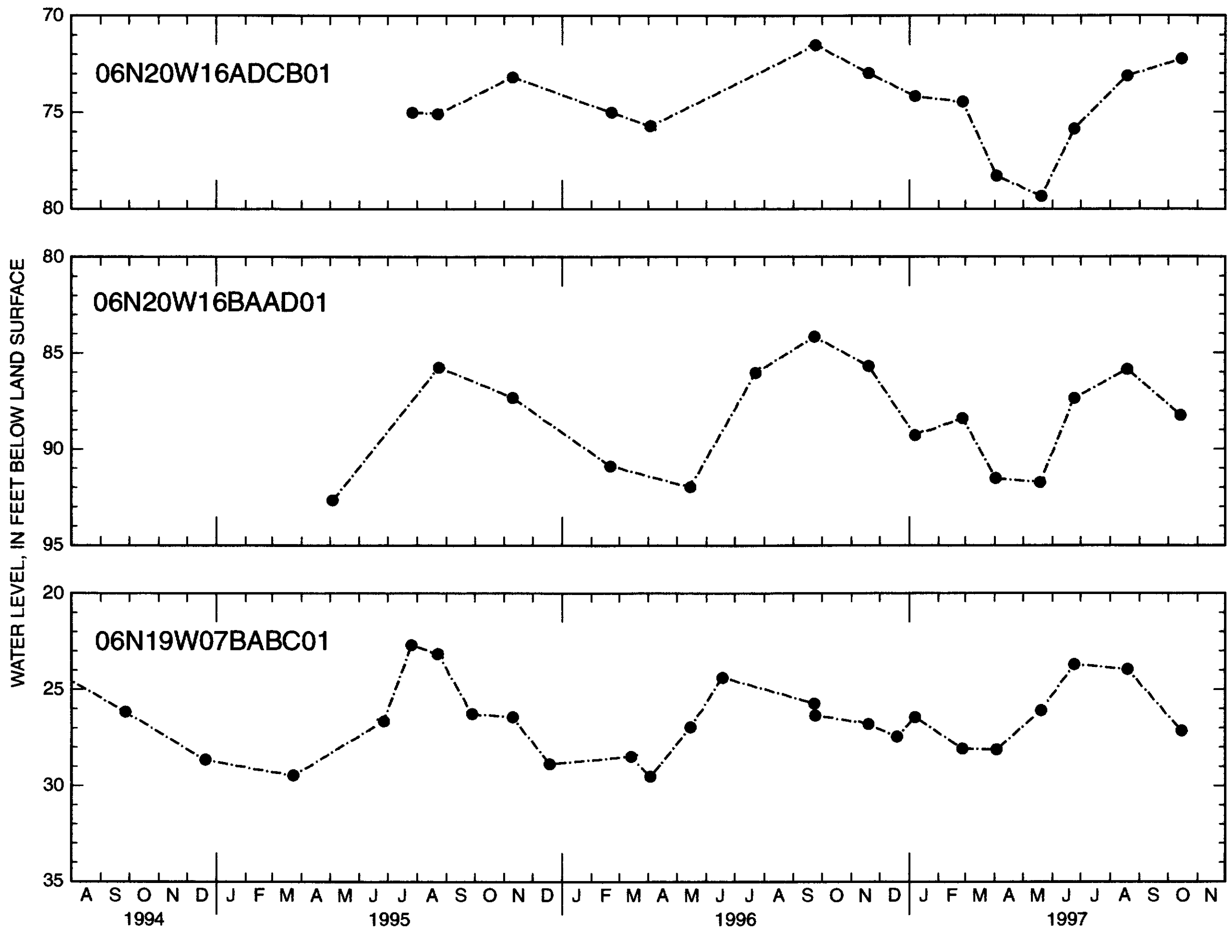

Figure 21. Hydrographs of water levels in wells of the monitoring network (Continued)

Table 6. Physical properties and major-ion concentrations for water from wells

[Location number--numbering system described in text. Constituents are dissolved, except as indicated. Collecting agency: MBMG, Montana Bureau of Mines and Geology, Butte, Mont.; USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont.; UM, University of Montana, Missoula, Mont.; NWQL, USGS National Water Quality Laboratory, Arvada, Colo. Abbreviations: µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mg/L, milligrams per liter. Symbols: <, less than minimum reporting level; --, no data]

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
10N20W02ABBC01	08-03-94	138	--	14.5	--	--	--	--	--	--	--
10N20W10ACBC01	06-23-80	97.0	--	11.5	--	8.5	2.0	7.3	1.5	--	--
10N20W10CBBD01	03-10-94	46.0	6.5	6.0	--	5.1	1.6	2.5	.60	--	--
	10-26-95	63.0	6.6	11.0	--	--	--	--	--	--	--
10N20W11CDCD01	03-10-94	106	6.6	11.5	--	9.1	2.6	9.0	1.6	--	--
	12-14-95	143	7.2	14.0	--	--	--	--	--	--	--
10N20W12ACDB01	08-24-94	264	--	13.5	--	--	--	--	--	--	--
10N20W12ADCB01	08-28-95	354	--	12.5	--	--	--	--	--	--	--
	09-13-95	344	7.2	12.5	8.6	48	12	8.6	2.4	210	0
10N20W12ADDC01	08-15-94	338	--	13.0	--	--	--	--	--	--	--
10N20W12DAAA01	08-15-94	286	--	13.5	--	--	--	--	--	--	--
10N20W12DABD01	08-28-95	283	--	14.0	--	--	--	--	--	--	--
10N20W12DADA01	08-15-94	292	--	13.0	--	--	--	--	--	--	--
	11-19-96	294	--	13.0	--	--	--	--	--	--	--
	01-07-97	303	--	11.5	--	--	--	--	--	--	--
	02-26-97	304	--	11.5	--	--	--	--	--	--	--
	04-03-97	305	--	11.9	--	--	--	--	--	--	--
	05-19-97	287	--	13.5	--	--	--	--	--	--	--
	06-24-97	292	--	12.6	--	--	--	--	--	--	--
	06-24-97[2]	292	--	12.6	--	--	--	--	--	--	--
	08-19-97	298	--	12.0	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
10N20W12DDDC01	09-27-94	216	--	13.5	--	--	--	--	--	--	--
	09-15-95	209	7.1	13.0	8.5	28	6.8	5.7	2.5	124	0
10N20W13BBA 01	05-12-80	--	--	--	--	8.5	1.9	4.2	1.1	--	--
10N19W05CCCC01	08-29-95	297	--	11.0	--	--	--	--	--	--	--
10N19W05CCCD01	08-29-95	443	--	16.0	--	--	--	--	--	--	--
10N19W05CDCC01	08-10-94	340	--	11.5	--	--	--	--	--	--	--
	08-10-94[2]	340	--	11.5	--	--	--	--	--	--	--
	08-15-94	--	--	--	--	--	--	--	--	--	--
10N19W05DCDD01	08-03-94	504	--	10.5	--	--	--	--	--	--	--
	06-08-95	--	--	--	--	--	--	--	--	--	--
	09-12-95	572	7.2	11.5	8.8	70	20	24	4.2	322	0
10N19W06CDCB01	09-27-94	306	--	13.5	--	--	--	--	--	--	--
	06-08-95	--	--	--	--	--	--	--	--	--	--
10N19W06CDDA01	08-28-95	421	--	12.5	--	--	--	--	--	--	--
10N19W06CDDD01	08-10-94	404	3.0	12.0	--	--	--	--	--	--	--
10N19W06DCCC01	08-10-94	409	--	11.0	--	--	--	--	--	--	--
	08-10-94[2]	409	--	11.0	--	--	--	--	--	--	--
10N19W06DCDA01	08-10-94	419	--	11.5	--	--	--	--	--	--	--
	09-12-95	400	7.2	10.5	7.6	49	13	16	4.0	235	0
10N19W06DDCC01	08-15-94	277	--	12.5	--	--	--	--	--	--	--
10N19W07ADBC01	08-10-94	359	--	12.5	--	--	--	--	--	--	--
	08-15-94	--	--	--	--	--	--	--	--	--	--
	09-13-95	375	7.4	11.5	9.4	53	13	6.2	2.6	203	0
	09-13-95[2]	375	7.4	11.5	9.4	53	13	6.1	2.4	203	0

Alka-linity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calcu-lated (mg/L)	Nitrate (mg/L as N)	Phos-phorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	4.3	1.4	--	--	--	0.52	--	USGS	UM	10N20W02ABBC01
--	3.8	0.60	0.17	33	--	.44	--	MBMG	MBMG	10N20W10ACBC01
--	<1.0	<.20	.04	14	--	<.05	<0.20	MBMG	MBMG	10N20W10CBBD01
--	2.6	< 1.0	--	--	--	<.15	--	USGS	UM	
--	<1.0	.20	.21	41	--	.30	<.20	MBMG	MBMG	10N20W11CDCD01
--	2.6	1.0	--	--	--	<.15	--	USGS	UM	
--	4.2	1.0	--	--	--	.79	--	USGS	UM	10N20W12ACDB01
--	4.9	2.3	--	--	--	.75	--	USGS	UM	10N20W12ADCB01
172	5.0	2.0	.10	27	212	.90	<.20	USGS	MBMG	
--	4.0	1.1	--	--	--	.85	--	USGS	UM	10N20W12ADDC01
--	4.6	1.8	--	--	--	.75	--	USGS	UM	10N20W12DAAA01
--	4.1	1.2	--	--	--	.76	--	USGS	UM	10N20W12DABD01
--	5.0	1.1	--	--	--	.69	--	USGS	UM	10N20W12DADA01
--	4.0	--	--	--	--	1.8	--	USGS	MBMG	
--	4.4	.6	--	--	--	1.7	--	USGS	MBMG	
--	4.8	1.3	--	--	--	1.7	--	USGS	MBMG	
--	4.9	1.0	--	--	--	1.5	--	USGS	MBMG	
--	5.0	1.1	--	--	--	1.4	--	USGS	MBMG	
--	5.2	1.0	--	--	--	1.6	--	USGS	MBMG	
--	5.0	1.0	--	--	--	1.8	--	USGS	MBMG	
--	4.1	1.0	--	--	--	1.6	--	USGS	MBMG	
--	4.9	1.1	--	--	--	1.7	--	USGS	MBMG	
--	3.9	< 1.0	--	--	--	.52	--	USGS	UM	10N20W12DDDC01
101	5.0	1.0	.20	37	149	.55	<.20	USGS	MBMG	
--	5.4	3.1	.20	16	--	.33	--	MBMG	MBMG	10N20W13BBA 01
--	6.3	3.2	--	--	--	1.9	--	USGS	UM	10N19W05CCCC01
--	14.0	5.6	--	--	--	3.0	--	USGS	UM	10N19W05CCCD01
--	8.4	3.8	--	--	--	2.8	--	USGS	UM	10N19W05CDCC01
--	8.5	3.7	--	--	--	2.8	--	USGS	UM	
--	6.1	4.2	--	--	--	3.4	--	USGS	UM	
--	19.0	12.0	--	--	--	1.8	--	USGS	UM	10N19W05DCDD01
--	23.0	14.0	--	--	--	2.0	--	USGS	UM	
264	23	14	.30	50	372	2.0	<.20	USGS	MBMG	
--	9.5	4.4	--	--	--	1.4	--	USGS	UM	10N19W06CDCB01
--	9.5	4.6	--	--	--	1.2	--	USGS	UM	
--	10.0	4.5	--	--	--	1.2	--	USGS	UM	10N19W06CDDA01
--	8.5	4.7	--	--	--	1.5	--	USGS	UM	10N19W06CDDD01
--	8.6	4.7	--	--	--	1.4	--	USGS	UM	10N19W06DCCC01
--	8.6	3.7	--	--	--	1.4	--	USGS	UM	
--	9.6	4.0	--	--	--	1.3	--	USGS	UM	10N19W06DCDA01
193	10	4.0	.20	33	254	1.8	<.20	USGS	MBMG	
--	5.2	1.4	--	--	--	1.7	--	USGS	UM	10N19W06DDCC01
--	5.9	3.9	--	--	--	3.5	--	USGS	UM	10N19W07ADBC01
--	7.2	3.0	--	--	--	2.7	--	USGS	UM	
167	7.5	3.5	.20	23	230	4.8	<.20	USGS	MBMG	
167	7.5	4.0	.20	23	230	4.8	<.20	USGS	MBMG	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
10N19W07BAAD01	08-10-94	386	--	12.0	--	--	--	--	--	--	--
	11-19-96	367	--	12.0	--	--	--	--	--	--	--
	01-07-97	378	--	10.8	--	--	--	--	--	--	--
	02-26-97	378	--	11.1	--	--	--	--	--	--	--
	04-03-97	372	--	11.5	--	--	--	--	--	--	--
	05-20-97	360	--	11.8	--	--	--	--	--	--	--
	05-20-97[2]	360	--	11.8	--	--	--	--	--	--	--
	06-24-97	365	--	11.0	--	--	--	--	--	--	--
	08-19-97	396	--	11.2	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
10N19W07BACB01	09-27-94	306	--	11.5	--	--	--	--	--	--	--
	09-27-94[2]	306	--	11.5	--	--	--	--	--	--	--
	06-08-95	--	--	--	--	--	--	--	--	--	--
	09-12-95	295	7.2	13.0	9.0	40	9.6	8.8	2.5	178	0
10N19W07BCBB01	08-24-94	366	--	13.5	--	--	--	--	--	--	--
10N19W07BDAD01	09-27-94	351	--	14.0	--	--	--	--	--	--	--
10N19W07BDBB01	08-10-94	353	--	12.5	--	--	--	--	--	--	--
10N19W07CAAB01	08-15-94	267	--	12.5	--	--	--	--	--	--	--
	09-15-95	251	7.2	11.0	8.7	33	10	3.7	1.7	145	0
10N19W07CABD01	08-15-94	272	--	12.0	--	--	--	--	--	--	--
10N19W07CACC01	09-27-94	327	--	12.0	--	--	--	--	--	--	--
10N19W07CDAA01	09-27-94	214	--	11.0	--	--	--	--	--	--	--
10N19W07CDBA01	08-15-94	228	--	11.5	--	--	--	--	--	--	--
10N19W07CDCC01	09-27-94	267	6.9	11.5	--	--	--	--	--	--	--
	09-13-95	267	6.9	11.5	7.4	36	9.7	4.9	1.8	159	0
10N19W07DABB01	08-28-95	334	--	12.0	--	--	--	--	--	--	--
	08-28-95[2]	334	--	12.0	--	--	--	--	--	--	--
10N19W07DBBC01	08-15-94	263	--	13.0	--	--	--	--	--	--	--
10N19W07DBDA01	08-28-95	199	--	11.5	--	--	--	--	--	--	--
10N19W07DDCD01	08-24-94	124	--	11.0	--	--	--	--	--	--	--
10N19W07DDDC01	08-24-94	185	--	10.5	--	--	--	--	--	--	--
	08-24-94[2]	185	--	10.5	--	--	--	--	--	--	--
10N19W08ABBC01	08-02-94	274	--	12.0	--	--	--	--	--	--	--
	11-19-96	403	--	11.2	--	--	--	--	--	--	--
	01-07-97	443	--	11.1	--	--	--	--	--	--	--
	02-26-97	434	--	8.3	--	--	--	--	--	--	--
	04-03-97	404	--	11.3	--	--	--	--	--	--	--
	04-03-97[2]	404	--	11.3	--	--	--	--	--	--	--
	05-20-97	288	--	10.9	--	--	--	--	--	--	--
	06-23-97	273	--	10.9	--	--	--	--	--	--	--
	08-19-97	445	--	10.8	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
10N19W08ADAD01	08-02-94	339	--	14.0	--	--	--	--	--	--	--
	06-08-95	--	--	--	--	--	--	--	--	--	--
10N19W08ADDC01	08-02-94	343	--	12.5	--	--	--	--	--	--	--
	06-08-95	343	--	12.5	--	--	--	--	--	--	--
	09-12-95	341	8.1	13.5	--	36	12	20	3.2	187	0
10N19W08BADD01	09-27-94	337	--	15.5	--	--	--	--	--	--	--
10N19W08BBDD01	08-02-94	315	--	15.5	--	--	--	--	--	--	--
	08-02-94[2]	315	--	15.5	--	--	--	--	--	--	--
10N19W08BCAD01	08-10-94	271	--	16.5	--	--	--	--	--	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	8.8	5.7	--	--	--	3.2	--	USGS	UM	10N19W07BAAD01
--	8.5	--	--	--	--	3.2	--	USGS	MBMG	
--	9.1	5.0	--	--	--	2.9	--	USGS	MBMG	
--	8.9	5.0	--	--	--	2.8	--	USGS	MBMG	
--	7.6	3.9	--	--	--	1.9	--	USGS	MBMG	
--	8.6	4.7	--	--	--	2.0	--	USGS	MBMG	
--	9.1	5.1	--	--	--	2.9	--	USGS	MBMG	
--	9.4	5.2	--	--	--	2.8	--	USGS	MBMG	
--	7.3	5.9	--	--	--	3.1	--	USGS	MBMG	
--	8.4	6.0	--	--	--	2.7	--	USGS	MBMG	
--	4.7	1.5	--	--	--	.72	--	USGS	UM	10N19W07BACB01
--	4.7	1.5	--	--	--	.72	--	USGS	UM	
--	4.8	1.8	--	--	--	.72	--	USGS	UM	
146	5.0	1.5	.20	34	193	.75	<.20	USGS	MBMG	
--	5.1	2.0	--	--	--	.63	--	USGS	UM	10N19W07BCBB01
--	5.0	1.6	--	--	--	1.9	--	USGS	UM	10N19W07BDAD01
--	4.9	2.7	--	--	--	1.3	--	USGS	UM	10N19W07BDBB01
--	4.7	1.5	--	--	--	.86	--	USGS	UM	10N19W07CAAB01
119	5.0	1.0	.10	16	150	1.8	<.20	USGS	MBMG	
--	5.3	1.4	--	--	--	1.1	--	USGS	UM	10N19W07CABD01
--	4.5	1.3	--	--	--	1.9	--	USGS	UM	10N19W07CACC01
--	5.1	1.5	--	--	--	.91	--	USGS	UM	10N19W07CDAA01
--	5.0	1.3	--	--	--	1.5	--	USGS	UM	10N19W07CDBA01
--	4.8	1.2	--	--	--	1.3	--	USGS	UM	10N19W07CDCC01
130	5.0	1.0	<.10	19	163	1.5	<.20	USGS	MBMG	
--	5.1	2.0	--	--	--	2.0	--	USGS	UM	10N19W07DABB01
--	5.3	2.0	--	--	--	1.9	--	USGS	UM	
--	4.7	4.5	--	--	--	.8	--	USGS	UM	10N19W07DBBC01
--	5.2	1.2	--	--	--	.82	--	USGS	UM	10N19W07DBDA01
--	5.6	1.1	--	--	--	.73	--	USGS	UM	10N19W07DDCD01
--	6.6	1.1	--	--	--	.63	--	USGS	UM	10N19W07DDDC01
--	4.8	1.2	--	--	--	.64	--	USGS	UM	
--	5.0	1.6	--	--	--	2.6	--	USGS	UM	10N19W08ABBC01
--	6.5	--	--	--	--	4.6	--	USGS	MBMG	
--	7.6	2.3	--	--	--	4.9	--	USGS	MBMG	
--	7.8	3.0	--	--	--	4.1	--	USGS	MBMG	
--	7.6	3.1	--	--	--	2.9	--	USGS	MBMG	
--	7.2	2.6	--	--	--	3.9	--	USGS	NWQL	
--	6.1	2.6	--	--	--	2.6	--	USGS	MBMG	
--	6.8	3.0	--	--	--	2.6	--	USGS	MBMG	
--	8.6	3.7	--	--	--	3.4	--	USGS	MBMG	
--	9.6	2.0	--	--	--	4.0	--	USGS	MBMG	
--	18.0	5.1	--	--	--	<.15	--	USGS	UM	10N19W08ADAD01
--	18.0	5.1	--	--	--	<.15	--	USGS	UM	
--	19.0	5.2	--	--	--	<.15	--	USGS	UM	10N19W08ADDC01
--	19.0	5.1	--	--	--	<.15	--	USGS	UM	
153	20	5.5	.50	18	208	<.05	<.20	USGS	MBMG	
--	17.0	4.9	--	--	--	<.15	--	USGS	UM	10N19W08BADD01
--	37.0	7.1	--	--	--	<.15	--	USGS	UM	10N19W08BBDD01
--	37.0	7.1	--	--	--	<.15	--	USGS	UM	
--	18.0	5.3	--	--	--	<.15	--	USGS	UM	10N19W08BCAD01

