Geohydrologic Framework, Ground-Water Hydrology, and Water Use in the Gasconade River Basin upstream from Jerome, Missouri, including the Fort Leonard Wood Military Reservation

Water-Resources Investigations Report 03–4165

Prepared in cooperation with the
Directorate of Public Works,
Environmental Division,
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VERTICAL DATUM

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). **Altitude,** as used in this report, refers to distance above or below NGVD 29. NGVD 29 can be converted to the North American Vertical Datum of 1988 (NAVD 88) by using the National Geodetic Survey conversion utility available at URL **http://www.ngs.noaa.gov/TOOLS/Vertcon/vertcon.html.**

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Abstract

The Ozark aquifer is the principal source of ground water in the Gasconade River Basin upstream from Jerome, Missouri (herein referred to as the upper Gasconade River Basin), including the Fort Leonard Wood Military Reservation (FLWMR). The Ozark aquifer is composed of, in order of increasing age, the Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite, Eminence Dolomite, and Potosi Dolomite. Sedimentary strata are nearly horizontal, except along folds and collapse zones where dips can be steep. The basin is cut by numerous faults, most of which trend generally northwest-southeast. The Jefferson City Dolomite and the Cotter Dolomite generally yield little water to wells. Wells completed in the Roubidoux Formation and Gasconade Dolomite commonly yield from several tens to several hundred gallons per minute of water. The Eminence Dolomite may form a weak hydrologic barrier to vertical ground-water flow between the overlying Gasconade Dolomite and the underlying Potosi Dolomite. The Potosi Dolomite is the most permeable formation in the Ozark aquifer. Wells completed in the Potosi Dolomite may yield from several hundred to 1,000 gallons per minute of water.

Water-table contours indicate several areas of high permeability karst terrain in the upper Gasconade River Basin. Ground-water levels may be as deep as 300 feet below the land surface beneath upland areas where karst features are prevalent. Although the Jefferson City Dolomite and the Roubidoux Formation are the uppermost bedrock formations in the upland areas of the FLWMR, the water table generally is deep enough to occur in the underlying Gasconade Dolomite throughout most of the FLWMR. Discharge from springs [311 ft^3/s (cubic feet per second)] represented 56 percent of the August 1999 discharge of the Gasconade River at Jerome, Missouri (552 ft^3/s).

From 1993 through 1997, annual pumpage from all public water-supply wells in the upper Gasconade River Basin ranged from 1,820 Mgal [million gallons; an average daily rate of 4.99 Mgal/d (million gallons per day)] in 1993 to 2,030 Mgal (an average daily rate of 5.56 Mgal/d) in 1997. Including an estimated 4 Mgal/d from domestic wells, the average daily pumping rate for all wells is estimated to range from 8.99 Mgal/d in 1993 to 9.56 Mgal/d in 1997. During the same period, annual pumpage from the Big Piney River, which supplies most of the water used at the FLWMR, ranged from 1,136 Mgal (an average of 3.11 Mgal/d) in 1997 to 1,334 Mgal (an average of 3.65 Mgal/d) in 1995, and as a percentage of total water use in the upper Gasconade River Basin, ranged from about 24.5 percent in 1997 to about 28.8 percent in 1993.

INTRODUCTION

The Gasconade River Basin upstream from Jerome, Missouri, is the study area for this report, and hereinafter is referred to as the upper Gasconade River Basin (fig. 1). It encompasses 2,836 mi^2 (square miles) of predominately rural countryside in parts of eight counties in south-central Missouri. It is drained by the Gasconade River and its tributaries, including the Little Piney Creek, Big Piney River, Roubidoux Creek, and Osage Fork (fig. 1). The 64,000-acre Fort Leonard Wood Military Reservation (FLWMR) is a large federal facility predominantly in Pulaski County in the north-central part of the basin.

The FLWMR (fig. 2) has been a major combat-troop training area since 1940. The U.S. Army base contains a variety of weapons training facilities, including small-arms firing ranges, grenade ranges, artillery ranges, an Air National Guard cannon and strafing range, and areas for armored vehicle training. The FLWMR presently (2003) is in a period of growth in personnel and training facilities. A chemical warfare training school recently was transferred to the FLWMR. Construction activities at the FLWMR have increased substantially and are expected to continue. Past, present, and future operations at the FLWMR involve the use, storage, and disposal of chemicals and petroleum products. These chemicals and petroleum products are potential ground-water contaminants.

There is concern that these potential contaminants could migrate into the FLWMR public water-supply wells or domestic and public water-supply wells located adjacent to and downgradient from the FLWMR. The U.S. Geological Survey (USGS), in cooperation with the Directorate of Public Works, Environmental Division (DPW-ED), FLWMR, began a study in 1998 of the geohydrologic framework, ground-water hydrology, and water use in the upper Gasconade River Basin. The results of this study will improve the understanding of the contributing areas of recharge to water-supply wells at and in the vicinity of the FLWMR, and thereby help protect the quality of water supplied by the water-supply wells. Data presented in this report can be used in future studies of contributing areas of recharge to wells and in other ground-water assessments of the upper Gasconade River Basin. Contributing areas of recharge refers to the source area (recharge area) of ground water pumped from wells.

The FLWMR receives most of its water supply from a surface-water intake in the Big Piney River (fig. 2) along the eastern boundary of the military reservation. A large part of the water in the Big Piney River comes from springs that discharge into the river. Ground-water level data collected during this study can help determine sources of water to the Big Piney River, and areas of spring recharge within the Big Piney River Basin upstream from the surface-water intake.

Purpose and Scope

The purpose of this report is to describe the geohydrologic framework, ground-water hydrology, and water use in the upper Gasconade River Basin (study area; fig. 1). The three major components of this report reflect the major tasks of the study: (1) to describe and map the geohydrologic units at the FLWMR and upper Gasconade River Basin, particularly the structure of several geologic formations; (2) to measure and map ground-water levels in the FLWMR and upper Gasconade River Basin; and (3) to compile water-use data, particularly pumpage data for public water-supply wells in the upper Gasconade River Basin. Ground-water levels measured in spring 1998; stream and spring discharge measurements made in September 1995, September 1998, and August 1999; and water-use data compiled for 1993–98 are presented in this report.

The study area is much larger than the FLWMR area and includes areas south of the FLWMR that potentially supply water to the FLWMR (fig. 1). Well-log and water-use data were compiled and ground-water levels were measured in the study area and in a 6-mi (mile) wide band surrounding the study area. Data were collected in the surrounding area to provide additional control to geologic and hydrologic contours near the study boundary and to define regional hydrologic boundaries.

Description of Study Area

Most of the study area (fig. 1) is located within the Salem Plateau of the Ozarks Plateaus physiographic province (Fenneman, 1938). The Salem Plateau is a large area of uplifted Cambrian- and Ordovician-age sedimentary strata in southern Missouri and northern Arkansas. It consists of an upland plain along a major southwesterly trending topographic divide, and more rugged topography north and south of the divide where stream erosion has been more exten-

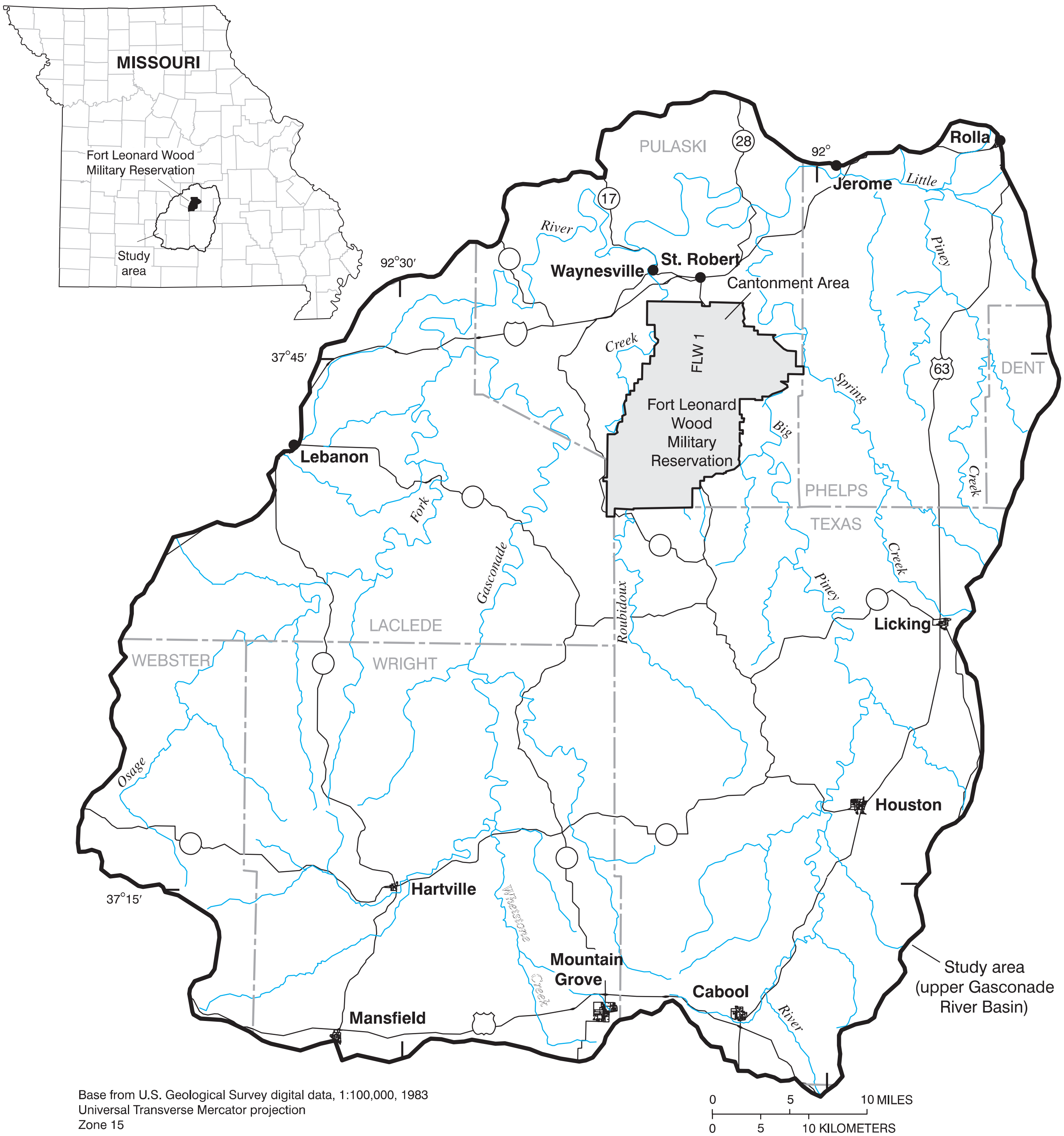


Figure 1. Location of the study area, streams, selected towns, major highways, county boundaries, and the Fort Leonard Wood Military Reservation boundary.

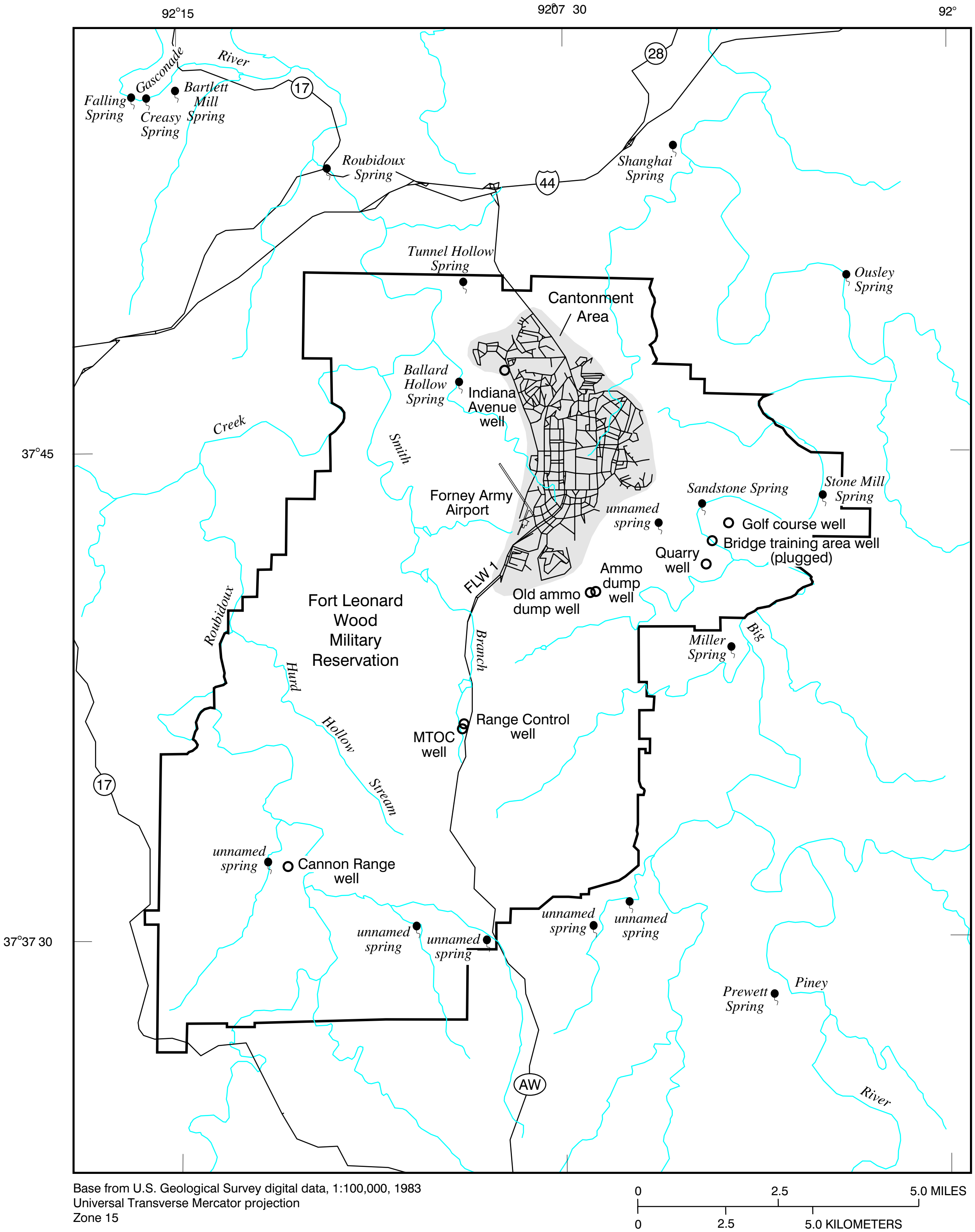


Figure 2. Streams, springs, and wells in and near the Fort Leonard Wood Military Reservation.

sive. The extreme southwestern part of the study area is in the Springfield Plateau of the Ozark Plateaus physiographic province (Fenneman, 1938), which is underlain by uplifted Mississippian-age sedimentary strata. The southern part of the study area is characterized by gently rolling upland hills covered with forest and pasture. The northern and central parts of the study area are heavily forested areas where stream incision by the northerly to northeasterly flowing Gasconade River and its tributaries (fig. 1) has resulted in narrow, steep-walled stream valleys separating erosional remnants of the upland plain. Most of the FLWMR is located on a broad upland ridge between the northerly flowing Big Piney River to the east and the northerly flowing Roubidoux Creek to the west (fig. 2). The upland ridge is further dissected by tributaries to these streams.

The study area has a humid, temperate climate with warm, humid summers and cool, wet winters. The long-term monthly average temperature from a weather station at the Forney Army Airport at the FLWMR ranges from 31.8 ^{o}F (degrees Fahrenheit) in January to 76.8 ^{o}F in July (National Oceanic and Atmospheric Administration, 2000). The average annual precipitation recorded at the weather station is approximately 42 in. (inches; National Oceanic and Atmospheric Administration, 2000).

The largest town in the basin is Rolla (fig. 1), which had a population of 16,367 in 2000 (U.S. Census Bureau, 2000). Other towns along or near the western, southern, and eastern upland boundaries of the basin drainage divide and along the Interstate 44 corridor that passes through the northern part of the basin and their populations in 2000 include Lebanon (12,155), Mountain Grove (4,574), Waynesville (3,507), St. Robert (2,760), Cabool (2,168), Houston (1,992), Licking (1,471), Mansfield (1,349), Hartville (no population figure), and Jerome (no population figure; fig. 1; U.S. Census Bureau, 2000). The number of military and civilian personnel at the FLWMR in 2000 was estimated at 13,666 (U.S. Census Bureau, 2000).

Most of the facilities of the FLWMR are concentrated in the cantonment area (fig. 2) in the north-central part of the base. This area contains classrooms, barracks, recreation and shopping facilities, and support units. The southern part of the base contains large tracts of land that are used for firing ranges, armored vehicle training, heavy equipment training, and landfills for waste disposal. The area west, south, and east of the FLWMR boundary contains large tracts of federally managed National Forest land predominantly covered with oak and hickory trees. Private land primarily is in fescue pasture to support livestock grazing. The towns of Waynesville and St. Robert and the areas around them are the most populated areas near the FLWMR.

Previous Investigations

The USGS developed a regional ground-water flow model for the Ozark Plateaus Aquifer System (Imes and Emmett, 1994) that covered parts of Missouri, Arkansas, Oklahoma, and Kansas, and included the study area. Regional structure-contour, isopach, potentiometric, and water-quality maps of geohydrologic units were prepared in support of the model. The three-dimensional finite difference model was used to simulate pre-development regional ground-water flow. Because of the large size of the model area and computer resource limitations at the time the model was developed (1981 to 1986), model cells were 14 miles square; therefore, the model grid is too coarse to be a useful tool to assess the ground-water flow at the FLWMR.

An assessment of facilities at the FLWMR that contained toxic or hazardous materials having the potential to migrate beyond the boundaries of the FLWMR was conducted by the U.S. Army Environmental Hygiene Agency (USAEHA) in 1982 (Environmental Science and Engineering, 1982). The report identified the presence of leachate seeps at several solid-waste landfills and concluded that disposal practices at one landfill in the central part of the FLWMR were in violation of State of Missouri solid-waste regulations. Large dichlorodiphenyltrichloroethane (DDT) concentrations were detected in soils near an abandoned pesticide storage building.

During follow-up investigations in 1987 and 1988, the USAEHA drilled 17 shallow monitoring wells in unconsolidated residuum near several large landfills to assess the movement of leachate into ground water beneath the landfills (U.S. Army Environmental Hygiene Agency, 1988). None of the drilled wells penetrated the water table, which was approximately 100 to 150 ft (feet) below the bottom of the deepest monitoring well, and only three wells contained sufficient water to sample (perched water that had drained into the wells). Based on water samples collected from these monitoring wells and one leachate sample, the report concluded that ground water was not affected by the landfills.

Additional monitoring wells were subsequently drilled to supplement the first set of monitoring wells. These wells also were dry except where perched water collected. The report on this phase of work concluded that deeper monitoring wells were needed to determine if hazardous constituents have been released from these sites (U.S. Army Environmental Hygiene Agency, 1990).

The final Resource Conservation and Recovery Act (RCRA) Facility Assessment Report (PRC Environmental Management, Inc., 1992) for the FLWMR summarized data for 54 solid-waste management units (SWMUs). The report concluded that because of the lack of data and the potential for environmental contamination by several landfills and other facilities, further investigations were advisable. No monitoring well installation or water sampling was conducted during the study.

Beginning in 1994, the USGS conducted a regional geohydrologic and water-quality assessment of the FLWMR, and preliminary geohydrologic and water-quality assessments of 12 SWMUs located on the FLWMR. The regional assessment was designed to characterize the geohydrologic framework of the FLWMR and to provide the background hydrochemical data needed to conduct and interpret more detailed investigations of contaminant distribution and movement near individual SWMUs. As part of this study, potentiometric surface maps were prepared to determine ground-water flow directions near the FLWMR. Ground-water discharge was measured indirectly by stream seepage-run discharge measurements and directly at several large springs. Ground-water, surface-water, or streambed samples were collected from wells and streams in the immediate vicinity of the FLWMR to define background chemical concentrations in water at the FLWMR. Dye-tracing techniques were used to map the recharge areas of springs that receive water from fractures and conduits in the extensive karst terrain beneath the FLWMR. The results of the regional geohydrologic and water-quality assessment were published in Imes and others (1996). A significant discovery of this investigation was the detection of tetrachloroethene (PCE) at Shanghai Spring (fig. 2) about 2.5 mi northeast of the FLWMR.

The regional geohydrologic assessment of the FLWMR included a comprehensive geologic mapping program of the FLWMR and immediate surrounding areas to determine the density and properties of bedrock fractures and their effect on ground-water flow (Harrison and others, 1996). Most of the observed fractures do not show evidence of solution activity, but those that do have a pronounced northeast orientation (Harrison and others, 1996), and conduit flow may have developed in some of these fractures (Imes and others, 1996). Most of the water discharged at large springs probably is transported along high-permeability pathways within solution-enlarged bedding planes rather than fractures (Imes and others, 1996). Nonetheless, hydrologic control by fractures is indicated by the distribution of some karst features at the FLWMR (Imes and others, 1996). During the mapping of fractures, geologic contacts that differed from those shown on existing geologic maps published by the Missouri Department of Natural Resources (MDNR), Geological Survey and Resource Assessment Division (GSRAD; formerly known as the Missouri Division of Geology and Land Survey) were noted, and a revised bedrock geologic map at 1:24,000 scale was produced (Harrison and others, 1996). A short summary document describing the complex karst terrain and associated ground-water flow system at the FLWMR and results of additional dye-trace tests not reported in Imes and others (1996) were reported by Kleeschulte and Imes (1997).

Results of the preliminary geohydrologic and water-quality assessments at 12 SWMUs are reported in Schumacher and Imes (2000). Assessments were made for six landfills, two open burn/open detonation areas for the disposal of unexploded ordnance, a former pesticide mixing and storage building, an ammunition container storage area, an abandoned fire training area, and the site of a former laundry and dry-cleaning facility. These assessments were focused on the immediate vicinity of each SWMU and areas where ground or surface water can readily migrate from the site. Samples collected for chemical analysis from the SWMUs included leachate, soil, soil gas, ground water, surface water, and sediment from streambeds and dry washes. Monitoring wells were installed at one landfill to assess the effect of this facility on ground water. Results of these assessments indicated that contaminants were being released to soil, surface water, streambed sediment, or ground water from several facilities. Analyses of water samples from monitoring wells indicated the release of contaminants to the regional water table. Samples from wells monitoring perched water in the overburden and shallow bedrock contained larger than background concentrations of many inorganic constituents. Water samples from Sandstone Spring (fig. 2) contained larger than background concentrations of sodium, chloride, and total nitrite plus nitrate, possibly a result of contaminant releases from three landfills located in or near the recharge area of the spring. The assessment also confirmed the release of pesticides from the former pesticide mixing and storage building to nearby soils and stream sediments. Soils at the former laundry and dry-cleaning facility were contaminated with large concentrations of PCE and trichloroethene (TCE). The site is suspected to be the source of the PCE detected at Shanghai Spring during the regional assessment. A geohydrologic and water-quality assessment also was conducted at Shanghai Spring. Concentrations of PCE in Shanghai Spring increased during and immediately following runoff events, indicating that infiltrating rainfall or runoff entering the unsaturated zone quickly mobilizes PCE.

GEOHYDROLOGIC FRAMEWORK

The USGS defines geohydrologic units on the basis of hydrologic properties. Geohydrologic units are composed of sequences of stratigraphic units and are classed as aquifers, aquifer systems, confining units, and confining systems. Generally, aquifers and aquifer systems are considered capable of providing a water supply, and confining units and confining systems are not.

Regional geohydrologic units in the study area are, in order of increasing depth: the Springfield Plateau aquifer, Ozark confining unit, Ozark aquifer, St. Francois confining unit, St. Francois aquifer, and Basement confining unit (fig. 3). The Springfield Plateau aquifer and Ozark confining unit are composed of Mississippian-age rocks that occur primarily in the extreme

TIME-STRATIGRAPHIC UNIT			ROCK-STRATIGRAPHIC UNIT	REGIONAL GEOHYDROLOGIC UNIT
ERA	SYSTEM	SERIES		
PALEOZOIC	MISSISSIPPIAN	Osagean	Burlington Limestone Elsey Formation Pierson Limestone	Springfield Plateau aquifer
		Kinderhookian	Chouteau Group Northview Formation Compton Limestone Bachelor Formation	Ozark confining unit
	ORDOVICIAN	Canadian	Cotter Dolomite Jefferson City Dolomite Roubidoux Formation Gasconade Dolomite	Ozark aquifer
	CAMBRIAN	Upper	Eminence Dolomite Potosi Dolomite	
			Elvins Group Derby-Doe Run Dolomite Davis Formation	St. Francois confining unit
			Bonneterre Formation Lamotte Sandstone	St. Francois aquifer
PRECAMBRIAN			Precambrian igneous and metamorphic rocks	Basement confining unit

Figure 3. Hydrostratigraphic column of geologic units for the study area (modified from Imes, 1990a; stratigraphic nomenclature follows that of the Missouri Geological Survey and Resource Assessment Division, formerly known as the Missouri Division of Geology and Land Survey).

southwestern part of the study area and are, therefore, not hydrologically significant in the study area. The Ozark aquifer is the principal source of ground water in the study area and is the focus of this report. It ranges from less than 700 ft thick in the northern part of the study area to more than 1,500 ft thick in the southern part of the study area (Imes, 1990b). The Ozark aquifer is composed of, in order of increasing age: the Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite, Eminence Dolomite, and Potosi Dolomite (stratigraphic nomenclature for all geologic formation names in this report follows that of the Missouri Geological Survey and Resource Assessment Division, formerly known as the Missouri Division of Geology and Land Survey; fig. 3). The underlying St. Francois confining unit is composed of the Derby-Doe Run Dolomite and the Davis Formation (fig. 3). The St. Francois confining unit impedes the vertical movement of ground water, and only a small fraction of the ground-water recharge in the study area likely penetrates below the confining unit. Water wells in the area are open only to formations above the St. Francois confining unit or terminate in the upper part of the Derby-Doe Run Dolomite. The underlying St. Francois aquifer is composed of the Bonneterre Formation and the Lamotte Sandstone (fig. 3). The St. Francois aquifer is an important aquifer in some parts of Missouri, but because ground water is readily available from the shallower Ozark Aquifer, it is not an important aquifer in the study area. The Basement confining unit, which is composed of Precambrian-age igneous and metamorphic rocks, underlies the St. Francois aquifer (fig. 3).

The geologic data and a substantial part of the hydrologic data used for this report were compiled from existing databases. Data from approximately 2,900 geologic logs were collected from the GSRAD geologic well log database. These logs generally contain geologic descriptions of formations encountered during the drilling of domestic and public water-supply wells and also may contain construction data (for example, well depth and casing depth), water-level data, and specific-capacity data. Also, approximately 4,100 well records were collected from the GSRAD well permit database. These records contain well-construction and water-level data for permitted wells constructed since 1987. Also, approximately 200 records were collected from the MDNR, Public Drinking Water Program. These records contain ownership data for public water-supply wells and also may contain well-construction, water-level, and specific-capacity data. Some of these records duplicate those collected from the GSRAD geologic well log database. In addition to data collected from Missouri state agencies, approximately 600 records were extracted from the USGS Ground Water Site Inventory (GWSI) database. Depending on the original source of the data, these records may contain geologic, well-construction, water-level, and specific-capacity data. Some of these records duplicate data collected from Missouri state agencies.

Latitude and longitude coordinates for well locations were converted to Universal Transverse Mercator (UTM) coordinates for use in a Geographic Information System (GIS) database. Because most well records did not have latitude and longitude coordinates, a computer program was developed to first convert land net (Section-Township-Range) descriptions to approximate latitude and longitude coordinates for these wells. Base maps of the study area were compiled from existing 1:100,000 scale USGS digital maps. These maps included streams attributed by stream basin and size, topographic contours attributed with altitude, spring locations, roads, county boundaries, township boundaries, and topographic quadrangle boundaries.

Bedrock Geology

A bedrock geologic map of the study area showing the geologic formations and major faults present at the bedrock surface was prepared from a GIS database constructed by combining digital versions of published and unpublished 7 1/2- and 15-minute quadrangle geologic maps prepared by the GSRAD (Easson, 1984a, 1984b; Easson and Sumner, 1984a, 1984b, 1984c; Middendorf, 1984a, 1984b, 1984c, 1984d, 1984e, 1984f, 1984g, 1984h, 1984i; Middendorf and McFarland, 1984; Sumner, 1984; Sumner and Easson, 1984; Sumner and Middendorf, 1984; Thomson, 1982a, 1982b; Thomson and others, 1982). Additional data from geologic maps prepared by the USGS and GSRAD as part of the Conterminous United States Mineral Assessment Program (CUSMAP; Middendorf, 1985; Middendorf and others, 1991; Pratt and others, 1992) and from geologic mapping of the FLWMR by the USGS (Harrison and others, 1996) also were included. During the process of combining separate databases, contacts and faults at quadrangle boundaries were joined, conflicts at boundaries were resolved, and minor faults and some other structural features were deleted.

Except for Mississippian-age rocks in the extreme southwest part of the study area and two isolated erosional outliers, Early Ordovician-age dolostones and sandstones (fig. 3) form the bedrock surface throughout the study area (fig. 4). Residuum and colluvium form a mantle over the bedrock throughout most of the study area. Alluvial deposits occur along streams. Sedimentary strata are nearly horizontal, except along folds and collapse zones where dips can be steep. Stream incision of these nearly horizontal strata has produced a dendritic pattern on the geologic map of the study area (fig. 4), with younger strata underlying the uplands and older strata exposed along streams. The study area is cut by numerous faults, some of which are pronounced enough to be shown on the geologic map. Most of these faults trend generally northwest-southeast. Vertical throw is more than 100 ft in places along the Macks Creek-Smittle Fault in the southwestern part of the study area (fig. 4). A detailed discussion of faulting at the FLWMR is contained in Harrison and others (1996). Another structural feature of interest in the study area is the Fort Leonard Wood Anticline (Middendorf, 1985) that trends generally north-south through the northern part of the FLWMR (fig. 4).

Stratigraphy and Geologic Structure

A series of generalized geologic maps were constructed to help describe the geologic framework of the Ozark aquifer in the study area. Generalized maps were made showing the altitude of the top of the Derby-Doe Run Dolomite, Potosi Dolomite, Eminence Dolomite, Gasconade Dolomite, and Roubidoux Formation. These maps were constructed by plotting and contouring top-of-formation altitude data from the GSRAD geologic well log records. Some of the top-of-formation data from these records are lower than the actual top-of-formation altitude because the log begins within the formation, and other top-of-formation data are lower than the pre-erosional top-of-formation altitude where the well is located in the outcrop area of the formation. These data represent minimum altitudes and were used in some places to determine the general location of contours. Also, approximate top-of-formation altitude data points were generated where well data were sparse by digitally superimposing geologic contacts on land surface topographic contours. The locations of faults, along which offset of top-of-formation altitude contours occur, were copied from the bedrock geologic map that was prepared as part of this study. The contours are approximately located out of necessity where data points are sparse and to show general trends without showing all the minor variations in top-of-formation altitudes where data points are dense. The top-of-formation maps were used to construct generalized thickness maps of the Potosi Dolomite, Eminence Dolomite, Gasconade Dolomite, and Roubidoux Formation. Generalized thickness maps were constructed using a combination of measured formation thicknesses from well-log data and formation thicknesses estimated by digitally interpolating each top-of-formation altitude map and subtracting the interpolated data from subjacent top-of-formation maps.

The oldest Paleozoic-age formation in the study area is the Upper Cambrian-age Lamotte Sandstone (fig. 3), which is a clean quartzose sandstone. It is overlain by the Upper Cambrian-age Bonneterre Formation (fig. 3), which is predominantly dolostone. Overlying the Bonneterre Formation is the Upper Cambrian-age Davis Formation (fig. 3), which is shale with interbedded limestone or dolostone. The Davis Formation and the overlying Derby-Doe Run Dolomite compose the Elvins Group (fig. 3).

The generalized map of the altitude of the top of the Derby-Doe Run Dolomite, which also is the base of the Ozark aquifer, is shown in figure 5. It is based on few data points because water-supply wells do not normally penetrate as deep as the top of the Derby-Doe Run Dolomite. Some of the structure contours are drawn to approximate the trend of contours on maps of overlying formations where more data are available. The top of the Derby-Doe Run Dolomite is highest along a ridge that trends generally east-west through the center of the study area. The axis of this ridge is offset to the northwest along the Macks Creek-Smittle Fault (fig. 4), with more than 100 ft of vertical displacement. The Fort Leonard Wood Anticline trending north-south through the FLWMR (fig. 4) is shown by contours that wrap around the anticlinal axis.

The Upper Cambrian-age Potosi Dolomite overlies the Derby-Doe Run Dolomite (fig. 3). The Potosi Dolomite is not exposed in the study area, and is the deepest formation of hydrologic significance to water-supply wells at the FLWMR. The Potosi Dolomite is a

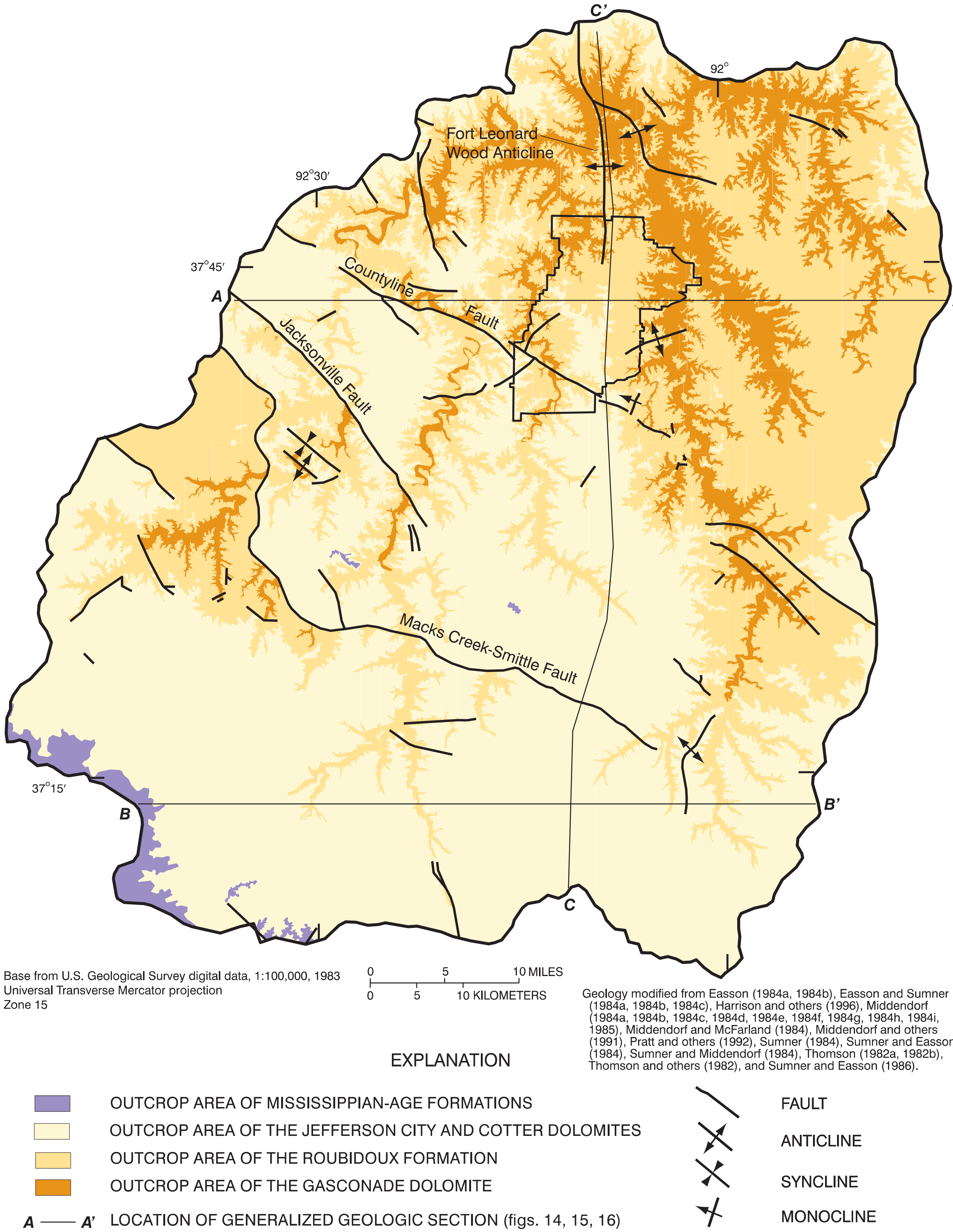


Figure 4. Bedrock geology of the study area showing location of generalized geologic sections.

massive bedded, vuggy dolostone with quartz druse that is associated with chert (Thompson, 1995). The large porosity and permeability of the formation causes it to be a good source of water to wells, and it is utilized by many public water-supply wells in the study area. The Potosi Dolomite is between 200 and 400 ft thick throughout most of the study area, thins to less than 200 ft thick in the southwestern part of the study area and in a few small isolated areas, and is more than 400 ft thick in two small areas in the northern and western part of the study area (fig. 6). The pattern of the structure contours for the top of the Potosi Dolomite (fig. 7) is similar to the pattern of the structure contours for the top of the Derby-Doe Run Dolomite (fig. 5) because the Derby-Doe Run structure contours were modeled after the Potosi Dolomite structure contours to a large extent. Similar to the structure contours for the top of the Derby-Doe Run Dolomite, the structure contours are generalized for the top of the Potosi Dolomite because they are based on few data points. In some places the top of the Potosi Dolomite structure contours are drawn to approximate the trend of contours on maps of overlying formations where more data are available. The top of the Potosi Dolomite is highest along a ridge that trends generally east-west through the center of the study area in approximately the same position as a corresponding ridge on the top of the Derby-Doe Run Dolomite. This ridge also is offset to the northwest along the Macks Creek-Smittle Fault (fig. 4). The Fort Leonard Wood Anticline (fig. 4) also is shown by the wrapping of contours of the top of the Potosi Dolomite around the anticlinal axis.