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
	09-13-95	264	7.3	15.5	.3	23	5.0	25	3.7	109	0
10N19W08BCBB01	08-15-94	294	--	15.0	--	--	--	--	--	--	--
10N19W08BCCC01	08-10-94	386	--	12.0	--	--	--	--	--	--	--
10N19W08BDAB01	08-10-94	243	--	15.0	--	--	--	--	--	--	--
10N19W08BDBB01	08-10-94	291	--	15.5	--	--	--	--	--	--	--
10N19W08CBAA01	08-02-94	306	--	11.0	--	--	--	--	--	--	--
10N19W08CBDD01	08-15-94	198	--	10.0	--	--	--	--	--	--	--
	11-19-96	205	--	8.8	--	--	--	--	--	--	--
	01-07-97	219	--	8.5	--	--	--	--	--	--	--
	02-27-97	254	--	9.2	--	--	--	--	--	--	--
	04-03-97	255	--	9.0	--	--	--	--	--	--	--
	05-20-97	236	--	11.2	--	--	--	--	--	--	--
	08-19-97	228	--	9.3	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
10N19W08CDAC01	08-10-94	338	--	10.5	--	--	--	--	--	--	--
	06-08-95	338	--	10.5	--	--	--	--	--	--	--
	09-13-95	328	7.1	10.0	8.2	45	14	3.9	1.9	174	0
10N19W08CDBD01	08-28-95	257	--	10.0	--	--	--	--	--	--	--
10N19W08DAAC01	08-24-94	168	--	13.5	--	--	--	--	--	--	--
10N19W08DBBD01	08-28-95	195	--	13.5	--	--	--	--	--	--	--
	09-12-95	187	7.1	13.5	5.0	22	6.8	6.7	2.6	111	0
10N19W08DCCB01	08-28-95	274	--	11.0	--	--	--	--	--	--	--
	09-13-95	264	7.1	10.5	8.6	35	11	3.7	2.1	150	0
	01-07-97	--	--	--	--	--	--	--	--	--	--
	02-26-97	277	--	10.4	--	--	--	--	--	--	--
	04-03-97	274	--	10.9	--	--	--	--	--	--	--
	05-20-97	269	--	12.9	--	--	--	--	--	--	--
	06-24-97	--	--	16.5	--	--	--	--	--	--	--
	08-19-97	288	--	10.5	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
10N19W08DCCC01	08-24-94	280	--	11.0	--	--	--	--	--	--	--
	08-28-95	280	--	11.0	--	--	--	--	--	--	--
10N19W08DCCC02	03-10-94	266	7.1	10.5	--	33	10	3.7	2.3	--	--
	10-26-95	258	7.2	11.0	--	--	--	--	--	--	--
10N19W09ABCC01	08-02-94	341	--	11.0	--	--	--	--	--	--	--
	06-08-95	341	--	11.0	--	--	--	--	--	--	--
10N19W09BCCC01	09-27-94	201	--	11.0	--	--	--	--	--	--	--
	06-08-95	201	--	11.0	--	--	--	--	--	--	--
10N19W16BBBC01	08-24-94	184	--	13.5	--	--	--	--	--	--	--
	09-15-95	165	7.2	13.0	7.9	15	4.3	12	2.6	77	0
10N19W17BAAA01	08-10-94	237	--	11.5	--	--	--	--	--	--	--
10N19W17BBDA01	08-24-94	182	--	9.5	--	--	--	--	--	--	--
10N19W17BCAB01	08-24-94	193	--	10.5	--	--	--	--	--	--	--
10N19W17DBBC01	12-14-95	210	7.3	12.0	--	--	--	--	--	--	--
10N19W18AAAA01	08-24-94	168	--	11.5	--	--	--	--	--	--	--
10N19W18AADB01	08-28-95	175	--	11.0	--	--	--	--	--	--	--
	09-13-95	171	6.9	10.0	8.4	21	6.8	3.7	1.8	99	0
10N19W18ABAD01	06-08-95	--	--	--	--	--	--	--	--	--	--
	06-08-95[2]	--	--	--	--	--	--	--	--	--	--
10N19W18ADDC01	06-08-95	--	--	--	--	--	--	--	--	--	--
10N19W18DBBA01	06-08-95	186	6.9	10.0	--	--	--	--	--	--	--

Alka-linity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calcu-lated (mg/L)	Nitrate (mg/L as N)	Phos-phorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
89	20	5.5	.50	52	189	<.05	<.20	USGS	MBMG	
--	5.4	1.3	--	--	--	1.7	--	USGS	UM	10N19W08BCBB01
--	4.9	1.6	--	--	--	2.4	--	USGS	UM	10N19W08BCCC01
--	8.6	2.1	--	--	--	2.4	--	USGS	UM	10N19W08BDAB01
--	15.0	4.8	--	--	--	<.15	--	USGS	UM	10N19W08BDBB01
--	7.4	1.6	--	--	--	3.1	--	USGS	UM	10N19W08CBAA01
--	5.0	1.2	--	--	--	1.3	--	USGS	UM	10N19W08CBDD01
--	4.6	--	--	--	--	1.9	--	USGS	MBMG	
--	4.8	1.4	--	--	--	1.8	--	USGS	MBMG	
--	5.7	2.0	--	--	--	2.3	--	USGS	MBMG	
--	5.1	1.6	--	--	--	1.6	--	USGS	MBMG	
--	5.7	1.6	--	--	--	1.3	--	USGS	MBMG	
--	4.5	2.2	--	--	--	2.2	--	USGS	MBMG	
--	5.3	2.4	--	--	--	2.4	--	USGS	MBMG	
--	5.8	1.5	--	--	--	2.9	--	USGS	UM	10N19W08CDAC01
--	6.3	2.5	--	--	--	3.3	--	USGS	UM	
142	7.5	1.5	.10	19	194	3.5	<.20	USGS	MBMG	
--	6.2	1.6	--	--	--	2.6	--	USGS	UM	10N19W08CDBD01
--	3.0	1.2	--	--	--	.25	--	USGS	UM	10N19W08DAAC01
--	6.9	1.7	--	--	--	.16	--	USGS	UM	10N19W08DBBD01
91	7.5	1.5	.20	55	157	.10	<.20	USGS	MBMG	
--	5.5	1.6	--	--	--	2.5	--	USGS	UM	10N19W08DCCB01
123	7.5	1.5	<.10	22	168	2.8	<.20	USGS	MBMG	
--	6.7	1.2	--	--	--	3.4	--	USGS	MBMG	
--	6.7	1.7	--	--	--	3.1	--	USGS	MBMG	
--	6.4	1.6	--	--	--	2.4	--	USGS	MBMG	
--	6.4	1.6	--	--	--	2.7	--	USGS	MBMG	
--	6.8	1.7	--	--	--	--	--	USGS	MBMG	
--	5.6	1.7	--	--	--	3.8	--	USGS	MBMG	
--	6.5	1.8	--	--	--	3.5	--	USGS	MBMG	
--	6.7	1.6	--	--	--	2.5	--	USGS	UM	10N19W08DCCC01
--	6.3	1.6	--	--	--	2.5	--	USGS	UM	
--	3.9	.65	.16	22	--	2.3	<.20	MBMG	MBMG	10N19W08DCCC02
--	7.0	1.6	--	--	--	2.4	--	USGS	UM	
--	9.8	1.6	--	--	--	4.3	--	USGS	UM	10N19W09ABCC01
--	7.3	1.5	--	--	--	1.9	--	USGS	UM	
--	5.3	1.5	--	--	--	.2	--	USGS	UM	10N19W09BCCC01
--	3.3	1.1	--	--	--	.37	--	USGS	UM	
--	4.5	3.2	--	--	--	.73	--	USGS	UM	10N19W16BBBC01
63	5.0	6.5	.50	68	156	.95	<.20	USGS	MBMG	
--	5.2	1.3	--	--	--	.94	--	USGS	UM	10N19W17BAAA01
--	4.8	1.0	--	--	--	.38	--	USGS	UM	10N19W17BBDA01
--	5.1	1.1	--	--	--	.79	--	USGS	UM	10N19W17BCAB01
--	5.3	1.5	--	--	--	.49	--	USGS	UM	10N19W17DBBC01
--	4.6	< 1.0	--	--	--	.5	--	USGS	UM	10N19W18AAAA01
--	4.7	1.1	--	--	--	.39	--	USGS	UM	10N19W18AADB01
81	5.0	1.0	<.10	19	109	.45	<.20	USGS	MBMG	
--	4.1	1.2	--	--	--	.59	--	USGS	UM	10N19W18ABAD01
--	4.1	1.3	--	--	--	.6	--	USGS	UM	
--	4.5	1.2	--	--	--	.49	--	USGS	UM	10N19W18ADDC01
--	4.7	1.6	--	--	--	.71	--	USGS	UM	10N19W18DBBA01