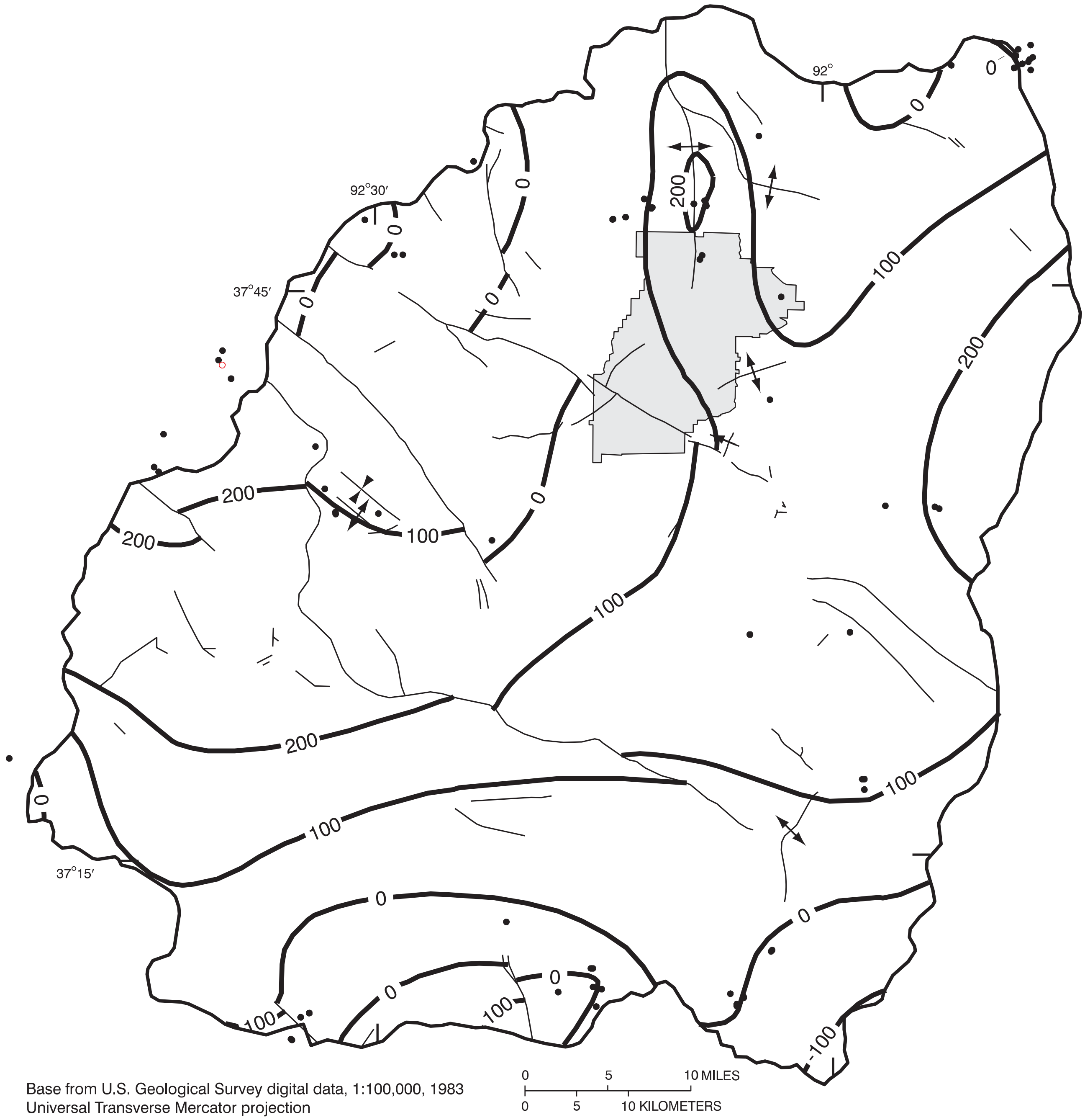
The Upper Cambrian-age Eminence Dolomite overlies the Potosi Dolomite (fig. 3). The Eminence Dolomite is conformable with the underlying Potosi Dolomite and also is not exposed in the study area. The Eminence Dolomite is a massive bedded dolostone with small amounts of chert and quartz druse (Thompson, 1995) and is less vuggy than the underlying Potosi Dolomite or the overlying Gasconade Dolomite. The Eminence Dolomite is 200 to 400 ft thick throughout most of the study area, with a few isolated areas where the thickness is less than 200 ft (fig. 8). One of the areas where it is thickest (greater than 300 ft) is in the southwestern part of the study area. This area corresponds with the area where the Potosi Dolomite is thinnest (fig. 6). The map of the altitude of the top of the Eminence Dolomite (fig. 9) is controlled by a few more data points than the maps for the top of the Derby-Doe Run Dolomite and the Potosi Dolomite, but data points are still sparse, and structure contours are generalized and, in some places, follow trends of contours on maps of overlying formations where data are more available. The top of the Eminence Dolomite is highest along the same east-west trending ridge shown by the top of the Derby-Doe Run Dolomite and the top of the Potosi Dolomite. The east-west ridge also is offset to the northwest by the Macks Creek-Smittle Fault (fig. 4). Wrapping of contours around the axis of the Fort Leonard Wood Anticline (fig. 4) also is apparent.

The Canadian Series Ordovician-age Gasconade Dolomite overlies the Eminence Dolomite (fig. 3). It is the oldest formation to crop out in the study area and forms the bedrock surface along the major streams and their tributaries (fig. 4). The Gasconade Dolomite primarily is a cherty dolostone and is divisible into informal upper and lower units based on chert content and a basal sandstone unit called the Gunter Sandstone (Thompson, 1991). A stromatolitic chert horizon that generally is 10 to 15 ft thick and 30 to 50 ft below the top of the formation separates the upper and lower units at the FLWMR (Harrison and others, 1996). The lower Gasconade Dolomite generally is medium to thin bedded, medium to finely crystalline dolostone and may have greater than 50 percent chert by volume, whereas the upper Gasconade Dolomite is massive, medium to finely crystalline dolostone and may contain small amounts of chert and sandstone stringers (Thompson, 1991). The upper part of the Gasconade Dolomite may be more permeable than the lower part at the FLWMR. Evidence for this includes the presence of permeable intraformational breccia horizons in the upper Gasconade Dolomite at the FLWMR and the fact that most caves and large springs in and around the FLWMR are in the upper Gasconade Dolomite (Harrison and others, 1996). The thickness of the Gasconade Dolomite in the study area is shown in figure 10. The thickness is not shown where the Gasconade Dolomite has been eroded and forms the bedrock surface (fig. 4). The pre-erosional thickness of the Gasconade Dolomite generally decreases from greater than 400 ft in the southwestern part of the study area to less than 300 ft in the northeastern part of the study area. The map showing the altitude of the top of the Gasconade Dolomite (fig. 11) is somewhat more complex than corresponding maps for deeper formations because more wells penetrate the Gasconade Dolomite, providing more data points. The structure contours in figure 11 are drawn through areas where the Gasconade Dolomite is the bedrock formation and are, therefore, approximations of the pre-erosional surface of the Gasconade Dolomite in these areas. The generally east-west ridge that is observed on other top-of-formation maps also is observed on this map, but with somewhat more detail. The Fort Leonard Wood Anticline at and north of the FLWMR (fig. 4) also is shown by the contours on figure 11.

The Canadian Series Ordovician-age Roubidoux Formation overlies the Gasconade Dolomite (fig. 3). It forms the bedrock surface throughout a large part of the study area, including a large part of the FLWMR (fig. 4). The Roubidoux Formation crops out in upland areas and hillsides in the northern part of the study area and along stream bottoms in parts of the southern part of the study area. The lithology of the Roubidoux Formation ranges from dolostone to cherty dolostone to sandy dolostone to sandstone. The amount of sandstone ranges throughout the study area from less than 5 percent west of the FLWMR to more than 40 percent in the southern part of the study area and is about 10 to 25 percent throughout most of the FLWMR (Harbaugh, 1983; Thompson, 1991). Solution effects in the Roubidoux Formation at the FLWMR can be pervasive in the interbedded dolostones in the lower part of the formation (Imes and others, 1996; Harrison and others, 1996). Although bedding normally is nearly horizontal, numerous irregular small folds occur in sandstone beds at the FLWMR and are interpreted to be the result of collapse in response to dissolution of interbedded or underlying dolostone (Harrison and others, 1996). Most of the observed sinkholes in the upland areas of the FLWMR are formed in the Roubidoux Formation (Imes and others, 1996). The thickness of the Roubidoux Formation in the study area is shown on figure 12. The thickness of the Roubidoux Formation is not shown where it has been eroded and forms the bedrock surface. The pre-erosional thickness of the Roubidoux Formation ranges from 100 to 200 ft throughout a large part of the study area, is less than 100 ft in isolated patches, and is more than 200 ft in places in the southern part of the study area. Contours of the altitude of the top of the Roubidoux Formation (fig. 13) are drawn through areas where the Roubidoux Formation or the Gasconade Dolomite forms the bedrock surface and are, therefore, approximations of the pre-erosional surface of the Roubidoux Formation in these areas. Contours are more detailed than corresponding contours for the Gasconade Dolomite (fig. 11) in the southern part of the study area because more wells penetrate the shallower Roubidoux Formation, but are more generalized in the northern part of the study area where they approximate the pre-erosional surface of the Roubidoux Formation. The generally east-west trending ridge that is observed on other top-of-formation maps also is observed at the top of the Roubidoux Formation (fig. 13). One significant difference is that this ridge also trends to the southwest in the southwestern part of the study area. The contours that define the Fort Leonard Wood Anticline at and north of the FLWMR (fig. 4) are pre-erosional and were drawn to approximate the trend of contours of the top of the underlying Gasconade Dolomite.

The Canadian Series Ordovician-age Jefferson City Dolomite and Cotter Dolomite overlie the Roubidoux Formation (fig. 3). These two formations are conformable and are sometimes difficult to distinguish (Thompson, 1995). They are grouped together on the geologic map of the study area (fig. 4) where they underlie the upland areas in the approximately southern two-thirds of the study area and in a few upland areas in the northern one-third of the study area. Most of the outcrop area is underlain by the Jefferson City Dolomite, with the Cotter Dolomite being the bedrock formation in the southern and southwestern part of the study area (Thompson, 1991) along the regional topographic ridge. The Jefferson City Dolomite is the youngest formation at the FLWMR and underlies the central upland ridge that trends north-south through the FLWMR (Imes and others, 1996). The Jefferson City Dolomite is a medium to finely crystalline dolostone and argillaceous dolostone with chert, and may contain lenses of orthoquartzite, conglomerate, and shale (Thompson, 1991). The Cotter Dolomite is medium to thin bedded, medium to finely crystalline cherty and non-cherty dolostone (Thompson, 1991). The combined thickness of the Jefferson City and Cotter Dolomites ranges from 0 to more than 400 ft, with the thickest sections in the southern and southwestern parts of the study area where both formations are present.

Kinderhookian and Osagean Series Mississippian-age rocks of the Springfield Plateau form the bedrock surface in the extreme southwestern part of the study area and at two small areas in the central part of the study area (fig. 4). These rocks are sandstone of the Bachelor Formation; limestone of the Compton Limestone; shale and siltstone of the Northview Formation; limestone, dolostone, and chert of the Pierson Limestone; limestone and chert of the Elsey Formation; and cherty limestone of the Burlington Limestone (fig. 3;



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

EXPLANATION

— 200 — STRUCTURE CONTOUR—Shows altitude of the top of the Derby-Doe Run Dolomite. Contour interval is 100 feet. Vertical datum is NGVD 29

DATA POINT—Black points are the top of the Derby-Doe Run Dolomite; red points are below the top of the Derby-Doe Run Dolomite

FAULT

ANTICLINE

SYNCLINE

MONOCLINE

Figure 5. Altitude of the top of the Derby-Doe Run Dolomite in the study area.

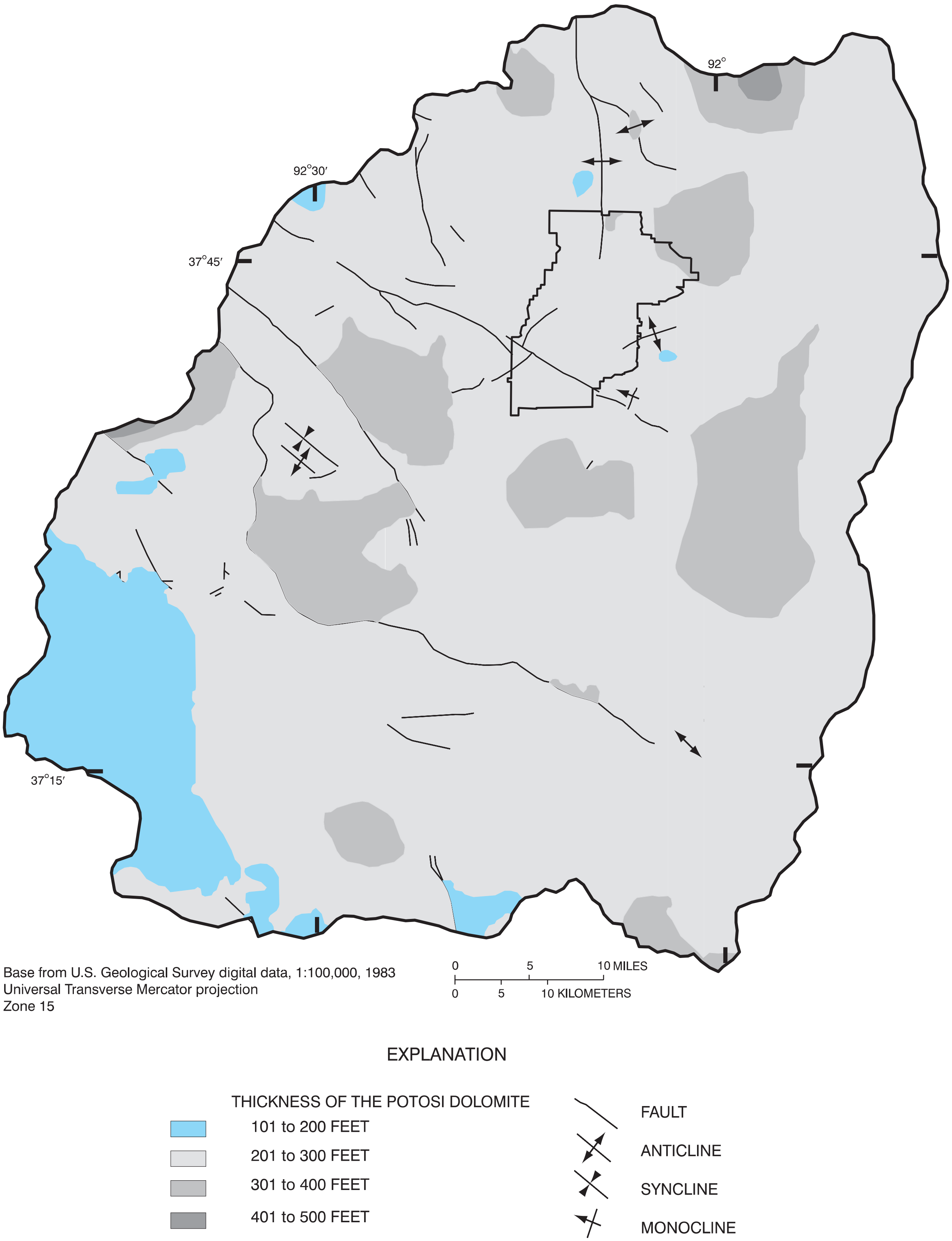


Figure 6. Thickness of the Potosi Dolomite in the study area.

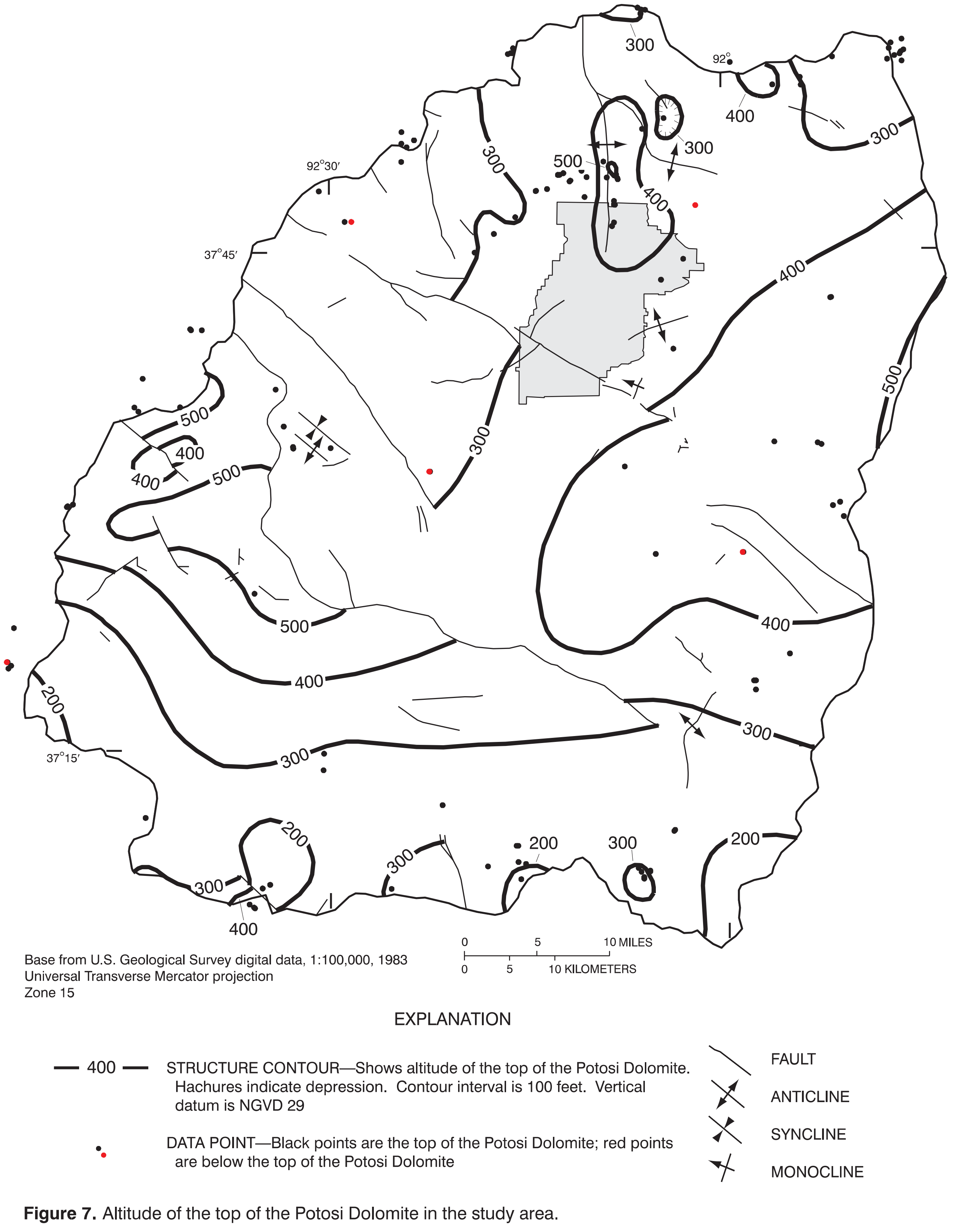


Figure 7. Altitude of the top of the Potosi Dolomite in the study area.

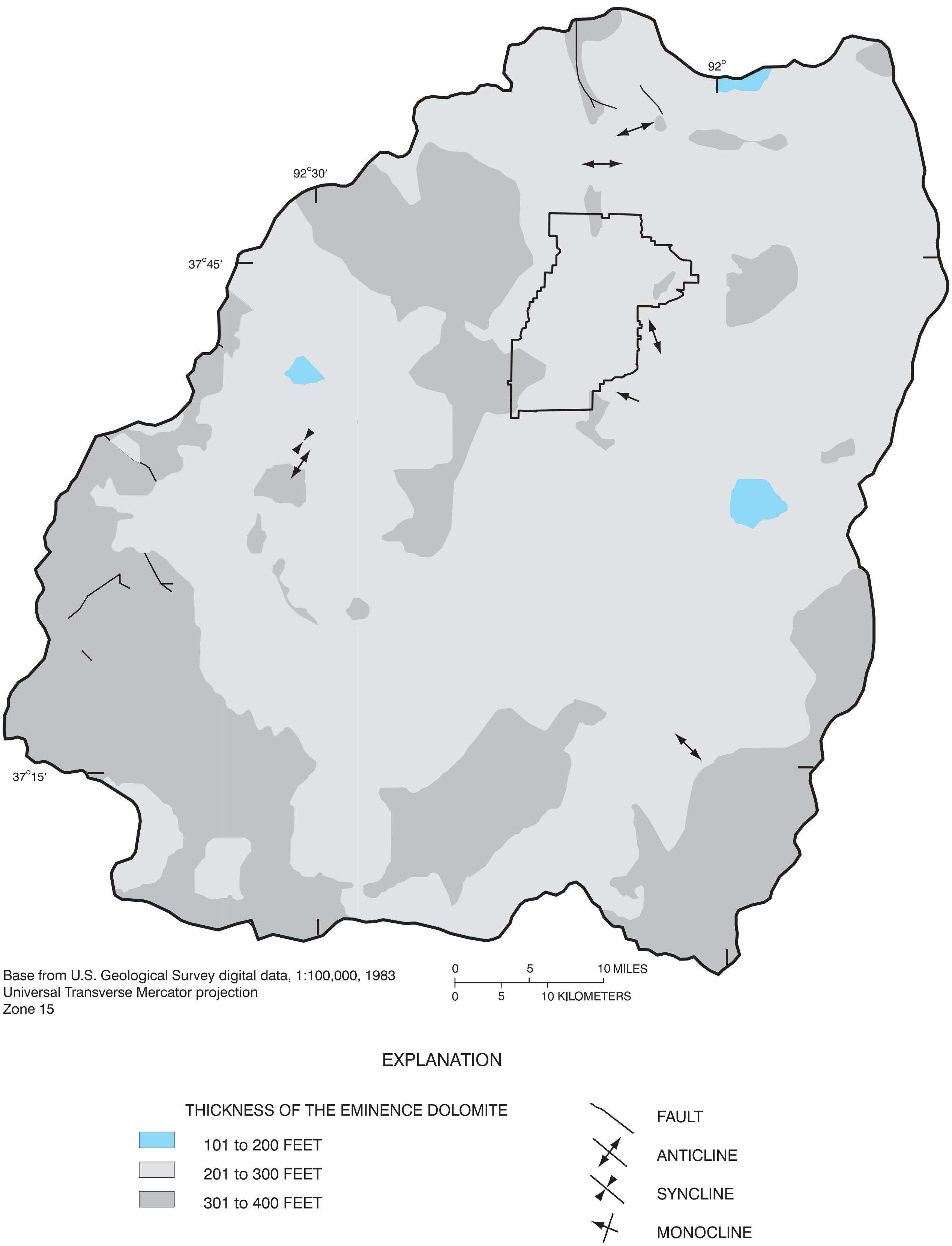


Figure 8. Thickness of the Eminence Dolomite in the study area.

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

EXPLANATION

— 600 — STRUCTURE CONTOUR—Shows altitude of the top of the Eminence Dolomite—Hachures indicate depression. Contour interval is 100 feet. Vertical datum is NGVD 29

DATA POINT—Black points are the top of the Eminence Dolomite; red points are below the top of the Eminence Dolomite

FAULT

ANTICLINE

SYNCLINE

MONOCLINE

Figure 9. Altitude of the top of the Eminence Dolomite in the study area.

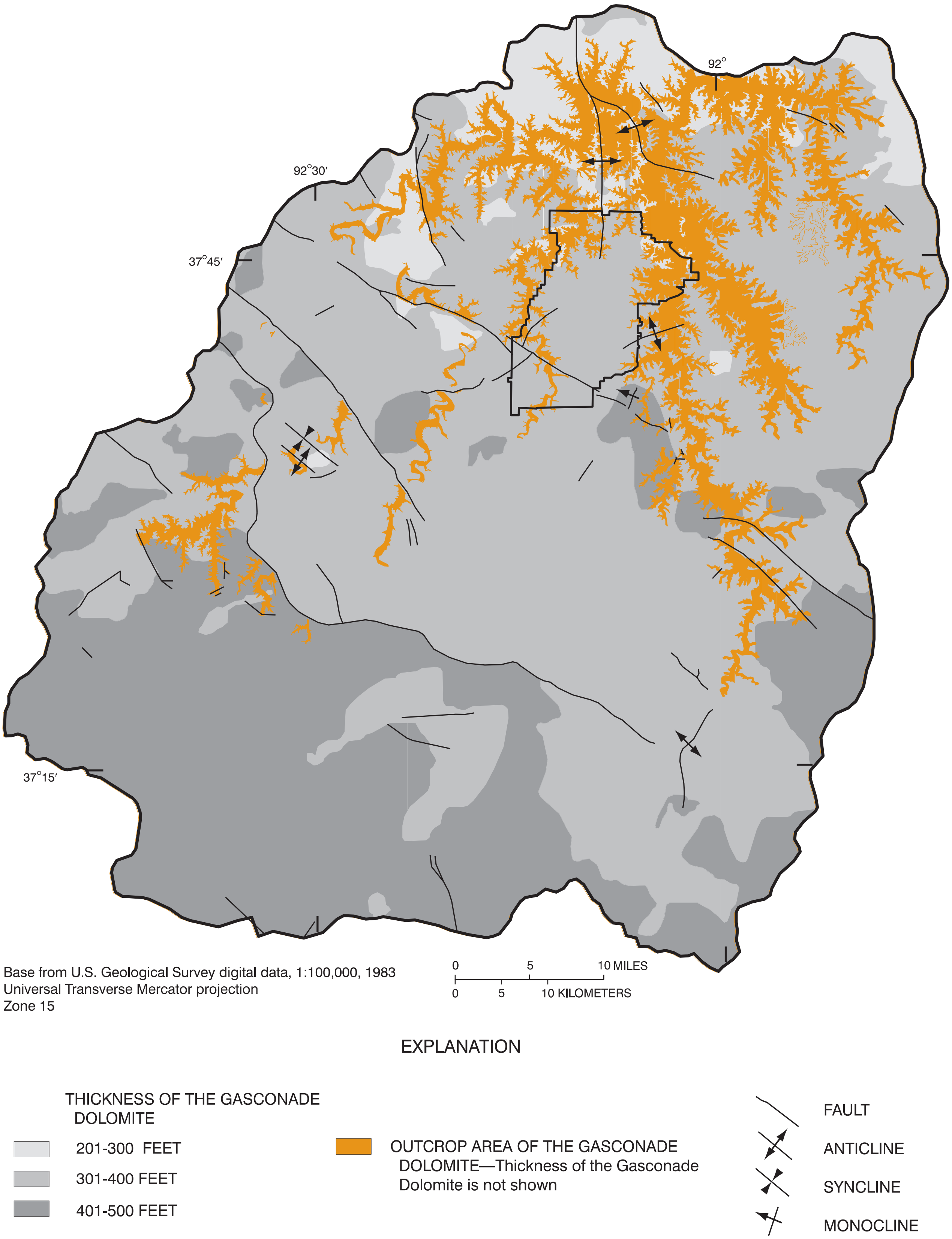
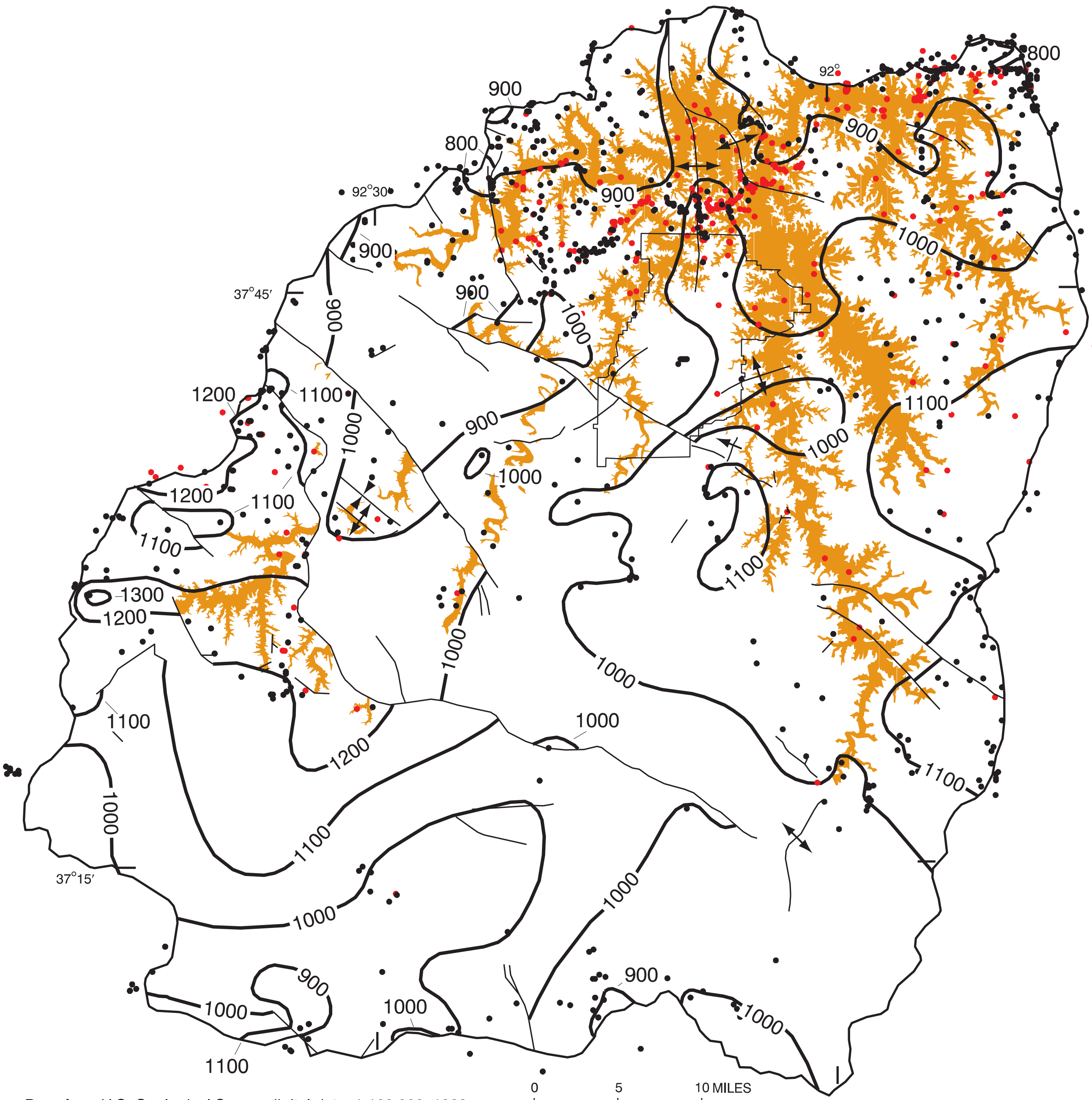


Figure 10. Thickness of the Gasconade Dolomite in the study area.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

0 5 10 MILES
0 5 10 KILOMETERS

EXPLANATION

OUTCROP AREA OF THE GASCONADE DOLOMITE

1000 STRUCTURE CONTOUR—Shows altitude of the top of the Gasconade Dolomite. Contours in outcrop area of the Gasconade Dolomite represent the estimated pre-erosional surface. Contour Interval is 100 feet. Vertical datum is NGVD 29

DATA POINT—Black points are the top of the Gasconade Dolomite; red points are below the top of the Gasconade Dolomite

FAULT

ANTICLINE

SYNCLINE

MONOCLINE

Figure 11. Altitude of the top of the Gasconade Dolomite in the study area.