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conduct-ance, field (µS/cm)	pH, field (stand-ard units)	Temper-ature, water (°C)	Oxygen, dis-solved, field (mg/L)	Cal-cium (mg/L as Ca)	Magne-sium (mg/L as Mg)	Sodium (mg/L as Na)	Potas-sium (mg/L as K)	Bicar-bonate[1] (mg/L as HCO_3)	Carbon-ate[1] (mg/L as CO_3)
	09-13-95	186	6.9	10.0	9.1	23	7.2	4.0	1.9	106	0
10N19W19BDAD01	10-26-95	214	6.9	10.5	--	--	--	--	--	--	--
10N19W19DDAA01	10-26-95	210	7.3	14.0	--	--	--	--	--	--	--
10N19W20BAAD01	10-26-95	191	7.1	13.5	--	--	--	--	--	--	--
10N19W21CBBA01	10-26-95	243	7.0	14.5	--	--	--	--	--	--	--
	10-26-95[2]	243	7.0	14.5	--	--	--	--	--	--	--
10N19W29ABAC01	10-26-95	274	7.4	13.5	--	--	--	--	--	--	--
10N19W30CACD01	10-26-95	236	7.2	11.0	--	--	--	--	--	--	--
09N20W19ADCA01	10-26-95	141	6.4	12.0	--	--	--	--	--	--	--
09N20W20ACAB01	10-12-95	118	6.4	11.0	--	--	--	--	--	--	--
09N20W20ACAD01	06-06-96	128	6.5	10.0	--	--	--	--	--	--	--
	06-06-96[2]	128	6.5	10.0	--	--	--	--	--	--	--
09N20W20CDCD01	09-14-95	230	8.3	10.0	.4	30	.7	18	1.5	130	0
09N20W21ACCB01	10-12-95	42.9	6.2	12.5	--	--	--	--	--	--	--
09N20W21CCAC01	12-14-95	287	7.4	10.5	--	--	--	--	--	--	--
09N20W28CCBB01	10-12-95	193	6.6	10.5	--	--	--	--	--	--	--
	10-12-95[2]	193	6.6	10.5	--	--	--	--	--	--	--
09N20W29ADCC01	10-26-95	256	6.8	10.5	--	--	--	--	--	--	--
09N19W33BDBC01	08-25-95	177	7.4	18.0	--	--	--	--	--	--	--
08N21W27DCBC01	03-10-94	67.0	6.3	5.5	--	8.4	1.6	3.2	1.0	38	0
	06-06-96	70.6	6.6	8.5	--	--	--	--	--	--	--
08N20W01ACCB01	08-25-95	648	7.6	10.5	--	--	--	--	--	--	--
08N20W01DAAD01	08-20-92	622	7.6	11.5	6.8	50	13	71	2.0	359	0
08N20W01DABD01	10-26-95	626	7.7	9.5	--	--	--	--	--	--	--
08N20W02CBDB01	08-25-95	306	7.7	13.5	--	--	--	--	--	--	--
08N20W11BDAA01	08-25-95	564	7.6	15.0	--	--	--	--	--	--	--
08N20W11CCAD01	08-25-95	60.9	7.6	14.0	--	--	--	--	--	--	--
08N20W12BAAA01	10-12-95	812	7.9	11.0	--	--	--	--	--	--	--
	11-19-96	813	--	10.3	--	--	--	--	--	--	--
	01-07-97	838	--	8.6	--	--	--	--	--	--	--
	02-26-97	854	--	8.7	--	--	--	--	--	--	--
	04-03-97	860	--	9.0	--	--	--	--	--	--	--
	04-03-97[2]	860	--	9.0	--	--	--	--	--	--	--
	05-20-97	839	--	9.8	--	--	--	--	--	--	--
	06-24-97	866	--	9.8	--	--	--	--	--	--	--
	08-19-97	723	--	9.3	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
08N20W13BBDB01	10-12-95	622	7.3	11.5	--	--	--	--	--	--	--
08N20W14ABDB01	09-15-95	579	7.5	14.5	7.8	69	16	34	8.0	316	0
	10-12-95	579	7.5	14.5	--	--	--	--	--	--	--
08N20W23CDDD01	08-20-92	386	7.4	15.0	9.2	34	7.4	29	7.8	170	0
	12-14-95	384	7.8	12.0	--	--	--	--	--	--	--
	12-14-95[2]	384	7.8	12.0	--	--	--	--	--	--	--
08N20W26BAAC01	03-10-94	602	7.6	16.0	--	42	13	68	8.2	258	0
	06-06-96	416	7.2	16.0	--	--	--	--	--	--	--
08N19W04BDAA01	03-09-94	--	7.4	4.5	--	22	4.6	2.6	1.8	--	--
	08-25-95	169	7.9	8.5	--	--	--	--	--	--	--
08N19W07CBBD01	03-10-94	756	8.1	9.0	--	33	14	130	2.0	--	--
	08-25-95	766	8.0	10.0	--	--	--	--	--	--	--
08N19W10BBCA01	08-25-95	288	7.8	13.5	--	--	--	--	--	--	--
	08-25-95[2]	288	7.8	13.5	--	--	--	--	--	--	--
08N19W11CDBB01	08-20-92	227	7.2	8.0	7.2	30	6.3	7.1	2.1	127	0

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
87	5.0	1.0	<.10	26	124	.80	<.20	USGS	MBMG	
--	13.0	4.7	--	--	--	.9	--	USGS	UM	10N19W19BDAD01
--	7.7	4.8	--	--	--	.55	--	USGS	UM	10N19W19DDAA01
--	4.7	2.4	--	--	--	.2	--	USGS	UM	10N19W20BAAD01
--	25.0	5.5	--	--	--	1.3	--	USGS	UM	10N19W21CBBA01
--	26.0	5.5	--	--	--	1.3	--	USGS	UM	
--	6.8	3.7	--	--	--	1.1	--	USGS	UM	10N19W29ABAC01
--	5.9	4.0	--	--	--	.95	--	USGS	UM	10N19W30CACD01
--	4.3	3.9	--	--	--	3.2	--	USGS	UM	09N20W19ADCA01
--	3.1	1.5	--	--	--	.35	--	USGS	UM	09N20W20ACAB01
--	2.7	1.1	--	--	--	.27	--	USGS	UM	09N20W20ACAD01
--	2.7	1.1	--	--	--	.26	--	USGS	UM	
107	7.5	2.0	.10	17	142	<.05	<.20	USGS	MBMG	09N20W20CDCD01
--	3.0	< 1.0	--	--	--	<.15	--	USGS	UM	09N20W21ACCB01
--	4.8	6.4	--	--	--	<.15	--	USGS	UM	09N20W21CCAC01
--	3.0	4.1	--	--	--	.19	--	USGS	UM	09N20W28CCBB01
--	3.0	4.1	--	--	--	.19	--	USGS	UM	
--	4.5	3.1	--	--	--	<.15	--	USGS	UM	09N20W29ADCC01
--	3.6	1.4	--	--	--	<.15	--	USGS	UM	09N19W33BDBC01
31	<1.0	<.20	.14	19	--	.18	<.20	MBMG	MBMG	08N21W27DCBC01
--	2.6	<1.0	--	--	--	--	--	USGS	UM	
--	11.0	5.7	--	--	--	3.0	--	USGS	UM	08N20W01ACCB01
295	18	11	.80	18	361	--	--	USGS	NWQL	08N20W01DAAD01
--	16.0	8.0	--	--	--	2.9	--	USGS	UM	08N20W01DABD01
--	11.0	9.0	--	--	--	1.0	--	USGS	UM	08N20W02CBDB01
--	26.0	11.0	--	--	--	.76	--	USGS	UM	08N20W11BDAA01
--	38.0	16.0	--	--	--	.43	--	USGS	UM	08N20W11CCAD01
--	22.0	27.0	--	--	--	5.4	--	USGS	UM	08N20W12BAAA01
--	27.0	24.0	--	--	--	4.6	--	USGS	MBMG	
--	25.0	28.0	--	--	--	5.1	--	USGS	MBMG	
--	23.0	31.0	--	--	--	5.9	--	USGS	MBMG	
--	23.7	36.5	--	--	--	5.0	--	USGS	MBMG	
--	24.0	34.0	--	--	--	5.5	--	USGS	NWQL	
--	24.3	36.4	--	--	--	5.3	--	USGS	MBMG	
--	26.3	47.7	--	--	--	5.4	--	USGS	MBMG	
--	26.0	36.0	--	--	--	5.5	--	USGS	MBMG	
--	26.0	37.0	--	--	--	5.4	--	USGS	MBMG	
--	60.0	12.0	--	--	--	.33	--	USGS	UM	08N20W13BBDB01
259	35	10	.60	51	386	1.5	<.20	USGS	MBMG	08N20W14ABDB01
--	34.0	10.0	--	--	--	1.4	--	USGS	UM	
139	24	21	.40	50	257	--	--	USGS	NWQL	08N20W23CDDD01
--	22.0	18.0	--	--	--	.19	--	USGS	UM	
--	24.0	18.0	--	--	--	.53	--	USGS	UM	
212	72	19	.27	42	--	--	<.20	MBMG	MBMG	08N20W26BAAC01
--	44.0	13.0	--	--	--	.55	--	USGS	UM	
--	1.4	<.20	.10	13	--	.07	<.20	MBMG	MBMG	08N19W04BDAA01
--	3.5	< 1.0	--	--	--	<.15	--	USGS	UM	
--	18	5.3	1.9	17	--	2.1	<.20	MBMG	MBMG	08N19W07CBBD01
--	20.0	6.9	--	--	--	2.0	--	USGS	UM	
--	4.8	1.7	--	--	--	.97	--	USGS	UM	08N19W10BBCA01
--	4.9	1.7	--	--	--	.97	--	USGS	UM	
104	9.9	.60	.20	15	134	--	--	USGS	NWQL	08N19W11CDBB01