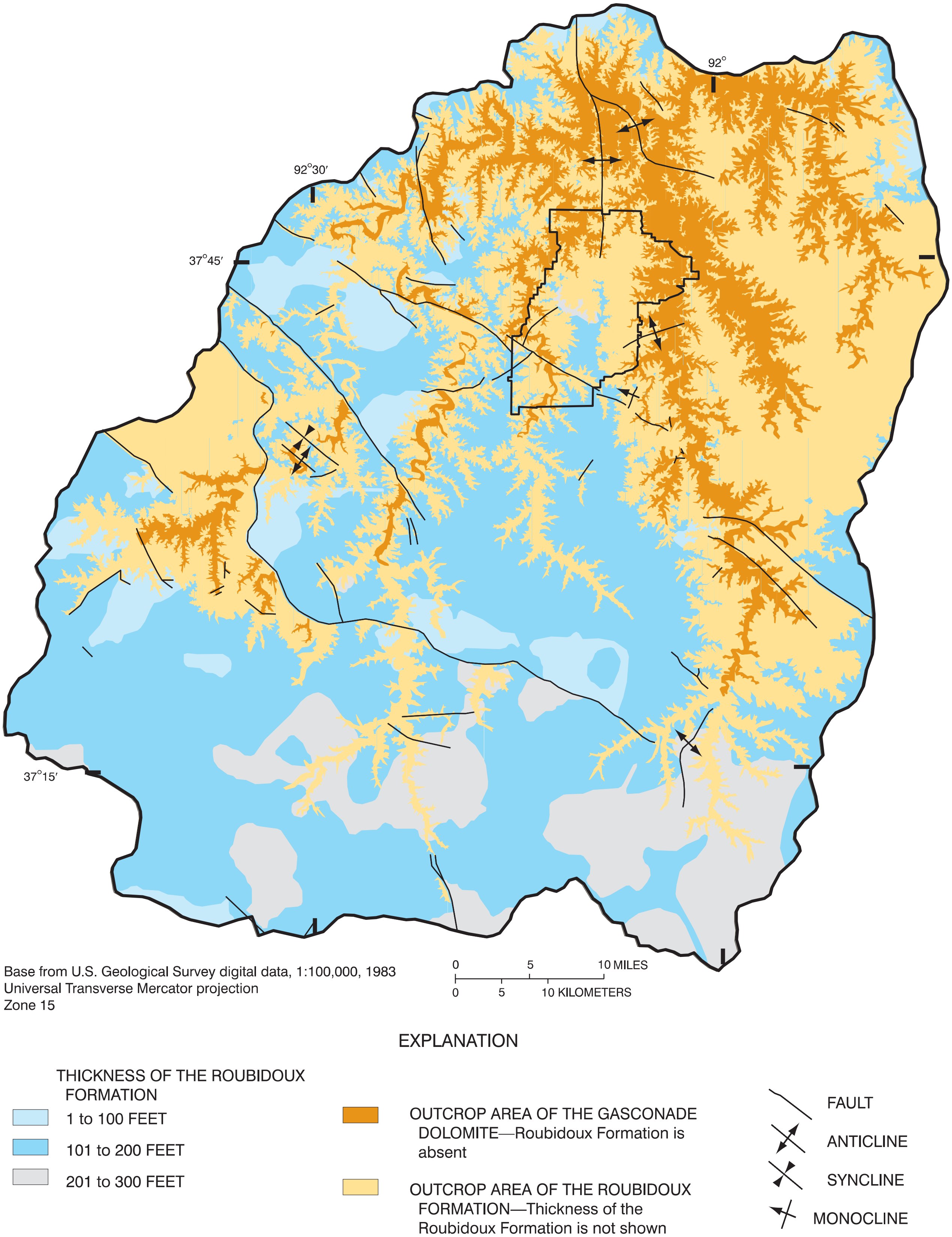
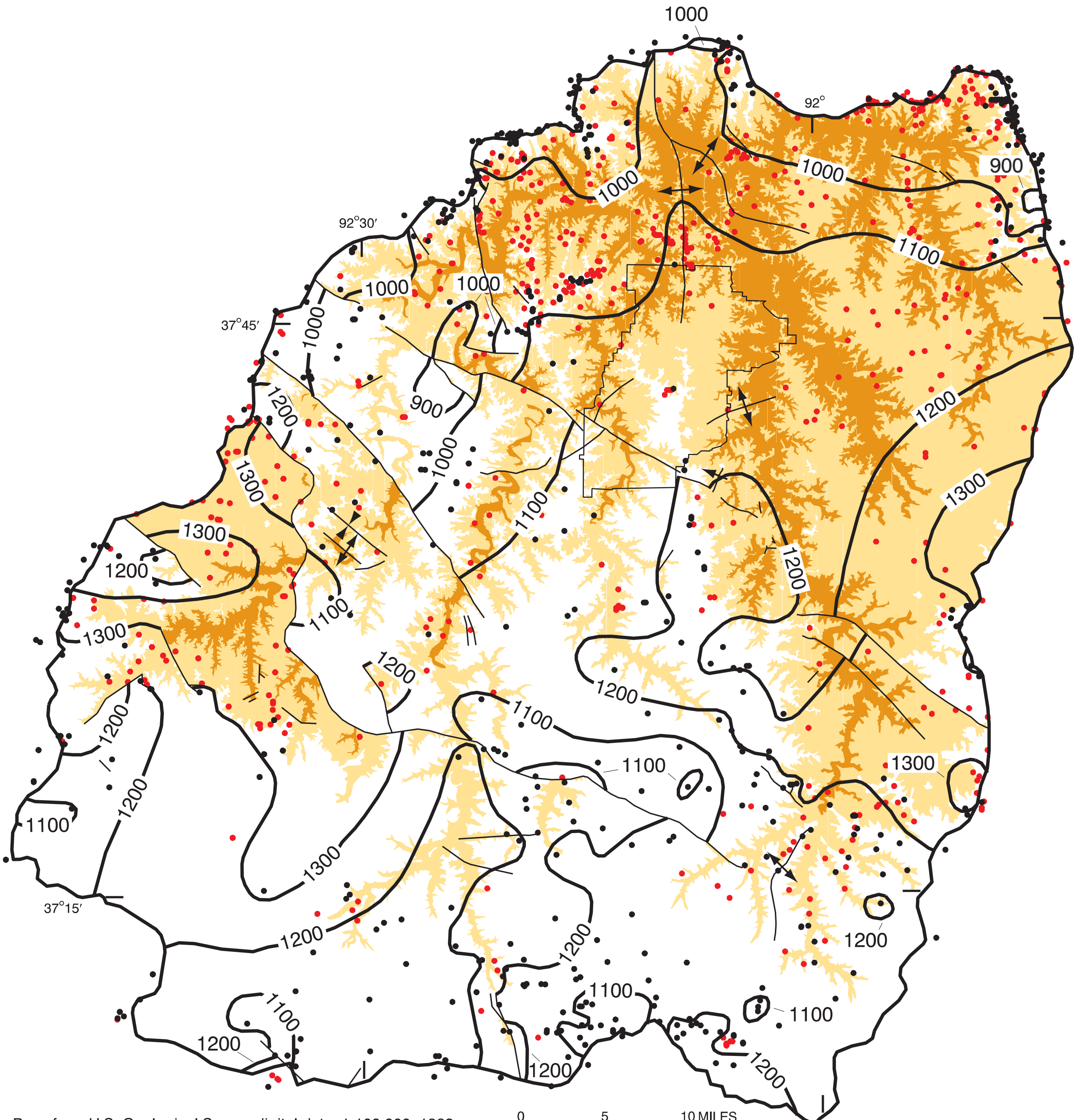


Figure 12. Thickness of the Roubidoux Formation in the study area.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

0 5 10 MILES
0 5 10 KILOMETERS

EXPLANATION

OUTCROP AREA OF THE ROUBIDOUX FORMATION

OUTCROP AREA OF THE GASCONADE DOLOMITE

—1000— STRUCTURE CONTOUR—Shows altitude of the top of the Roubidoux Formation. Contours in outcrop areas of the Roubidoux Formation and the Gasconade Dolomite represent the estimated pre-erosional surface. Contour interval is 100 feet. Vertical datum is NGVD 29

DATA POINT—Black points are the top of the Roubidoux Formation; red points are below the top of the Roubidoux Formation

FAULT

ANTICLINE

SYNCLINE

MONOCLINE

Figure 13. Altitude of the top of the Roubidoux Formation in the study area.

Thomson, 1986). The maximum thickness of Mississippian-age rocks in the study area probably is less than 150 ft.

Two east-west trending geologic sections (figs. 14, 15) and one south-north trending geologic section (fig. 16) were constructed using top-of-formation and thickness maps, and show in a third dimension the structure and relative thicknesses of formations. The geologic sections generally show more local relief on the upper formation contacts than contacts for the lower formations, in part because more data are available for these formations and because erosion has removed or partially removed the upper formations. The substantial topographic relief along some streams also is shown in the geologic sections.

In the northern part of the study area (fig. 14), the thicknesses of the Potosi and Eminence Dolomites are fairly uniform at about 250 to 300 ft each. The Gasconade Dolomite ranges from a little more than 200 ft to a little more than 400 ft because of the more irregular formation top and because in places part of the formation has been removed by erosion. The Roubidoux Formation, Jefferson City Dolomite, and Cotter Dolomite are present only in some places because they have been removed by erosion over much of the northern part of the study area.

In the southern part of the study area (fig. 15), the Potosi Dolomite thins to the west and is somewhat thinner (generally about 200 to 250 ft thick) than the Eminence Dolomite (about 300 ft thick). The thickness of the Gasconade Dolomite is fairly uniform at about 400 ft. The thickness of the overlying Roubidoux Formation is fairly uniform at about 200 ft except where it has been eroded along streams. The Jefferson City Dolomite and Cotter Dolomite are present across most of the southern part of the study area (fig. 15), but are thicker at ridges and thinner or absent at valleys.

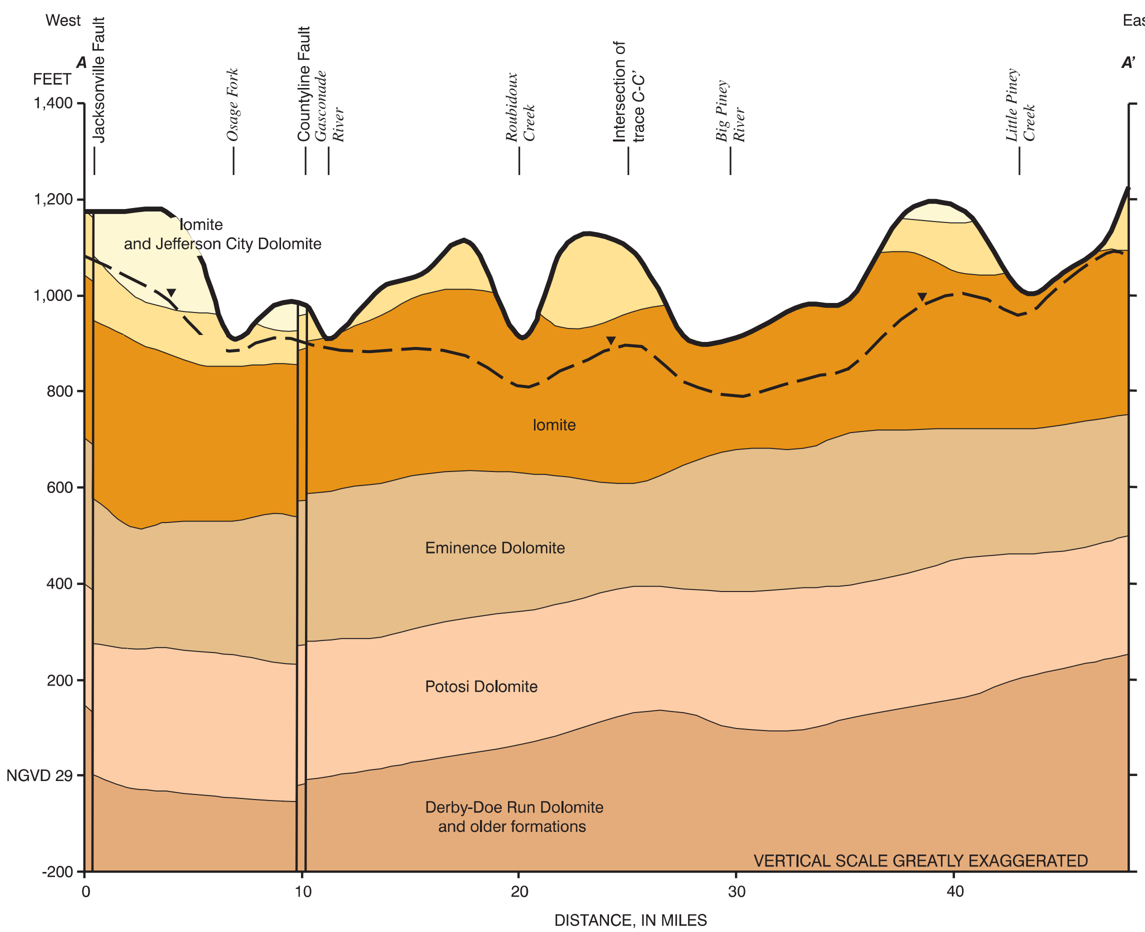


Figure 14. Generalized geologic section trending west-east across the northern part of the study area. The trace of the section is shown in figure 4.

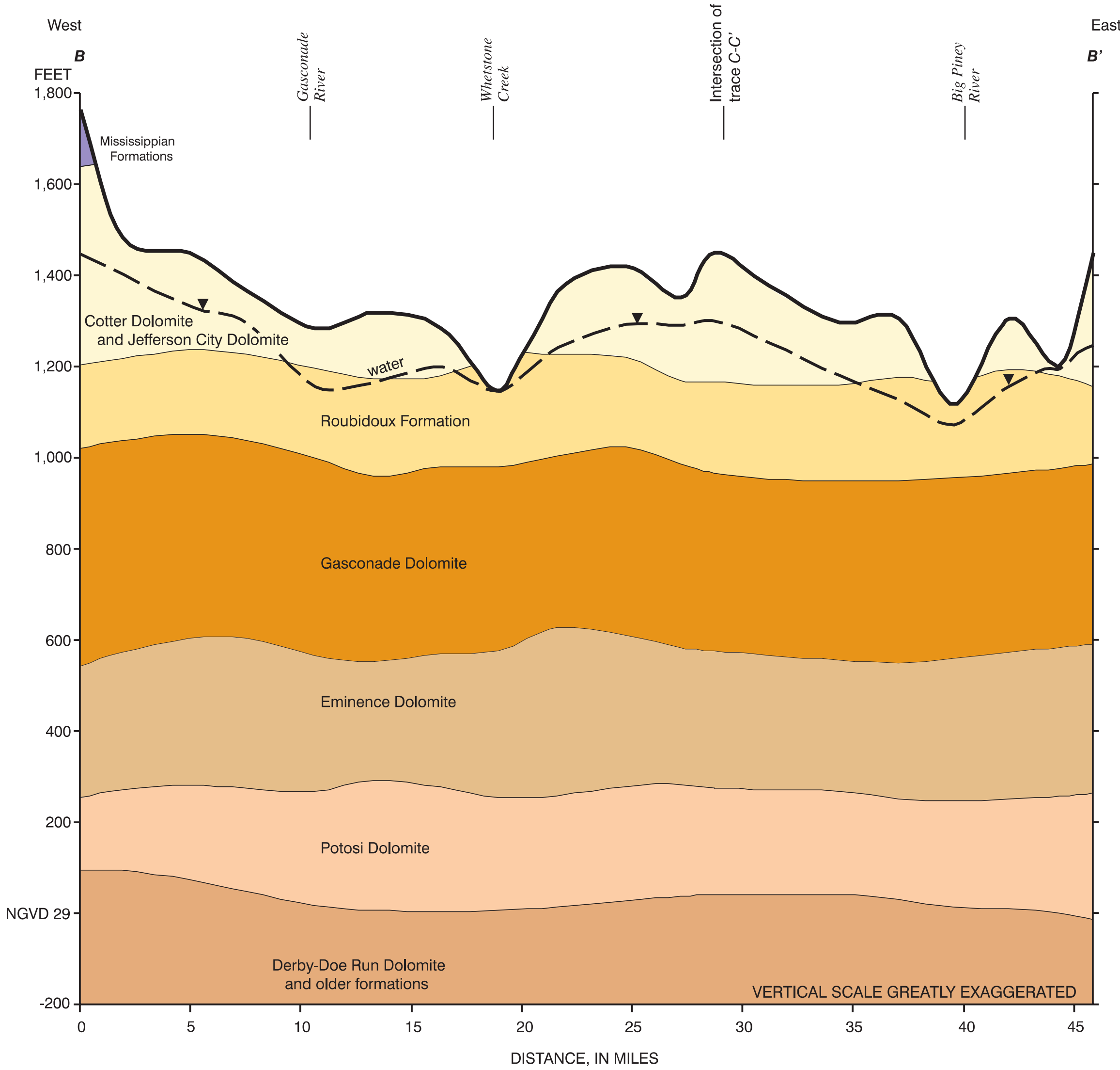


Figure 15. Generalized geologic section trending west-east across the southern part of the study area. The trace of the section is shown in figure 4.

The south-north trending geologic section (fig. 16) shows a broad structural high in the center of the section that is observed in the top-of-formation maps, and also shows another structural high in the northern part of the section. The thicknesses of the Eminence Dolomite and Potosi Dolomite do not vary much from south to north. The thickness of the Gasconade Dolomite generally decreases from about 400 ft in the south to about 300 ft in the north, but is much thinner where it has been eroded along the Gasconade River in the northern part of the study area. The thickness of the Roubidoux Formation ranges from 0 ft along the Gasconade River in the northern part of the study area to about 100 to 200 ft in most places in the central and southern parts of the study area where the entire formation is present. The Jefferson City Dolomite and Cotter Dolomite thin from more than 400 ft in the extreme south to 0 ft in most of the northern part of the study area.

GROUND-WATER HYDROLOGY

The geologic formations that compose the Ozark aquifer have different hydrologic properties. The Jefferson City Dolomite and Cotter Dolomite generally are less permeable than the stratigraphically lower rocks of the Ozark aquifer and yield little water to wells (Imes and Emmett, 1994). Wells completed in the Rou-

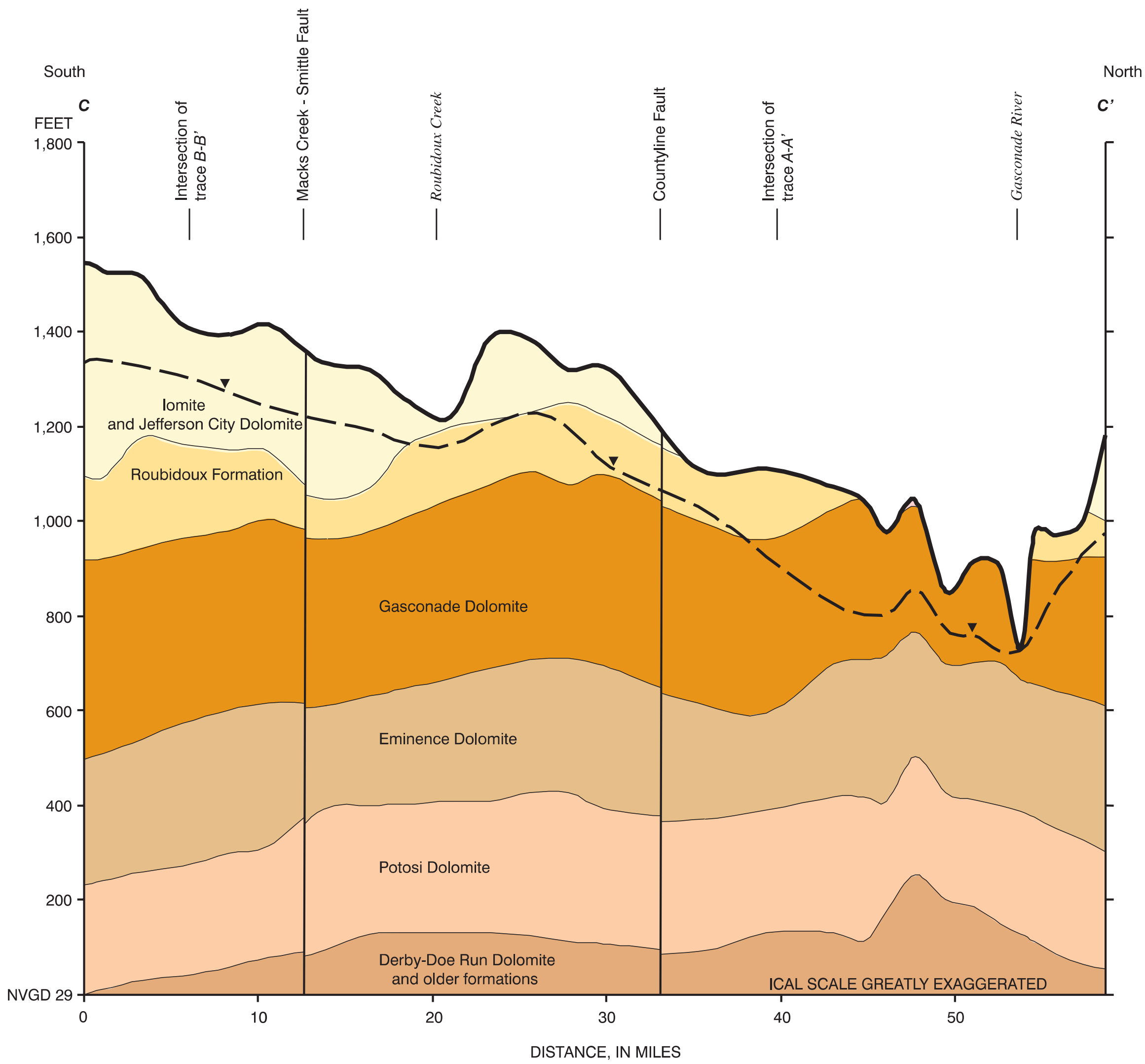


Figure 16. Generalized geologic section trending south-north across the central part of the study area. The trace of the section is shown in figure 4.

bidoux Formation and Gasconade Dolomite commonly yield from several tens to several hundred gallons per minute of water (Melton, 1976). Yields at the lower end of this range are suitable for domestic supplies, the primary use of ground water pumped from these formations. The Eminence Dolomite may form a weak hydrologic barrier to vertical ground-water flow between the overlying Gasconade Dolomite and the underlying Potosi Dolomite. The Potosi Dolomite is the most permeable formation in the Ozark aquifer. Wells completed in the Potosi Dolomite can yield from several hundred to 1,000 gal/min (gallons per minute) of water (Fuller and others, 1967; Imes and Emmett, 1994).

Domestic and Public Water-Supply Well Inventory

A well inventory was conducted in spring 1998. Depth to water was measured in 367 wells in the study area and in a 6-mi wide band surrounding the study area (table 1, at the back of this report). Wells in the GSRAD geologic well-log and well permit databases were targeted because it was preferable that well construction information be known for the wells that were measured. In areas where a targeted well was not available, the water level in another well was measured and construction information was obtained from the well owner, if it was known. Depth-to-water measurements in shallow wells open only to the uppermost saturated formation were preferred as representative water-table data. However, these ideal conditions were not encountered for many wells, because wells were commonly open to more than one formation or cased well below the water table.

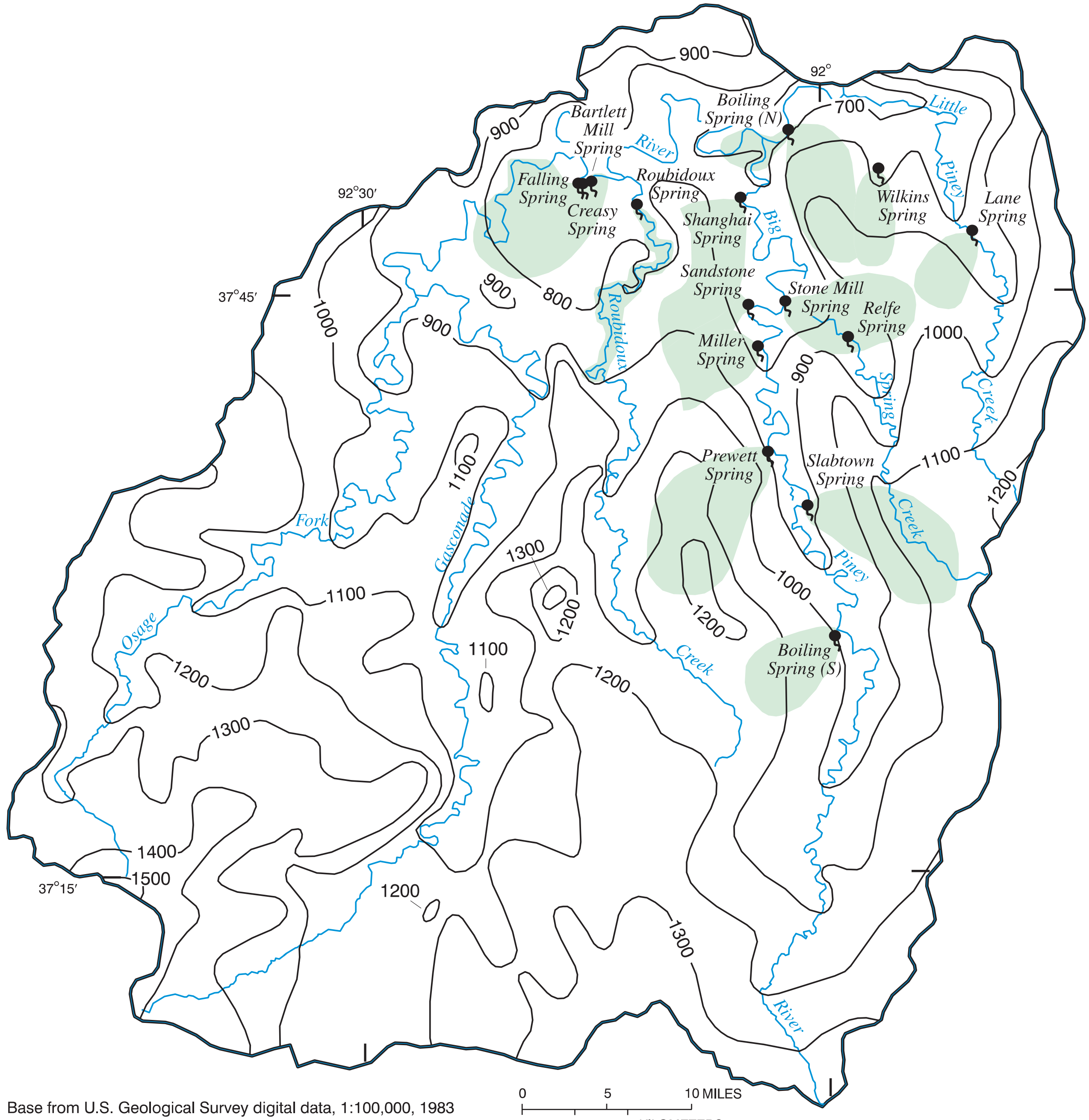
The procedure at each well consisted of measuring the static depth to water to the nearest 0.1 ft with an electric tape with the pump off. If the pump had been on recently, the water level was allowed to recover before taking a measurement. The land-surface altitude was estimated using contours on a 7 1/2-minute USGS topographic map; the land-surface altitude was accurate to one-half the contour interval of the topographic map, which was either 10 or 20 ft. The water-level depth from land surface was subtracted from the land-surface altitude to calculate the water-level altitude, after subtracting the height of the measuring point (usually the top of the well casing) above the land surface. An acoustic water-level instrument was used to measure the depth to water in some of the deeper wells, particularly public water-supply wells. Also, the specific conductance of the well water was measured for 62 of these wells (table 1).

Ground-Water Occurrence and Flow

A pre-development water-table map (fig. 17) shows the altitude of the water table (potentiometric surface) in the study area. The map was constructed using most of the water-level measurements made in 1998. Because water-level drawdown probably is minimal in domestic wells, these measurements were considered suitable for constructing the map. Some water levels were not used because they were measured in wells that did not fit this criterion. These included water levels in public water-supply wells that are open to a deeper part of the aquifer and may have drawdown because of the large pumpage from the wells, and water levels that appeared to be affected by pumpage in nearby wells. Some of the water-level measurements made in 1998 were in wells that were measured previously in 1994 and 1995 during a regional geohydrologic investigation of the FLWMR (Imes and others, 1996). Because the water-level changes from 1994 and 1995 to 1998 were small (less than 5 ft), measurements made in 1994 and 1995 in wells not measured in 1998 also were used to construct the pre-development water-table map. Historic water-level data from the GSRAD geologic well-log database also were used in a few places where more recent water-level data were lacking. The location of the onset of flow in small streams was available for several streams and was used as an indication of the altitude at which the streambed intersected the water table. Several dye-trace investigations, which demonstrate subsurface fracture, bedding-plane, and conduit flow from sinkholes and losing streams to springs, had been conducted previously (Imes and others, 1996). This information was used to position water-table contours in areas near large springs.

The regional ground-water divide is approximately coincident with the surface-water divide of the upper Gasconade River Basin. Water levels along the ground-water divide decline from an altitude of about 1,500 ft in the southwest to less than 700 ft where the Gasconade River flows out of the northern part of study area (fig. 17). The lower altitude (less than 900 ft) of the ground-water divide in a small area in the northwestern part of the study area is indicative of the extensive karst development in the Dry Auglaise Creek valley (not shown; Harvey, 1980) about 2 mi northwest of the study area. Low water-table gradients along the right bank of the Gasconade River in the area between the mouths of Osage Fork and Roubidoux Creek also indicate high permeability karst terrain. The effect of karst on the water table also is evident along the left bank of the Big Piney River between Miller Spring and the mouth of the Big Piney River. Ground-water levels may be as deep as 300 ft below the land surface (table 1) beneath upland areas where karst features are prevalent.

A part of the precipitation that falls in upland areas of the Gasconade River Basin infiltrates into the soil and residuum overburden and percolates downward through the unsaturated zone to the ground-water system at the water table. This recharge is the primary mechanism by which ground water is replenished in the basin. In areas where substantial karst has developed, local recharge through losing streambeds may be a significant source of ground-water recharge. Once ground water reaches the water table, it flows under hydraulic gradient from areas of high potentiometric head to areas of low potentiometric head. Ground-water flow directions are perpendicular to the lines of equal water-level altitude, and can be inferred from the water-table map (fig. 17). Ground-water discharges to perennial reaches of streams, as shown by gradients inferred from the water-table contours adjacent to streams. Where conduit flow to springs exists, such as in the FLWMR



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

0 5 10 MILES
0 5 10 KILOMETERS

EXPLANATION

SPRING RECHARGE AREA

— 200 — PRE-DEVELOPMENT WATER-TABLE CONTOUR—Shows altitude of water table in spring 1998. Contour interval is 100 feet. Vertical datum is NGVD 29

Figure 17. Pre-development water-table surface of the Ozark aquifer and recharge areas of selected springs in the study area.

area (Imes and others, 1996), flow directions may depart locally from the generalized directions inferred from the contours on figure 17.

Generally, ground water flows downward in recharge areas to deeper parts of the Ozark aquifer, then laterally and upward at discharge areas. Vertical potentiometric head differences between upper and lower parts of the aquifer determine whether the vertical component of ground-water flow is upward or downward at any given location. A potentiometric map of the deeper part of the Ozark aquifer was not constructed because of insufficient water-level measurements in wells open primarily to the Potosi Dolomite. Deep wells in southern Missouri commonly are open to stratigraphically higher formations (especially the Roubidoux Formation and Gasconade Dolomite) in addition to the Potosi Dolomite. Water levels measured in these wells represent an average of the potentiometric head in the formations to which the wells are open and may not accurately represent the potentiometric head in the Potosi Dolomite.

Although a potentiometric map of the deeper part of the Ozark aquifer was not available, the vertical component of flow in the southern part of the study area can be inferred to be downward because this area is the regional recharge area for the Ozark aquifer. Further north, a downward vertical component of flow also is present along the main north-south topographic ridge at the FLWMR, as evidenced by the potentiometric head difference between two FLWMR wells known as the Range Control well and the Motor Transport Operator Course (MTOC) well (fig. 2). The Range Control well is 292 ft deep, cased to 82 ft, and is open to the middle part of the Gasconade Dolomite. The MTOC well is 692 ft deep, cased to 295 ft, and is open to the middle part of the Gasconade Dolomite as well as the Eminence Dolomite and the Potosi Dolomite. Two different sets of water-level measurements made in 1994 and 1995 indicate that the water level in the shallower Range Control well was 6 ft and 16 ft higher than the water level in the deeper MTOC well (Imes and others, 1996). Although the water level measured in the MTOC well represents an average of the potentiometric head over the open interval of the well rather than at a discrete point in the Potosi Dolomite, a higher potentiometric head in the upper part of the aquifer than the lower part of the aquifer is evident.

Further north in the FLWMR and east of the main north-south topographic ridge at the FLWMR, an upward vertical component of flow is present, as evidenced by the potentiometric head difference between two FLWMR wells known as the Old Ammo Dump well and the New Ammo Dump well (fig. 2). The Old Ammo Dump well was drilled into the top few feet of the Eminence Dolomite, and is about 400 ft deep (Imes and others, 1996). The New Ammo Dump well is 630 ft deep, cased to 488 ft, and is open to the middle and lower parts of the Eminence Dolomite and possibly the upper Potosi Dolomite. A set of water-level measurements made in 1995 show that the water level in the deeper New Ammo Dump well was about 8 ft higher than the water level in the shallower Old Ammo Dump well (Imes and other, 1996). The lower potentiometric head in the upper part of the aquifer may be a result of drainage of water to nearby springs (Imes and others, 1996).

Generally, the water table occurs within younger formations in the southern part of the study area and occurs within progressively older formations to the north as the younger formations become thinner and eventually become absent (figs. 16, 18). Where the water table occurs within a formation, the formation is only partially saturated. In the southern part of the study area, the water table occurs in the Jefferson City Dolomite and possibly in the Cotter Dolomite. To the north, the water table occurs in the Roubidoux Formation, and further north it occurs in the Gasconade Dolomite. Although the Jefferson City Dolomite and the Roubidoux Formation are the uppermost bedrock formations in the upland areas of the FLWMR, the water table generally is deep enough to occur in the underlying Gasconade Dolomite throughout most of the FLWMR. At one small location north of the FLWMR along the eastern flank of the Fort Leonard Wood Anticline, the water table occurs in the Eminence Dolomite.

The Jefferson City Dolomite and possibly the Cotter Dolomite are saturated where these formations crop out and are thick enough, generally in the southern part of the study area (figs. 16, 19). The saturated thickness of the Jefferson City and Cotter Dolomites is largest (locally more than 300 ft) in the extreme southwestern and south-central part of the study area (fig. 19). The saturated thickness of the formations generally decreases to zero to the north (figs. 16, 19) and along river valleys in the southern part of the study area, but increases in some places on the north side of the Macks Creek-Smittle Fault (fig. 4) where the formations are downthrown. The Jefferson City Dolomite normally is unsaturated at the FLWMR (fig. 18; Imes and others, 1996).

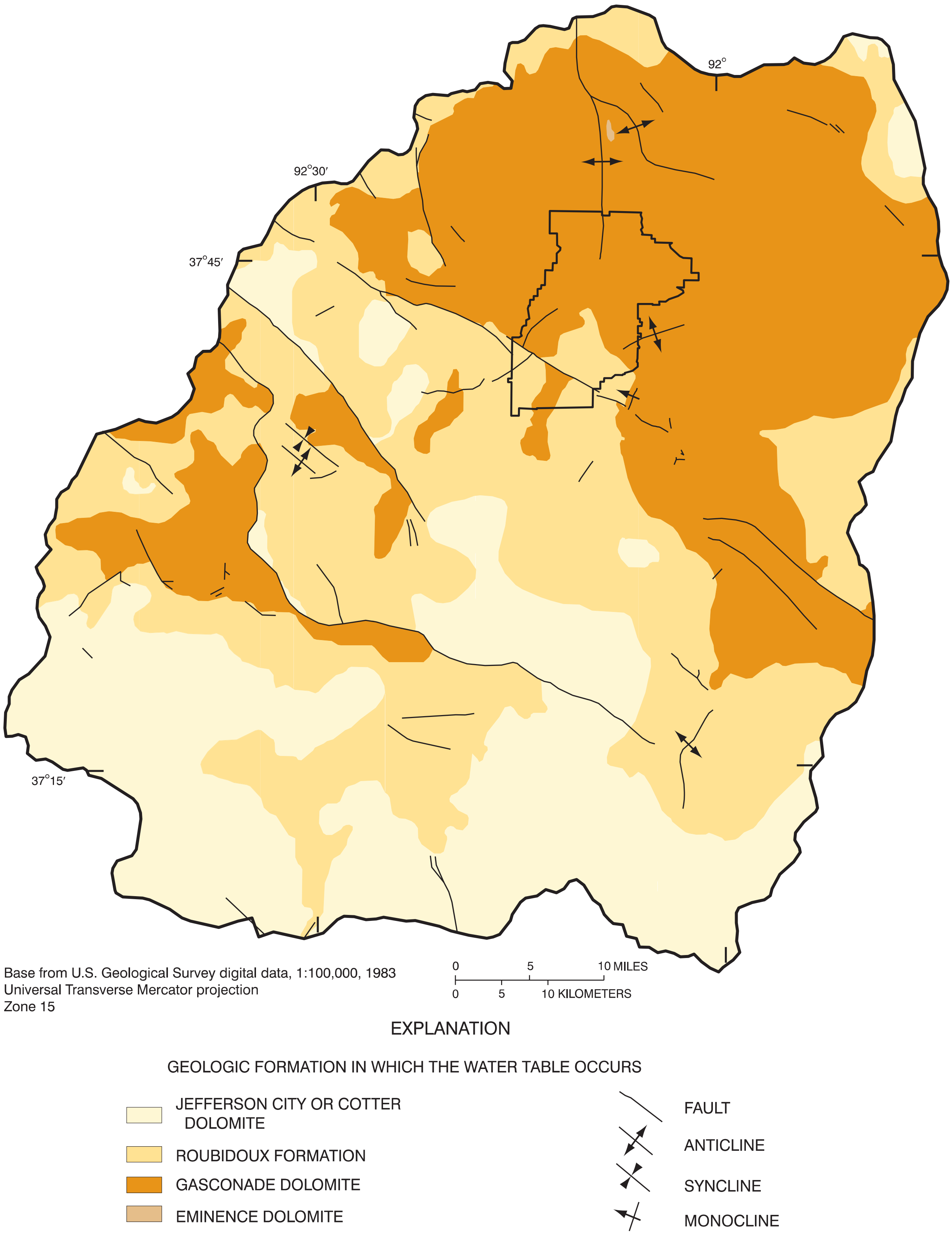


Figure 18. Area where the water table occurs within the indicated formation and where the formation is partially saturated in the study area, spring 1998.