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (μS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
	10-26-95	233	7.2	8.5	--	--	--	--	--	--	--
07N21W13BBAD01	08-17-92	96.0	6.8	11.0	7.4	8.3	1.5	8.7	1.7	54	0
	08-17-92[2]	96.0	6.8	11.0	7.4	8.2	1.5	8.7	1.6	54	0
	12-14-95	82.2	7.6	9.5	--	--	--	--	--	--	--
07N21W25CABC01	08-17-92	86.0	6.5	11.0	1.5	6.1	2.0	7.5	1.2	45	0
	12-14-95	89.5	6.9	10.0	--	--	--	--	--	--	--
07N21W36DDDC01	06-20-84	34.0	5.5	10.3	--	3.3	.7	2.4	1.0	20	0
	03-09-94	32.0	6.0	11.0	--	3.8	.9	2.2	1.6	--	--
	08-25-95	48.9	6.6	14.0	--	--	--	--	--	--	--
07N20W32DDDA02	03-09-94	345	7.1	11.5	--	45	10	12	3.7	--	--
07N20W34CCCD01	07-27-95	473	7.6	10.5	--	--	--	--	--	--	--
07N20W34CDDB01	07-27-95	417	7.6	12.0	--	--	--	--	--	--	--
07N20W36CCCA01	12-14-95	313	7.8	12.0	--	--	--	--	--	--	--
06N21W01ACDA01	05-01-95	28.0	6.7	10.0	--	--	--	--	--	--	--
06N21W01CADD01	04-18-95	71.0	6.9	11.0	--	--	--	--	--	--	--
06N21W01CBAB01	05-01-95	74.0	7.0	10.0	--	--	--	--	--	--	--
06N21W02ABBD01	03-09-94	82.0	6.1	11.5	--	10	2.5	2.9	.70	--	--
	08-17-95	90.3	7.3	15.0	--	--	--	--	--	--	--
	11-18-96	89.0	--	11.0	--	--	--	--	--	--	--
	01-06-97	88.6	--	9.7	--	--	--	--	--	--	--
	02-25-97	86.5	--	9.2	--	--	--	--	--	--	--
	04-02-97	80.0	--	11.2	--	--	--	--	--	--	--
	05-19-97	83.0	--	13.5	--	--	--	--	--	--	--
	06-23-97	86.0	--	12.4	--	--	--	--	--	--	--
	08-18-97	103	--	11.7	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N21W02CADD01	05-02-95	25.8	6.7	10.0	--	--	--	--	--	--	--
06N21W03ACBA01	05-01-95	25.4	6.8	9.0	--	--	--	--	--	--	--
06N21W03CAAC01	05-01-95	88.6	6.5	9.5	--	--	--	--	--	--	--
	11-18-96	81.0	--	10.9	--	--	--	--	--	--	--
	01-06-97	89.6	--	7.6	--	--	--	--	--	--	--
	02-25-97	--	--	--	--	--	--	--	--	--	--
	04-02-97	85.0	--	6.9	--	--	--	--	--	--	--
	04-02-97[2]	85.0	--	6.9	--	--	--	--	--	--	--
	04-02-97[2]	85.0	--	6.9	--	--	--	--	--	--	--
	06-23-97	76.0	--	10.7	--	--	--	--	--	--	--
	08-18-97	80.0	--	11.3	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N21W03CCDD01	05-01-95	197	7.3	8.5	--	--	--	--	--	--	--
06N21W03DDAA01	05-01-95	87.5	6.5	10.0	--	--	--	--	--	--	--
	09-07-95	119	5.7	14.5	6.3	11	3.0	7.3	2.2	41	0
06N21W09DADA01	05-01-95	266	8.5	7.5	--	--	--	--	--	--	--
	09-07-95	263	8.1	14.5	.4	22	6.1	29	.44	151	0
06N21W10BDDD01	05-01-95	109	7.2	6.5	--	--	--	--	--	--	--
06N21W11ABAA01	06-18-84	102	6.8	11.5	--	6.0	1.6	12.4	1.6	59	0
	05-01-95	102	7.5	9.5	--	--	--	--	--	--	--
	09-06-95	100	6.8	12.0	.4	5.7	1.6	11	1.4	59	0
06N21W11CAAA01	04-18-95	136	6.8	8.5	--	--	--	--	--	--	--
06N21W11CBCA01	05-01-95	144	7.0	6.5	--	--	--	--	--	--	--
06N21W11CBDC01	05-01-95	161	7.8	11.0	--	--	--	--	--	--	--
	05-01-95[2]	161	7.8	11.0	--	--	--	--	--	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	10.0	1.8	--	--	--	.5	--	USGS	UM	
44	1.2	.50	.10	27	76	--	--	USGS	NWQL	07N21W13BBAD01
44	1.2	.50	.10	28	77	--	--	USGS	NWQL	
--	< 2.0	1.1	--	--	--	.35	--	USGS	UM	
37	1.6	1.0	<.10	35	77	--	--	USGS	NWQL	07N21W25CABC01
--	< 2.0	1.6	--	--	--	<.15	--	USGS	UM	
16	0.9	.40	.10	14	34	.10	.30	MBMG	MBMG	07N21W36DDDC01
--	<1.0	.40	.10	14	--	.28	<.20	MBMG	MBMG	
--	< 2.0	< 1.0	--	--	--	.25	--	USGS	UM	
--	2.6	1.7	.27	34	--	1.2	<.20	MBMG	MBMG	07N20W32DDDA02
--	13.0	4.4	--	--	--	.62	--	USGS	UM	07N20W34CCCD01
--	12.0	7.0	--	--	--	.41	--	USGS	UM	07N20W34CDDB01
--	5.9	3.9	--	--	--	1.4	--	USGS	UM	07N20W36CCCA01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W01ACDA01
--	2.9	1.7	--	--	--	<.15	--	USGS	UM	06N21W01CADD01
--	< 2.0	1.1	--	--	--	.17	--	USGS	UM	06N21W01CBAB01
--	<1.0	.50	.14	33	--	1.1	.20	MBMG	MBMG	06N21W02ABBD01
--	2.4	2.1	--	--	--	1.9	--	USGS	UM	
--	3.0	1.8	--	--	--	1.8	--	USGS	MBMG	
--	2.5	1.1	--	--	--	1.6	--	USGS	MBMG	
--	2.8	1.5	--	--	--	1.4	--	USGS	MBMG	
--	2.9	1.3	--	--	--	1.4	--	USGS	MBMG	
--	3.0	1.3	--	--	--	1.3	--	USGS	MBMG	
--	3.7	1.9	--	--	--	1.7	--	USGS	MBMG	
--	2.5	3.0	--	--	--	3.2	--	USGS	MBMG	
--	2.3	2.9	--	--	--	3.1	--	USGS	MBMG	
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W02CADD01
--	< 2.0	1.4	--	--	--	<.15	--	USGS	UM	06N21W03ACBA01
--	5.2	1.9	--	--	--	5.5	--	USGS	UM	06N21W03CAAC01
--	<2.5	0.9	--	--	--	.9	--	USGS	MBMG	
--	<2.5	0.9	--	--	--	2.8	--	USGS	MBMG	
--	2.6	1.0	--	--	--	1.3	--	USGS	MBMG	
--	<2.5	1.0	--	--	--	1.3	--	USGS	MBMG	
--	<2.5	1.0	--	--	--	1.3	--	USGS	MBMG	
--	2.3	1.1	--	--	--	1.6	--	USGS	NWQL	
--	3.0	0.78	--	--	--	.87	--	USGS	MBMG	
--	<2.5	0.69	--	--	--	.77	--	USGS	MBMG	
--	2.7	0.98	--	--	--	.79	--	USGS	MBMG	
--	< 2.0	2.6	--	--	--	.17	--	USGS	UM	06N21W03CCDD01
--	< 2.0	3.6	--	--	--	.61	--	USGS	UM	06N21W03DDAA01
34	2.5	14	<.10	30	91	.20	<.20	USGS	MBMG	
--	5.3	1.7	--	--	--	<.15	--	USGS	UM	06N21W09DADA01
124	5.0	1.0	2.9	18	160	<.05	<.20	USGS	MBMG	
--	< 2.0	1.3	--	--	--	.18	--	USGS	UM	06N21W10BDDD01
48	1.6	.60	.20	55	109	.06	.40	MBMG	MBMG	06N21W11ABAA01
--	< 2.0	1.0	--	--	--	<.15	--	USGS	UM	
48	<2.5	.50	.20	54	--	<.05	<.20	USGS	MBMG	
--	3.1	2.6	--	--	--	<.15	--	USGS	UM	06N21W11CAAA01
--	< 2.0	2.3	--	--	--	.29	--	USGS	UM	06N21W11CBCA01
--	< 2.0	1.1	--	--	--	<.15	--	USGS	UM	06N21W11CBDC01
--	<2.0	1.3	--	--	--	<.15	--	USGS	UM	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
06N21W11CDCB01	06-15-95	121	7.2	12.0	--	--	--	--	--	--	--
	09-06-95	105	6.6	10.0	.3	7.6	2.2	10	1.5	62	0
06N21W11DCCA01	10-26-94	210	7.8	10.0	--	--	--	--	--	--	--
06N21W12ABAB01	04-18-95	59.0	6.6	10.0	--	--	--	--	--	--	--
06N21W12BDDD01	04-18-95	149	6.9	9.5	--	--	--	--	--	--	--
	09-06-95	133	6.3	10.0	1.8	11	2.8	10	1.6	78	0
06N21W13BADC01	04-18-95	143	7.8	11.5	--	--	--	--	--	--	--
06N21W13BBAB01	04-18-95	90.0	7.6	11.0	--	--	--	--	--	--	--
	11-18-96	87.8	--	10.9	--	--	--	--	--	--	--
	01-06-97	88.9	--	10.6	--	--	--	--	--	--	--
	02-25-97	79.1	--	10.8	--	--	--	--	--	--	--
	04-02-97	80.0	--	13.0	--	--	--	--	--	--	--
	05-19-97	81.0	--	14.9	--	--	--	--	--	--	--
	06-23-97	83.0	--	12.9	--	--	--	--	--	--	--
	08-18-97	86.0	--	13.0	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N21W13CCCD01	10-26-94	89.9	6.2	11.5	--	--	--	--	--	--	--
06N21W13DBBD01	05-01-95	106	6.4	11.0	--	--	--	--	--	--	--
06N21W14BCBD01	05-01-95	57.3	6.9	10.0	--	--	--	--	--	--	--
06N21W14BDAC01	10-26-94	82.2	7.1	12.0	--	--	--	--	--	--	--
	09-06-95	84.5	7.0	12.0	9.2	12	1.8	2.5	.59	47	0
	09-06-95[2]	84.5	7.0	12.0	9.2	12	1.8	2.5	.79	47	0
06N21W14DAAD01	10-26-94	58.3	6.1	9.0	--	--	--	--	--	--	--
06N21W15ABBB01	05-01-95	75.8	6.7	10.0	--	--	--	--	--	--	--
06N21W15ADBC01	06-15-95	101	7.6	12.0	--	--	--	--	--	--	--
06N21W15CDDD01	06-10-84	53.0	6.2	10.8	--	5.8	1.3	3.4	.60	34	0
	08-17-92	52.0	6.3	9.5	8.4	5.2	1.1	3.1	.60	28	0
	10-26-94	50.3	6.4	9.5	--	--	--	--	--	--	--
	10-26-94[2]	50.3	6.4	9.5	--	--	--	--	--	--	--
06N21W21ADDB01	10-26-94	122	7.2	11.0	--	--	--	--	--	--	--
06N21W22AADC01	05-01-95	40.1	6.7	9.5	--	--	--	--	--	--	--
	09-06-95	39.0	5.7	9.5	6.5	3.4	1.2	2.5	1.4	22	0
06N21W22BCCA01	08-30-94	124	9.6	11.0	--	--	--	--	--	--	--
06N21W22CACA01	08-30-94	120	6.4	13.5	--	--	--	--	--	--	--
06N21W23ADAA01	10-26-94	47.2	6.2	11.5	--	--	--	--	--	--	--
06N21W23BABB01	10-26-94	36.2	6.3	12.5	--	--	--	--	--	--	--
06N21W23BDDD01	08-30-94	36.2	6.3	12.5	--	--	--	--	--	--	--
06N21W23CABC01	06-15-95	79.0	7.1	10.0	--	--	--	--	--	--	--
	06-15-95[2]	79.0	7.1	10.0	--	--	--	--	--	--	--
	08-09-95	79.0	7.1	10.0	--	--	--	--	--	--	--
	09-06-95	79.4	6.6	11.5	7.4	7.3	1.8	7.3	.59	44	0
06N21W23CBCB01	06-08-84	99.0	6.7	11.0	--	10	2.5	9.1	.7	62.5	0
	09-15-94	99.0	6.7	11.0	--	--	--	--	--	--	--
06N21W23CDCB01	08-30-94	105	6.6	12.0	--	--	--	--	--	--	--
06N21W23DADA01	09-15-94	48.4	6.1	10.5	--	--	--	--	--	--	--
	09-15-94[2]	48.4	6.1	10.5	--	--	--	--	--	--	--
	08-08-95	48.4	6.1	10.5	--	--	--	--	--	--	--
06N21W23DADD01	09-15-94	54.0	6.1	11.0	--	--	--	--	--	--	--
	09-15-94[2]	54.0	6.1	11.0	--	--	--	--	--	--	--
	09-28-94	54.0	6.1	11.0	--	--	--	--	--	--	--
	09-28-94[2]	54.0	6.1	11.0	--	--	--	--	--	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W11CDCB01
51	2.5	.50	.20	40	97	<.05	<.20	USGS	MBMG	
--	11.0	7.2	--	--	--	.7	--	USGS	UM	06N21W11DCCA01
--	< 2.0	< 1.0	--	--	--	.16	--	USGS	UM	06N21W12ABAB01
--	< 2.0	2.1	--	--	--	<.15	--	USGS	UM	06N21W12BDDD01
64	<2.5	1.5	.20	29	--	<.05	<.20	USGS	MBMG	
--	< 2.0	1.0	--	--	--	.6	--	USGS	UM	06N21W13BADC01
--	< 2.0	1.1	--	--	--	.4	--	USGS	UM	06N21W13BBAB01
--	<2.5	.8	--	--	--	.4	--	USGS	MBMG	
--	<2.5	<.05	--	--	--	.4	--	USGS	MBMG	
--	<2.5	1.0	--	--	--	.4	--	USGS	MBMG	
--	<2.5	.8	--	--	--	.3	--	USGS	MBMG	
--	<2.5	.9	--	--	--	.3	--	USGS	MBMG	
--	<2.5	.86	--	--	--	.37	--	USGS	MBMG	
--	<2.5	.89	--	--	--	.34	--	USGS	MBMG	
--	<2.5	.87	--	--	--	.3	--	USGS	MBMG	
--	2.3	2.7	--	--	--	.8	--	USGS	UM	06N21W13CCCD01
--	< 2.0	2.8	--	--	--	.3	--	USGS	UM	06N21W13DBBD01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W14BCBD01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W14BDAC01
39	<2.5	<.50	.10	35	--	.10	<.20	USGS	MBMG	
39	<2.5	<.50	.20	35	--	.10	<.20	USGS	MBMG	
--	< 2.0	< 1.0	--	--	--	.3	--	USGS	UM	06N21W14DAAD01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W15ABBB01
--	2.3	1.7	--	--	--	.16	--	USGS	UM	06N21W15ADBC01
28	.70	.30	.10	31	61	.15	.40	MBMG	MBMG	06N21W15CDDD01
23	.80	.20	<.10	27	52	--	--	USGS	NWQL	
--	< 2.0	< 1.0	--	--	--	.18	--	USGS	UM	
--	<2.0	<1.0	--	--	--	.16	--	USGS	UM	
--	< 2.0	1.2	--	--	--	<.15	--	USGS	UM	06N21W21ADDB01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W22AADC01
18	<2.5	<.50	<.10	22	--	.15	<.20	USGS	MBMG	
--	< 2.0	1.9	--	--	--	.17	--	USGS	UM	06N21W22BCCA01
--	< 2.0	2.7	--	--	--	.25	--	USGS	UM	06N21W22CACA01
--	< 2.0	4.6	--	--	--	<.15	--	USGS	UM	06N21W23ADAA01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W23BABB01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W23BDDD01
--	2.3	< 1.0	--	--	--	.16	--	USGS	UM	06N21W23CABC01
--	2.7	<1.0	--	--	--	.22	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.21	--	USGS	UM	
36	<2.5	<.50	<1.0	42	--	.15	<.20	USGS	MBMG	
51	1.5	.6	.3	45	102	.28	.3	MBMG	MBMG	06N21W23CBCB01
--	< 2.0	1.1	--	--	--	.28	--	USGS	UM	
--	< 2.0	1.4	--	--	--	.31	--	USGS	UM	06N21W23CDCB01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	06N21W23DADA01
--	<2.0	<1.0	--	--	--	<.15	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.22	--	USGS	UM	
--	< 2.0	1.2	--	--	--	.27	--	USGS	UM	06N21W23DADD01
--	<2.0	1.1	--	--	--	.18	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.34	--	USGS	UM	
--	<2.0	<1.0	--	--	--	.26	--	USGS	UM	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
06N21W23DBDA01	07-14-95	43.9	6.7	11.0	--	--	--	--	--	--	--
	08-09-95	43.9	6.7	11.0	--	--	--	--	--	--	--
06N21W23DDAA01	09-15-94	50.8	6.3	14.5	--	--	--	--	--	--	--
	08-09-95	50.8	6.3	14.5	--	--	--	--	--	--	--
06N21W23DDAD01	09-15-94	51.7	6.3	12.5	--	--	--	--	--	--	--
	08-08-95	51.7	6.3	12.5	--	--	--	--	--	--	--
	09-05-95	55.0	6.0	12.5	7.1	4.4	1.4	3.9	1.7	23	0
06N21W23DDBB01	09-15-94	51.4	6.3	10.0	--	--	--	--	--	--	--
	08-08-95	51.4	6.3	10.0	--	--	--	--	--	--	--
	09-05-95	52.2	6.0	10.5	4.4	5.0	1.1	3.3	2.4	22	0
06N21W23DDCB01	09-15-94	73.3	6.6	10.0	--	--	--	--	--	--	--
	08-08-95	73.3	6.6	10.0	--	--	--	--	--	--	--
06N21W23DDDA01	09-15-94	59.2	6.2	11.0	--	--	--	--	--	--	--
	08-08-95	59.2	6.2	11.0	--	--	--	--	--	--	--
06N21W24BAAC01	10-26-94	92.9	6.6	9.0	--	--	--	--	--	--	--
	09-06-95	93.0	6.1	9.0	0.4	11	3.1	3.0	1.1	53	0
06N21W24CCAC01	09-15-94	63.3	6.2	12.5	--	--	--	--	--	--	--
	08-08-95	63.3	6.2	12.5	--	--	--	--	--	--	--
	09-05-95	70.1	5.8	12.5	6.7	5.7	2.2	4.3	1.9	29	0
	11-18-96	69.0	--	12.3	--	--	--	--	--	--	--
	01-06-97	74.0	--	10.6	--	--	--	--	--	--	--
	02-25-97	71.8	--	11.8	--	--	--	--	--	--	--
	04-02-97	70.0	--	12.3	--	--	--	--	--	--	--
	05-19-97	66.0	--	14.0	--	--	--	--	--	--	--
	06-23-97	70.0	--	11.7	--	--	--	--	--	--	--
	08-18-97	71.0	--	11.7	--	--	--	--	--	--	--
	08-18-97[2]	71.0	--	11.7	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N21W24CCBB01	09-15-94	60.2	6.3	14.0	--	--	--	--	--	--	--
06N21W24CCBB02	09-15-94	57.3	6.5	14.5	--	--	--	--	--	--	--
	09-15-94[2]	57.3	6.5	14.5	--	--	--	--	--	--	--
	08-08-95	57.3	6.5	14.5	--	--	--	--	--	--	--
	08-08-95[2]	57.3	6.5	14.5	--	--	--	--	--	--	--
06N21W24CCCB01	09-15-94	72.0	5.8	11.0	--	--	--	--	--	--	--
	08-09-95	72.0	5.8	11.0	--	--	--	--	--	--	--
06N21W25DBAA01	08-18-92	284	6.9	12.5	6.4	38	9.0	4.6	2.9	171	0
	12-14-95	293	7.2	12.0	--	--	--	--	--	--	--
06N21W26AADD01	08-30-94	90.3	6.6	10.0	--	--	--	--	--	--	--
06N21W26ABAD01	08-30-94	212	7.2	11.5	--	--	--	--	--	--	--
06N21W26BBCA01	08-30-94	45.3	6.3	10.5	--	--	--	--	--	--	--
	08-30-94[2]	45.3	6.3	10.5	--	--	--	--	--	--	--
06N21W26CBAB01	08-30-94	97.9	6.7	11.5	--	--	--	--	--	--	--
06N21W26DBAD01	03-08-94	146	6.9	10.5	--	13	3.2	13	3.8	--	--
06N21W26DBDD01	09-15-94	107	7.2	13.0	--	--	--	--	--	--	--
06N21W27ADBC01	08-30-94	108	6.4	10.0	--	--	--	--	--	--	--
	11-18-96	111	--	10.4	--	--	--	--	--	--	--
	11-18-96[2]	111	--	10.4	--	--	--	--	--	--	--
	01-06-97	113	--	9.6	--	--	--	--	--	--	--
	02-25-97	111	--	10.9	--	--	--	--	--	--	--
	04-02-97	108	--	11.1	--	--	--	--	--	--	--
	05-19-97	107	--	12.9	--	--	--	--	--	--	--

Alka-linity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calcu-lated (mg/L)	Nitrate (mg/L as N)	Phos-phorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	< 2.0	1.1	--	--	--	.22	--	USGS	UM	06N21W23DBDA01
--	< 2.0	1.0	--	--	--	.17	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.16	--	USGS	UM	06N21W23DDAA01
--	< 2.0	1.7	--	--	--	.39	--	USGS	UM	
--	< 2.0	1.1	--	--	--	.38	--	USGS	UM	06N21W23DDAD01
--	< 2.0	1.4	--	--	--	.51	--	USGS	UM	
19	<2.5	1.5	<.10	27	--	.50	<.20	USGS	MBMG	
--	< 2.0	12.0	--	--	--	<.15	--	USGS	UM	06N21W23DDBB01
--	< 2.0	2.3	--	--	--	.62	--	USGS	UM	
18	<2.5	2.0	<.10	26	--	.30	<.20	USGS	MBMG	
--	< 2.0	< 1.0	--	--	--	.15	--	USGS	UM	06N21W23DDCB01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.2	--	USGS	UM	06N21W23DDDA01
--	< 2.0	1.4	--	--	--	.37	--	USGS	UM	
--	< 2.0	1.2	--	--	--	<.15	--	USGS	UM	06N21W24BAAC01
43	<2.5	1.0	<.10	38	--	<.05	<.20	USGS	MBMG	
--	< 2.0	1.4	--	--	--	.36	--	USGS	UM	06N21W24CCAC01
--	2.5	2.1	--	--	--	1.1	--	USGS	UM	
24	2.5	2.5	<.10	28	65	.75	<.20	USGS	MBMG	
--	<2.5	1.8	--	--	--	.50	--	USGS	MBMG	
--	<2.5	2.6	--	--	--	.57	--	USGS	MBMG	
--	<2.5	1.6	--	--	--	.64	--	USGS	MBMG	
--	<2.5	1.7	--	--	--	.87	--	USGS	MBMG	
--	<2.5	2.0	--	--	--	1.0	--	USGS	MBMG	
--	2.7	2.3	--	--	--	1.2	--	USGS	MBMG	
--	<2.5	2.4	--	--	--	.86	--	USGS	MBMG	
--	<2.5	2.3	--	--	--	.85	--	USGS	MBMG	
--	2.8	2.0	--	--	--	.79	--	USGS	MBMG	
--	< 2.0	< 1.0	--	--	--	.48	--	USGS	UM	06N21W24CCBB01
--	< 2.0	< 1.0	--	--	--	.51	--	USGS	UM	06N21W24CCBB02
--	2.0	<1.0	--	--	--	.51	--	USGS	UM	
--	2.6	2.0	--	--	--	.71	--	USGS	UM	
--	2.2	1.4	--	--	--	.42	--	USGS	UM	
--	< 2.0	1.7	--	--	--	.47	--	USGS	UM	06N21W24CCCB01
--	< 2.0	1.4	--	--	--	.44	--	USGS	UM	
140	3.9	0.80	.20	16	160	--	--	USGS	NWQL	06N21W25DBAA01
--	4.3	2.5	--	--	--	.75	--	USGS	UM	
--	< 2.0	1.1	--	--	--	.15	--	USGS	UM	06N21W26AADD01
--	2.0	2.3	--	--	--	<.15	--	USGS	UM	06N21W26ABAD01
--	< 2.0	< 1.0	--	--	--	.17	--	USGS	UM	06N21W26BBCA01
--	<2.0	<1.0	--	--	--	.17	--	USGS	UM	
--	< 2.0	1.3	--	--	--	.57	--	USGS	UM	06N21W26CBAB01
--	<1.0	1.3	.21	62	--	.55	.20	MBMG	MBMG	06N21W26DBAD01
--	4.4	1.6	--	--	--	<.15	--	USGS	UM	06N21W26DBDD01
--	< 2.0	3.6	--	--	--	1.4	--	USGS	UM	06N21W27ADBC01
--	<2.5	3.4	--	--	--	1.6	--	USGS	MBMG	
--	<2.5	3.3	--	--	--	1.6	--	USGS	MBMG	
--	<2.5	3.5	--	--	--	1.6	--	USGS	MBMG	
--	<2.5	3.6	--	--	--	1.4	--	USGS	MBMG	
--	<2.5	3.3	--	--	--	1.6	--	USGS	MBMG	
--	1.9	3.4	--	--	--	1.2	--	USGS	MBMG	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
	06-23-97	107	--	11.8	--	--	--	--	--	--	--
	08-18-97	108	--	11.0	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N21W27BABA01	08-30-94	99.2	6.7	12.0	--	--	--	--	--	--	--
06N21W27BBAA01	03-08-94	83.0	6.4	9.5	--	8.4	1.1	8.3	1.0	--	--
	08-15-95	83.9	7.8	11.0	--	--	--	--	--	--	--
06N21W34ABCD01	08-15-95	100	6.6	11.0	--	--	--	--	--	--	--
06N20W01BABB01	07-27-95	396	8.0	14.5	--	--	--	--	--	--	--
	09-14-95	378	8.0	13.5	6.6	21	3.0	60	4.2	199	0
06N20W01CDCD01	06-20-84	413	7.2	9.5	--	56	13.1	19	2.2	260	0
	06-15-95	395	7.3	10.5	--	--	--	--	--	--	--
	09-07-95	204	7.4	11.0	7.4	24	5.6	13	1.5	119	0
	11-19-96	324	--	10.9	--	--	--	--	--	--	--
	01-07-97	389	--	9.2	--	--	--	--	--	--	--
	02-26-97	428	--	8.5	--	--	--	--	--	--	--
	04-03-97	418	--	9.0	--	--	--	--	--	--	--
	04-03-97[2]	418	--	9.0	--	--	--	--	--	--	--
	05-20-97	421	--	9.3	--	--	--	--	--	--	--
	06-24-97	446	--	10.2	--	--	--	--	--	--	--
	08-19-97	330	--	10.7	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
06N20W02AADC01	07-27-95	453	7.3	15.0	--	--	--	--	--	--	--
06N20W02BBDA01	07-14-95	661	7.8	12.5	--	--	--	--	--	--	--
06N20W02CCAA01	07-27-95	558	7.6	10.5	--	--	--	--	--	--	--
	07-27-95[2]	558	7.6	10.5	--	--	--	--	--	--	--
06N20W02DCDC01	07-14-95	532	7.5	12.0	--	--	--	--	--	--	--
06N20W03BDBB01	07-27-95	328	7.7	12.0	--	--	--	--	--	--	--
06N20W03BDCC01	03-09-94	499	7.1	10.0	--	72	9.0	22	4.0	--	--
	07-14-95	505	7.2	11.5	--	--	--	--	--	--	--
06N20W03CCDB01	06-15-95	463	7.6	10.5	--	--	--	--	--	--	--
06N20W04AABC01	07-27-95	449	7.3	11.5	--	--	--	--	--	--	--
06N20W04ACCD01	07-27-95	385	7.3	12.5	--	--	--	--	--	--	--
06N20W04ADCD01	06-15-95	359	7.6	12.0	--	--	--	--	--	--	--
	01-07-97	364	--	8.2	--	--	--	--	--	--	--
	02-27-97	365	--	9.5	--	--	--	--	--	--	--
	04-03-97	361	--	9.7	--	--	--	--	--	--	--
	05-20-97	353	--	10.2	--	--	--	--	--	--	--
	06-24-97	359	--	10.7	--	--	--	--	--	--	--
	08-19-97	365	--	11.1	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
06N20W04CCCD01	06-15-95	363	7.5	10.5	--	--	--	--	--	--	--
06N20W04DCCB01	06-15-95	436	7.5	13.0	--	--	--	--	--	--	--
	06-15-95[2]	436	7.5	13.0	--	--	--	--	--	--	--
	09-14-95	390	7.5	12.5	8.2	49	15	14	2.9	244	0
	01-07-97	393	--	10.7	--	--	--	--	--	--	--
	01-07-97[2]	393	--	10.7	--	--	--	--	--	--	--
	02-26-97	403	--	10.3	--	--	--	--	--	--	--
	04-03-97	411	--	11.3	--	--	--	--	--	--	--
	04-03-97[2]	411	--	11.3	--	--	--	--	--	--	--
	05-20-97	411	--	11.8	--	--	--	--	--	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	2.1	3.2	--	--	--	1.2	--	USGS	MBMG	
--	<2.5	3.1	--	--	--	1.2	--	USGS	MBMG	
--	<2.5	3.1	--	--	--	1.2	--	USGS	MBMG	
--	< 2.0	< 1.0	--	--	--	.24	--	USGS	UM	06N21W27BABA01
--	<1.0	<.20	.08	40	--	.11	<.20	MBMG	MBMG	06N21W27BBAA01
--	< 2.0	1.0	--	--	--	<.15	--	USGS	UM	
--	< 2.0	1.3	--	--	--	.17	--	USGS	UM	06N21W34ABCD01
--	14.0	5.9	--	--	--	.69	--	USGS	UM	06N20W01BABB01
163	23	8.0	1.3	47	268	.60	.21	USGS	MBMG	
213	7.2	2.7	.60	39	276	1.81	<.10	MBMG	MBMG	06N20W01CDCD01
--	6.1	4.0	--	--	--	3.5	--	USGS	UM	
98	2.5	1.0	.80	40	151	.85	.24	USGS	MBMG	
--	3.8	--	--	--	--	.6	--	USGS	MBMG	
--	4.6	2.4	--	--	--	.90	--	USGS	MBMG	
--	6.8	4.4	--	--	--	1.5	--	USGS	MBMG	
--	6.5	3.9	--	--	--	1.8	--	USGS	MBMG	
--	7.5	4.4	--	--	--	1.4	--	USGS	MBMG	
--	8.5	6.3	--	--	--	1.5	--	USGS	NWQL	
--	6.6	3.9	--	--	--	.94	--	USGS	MBMG	
--	<2.5	.79	--	--	--	.23	--	USGS	MBMG	
--	3.8	1.5	--	--	--	.47	--	USGS	MBMG	
--	18.0	18.0	--	--	--	2.4	--	USGS	UM	06N20W02AADC01
--	37.0	23.0	--	--	--	1.7	--	USGS	UM	06N20W02BBDA01
--	15.0	7.0	--	--	--	.49	--	USGS	UM	06N20W02CCAA01
--	16.0	7.8	--	--	--	.50	--	USGS	UM	
--	6.6	2.9	--	--	--	.62	--	USGS	UM	06N20W02DCDC01
--	6.0	1.9	--	--	--	.21	--	USGS	UM	06N20W03BDBB01
--	13	3.6	.42	33	--	.92	<.20	MBMG	MBMG	06N20W03BDCC01
--	12.0	3.9	--	--	--	.52	--	USGS	UM	
--	8.5	3.4	--	--	--	1.6	--	USGS	UM	06N20W03CCDB01
--	11.0	5.1	--	--	--	3.1	--	USGS	UM	06N20W04AABC01
--	6.3	3.2	--	--	--	2.0	--	USGS	UM	06N20W04ACCD01
--	8.7	3.9	--	--	--	.81	--	USGS	UM	06N20W04ADCD01
--	8.7	3.7	--	--	--	.80	--	USGS	MBMG	
--	8.9	3.9	--	--	--	.80	--	USGS	MBMG	
--	8.0	3.2	--	--	--	.94	--	USGS	MBMG	
--	8.7	3.8	--	--	--	.80	--	USGS	MBMG	
--	9.3	3.7	--	--	--	.88	--	USGS	MBMG	
--	4.9	2.2	--	--	--	.51	--	USGS	MBMG	
--	8.4	3.6	--	--	--	.76	--	USGS	MBMG	
--	6.6	3.6	--	--	--	1.6	--	USGS	UM	06N20W04CCCD01
--	7.1	5.0	--	--	--	2.9	--	USGS	UM	06N20W04DCCB01
--	7.7	5.0	--	--	--	2.9	--	USGS	UM	
200	5.0	2.5	.40	41	255	1.3	<.20	USGS	MBMG	
--	5.2	2.8	--	--	--	1.7	--	USGS	MBMG	
--	6.0	2.8	--	--	--	1.7	--	USGS	MBMG	
--	5.7	3.3	--	--	--	1.9	--	USGS	MBMG	
--	5.4	2.9	--	--	--	1.6	--	USGS	MBMG	
--	5.9	3.1	--	--	--	2.1	--	USGS	NWQL	
--	6.4	3.7	--	--	--	1.8	--	USGS	MBMG	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
	06-24-97	421	--	12.2	--	--	--	--	--	--	--
	08-19-97	404	--	12.4	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
06N20W09BDDD01	07-27-95	595	7.4	12.0	--	--	--	--	--	--	--
06N20W09CBCC01	08-15-95	332	7.5	13.0	--	--	--	--	--	--	--
06N20W09CCDB01	05-03-95	375	7.5	12.5	--	--	--	--	--	--	--
06N20W09DCAB01	06-15-95	588	7.2	12.0	--	--	--	--	--	--	--
06N20W10AADC01	07-14-95	775	7.6	12.5	--	--	--	--	--	--	--
	09-14-95	773	7.5	11.0	2.0	110	20	28	7.0	495	0
	01-07-97	--	--	9.6	--	--	--	--	--	--	--
	02-26-97	774	--	9.5	--	--	--	--	--	--	--
	04-03-97	774	--	10.0	--	--	--	--	--	--	--
	05-20-97	753	--	10.3	--	--	--	--	--	--	--
	06-24-97	747	--	10.2	--	--	--	--	--	--	--
	08-19-97	766	--	10.8	--	--	--	--	--	--	--
	10-14-97	--	--	--	--	--	--	--	--	--	--
06N20W10ABDB01	06-15-95	419	8.0	10.0	--	--	--	--	--	--	--
06N20W10BCAC01	07-14-95	429	7.8	12.0	--	--	--	--	--	--	--
	07-14-95[2]	429	7.8	12.0	--	--	--	--	--	--	--
	09-14-95	465	7.6	11.5	9.0	50	7.3	43	4.6	265	0
06N20W10CACB01	06-15-95	600	7.9	13.0	--	--	--	--	--	--	--
	06-15-95[2]	600	7.9	13.0	--	--	--	--	--	--	--
06N20W10DADD01	07-27-95	420	7.7	13.0	--	--	--	--	--	--	--
06N20W10DBBB01	07-27-95	411	7.9	12.0	--	--	--	--	--	--	--
06N20W10DCAB01	07-27-95	384	8.0	10.5	--	--	--	--	--	--	--
06N20W11CCBD01	06-15-95	598	7.8	12.5	--	--	--	--	--	--	--
06N20W11DBAA01	06-15-95	582	7.5	11.5	--	--	--	--	--	--	--
06N20W12ABDB01	06-15-95	232	7.8	11.0	--	--	--	--	--	--	--
06N20W12CCCD01	06-15-95	750	7.6	11.5	--	--	--	--	--	--	--
	09-08-95	618	7.9	10.5	5.7	75	15	47	2.3	385	0
	09-08-95[2]	618	7.9	10.5	5.7	74	15	47	2.2	385	0
	01-07-97	638	--	10.2	--	--	--	--	--	--	--
	02-26-97	620	--	10.4	--	--	--	--	--	--	--
	04-03-97	604	--	10.7	--	--	--	--	--	--	--
	05-20-97	--	--	--	--	--	--	--	--	--	--
	06-24-97	510	--	10.7	--	--	--	--	--	--	--
	08-19-97	556	--	10.3	--	--	--	--	--	--	--
	10-15-97	--	--	--	--	--	--	--	--	--	--
	10-15-97[2]	--	--	--	--	--	--	--	--	--	--
06N20W13BADD01	06-15-95	864	7.3	12.0	--	--	--	--	--	--	--
06N20W13BCAC01	07-14-95	637	7.6	12.5	--	--	--	--	--	--	--
06N20W14ACDD01	06-15-95	578	7.6	9.5	--	--	--	--	--	--	--
	09-07-95	581	7.7	11.5	7.3	29	6.1	100	3.8	355	0
06N20W14BADB01	05-02-95	440	7.5	11.0	--	--	--	--	--	--	--
06N20W14BBBB01	07-30-79	350	--	18.5	--	68	12	21	4.4	--	--
	08-28-79	330	--	13.0	--	73	12	20	5.1	--	--
06N20W14CAAA01	07-14-95	248	7.3	10.0	--	--	--	--	--	--	--
06N20W14CDAB01	08-05-95	555	7.5	14.5	--	--	--	--	--	--	--
06N20W14DAAA01	08-24-95	517	8.1	18.0	--	--	--	--	--	--	--
	08-24-95[2]	517	8.1	18.0	--	--	--	--	--	--	--
	09-07-95	540	7.6	11.0	7.9	47	9.2	65	4.3	310	0
06N20W15AACD01	06-15-95	580	7.6	12.0	--	--	--	--	--	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	7.0	5.0	--	--	--	.79	--	USGS	MBMG	
--	5.0	3.3	--	--	--	2.0	--	USGS	MBMG	
--	5.9	3.5	--	--	--	1.6	--	USGS	MBMG	
--	49.0	19.0	--	--	--	4.2	--	USGS	UM	06N20W09BDDD01
--	5.5	2.4	--	--	--	.62	--	USGS	UM	06N20W09CBCC01
--	6.1	2.6	--	--	--	1.1	--	USGS	UM	06N20W09CCDB01
--	33.0	19.0	--	--	--	3.3	--	USGS	UM	06N20W09DCAB01
--	13.0	3.8	--	--	--	2.0	--	USGS	UM	06N20W10AADC01
406	12	4.5	.20	56	497	2.5	<.20	USGS	MBMG	
--	12.0	2.9	--	--	--	1.7	--	USGS	MBMG	
--	12.0	3.8	--	--	--	1.7	--	USGS	MBMG	
--	11.0	3.6	--	--	--	1.4	--	USGS	MBMG	
--	10.0	3.2	--	--	--	1.3	--	USGS	MBMG	
--	8.9	3.1	--	--	--	1.7	--	USGS	MBMG	
--	9.9	3.8	--	--	--	1.8	--	USGS	MBMG	
--	11.0	3.5	--	--	--	1.8	--	USGS	MBMG	
--	5.4	1.6	--	--	--	1.1	--	USGS	UM	06N20W10ABDB01
--	7.4	2.5	--	--	--	1.6	--	USGS	UM	06N20W10BCAC01
--	7.6	2.5	--	--	--	1.6	--	USGS	UM	
217	12	5.0	.40	54	317	2.3	<.20	USGS	MBMG	
--	49.0	3.2	--	--	--	3.1	--	USGS	UM	06N20W10CACB01
--	47.0	3.4	--	--	--	3.1	--	USGS	UM	
--	10.0	1.2	--	--	--	.82	--	USGS	UM	06N20W10DADD01
--	9.6	1.9	--	--	--	1.5	--	USGS	UM	06N20W10DBBB01
--	7.0	2.5	--	--	--	2.7	--	USGS	UM	06N20W10DCAB01
--	56.0	26.0	--	--	--	1.8	--	USGS	UM	06N20W11CCBD01
--	21.0	6.9	--	--	--	1.7	--	USGS	UM	06N20W11DBAA01
--	3.0	1.1	--	--	--	.2	--	USGS	UM	06N20W12ABDB01
--	26.0	4.4				2.0	--	USGS	UM	06N20W12CCCD01
315	17	6.0	.70	32	394	2.0	<.20	USGS	MBMG	
315	17	6.0	.70	33	394	2.0	<.20	USGS	MBMG	
--	20.0	6.7	--	--	--	2.4	--	USGS	MBMG	
--	17.0	7.0	--	--	--	2.7	--	USGS	MBMG	
--	17.0	7.0	--	--	--	2.0	--	USGS	MBMG	
--	20.0	7.6	--	--	--	1.9	--	USGS	MBMG	
--	14.0	5.4	--	--	--	1.7	--	USGS	MBMG	
--	12.0	7.3	--	--	--	1.4	--	USGS	MBMG	
--	15.0	7.2	--	--	--	3.0	--	USGS	MBMG	
--	14.0	<10	--	--	--	3.1	--	USGS	MBMG	
--	26.0	10.0	--	--	--	3.2	--	USGS	UM	06N20W13BADD01
--	38.0	13.0	--	--	--	.84	--	USGS	UM	06N20W13BCAC01
--	15.0	6.4	--	--	--	1.8	--	USGS	UM	06N20W14ACDD01
291	15	5.5	.50	56	399	1.5	<.20	USGS	MBMG	
--	9.7	1.5	--	--	--	.94	--	USGS	UM	06N20W14BADB01
--	20	10	.37	59	--	.54	--	MBMG	MBMG	06N20W14BBBB01
--	18	10	.31	57	--	.53	--	MBMG	MBMG	
--	<2.0	<1.0	--	--	--	.16	--	USGS	UM	06N20W14CAAA01
--	18.0	6.8	--	--	--	1.1	--	USGS	UM	06N20W14CDAB01
--	20.0	4.4	--	--	--	1.0	--	USGS	UM	06N20W14DAAA01
--	20.0	4.4	--	--	--	1.0	--	USGS	UM	
254	25	6.0	.40	55	373	1.9	<.20	USGS	MBMG	
--	25.0	8.7	--	--	--	1.5	--	USGS	UM	06N20W15AACD01