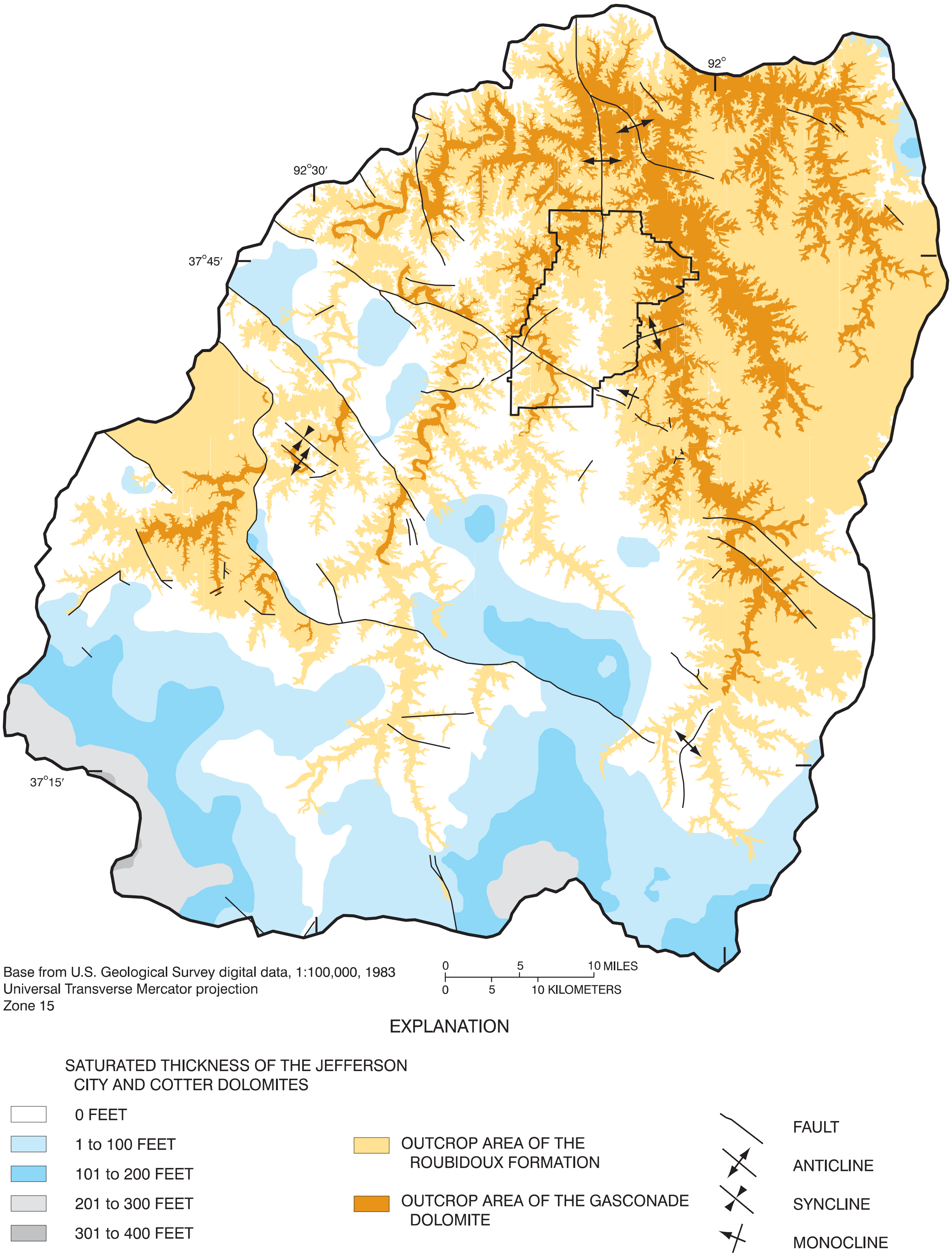


Figure 19. Saturated thickness of the Jefferson City and Cotter Dolomites in the study area, spring 1998.

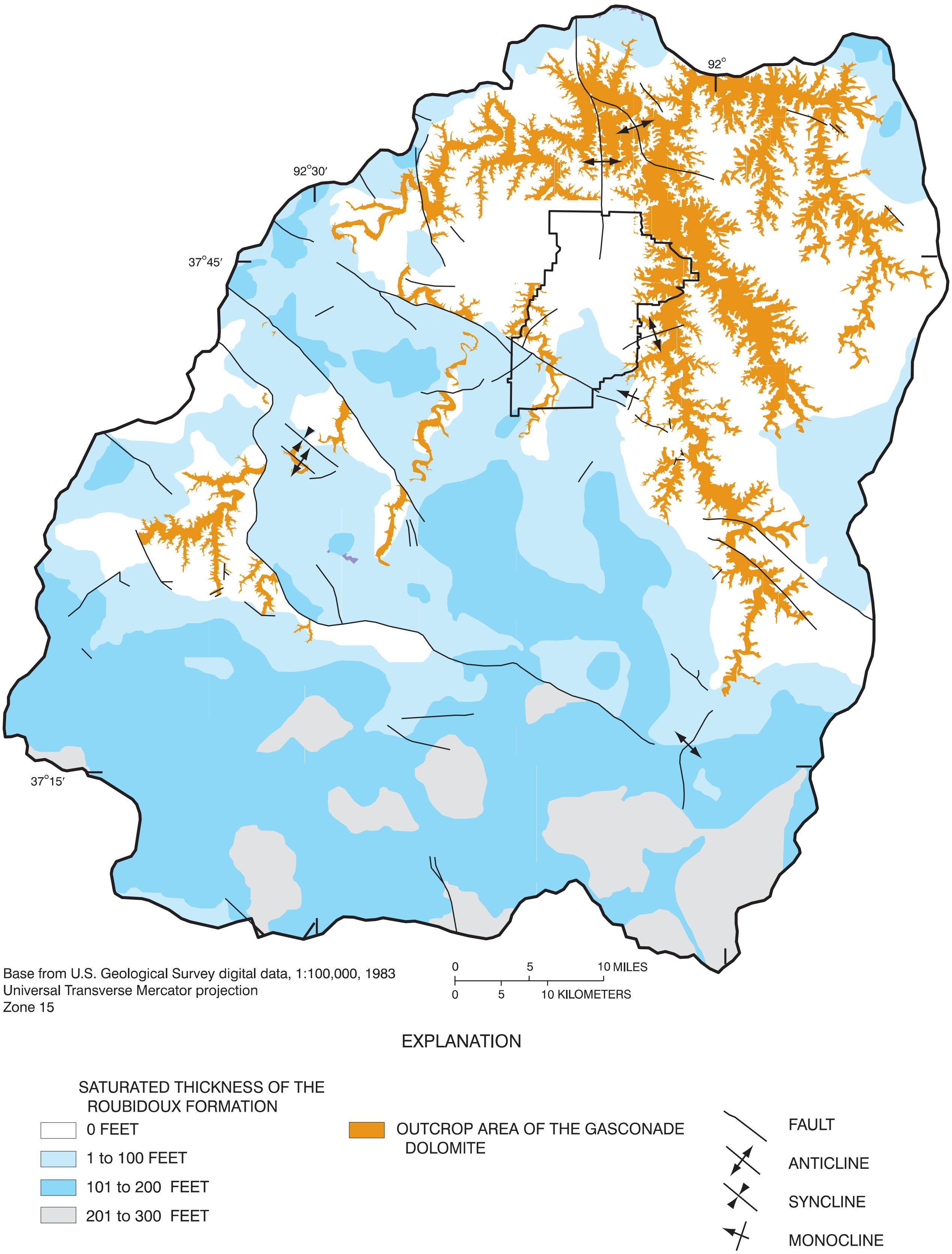


Figure 20. Saturated thickness of the Roubidoux Formation in the study area, spring 1998.

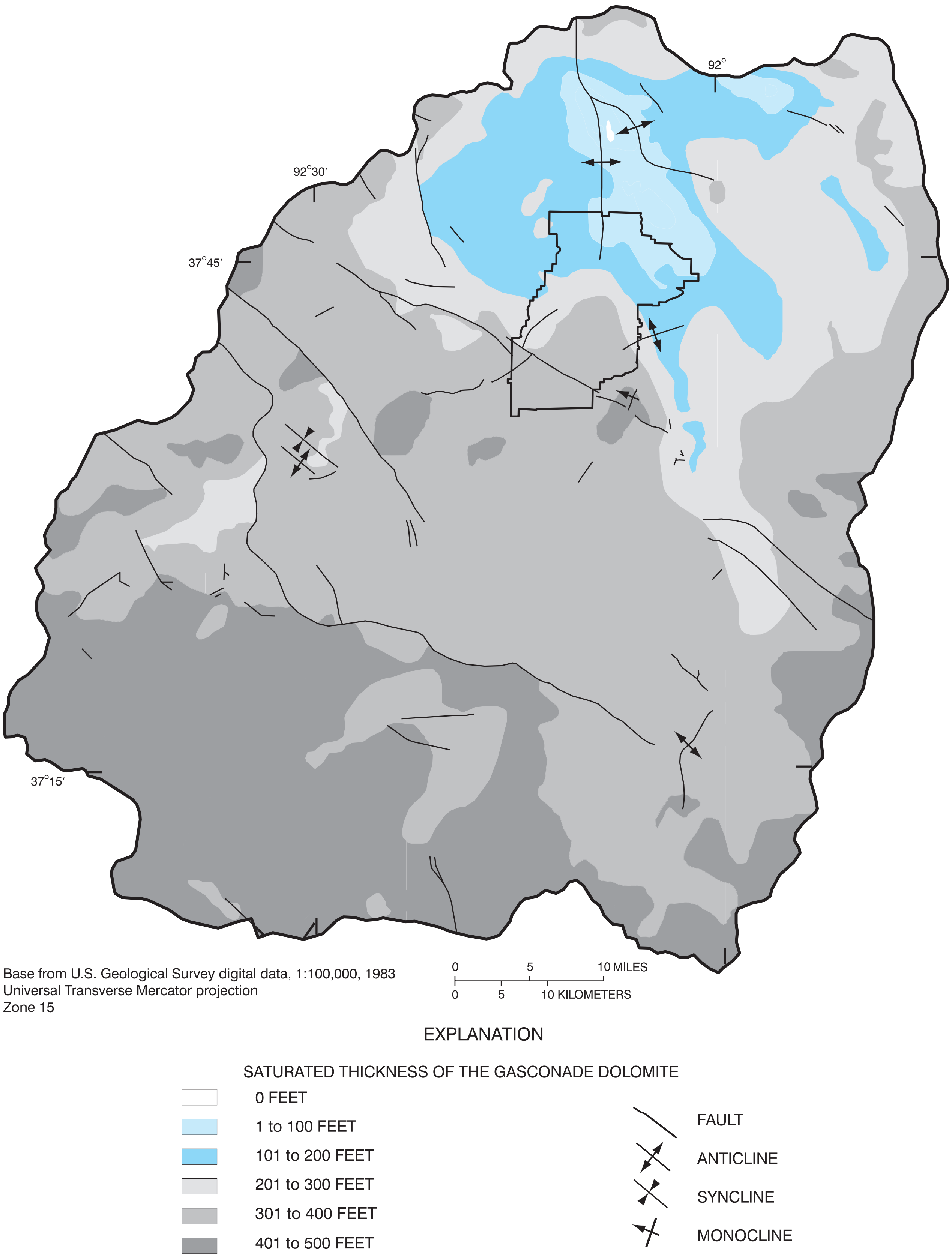


Figure 21. Saturated thickness of the Gasconade Dolomite in the study area, spring 1998.

The Roubidoux Formation is fully saturated throughout most of the southern one-third of the study area (figs. 16, 18) where its saturated thickness is larger than 200 ft in places (fig. 20). Its saturated thickness generally decreases to zero to the north (figs. 16, 20). In the central part of the study area, the lower part of the Roubidoux Formation is saturated beneath inter-valley ridges, but usually is unsaturated along stream valleys where ground-water levels are lower. The formation is unsaturated in most of the northeastern one-third of the study area. Although the formation is present beneath the inter-valley ridges in this area, the rocks are more permeable, ground-water discharge to springs is rapid, and the water table generally is low and occurs in the underlying Gasconade Dolomite.

The Gasconade Dolomite is fully saturated in most of the southern one-half of the study area (figs. 16, 18) where its saturated thickness is larger than 400 ft in places (fig. 21). It is partially saturated throughout the remainder of the area and its saturated thickness generally decreases to the north (fig. 21). The water table is in the underlying Eminence Dolomite in a small area in the north-central part of the study area (figs. 18, 21).

Ground-Water Discharge to Streams and Springs

One hundred and eleven discharge measurements or discharge estimates were made at 99 sites in September 1998 and August 1999 on the Gasconade River, Little Piney Creek, Big Piney River, Roubidoux Creek, Osage Fork, and their major tributaries and spring branches (table 2, at the back of this report). The specific conductance and temperature of the water were measured at most sites at the time discharge was measured. Discharge measurements were made during periods of low streamflow to quantify the exchange of ground and surface water. This exchange takes the form of gaining stream reaches where ground water enters streams by diffuse seepage through the streambed or from spring discharge, and losing stream reaches where surface water is lost to the ground-water system through the streambed.

Streamflow velocity was measured using either a standard AA or pygmy current meter, depending on stream velocity and depth. The methods used to make discharge measurements and the criteria used to determine the type of current meter applicable for the measuring section are described by Rantz and others (1982). The accuracy of the measurements was rated according to stream channel conditions and uniformity of flow using the following subjective scale: "good" indicates that the difference between the actual discharge and the measured discharge is less than 5 percent, "fair" is between 5 and 8 percent, and "poor" is greater than 8 percent. Discharge was estimated where shallow water depths or low-flow velocities prevented accurate current meter discharge measurements. The error at the sites where discharge was estimated may exceed 8 percent.

The planned series of discharge measurements made during low-flow conditions in September 1998 was suspended after a few days because rainfall and runoff were sufficient to cause streamflow to increase above low-flow conditions. Low-flow conditions were present again in August 1999, and discharge measurements were made on the stream reaches that were not measured in September 1998. Discharge measurements also were made at selected locations where measurements were made in September 1998 to correlate the two data sets. Discharge measurements also were made at selected springs by direct measurement of flow in the spring branch or by measuring upstream and downstream from the point where the spring branch discharged into a stream. Discharge data for springs that were not measured during September 1998 or August 1999 were estimated from low-flow or average discharge data published in Vineyard and Feder (1974). These data and discharge measurements (table 18 in Imes and others, 1996) made on the Big Piney River and Roubidoux Creek in September 1995 are presented in table 2.

A composite discharge was determined for streams and springs by scaling discharge measurements made in September 1995 and September 1998 to the measurements made in August 1999 (table 2; figs. 22, 23). The purpose of computing a composite discharge was to create a data set representative of one hydrologic condition, so that flow comparisons could be made across the basin. The scale factors were calculated as the ratio of an August 1999 measurement at the mouth of a stream and the appropriate September 1995 or September 1998 measurement at the same location. The Gasconade River scale factor was recomputed for the Gasconade River upstream of Osage Fork using the discharge values at site 17 (table 2). The composite discharge of the Gasconade River at Jerome was 552 ft^3/s (cubic feet per second), and discharges of main tributaries to the Gasconade River were 86.1 ft^3/s at the mouth of the Little Piney Creek, 246 ft^3/s at the mouth of the Big Piney River, 25.9 ft^3/s at the mouth of Roubidoux Creek, and 34.7 ft^3/s at the mouth of Osage Fork. Of the 552 ft^3/s discharged at Jerome, 393 ft^3/s were supplied by the four main tributaries of the Gasconade River and 159 ft^3/s were derived from the Gasconade River and its smaller tributaries.

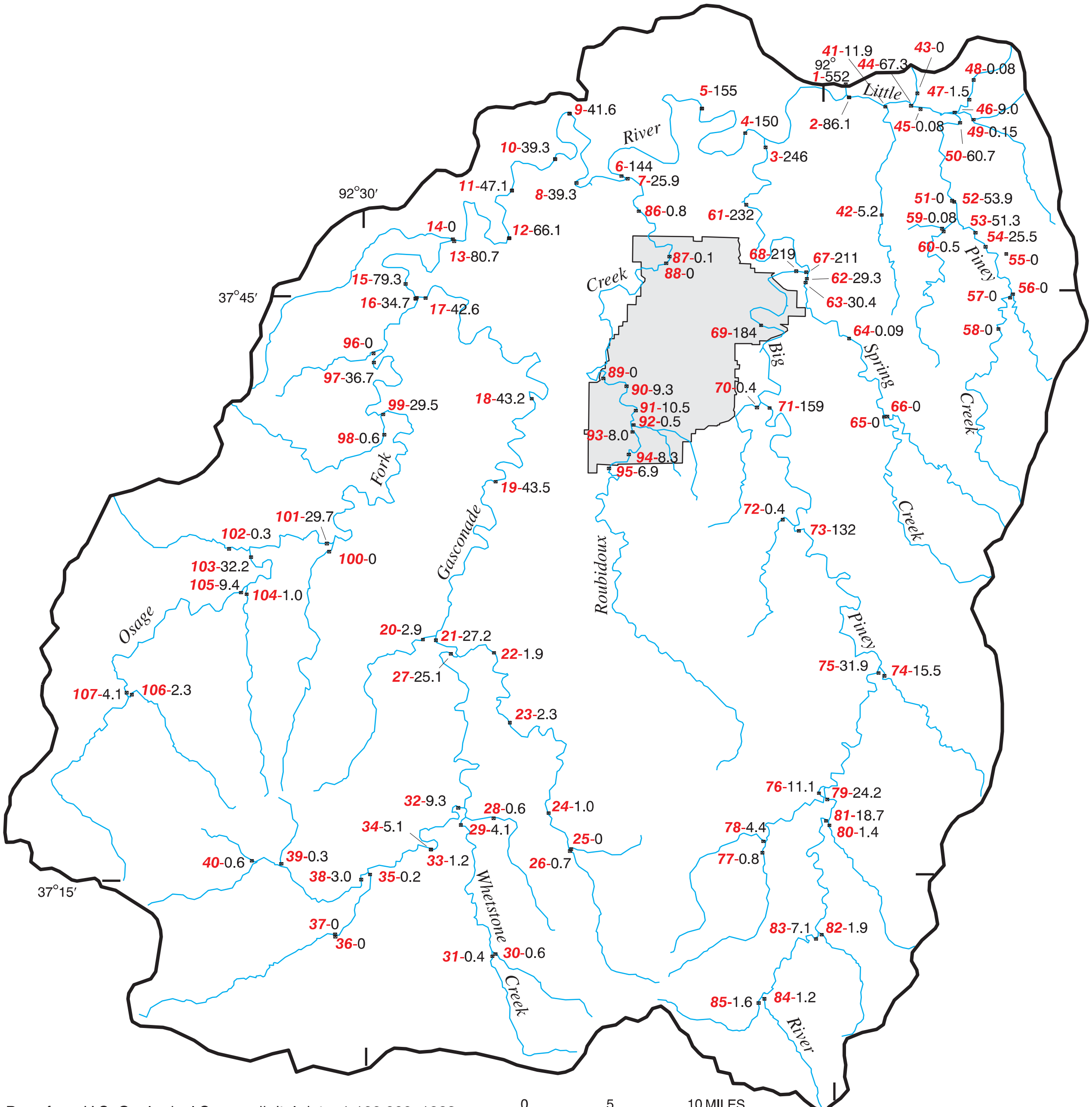
A substantial quantity of ground water in the study area discharges from springs. Springs are more numerous and larger in the northern part of the basin where the Gasconade Dolomite and Roubidoux Formations crop out (fig. 4) and karst terrain is more well developed. Discharge from springs represented 56 percent (311 ft^3/s) of the 552 ft^3/s total discharge from the upper Gasconade River Basin at Jerome. As a percentage of discharge at the mouth of the main tributaries of the Gasconade River, spring discharge represented 27 percent (23.3 ft^3/s) of the discharge of the Little Piney Creek, 54 percent (133 ft^3/s) of the discharge of the Big Piney River, 92 percent (23.8 ft^3/s) of the discharge of Roubidoux Creek, and 49 percent (17.1 ft^3/s) of the discharge of Osage Fork. Spring discharge also represented 72 percent (114 ft^3/s) of the 159 ft^3/s of discharge derived from the Gasconade River and its smaller tributaries.