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
06N20W15BBCC01	06-15-95	481	7.5	11.5	--	--	--	--	--	--	--
	06-15-95[2]	481	7.5	11.5	--	--	--	--	--	--	--
06N20W15CACC01	07-27-95	505	7.5	11.5	--	--	--	--	--	--	--
06N20W16AABD01	08-15-95	526	7.5	15.0	--	--	--	--	--	--	--
	09-14-95	523	7.3	11.5	7.0	71	13	22	3.7	287	0
06N20W16ACCB01	05-02-95	484	7.5	11.5	--	--	--	--	--	--	--
06N20W16ADCB01	07-27-95	577	7.5	14.5	--	--	--	--	--	--	--
	09-07-95	563	7.6	12.5	6.7	70	12	40	3.1	342	0
06N20W16BAAD01	06-15-95	364	7.5	10.0	--	--	--	--	--	--	--
	09-07-95	353	7.5	12.5	8.8	42	7.9	19	2.8	156	0
06N20W16DDDB01	06-15-95	453	7.5	9.5	--	--	--	--	--	--	--
06N20W17AACA01	06-15-95	284	6.9	10.0	--	--	--	--	--	--	--
06N20W17ADCC01	05-02-95	307	7.2	10.5	--	--	--	--	--	--	--
06N20W29BADB01	03-09-94	402	7.3	11.0	--	64	9.1	6.7	3.3	--	--
	08-24-95	409	7.7	12.5	--	--	--	--	--	--	--
06N19W06CBCA01	07-27-95	739	6.9	14.5	--	--	--	--	--	--	--
06N19W07BABC01	07-27-95	391	7.6	12.0	--	--	--	--	--	--	--
	07-27-95[2]	391	7.6	12.0	--	--	--	--	--	--	--
	09-14-95	429	7.3	11.5	7.8	64	7.6	17	3.7	243	0
	09-14-95[2]	429	7.3	11.5	7.8	62	7.6	18	3.7	243	0
05N21W03ACBA01	08-15-95	106	6.3	9.0	--	--	--	--	--	--	--
05N21W12BCAB01	08-15-95	42.1	6.4	11.0	--	--	--	--	--	--	--
05N21W15AABD01	08-18-92	172	8.5	--	.7	3.5	3.9	28	1.3	95	4
	12-14-95	158	8.0	11.0	--	--	--	--	--	--	--
05N21W15AADB01	08-18-92	36.0	6.1	10.5	7.2	2.7	.9	2.3	.70	17	0
	12-14-95	40.3	6.7	7.5	--	--	--	--	--	--	--
05N21W22CDAD01	08-15-95	95.8	7.3	13.5	--	--	--	--	--	--	--
05N21W23BBAA01	08-15-95	40.0	--	11.5	--	--	--	--	--	--	--
	08-15-95[2]	40.0	--	11.5	--	--	--	--	--	--	--
05N21W27DDBD01	08-15-95	108	6.6	11.5	--	--	--	--	--	--	--
05N21W36DCC 02	08-20-92	115	6.2	9.5	1.4	7.5	2.0	11	1.1	53	0
	06-06-96	102	6.4	7.5	--	--	--	--	--	--	--
	06-06-96[2]	102	6.4	7.5	--	--	--	--	--	--	--
05N20W10BAAC01	08-18-92	630	7.7	10.5	7.5	45	13	78	3.6	374	0
	12-14-95	622	7.9	9.0	--	--	--	--	--	--	--
05N20W17BADC01	08-15-95	424	7.8	13.5	--	--	--	--	--	--	--
05N20W17CBAB01	08-15-95	427	4.1	15.0	--	--	--	--	--	--	--
05N20W17CDDB01	08-25-95	435	8.0	11.0	--	--	--	--	--	--	--
05N20W18ABDA01	08-15-95	426	7.6	14.5	--	--	--	--	--	--	--
05N20W18ADBA01	08-15-95	415	7.5	13.5	--	--	--	--	--	--	--
05N20W18CACC01	08-18-92	237	7.1	12.0	8.2	28	6.2	10	1.9	140	0
	12-14-95	244	7.2	10.0	--	--	--	--	--	--	--
05N20W18DACA01	08-15-95	310	7.8	12.5	--	--	--	--	--	--	--
	08-15-95[2]	310	7.8	12.5	--	--	--	--	--	--	--
05N20W18DBAA01	08-15-95	288	7.6	11.5	--	--	--	--	--	--	--
05N20W18DCDB01	08-15-95	243	7.7	13.0	--	--	--	--	--	--	--
05N20W30BDCD01	03-09-94	181	6.9	9.5	--	23	4.3	6.6	2.2	--	--
	12-14-95	188	6.7	10.0	--	--	--	--	--	--	--
04N21W14CBAA01	08-19-92	254	6.6	11.5	6.9	33	7.6	6.8	3.4	144	0
	12-13-95	284	6.8	10.0	--	--	--	--	--	--	--
04N21W16DDDD01	08-20-92	70.0	6.2	11.5	6.0	5.9	1.5	5.5	.40	39	0
	12-13-95	70.4	6.8	10.0	--	--	--	--	--	--	--

Alka-linity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calcu-lated (mg/L)	Nitrate (mg/L as N)	Phos-phorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
--	6.1	4.3	--	--	--	1.4	--	USGS	UM	06N20W15BBCC01
--	6.5	4.7	--	--	--	1.6	--	USGS	UM	
--	16.0	7.0	--	--	--	1.0	--	USGS	UM	06N20W15CACC01
--	22.0	13.0	--	--	--	1.3	--	USGS	UM	06N20W16AABD01
235	23	14	.20	41	336	1.6	<.20	USGS	MBMG	
--	24.0	28.0	--	--	--	1.4	--	USGS	UM	06N20W16ACCB01
--	13.0	6.1	--	--	--	1.5	--	USGS	UM	06N20W16ADCB01
280	12	5.5	.40	49	368	1.5	<.20	USGS	MBMG	
--	20.0	17.0	--	--	--	<.15	--	USGS	UM	06N20W16BAAD01
128	17	19	.40	55	247	1.4	<.20	USGS	MBMG	
--	17.0	14.0	--	--	--	1.6	--	USGS	UM	06N20W16DDDB01
--	5.5	3.7	--	--	--	.92	--	USGS	UM	06N20W17AACA01
--	4.0	< 1.0	--	--	--	1.0	--	USGS	UM	06N20W17ADCC01
--	3.3	1.4	.11	31	--	1.3	<.20	MBMG	MBMG	06N20W29BADB01
--	6.0	2.1	--	--	--	1.3	--	USGS	UM	
--	42.0	27.0	--	--	--	1.7	--	USGS	UM	06N19W06CBCA01
--	12.0	2.8	--	--	--	.75	--	USGS	UM	06N19W07BABC01
--	11.0	2.5	--	--	--	.77	--	USGS	UM	
199	17	5.0	.80	48	285	.40	<.20	USGS	MBMG	
199	17	5.0	.90	49	286	.50	<.20	USGS	MBMG	
--	2.5	1.3	--	--	--	.15	--	USGS	UM	05N21W03ACBA01
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	05N21W12BCAB01
84	3.1	.40	.30	38	130	--	--	USGS	NWQL	05N21W15AABD01
--	< 2.0	1.3				<.15	--	USGS	UM	
14	1.0	.10	<.10	19	35	--	--	USGS	NWQL	05N21W15AADB01
--	<2.0	<1.0	--	--	--	<.15	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	<.15	--	USGS	UM	05N21W22CDAD01
--	< 2.0	< 1.0	--	--	--	.15	--	USGS	UM	05N21W23BBAA01
--	<2.0	<1.0	--	--	--	<.15	--	USGS	UM	
--	< 2.0	1.7	--	--	--	.28	--	USGS	UM	05N21W27DDBD01
43	1.5	7.6	<.10	25	83	--	--	USGS	NWQL	05N21W36DCC 02
--	2.0	2.1	--	--	--	.22	--	USGS	UM	
--	2.1	2.1	--	--	--	.22	--	USGS	UM	
307	30	.70	1.5	44	400	--	--	USGS	NWQL	05N20W10BAAC01
--	31.0	2.9	--	--	--	.45	--	USGS	UM	
--	8.7	4.0	--	--	--	.52	--	USGS	UM	05N20W17BADC01
--	16.0	11.0	--	--	--	.73	--	USGS	UM	05N20W17CBAB01
--	21.0	24.0	--	--	--	1.2	--	USGS	UM	05N20W17CDDB01
--	10.0	7.3	--	--	--	1.2	--	USGS	UM	05N20W18ABDA01
--	10.0	7.4	--	--	--	1.1	--	USGS	UM	05N20W18ADBA01
115	3.7	.70	.40	31	151	--	--	USGS	NWQL	05N20W18CACC01
--	2.8	1.3	--	--	--	.38	--	USGS	UM	
--	< 2.0	< 1.0	--	--	--	.25	--	USGS	UM	05N20W18DACA01
--	<2.0	<1.0	--	--	--	.27	--	USGS	UM	
--	3.5	2.5	--	--	--	.94	--	USGS	UM	05N20W18DBAA01
--	3.6	2.0	--	--	--	.63	--	USGS	UM	05N20W18DCDB01
--	4.6	1.4	.23	37	--	2.2	.20	MBMG	MBMG	05N20W30BDCD01
--	6.5	1.9	--	--	--	3.7	--	USGS	UM	
118	4.8	.30	.20	35	162	--	--	USGS	NWQL	04N21W14CBAA01
--	5.6	1.2	--	--	--	2.3	--	USGS	UM	
32	1.0	.20	<.10	43	77	--	--	USGS	NWQL	04N21W16DDDD01
--	< 2.0	< 1.0	--	--	--	.5	--	USGS	UM	

Table 6. Physical properties and major-ion concentrations for water from wells (Continued)

Location number	Date	Specific conduct-ance, field (µS/cm)	pH, field (stand-ard units)	Temper-ature, water (°C)	Oxygen, dis-solved, field (mg/L)	Cal-cium (mg/L as Ca)	Magne-sium (mg/L as Mg)	Sodium (mg/L as Na)	Potas-sium (mg/L as K)	Bicar-bonate[1] (mg/L as HCO_3)	Carbon-ate[1] (mg/L as CO_3)
04N21W35CCBA01	08-19-92	156	6.7	10.5	4.8	16	5.6	6.5	1.8	92	0
03N21W14BBAC01	08-19-92	159	6.5	10.5	4.3	14	2.7	16	1.4	98	0
03N21W15CCCD01	08-19-92	148	6.5	9.5	6.0	15	3.5	11	.50	84	0
	06-06-96	151	6.8	9.5	--	--	--	--	--	--	--
02N21W01CACD01	12-13-95	215	7.0	9.5	--	--	--	--	--	--	--
	12-13-95[2]	215	7.0	9.5	--	--	--	--	--	--	--
02N20W07BCCC01	08-19-92	54.0	6.8	11.0	7.4	5.6	1.2	2.2	1.4	28	0
02N20W07CABC01	12-13-95	69.9	6.8	9.0	--	--	--	--	--	--	--

[1]Field incremental titration for samples collected by USGS. Laboratory fixed-end titration for samples collected by MBMG.
[2]Replicate analyses.

Alka-linity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calcu-lated (mg/L)	Nitrate (mg/L as N)	Phos-phorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
76	2.0	.60	.20	29	107	--	--	USGS	NWQL	04N21W35CCBA01
80	2.5	.70	.10	26	112	--	--	USGS	NWQL	03N21W14BBAC01
69	1.4	1.2	<.10	41	115	--	--	USGS	NWQL	03N21W15CCCD01
--	<2.0	1.9	--	--	--	.69	--	USGS	UM	
--	< 2.0	1.3	--	--	--	.18	--	USGS	UM	02N21W01CACD01
--	<2.0	<1.0	--	--	--	.16	--	USGS	UM	
23	1.5	.40	.10	13	40	--	--	USGS	NWQL	02N20W07BCCC01
--	2.6	1.0	--	--	--	.43	--	USGS	UM	02N20W07CABC01

Table 7. Trace-element and radon concentrations for water from wells

[Location number--numbering system described in text. Constituents are dissolved, except as indicated. Collecting agency: MBMG, Montana Bureau of Mines and Geology, Butte, Mont.; USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont.; NWQL, USGS National Water Quality Laboratory, Arvada, Colo. Abbreviations: µg/L, micrograms per liter; pCi/L, picocuries per liter. Symbols: <, less than; --, no data]

Location number	Date	Aluminum (µg/L as Al)	Arsenic, As^{+3} and As^{+5} (µg/L as As)	Barium (µg/L as Ba)	Beryllium (µg/L as Be)	Boron (µg/L as B)	Cadmium (µg/L as Cd)	Chromium (µg/L as Cr)	Copper (µg/L as Cu)	Iron (µg/L as Fe)	Lead (µg/L as Pb)	Lithium (µg/L as Li)	Manganese (µg/L as Mn)
10N20W10ACBC01	06-23-80	--	--	--	--	--	--	--	--	<10	--	--	<10
10N20W10CBBD01	03-10-94	<30	<1	3	<2	<30	<2	<2	47	3	<2	<6	<2
10N20W11CDCD01	03-10-94	<30	<1	71	<2	<30	<2	<2	<2	450	<2	<6	51
10N20W12ADCB01	09-13-95	<30	<1	77	<2	<30	<2	<2	<2	4	<2	<6	<2
10N20W12DDDC01	09-15-95	<30	2	110	<2	<30	<2	<2	<2	<3	<2	<6	<2
10N20W13BBA 01	05-12-80	--	--	--	--	--	--	--	--	160	--	--	<10
10N19W05DCDD01	09-12-95	<30	<1	190	<2	<80	<2	<2	<2	<3	<2	6	<2
10N19W06DCDA01	09-12-95	<30	1	140	--	<30	<2	<2	<2	<3	<2	<6	<2
10N19W06DDCC01	09-19-95	--	--	--	--	--	--	--	--	--	--	--	--
10N19W07ADBC01	09-13-95	<30	<1	98	<2	<80	<2	<2	<2	12	<2	<6	3
	09-13-95[1]	<30	<1	100	--	<30	<2	<2	<2	5	<2	<6	<2
10N19W07BACB01	09-12-95	<30	<1	110	<2	<30	<2	<2	<2	<3	<2	<6	<2
10N19W07CAAB01	09-15-95	<30	<1	76	<2	<30	<2	<2	<2	4	<2	<6	<2
10N19W07CDCC01	09-13-95	<30	<1	92	<2	<30	<2	<2	<2	<3	<2	<6	<2
10N19W08ADDC01	09-12-95	<30	4	130	<2	<30	<2	<2	<2	6	<2	<6	15
10N19W08BCAD01	09-13-95	<30	<1	100	<2	<80	<2	<2	<2	270	<2	23	32
10N19W08CDAC01	09-13-95	<30	<1	100	<2	<80	<2	<2	5	<3	<2	<6	<2
10N19W08DBBD01	09-12-95	<30	5	140	<2	<80	<2	<2	3	<3	<2	7	4
10N19W08DCCB01	09-13-95	<30	<1	97	<2	<30	<2	<2	<2	<3	<2	<6	<2
10N19W08DCCC02	03-10-94	<30	<1	100	<2	<30	<2	<2	32	<3	<2	<6	2
10N19W16BBBC01	09-15-95	<30	2	60	<2	<30	<2	<2	<2	6	<2	<6	<2
10N19W18AADB01	09-13-95	<30	<1	73	<2	<30	<2	<2	<2	<3	<2	<6	<2
10N19W18DBBA01	09-13-95	<30	<1	80	<2	<30	<2	<2	36	<3	<2	<6	<2
09N20W20CDCD01	09-14-95	<30	<1	11	<2	<30	<2	<2	<2	200	<2	<6	6
08N21W27DCBC01	03-10-94	160	<1	21	<2	<30	<2	<2	<2	150	<2	11	<2
08N20W01DAAD01	08-20-92	--	--	55	<.5	40	5	<5	<10	4	<10	<4	<1
08N20W14ABDB01	09-15-95	<30	3	140	<2	<30	<2	<2	3	<3	<2	8	<2
08N20W23CDDD01	08-20-92	--	--	40	<.5	20	2	<5	<10	18	10	7	3
08N20W26BAAC01	03-10-94	<30	<1	27	<2	<30	<2	<2	<2	12	<2	14	130
08N19W04BDAA01	03-09-94	<30	<1	31	<2	<30	<2	<2	<2	42	<2	<6	<2
08N19W07CBBD01	03-10-94	<30	2	55	<2	220	<2	<2	2	<2	<2	7	<2
08N19W11CDBB01	08-20-92	--	--	37	<.5	10	1	<5	<10	38	<10	10	1
07N21W13BBAD01	08-17-92	--	--	7	<.5	<10	1	<5	<10	<3	<10	<4	<1
	08-17-92[1]	--	--	7	<.5	<10	2	<5	<10	<3	<10	<4	<1
07N21W25CABC01	08-17-92	--	--	23	<.5	<10	2	<5	<10	160	<10	9	16
07N21W36DDDC01	03-09-94	<30	<1	7	<2	<30	<2	<2	11	13	<2	7	<2
07N20W32DDDA02	03-09-94	<30	3	64	<2	<30	<2	<2	<2	4	<2	10	<2
06N21W02ABBD01	03-09-94	<30	<1	6	<2	<30	<2	<2	4	3	<2	14	<2
06N21W03DDAA01	09-07-95	30	<1	48	<2	<80	<2	3	12	39	<2	10	<2
06N21W09DADA01	09-07-95	<30	<1	42	<2	130	<2	4	<2	<10	<2	58	20

Molybdenum (µg/L as Mo)	Nickel (µg/L as Ni)	Selenium (µg/L as Se)	Silver (µg/L as Ag)	Strontium (µg/L as Sr)	Titanium (µg/L as Ti)	Vanadium (µg/L as V)	Zinc (µg/L as Zn)	Zirconium (µg/L as Zr)	Radon 222, total (pCi/L)	Collecting agency	Analyzing agency	Location number
--	--	--	--	--	--	--	--	--	--	MBMG	MBMG	10N20W10ACBC01
<10	<2	<1	<1	24	<10	<5	17	<20	--	MBMG	MBMG	10N20W10CBBD01
<10	<2	<1	<1	120	<10	<5	61	<20	--	MBMG	MBMG	10N20W11CDCD01
<10	<2	<1	<1	74	<10	<5	15	<20	1,080	USGS	MBMG	10N20W12ADCB01
<10	<2	<1	<1	72	<10	<5	<8	<20	580	USGS	MBMG	10N20W12DDDC01
--	--	--	--	--	--	--	--	--	--	MBMG	MBMG	10N20W13BBA 01
<10	2	2	<1	270	<10	<5	8	<20	1,080	USGS	MBMG	10N19W05DCDD01
<10	<2	<1	<1	110	<10	<5	15	<20	--	USGS	MBMG	10N19W06DCDA01
--	--	--	--	--	--	--	--	--	880	USGS	MBMG	10N19W06DDCC01
<10	<2	<1	<1	73	<10	<5	120	<20	1,070	USGS	MBMG	10N19W07ADBC01
<10	<2	<1	<1	72	<10	<5	130	<20	--	USGS	MBMG	
<10	<2	<1	<1	69	<10	<5	13	<20	500	USGS	MBMG	10N19W07BACB01
<10	<2	<1	<1	47	<10	<5	13	<20	760	USGS	MBMG	10N19W07CAAB01
<10	<2	<1	<1	66	<10	<5	24	<20	410	USGS	MBMG	10N19W07CDCC01
<10	<2	<1	<1	110	<10	<5	430	<20	--	USGS	MBMG	10N19W08ADDC01
<10	<2	1	<1	110	<10	<5	200	<20	710	USGS	MBMG	10N19W08BCAD01
<10	<2	<1	<1	61	<10	<5	77	<20	510	USGS	MBMG	10N19W08CDAC01
<10	<2	2	<1	61	<10	<5	<8	<20	810	USGS	MBMG	10N19W08DBBD01
<10	<2	<1	<1	48	<10	<5	15	<20	550	USGS	MBMG	10N19W08DCCB01
<10	<2	<1	<1	49	<10	<5	490	<20	--	MBMG	MBMG	10N19W08DCCC02
<10	<2	<1	<1	40	<10	<5	180	<20	650	USGS	MBMG	10N19W16BBBC01
<10	<2	<1	<1	33	<10	<5	18	<20	810	USGS	MBMG	10N19W18AADB01
<10	<2	<1	<1	35	<10	<5	<8	<20	660	USGS	MBMG	10N19W18DBBA01
<10	<2	<1	<1	160	<10	<5	<8	<20	--	USGS	MBMG	09N20W20CDCD01
<10	<2	<1	<1	89	<10	<5	16	29	--	MBMG	MBMG	08N21W27DCBC01
<10	<10	--	<1	290	--	<6	180	--	--	USGS	NWQL	08N20W01DAAD01
<10	<2	<1	<1	200	<10	<5	120	<20	--	USGS	MBMG	08N20W14ABDB01
<10	<10	--	1	85	--	<6	120	--	--	USGS	NWQL	08N20W23CDDD01
<10	<2	<1	<1	180	<10	<5	18	<20	--	MBMG	MBMG	08N20W26BAAC01
<10	<2	<1	<1	41	<10	<5	25	<20	--	MBMG	MBMG	08N19W04BDAA01
<10	<2	<1	<1	360	<10	<5	34	<20	--	MBMG	MBMG	08N19W07CBBD01
<10	<10	--	<1	54	--	<6	36	--	--	USGS	NWQL	08N19W11CDBB01
<10	<10	--	<1	120	--	<6	21	--	3,600	USGS	NWQL	07N21W13BBAD01
<10	<10	--	<1	120	--	<6	24	--	--	USGS	NWQL	
<10	<10	--	<1	87	--	<6	17	--	1,800	USGS	NWQL	07N21W25CABC01
<10	<2	<1	<1	43	<10	<5	220	<20	--	MBMG	MBMG	07N21W36DDDC01
<10	<2	<1	<1	130	<10	<5	25	<20	--	MBMG	MBMG	07N20W32DDDA02
<10	<2	<1	<1	110	<10	<5	7	<20	--	MBMG	MBMG	06N21W02ABBD01
<10	<2	<1	<1	150	<10	<5	19	<20	1,950	USGS	MBMG	06N21W03DDAA01
<10	<2	<1	<1	730	<10	<5	43	<20	1,280	USGS	MBMG	06N21W09DADA01

Table 7. Trace-element and radon concentrations for water from wells (Continued)

Location number	Date	Aluminum (µg/L as Al)	Arsenic, As^{+3} and As^{+5} (µg/L as As)	Barium (µg/L as Ba)	Beryllium (µg/L as Be)	Boron (µg/L as B)	Cadmium (µg/L as Cd)	Chromium (µg/L as Cr)	Copper (µg/L as Cu)	Iron (µg/L as Fe)	Lead (µg/L as Pb)	Lithium (µg/L as Li)	Manganese (µg/L as Mn)
06N21W11ABAA01	09-06-95	<30	<1	67	<2	<80	<2	<2	<2	1,000	<2	<6	120
06N21W11CDCB01	09-06-95	<30	1	57	<2	<80	<2	<2	<2	1,400	<2	25	39
06N21W12BDDD01	09-06-95	60	<1	53	<2	<80	<2	<2	<2	1,200	<2	6	54
06N21W14BDAC01	09-06-95	40	<1	6	<2	<80	<2	<2	<2	15	<2	8	<2
	09-06-95[1]	40	<1	6	<2	<80	<2	<2	<2	16	<2	<6	<2
06N21W15CDDD01	08-17-92	--	--	3	<.5	<10	<1	<5	<10	6	<10	<4	<1
06N21W22AADC01	09-06-95	60	<1	7	<2	<80	<2	<2	4	170	<2	9	3
06N21W23CABC01	09-06-95	<30	<1	12	<2	<80	<2	<2	7	<10	<2	11	<2
06N21W23DDAD01	09-05-95	190	<1	10	<2	<80	<2	<2	4	300	<2	12	6
06N21W23DDBB01	09-05-95	190	<1	13	<2	<80	<2	<2	2	280	<2	12	6
06N21W24BAAC01	09-06-95	<30	<1	14	<2	<80	<2	<2	<2	250	<2	9	6
06N21W24CCAC01	09-05-95	160	<1	6	<2	<80	<2	<2	6	230	<2	6	4
06N21W25DBAA01	08-18-92	--	--	32	<.5	<10	3	<5	<10	<3	<10	<4	<1
06N21W26DBAD01	03-08-94	<30	<1	17	<2	<30	<2	<2	<2	91	<2	12	10
06N21W27BBAA01	03-08-94	<30	<1	10	<2	<30	<2	<2	<2	45	<2	9	8
06N20W01BABB01	09-14-95	<30	12	24	<2	120	<2	<2	<2	5	<2	14	<2
06N20W01CDCD01	09-07-95	<30	11	35	<2	<80	<2	8	4	11	<2	10	<2
06N20W03BDCC01	03-09-94	<30	4	55	<2	<30	<2	<2	3	4	<2	10	<2
06N20W04DCCB01	09-14-95	<80	8	64	--	<80	<2	<2	<2	8	<2	9	<2
06N20W10AADC01	09-14-95	<30	9	180	<2	80	<2	6	2	4	<2	12	<2
06N20W10BCAC01	09-14-95	<30	7	120	<2	90	<2	<2	<2	<3	<2	7	<2
06N20W12CCCD01	09-08-95	<30	9	79	<2	80	<2	8	<2	<5	<2	10	<2
	09-08-95[1]	<30	9	78	<2	<80	<2	7	<2	<5	<2	<10	<2
06N20W14ACDD01	09-07-95	<30	11	79	<2	200	<2	7	<2	6	<2	21	<2
06N20W14BBBB01	07-30-79	--	--	--	--	--	--	--	--	30	--	10	<10
	08-28-79	--	--	--	--	--	--	--	--	<0	--	9	<0
06N20W14DAAA01	09-07-95	<30	8	64	<2	170	<2	6	<2	<5	<2	13	<2
06N20W16AABD01	09-14-95	<30	2	95	<2	<30	<2	<2	<2	<3	<2	<6	<2
06N20W16ADCB01	09-07-95	<30	4	120	<2	80	<2	7	7	<3	<2	12	<2
06N20W16BAAD01	09-07-95	<30	5	69	<2	<80	<2	4	4	<10	<2	10	<2
06N20W29BADB01	03-09-94	<30	2	83	<2	<30	<2	<2	<2	<2	<2	<6	<2
06N20W30DBCC01	09-19-92	--	--	--	--	--	--	--	--	--	--	--	--
06N19W07BABC01	09-14-95	<30	5	71	<2	80	<2	<2	<2	5	<2	9	<2
	09-14-95[1]	<30	5	71	<2	90	<2	<2	<2	6	<2	11	<2
05N21W15AABD01	08-18-92	--	--	9	<.5	10	3	<5	<10	45	<10	28	290
05N21W15AADB01	08-18-92	--	--	3	<.5	<10	3	<5	<10	39	<10	<4	20
05N21W36DCC 02	08-20-92	--	--	22	<.5	<10	1	<5	<10	1,200	<10	8	76
05N20W10BAAC01	08-18-92	--	--	42	<.5	<10	<1	<5	<10	<3	<10	12	<1
05N20W18CACC01	08-18-92	--	--	54	<.5	<10	2	<5	<10	40	20	6	14
05N20W30BDCD01	03-09-94	<30	<1	29	<2	<30	<2	<2	5	4	<2	18	<2
04N21W14CBAA01	08-19-92	--	--	46	<.5	10	2	<5	<10	<3	<10	13	1
04N21W16DDDD01	08-20-92	--	--	11	<.5	<10	2	<5	<10	4	<10	9	<1
04N21W35CCBA01	08-19-92	--	--	44	<.5	100	2	<5	<10	4	<10	12	<1
03N21W14BBAC01	08-19-92	--	--	13	<.5	10	3	<5	<10	<3	<10	17	<1
	09-19-92	--	--	--	--	--	--	--	--	--	--	--	--
03N21W14CAAA01	09-19-92	--	--	--	--	--	--	--	--	--	--	--	--
03N21W15CCCD01	08-19-92	--	--	9	<.5	<10	3	<5	<10	5	<10	9	2
02N20W07BCCC01	08-19-92	--	--	6	<.5	<10	2	<5	<10	29	<10	<4	23

[1]Replicate analyses.

Molybdenum (µg/L as Mo)	Nickel (µg/L as Ni)	Selenium (µg/L as Se)	Silver (µg/L as Ag)	Strontium (µg/L as Sr)	Titanium (µg/L as Ti)	Vanadium (µg/L as V)	Zinc (µg/L as Zn)	Zirconium (µg/L as Zr)	Radon 222, total (pCi/L)	Collecting agency	Analyzing agency	Location number
<10	<2	<1	<1	120	<10	<5	28	<20	--	USGS	MBMG	06N21W11ABAA01
<10	<2	<1	<1	130	<10	<5	69	<20	--	USGS	MBMG	06N21W11CDCB01
<10	<2	<1	<1	170	<10	<5	6	<20	--	USGS	MBMG	06N21W12BDDD01
<10	<2	<1	<1	85	<10	<5	8	<20	--	USGS	MBMG	06N21W14BDAC01
<10	,2	<1	<1	84	<10	<5	8	<20	--	USGS	MBMG	
<10	<10	--	1	54	--	<6	27	--	1,600	USGS	NWQL	06N21W15CDDD01
<10	<2	<1	<1	45	20	<5	32	<20	1,100	USGS	MBMG	06N21W22AADC01
<10	<2	<1	<1	84	<10	<5	<2	<20	1,120	USGS	MBMG	06N21W23CABC01
<10	<2	<1	<1	64	20	<5	3	<20	1,130	USGS	MBMG	06N21W23DDAD01
<10	<2	<1	<1	68	20	<5	18	<20	910	USGS	MBMG	06N21W23DDBB01
<10	<2	<1	<1	120	<10	<5	3	<20	2,720	USGS	MBMG	06N21W24BAAC01
<10	<2	<1	<1	74	20	<5	9	<20	1,090	USGS	MBMG	06N21W24CCAC01
<10	<10	--	<1	55	--	<6	7	--	1,300	USGS	NWQL	06N21W25DBAA01
<10	<2	<1	<1	140	<10	<5	17	<20	--	MBMG	MBMG	06N21W26DBAD01
<10	<2	<1	<1	170	<10	<5	6	<20	--	MBMG	MBMG	06N21W27BBAA01
<10	<2	1	<1	120	<10	15	110	<20	490	USGS	MBMG	06N20W01BABB01
<10	<2	<1	<1	140	<10	28	42	<20	350	USGS	MBMG	06N20W01CDCD01
<10	2	<1	<1	100	<10	<5	12	<20	--	MBMG	MBMG	06N20W03BDCC01
<10	<2	<1	<1	26	<10	14	26	<20	640	USGS	MBMG	06N20W04DCCB01
<10	3	1	<1	260	<10	7	91	<20	150	USGS	MBMG	06N20W10AADC01
<10	<2	<1	<1	120	<10	<5	32	<20	--	USGS	MBMG	06N20W10BCAC01
<10	2	<1	<1	140	<10	15	26	<20	200	USGS	MBMG	06N20W12CCCD01
<10	2	<1	<1	140	<10	14	27	<20	--	USGS	MBMG	
11	<2	<1	<1	69	<10	17	43	<20	--	USGS	MBMG	06N20W14ACDD01
--	--	--	--	--	--	--	--	--	--	MBMG	MBMG	06N20W14BBBB01
--	--	--	--	--	--	--	--	--	--	MBMG	MBMG	
12	<2	<1	<1	83	<10	14	2	<20	170	USGS	MBMG	06N20W14DAAA01
<10	<2	<1	<1	180	<10	<5	<8	<20	--	USGS	MBMG	06N20W16AABD01
<10	<2	<1	<1	170	<10	9	23	<20	150	USGS	MBMG	06N20W16ADCB01
<10	<2	1	<1	82	<10	9	74	<20	230	USGS	MBMG	06N20W16BAAD01
<10	2	<1	<1	110	<10	<5	13	<20	--	MBMG	MBMG	06N20W29BADB01
--	--	--	--	--	--	--	--	--	725	MBMG	MBMG	06N20W30DBCC01
<10	<2	<1	<1	130	<10	<5	80	<20	--	USGS	MBMG	06N19W07BABC01
<10	<2	<1	<1	130	<10	<5	83	<20	--	USGS	MBMG	
<10	<10	--	<1	120	--	<6	<3	--	--	USGS	NWQL	05N21W15AABD01
<10	<10	--	1	49	--	<6	280	--	670	USGS	NWQL	05N21W15AADB01
<10	<10	--	<1	90	--	<6	24	--	--	USGS	NWQL	05N21W36DCC 02
<10	<10	--	<1	140	--	14	16	--	430	USGS	NWQL	05N20W10BAAC01
<10	<10	--	<1	160	--	7	16	--	1,400	USGS	NWQL	05N20W18CACC01
<10	<2	<1	<1	210	<10	<5	7	<20	--	MBMG	MBMG	05N20W30BDCD01
<10	<10	--	<1	210	--	7	80	--	--	USGS	NWQL	04N21W14CBAA01
<10	<10	--	2	76	--	<6	8	--	--	USGS	NWQL	04N21W16DDDD01
<10	<10	--	<1	180	--	<6	34	--	--	USGS	NWQL	04N21W35CCBA01
<10	<10	--	<1	160	--	<6	4	--	3,700	USGS	NWQL	03N21W14BBAC01
--	--	--	--	--	--	--	--	--	1,667	MBMG	MBMG	
--	--	--	--	--	--	--	--	--	2,423	MBMG	MBMG	03N21W14CAAA01
<10	<10	--	<1	150	--	<6	14	--	3,300	USGS	NWQL	03N21W15CCCD01
<10	<10	--	<1	46	--	<6	530	--	--	USGS	NWQL	02N20W07BCCC01

Table 8. Physical properties and major-ion concentrations for water from surface-water sites and one spring

[Location number: numbering system described in text. Constituents are dissolved, except as indicated. Collecting agency: USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont.; UM, University of Montana, Missoula, Mont. Abbreviations: µS/cm, microsiemens per centimeter at 25 °C; °C, degrees Celsius; mg/L, milligrams per liter. Symbols: <, less than; --, no data]

Location number	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
06N21W20AABB01	09-20-95	11	6.1	8.5	1.4	0.1	0.8	0.20	6	0
06N20W12AACD01	09-20-95	34	7.1	14.0	3.7	.9	1.2	.3	17	0
06N20W12AACD02	09-20-95	309	7.0	9.0	52	6.8	5.3	2.8	154	0
08N20W02ACBD01[2]	10-26-95	588	7.4	9.5	--	--	--	--	--	--
10N19W03DCCD01	09-20-95	157	7.7	8.0	20	6.4	3.2	1.5	94	0

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number
5	<2.5	<0.50	<0.10	5.3	--	<0.05	<0.20	USGS	MBMG	06N21W20AABB01
14	<2.5	.50	<.10	5.5	--	<.05	<.20	USGS	MBMG	06N20W12AACD01
126	5.0	1.5	.30	29	178	<.05	<.20	USGS	MBMG	06N20W12AACD02
--	15	7.2	--	--	--	1.2	--	USGS	UM	08N19W02ACBD01[2]
77	5.0	.50	<.10	17	100	.05	<.20	USGS	MBMG	10N19W03DCCD01

[1]Field incremental titration.
[2]Spring.

Table 9. Trace-element concentrations for water from surface-water sites

[Location number: Numbering system described in text. Constituents are dissolved, except as indicated. Collecting agency: USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont. Abbreviations: µg/L, micrograms per liter. Symbols: <, less than]

Location number	Date	Aluminum (µg/L as Al)	Arsenic, As^{+3} and As^{+5} (µg/L as As)	Barium (µg/L as Ba)	Boron (µg/L as B)	Cadmium (µg/L as Cd)	Chromium (µg/L as Cr)	Copper (µg/L as Cu)	Iron (µg/L as Fe)	Lead (µg/L as Pb)	Lithium (µg/L as Li)	Manganese (µg/L as Mn)
06N21W20AABB01	09-20-95	30	<1	4	<30	<2	<2	<2	<20	<2	<6	<2
06N20W12AACD01	09-20-95	<30	<1	14	<30	<2	<2	<2	<20	<2	<6	<2
06N20W12AACD02	09-20-95	<30	4	35	<30	<2	<2	<2	<20	<2	<6	<2
10N19W03DCCD01	09-20-95	<30	<1	53	<30	<2	<2	<2	<20	<2	<6	<2

Molybdenum (µg/L as Mo)	Nickel (µg/L as Ni)	Selenium (µg/L as Se)	Silver (µg/L as Ag)	Strontium (µg/L as Sr)	Titanium (µg/L as Ti)	Vanadium (µg/L as V)	Zinc (µg/L as Zn)	Zirconium (µg/L as Zr)	Collecting agency	Analyzing agency	Location number
<10	<2	<1	<1	15	<10	<5	<8	<20	USGS	MBMG	06N21W20AABB01
<10	<2	<1	<1	27	<10	<5	<8	<20	USGS	MBMG	06N20W12AACD01
<10	<2	<1	<1	100	<10	<5	<8	<20	USGS	MBMG	06N20W12AACD02
<10	<2	<1	<1	28	<10	<5	<8	<20	USGS	MBMG	10N19W03DCCD01

Table 10. Physical properties and major-ion concentrations for deionized-water field blanks

[Location number indicates site where sampling equipment was used prior to collecting field blank. Constituents are dissolved, except as indicated. Collecting agency: USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont. Abbreviations: µS/cm, microsiemens per centimeter at 25 °C; °C, degrees Celsius; mg/L, milligrams per liter. Symbols: <, less than; --, no data]

Location number of previous site	Date	Specific conductance, field (µS/cm)	pH, field (standard units)	Temperature, water (°C)	Oxygen, dissolved, field (mg/L)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate[1] (mg/L as HCO_3)	Carbonate[1] (mg/L as CO_3)
06N20W12CCCD01	09-08-95	--	--	--	--	<0.1	<0.1	<0.1	0.19	--	--
10N20W12DDDC01	09-15-95	--	--	--	--	<.1	<.1	<.1	<.1	--	--

Alkalinity[1] (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Silica (mg/L as SiO_2)	Dissolved solids, calculated (mg/L)	Nitrate (mg/L as N)	Phosphorus (mg/L as P)	Collecting agency	Analyzing agency	Location number of previous site
--	<2.5	<0.50	<0.10	20	--	<0.05	<0.20	USGS	MBMG	06N20W12CCCD01
--	<2.5	<.50	<.10	20	--	<.5	<.20	USGS	MBMG	10N20W12DDDC01

[1]Field incremental titration.

Table 11. Trace-element concentrations for deionized-water field blanks

[Location number indicates site where sampling equipment was used prior to collecting field blank. Constituents are dissolved, except as indicated. Collecting agency: USGS, U.S. Geological Survey, Helena, Mont. Analyzing agency: MBMG, Montana Bureau of Mines and Geology, Analytical Division, Butte, Mont. Abbreviation: µg/L, micrograms per liter. Symbol: <, less than]

Location number of previous site	Date	Aluminum (µg/L as Al)	Arsenic, As^{+3} and As^{+5} (µg/L as As)	Barium (µg/L as Ba)	Beryllium (µg/L as Be)	Boron (µg/L as B)	Cadmium (µg/L as Cd)	Chromium (µg/L as Cr)	Copper (µg/L as Cu)	Iron (µg/L as Fe)	Lead (µg/L as Pb)	Lithium (µg/L as Li)
06N20W12CCCD01	09-08-95	<30	<1	<10	<2	<80	<2	<2	<2	<10	<2	<6
10N20W12DDDC01	09-15-95	<30	<1	6	<2	<30	<2	<2	<2	<3	<2	<6

Manganese (µg/L as Mn)	Molybdenum (µg/L as Mo)	Nickel (µg/L as Ni)	Silver (µg/L as Ag)	Selenium (µg/L as Se)	Strontium (µg/L as Sr)	Titanium (µg/L as Ti)	Vanadium (µg/L as V)	Zinc (µg/L as Zn)	Zirconium (µg/L as Zr)	Collecting agency	Analzing agency	Location number of previous site
<2	<10	<2	<1	<1	<6	<10	<5	<2	<20	USGS	MBMG	06N20W12CCCD01
<2	<10	<2	<1	<1	<6	<10	<5	<8	<20	USGS	MBMG	10N20W12DDDC01

Table 12. Drinking-water regulations and guidelines for public water supply[1,2]

[MCL, Maximum Contaminant Level; SMCL, Secondary Maximum Contaminant Level; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no regulation available or not applicable]

Water-quality characteristic	Maximum concentration or value for indicated regulation			
	National Primary Drinking-Water Regulation[3] (MCL)	National Secondary Drinking-Water Regulation[3] (SMCL)	Montana drinking-water regulation[4]	Equivalent trace-element concentration[5] for MCL or SMCL (µg/L)
		Physical property (standard units)		
pH	--	6.5-8.5	--	--
		Common constituents (mg/L)		
Dissolved solids	--	500	--	--
Chloride	--	250	--	--
Fluoride	4.0	2.0	4.0	--
Nitrate (as N)	10	--	10	--
Sulfate	500	250	--	--
		Trace elements (mg/L)		
Aluminum	--	.05-.2	--	50-200
Arsenic	.05	--	.018	50
Barium	2.0	--	1.0	2,000
Beryllium	.004	--	.04	4
Cadmium	.005	--	.005	5
Chromium	.1	--	.1	100
Copper[6]	1.3	1.0	1.0	1,300; 1,000
Iron	--	.3	.3	300
Lead[7]	.015	--	.015	15
Manganese	--	.05	.05	50
Nickel	.14	--	.1	140
Selenium	.05	--	.05	50
Silver	--	.1	--	100
Zinc	--	5.0	5.0	5,000

[1]Regulations in effect as of October 1996.

[2]Listed only for properties, common constituents, trace elements, and radionuclides analyzed in this report.

[3]U.S. Environmental Protection Agency, 1996.

[4]Montana Department of Environmental Quality, 1995.

[5]The U.S. Geological Survey reports trace-element concentrations in micrograms per liter.

[6]Copper is covered under primary regulations by an "action level."

[7]Lead is covered under primary regulations by an "action level."