Qualifications must be stated regarding the percentage of spring discharge that contributes to the discharge of Roubidoux Creek and of the Gasconade River and its smaller tributaries. Roubidoux Creek lost 9.3 ft^3/s (36 percent of the 25.9 ft^3/s flow at the mouth of Roubidoux Creek) of discharge to the ground-water flow system near Quesenberry Ford (table 2). This water returned to Roubidoux Creek 21 river miles downstream at Roubidoux Spring. The remainder of the ground-water discharge at Roubidoux Spring (16.6 ft^3/s) probably was from ground-water recharge in the immediate vicinity of the spring. Likewise, the Gasconade River lost 41.4 ft^3/s of discharge to the ground-water flow system between Highway 133 and Highway T (site 13 to site 10, fig. 22). The lost discharge reappears in Bartlett Mill Spring, Creasy Spring, and Falling Spring (fig. 23). These springs flow into the Gasconade River a short distance downstream from Collie Hollow (site 8, fig. 22). A series of discharge measurements were made on the Gasconade River during the extreme drought conditions of September 1953 (H.C. Bolon, U.S. Geological Survey, written commun., 1953). These measurements indicated that the Gasconade River lost 24.6 ft^3/s of discharge between Highway 133 (28.5 ft^3/s) and Highway T (called Lundstrum Ford Bridge; 3.9 ft^3/s). An appreciable volume of surface water was observed entering a sinkhole on the west side of the river near Cave Restaurant (site 11, fig. 22; called Ozark Springs Bridge). Stream discharge within the 0.75-mi reach of the Gasconade River below Collie Hollow reportedly increased from 4.3 to 69.8 ft^3/s, caused by discharge from Bartlett Mill Spring, Creasy Spring, Falling Spring, and discharge of ground water through the gravel streambed of the Gasconade River.

WATER USE FOR PUBLIC AND DOMESTIC SUPPLY

Well pumpage data were collected and compiled for public-water suppliers for the period from January 1993 through June 1998. Average daily pumping rates and annual pumpage for 80 public water-supply wells (owned by 30 public-water suppliers) in the study area and for 63 public water-supply wells (owned by 25 public-water suppliers) in a 6-mi wide band surrounding the study area (fig. 24) are presented in table 3, at the back of this report. Public water-supply wells in the study area are concentrated around the northern end of the FLWMR and are mostly associated with the towns of St. Robert and Waynesville (fig. 2), the Pulaski County Public Water-Supply District #1, or mobile home parks. Most of the remaining public water-supply wells are around towns along the boundary of the study area and are near the surface-water divide that defines the upper Gasconade River Basin.

Pumpage data for individual wells owned by public-water suppliers were collected directly from the suppliers and from the GSRAD, which compiles such data under their Water Resources Program. Where these data were not available, data published in the Missouri Census of Public Water Systems series (Missouri Department of Natural Resources, Division of Environmental Quality, 1991, 1996, 1997, 1998) were used. These publications contain annual consumption data for public water-supply wells on a system-wide basis, but not for individual wells. Average daily pumping rates and annual pumpage for individual wells were estimated from the published census data by interpolating the data between published intervals and, where necessary, prorating the data among the several wells of a public water-supply system. Data for surface-water pumpage by the FLWMR were supplied by the FLWMR Department of Public Works.



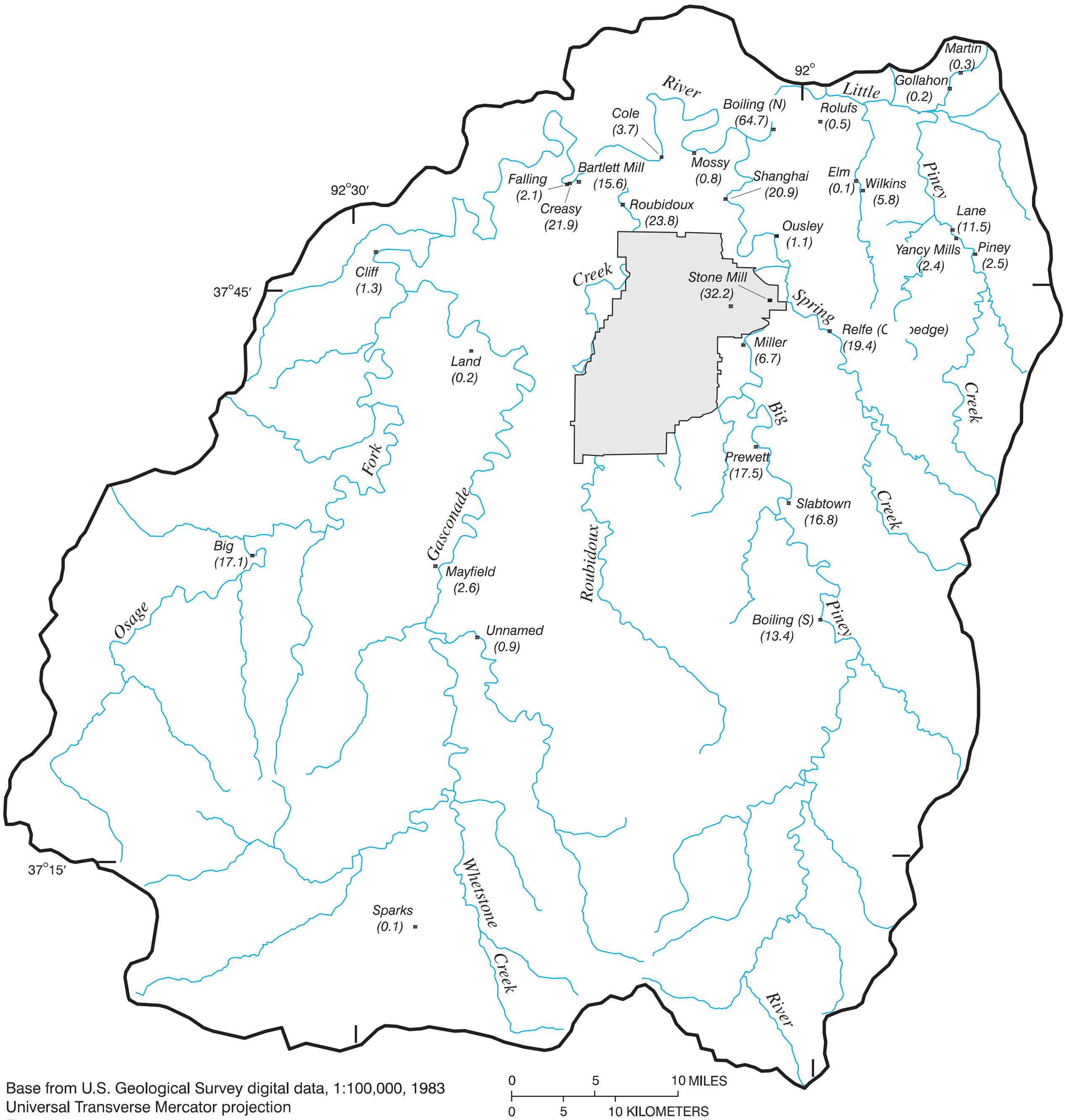
Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
Zone 15

0 5 10 MILES
0 5 10 KILOMETERS

EXPLANATION

91-10.5 ▪ SITE NUMBER AND STREAM DISCHARGE VALUE, IN CUBIC FEET PER SECOND—Red numbers are site numbers; black numbers are composite discharge values (table 2)

Figure 22. Location of low-flow measurement sites and value of composite stream discharge.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection
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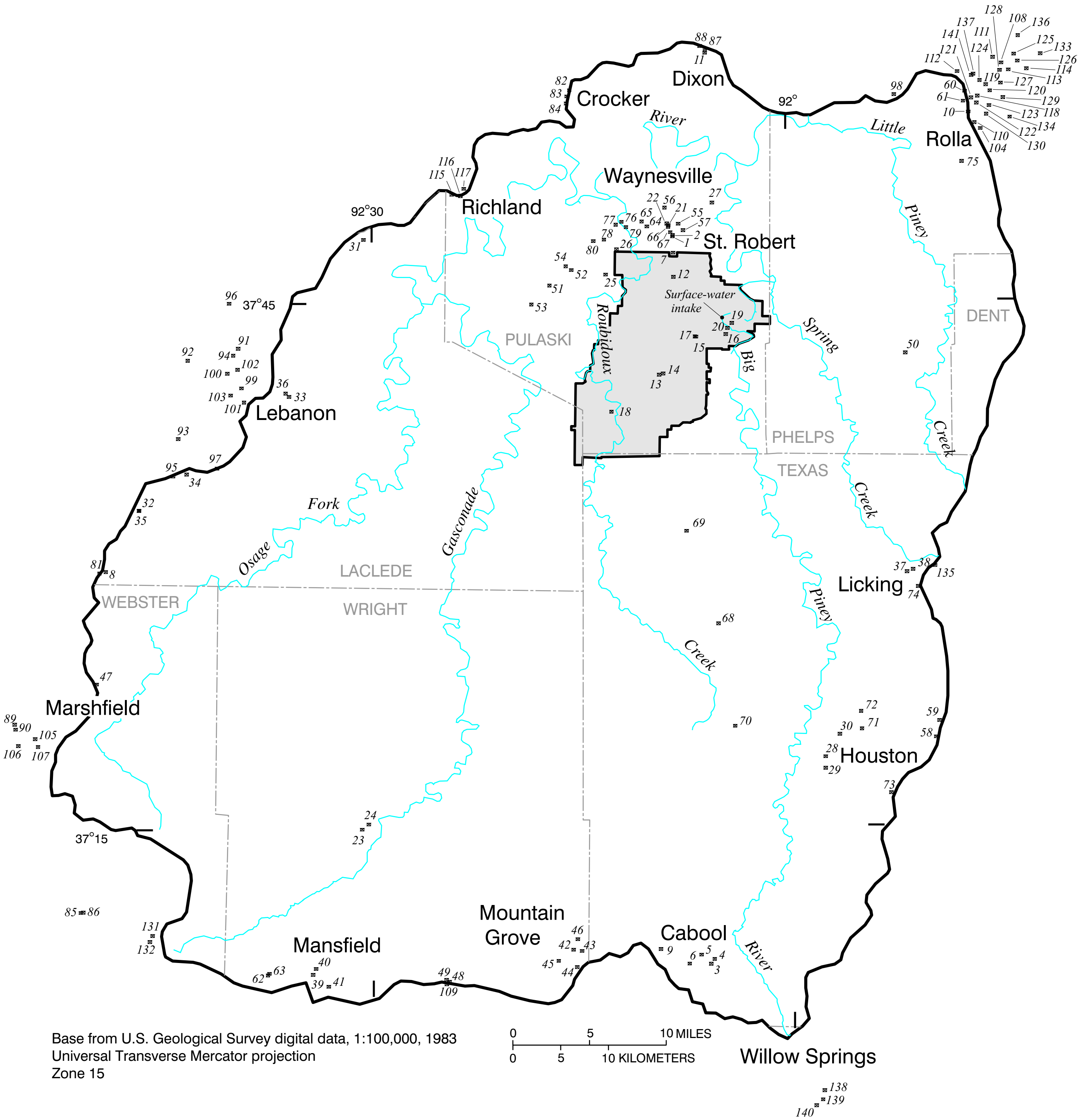
EXPLANATION

Stone Mill (32.2) ▪ SPRING NAME AND DISCHARGE, IN CUBIC FEET PER SECOND

Figure 23. Location of selected springs in the study area and composite spring discharge values.



EXPLANATION

41 WELL LOCATION AND SITE NUMBER (table 3)

Figure 24. Location of wells in the study area and in a 6-mile wide band surrounding the study area and the Fort Leonard Wood Military Reservation surface-water intake on the Big Piney River.

Except for water withdrawn from the Big Piney River for use at the FLWMR, all water used in the study area is ground water. Well pumpage, however, constitutes a much smaller amount of discharge from the ground-water system than discharge to streams. Average daily pumping rates ranged from 0 to 0.673 Mgal/d (million gallons per day) for individual public water-supply wells from January 1993 to June 1998 (table 3). Average daily pumping rates from all public water-supply wells in the study area during this period ranged from 4.73 (March 1998) to 6.29 Mgal/d (July 1997; table 3). Annual pumpage from all public water-supply wells in the study area from 1993 through 1997 (the latest year with full pumpage data) ranged from 1,820 Mgal (million gallons; an average daily rate of 4.99 Mgal/d) in 1993 to 2,030 Mgal (an average daily rate of 5.56 Mgal/d) in 1997 (table 3; fig. 25). The daily pumping rate from domestic wells in the study area is estimated at about 4 Mgal/d, based on an estimate of 40,000 people in the study area not served by public water-supply systems and an assumed water usage of 100 gal/d (gallons per day) per person. The average daily pumping rate for all wells in the study area from 1993 through 1997 is thus estimated to range from 8.99 Mgal/d in 1993 to 9.56 Mgal/d in 1997, much less than the 357 Mgal/d (552 ft^3/s) low-flow discharge measured for the Gasconade River at Jerome in August 1999. Annual pumpage from public water-supply wells in the 6-mi wide band surrounding the study area from 1993 through 1997 ranged from 1,580 Mgal (an average rate of 4.33 Mgal/d) in 1993 to 1,730 Mgal (an average rate of 4.74 Mgal/d) in 1996 and 1997 (table 3; fig. 25).

Most of the water used at the FLWMR is supplied from a pumping station on the Big Piney River. A smaller quantity of the water is supplied from eight (as of 1998) public water-supply wells at the FLWMR (fig. 2). Most of the ground water used at the FLWMR is pumped from the Indiana Avenue well, located at the western edge of the cantonment area (fig. 2). The seven other wells provide water to isolated small facilities and provide a much smaller quantity of water than the Indiana Avenue well. Pumpage records are not maintained for these wells. From 1993 through 1997, the Indiana Avenue well supplied from 1.6 percent (in 1994) to 2.9 percent (in 1997) of the total water use at the FLWMR. Annual pumpage from the Big Piney River during the same period ranged from 1,136 Mgal (an average of 3.11 Mgal/d) in 1997 to 1,334 Mgal (an average of 3.65 Mgal/d) in 1995 (table 4). Total water use in the study area ranged from a daily average of about 12.6 Mgal/d (9.12 Mgal/d ground water and 3.46 Mgal/d surface water) in 1994 to a daily average of about 12.8 Mgal/d (9.18 Mgal/d ground water and 3.65

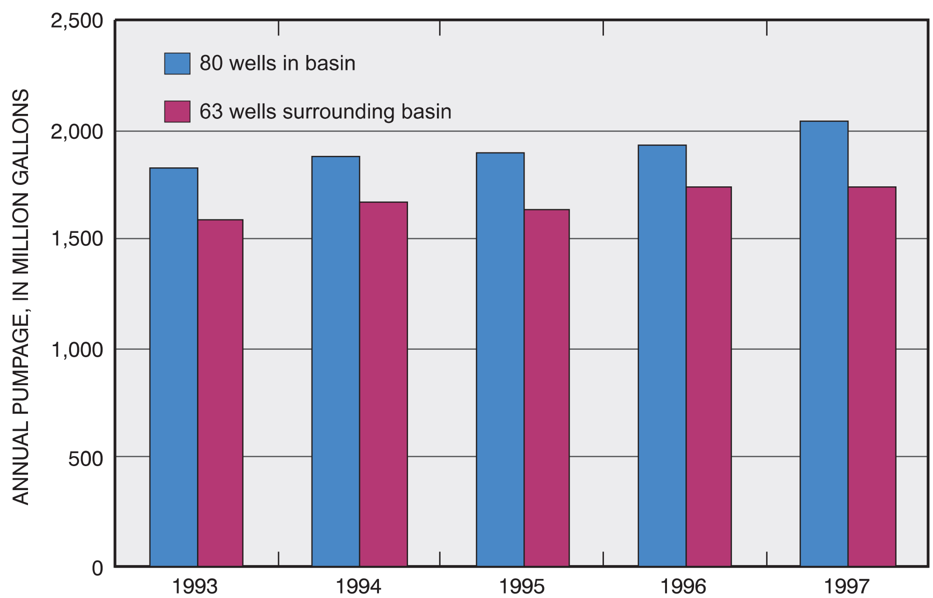


Figure 25. Annual pumpage for 80 public water-supply wells in the study area and 63 public water-supply wells in a 6-mile wide band surrounding the study area from 1993 through 1997.

Mgal/d surface water) in 1995 during the same period. Surface-water pumpage by the FLWMR as a percentage of total water use in the study area ranged from about 24.5 percent in 1997 to about 28.8 percent in 1993.

Table 4. Annual pumpage of water from the Big Piney River for public water use at the Fort Leonard Wood Military Reservation, 1993–1997

[MG, millions of gallons]

Annual pumpage (MG)				
1993	**1994**	**1995**	**1996**	**1997**
1,329	1,262	1,334	1,252	1,136

SUMMARY

The Gasconade River Basin upstream from Jerome, Missouri, is the study area for this report, and is referred to as the upper Gasconade River Basin. It encompasses 2,836 square miles of predominately rural countryside in south-central Missouri, and contains the 64,000-acre Fort Leonard Wood Military Reservation (FLWMR). There is concern that chemicals and petroleum products used and disposed of at the FLWMR could migrate into the FLWMR public water-supply wells or domestic and other public water-supply wells. The U.S. Geological Survey (USGS) in cooperation with the Directorate of Public Works, Environmental Division (DPW-ED), FLWMR, began a study in 1998 of the geohydrologic framework, ground-water hydrology, and water use in the upper Gasconade River Basin to improve the understanding of the contributing areas of recharge to water-supply wells at and in the vicinity of the FLWMR.

Regional geohydrologic units in the study area are, in order of increasing depth: the Springfield Plateau aquifer, Ozark confining unit, Ozark aquifer, St. Francois confining unit, St. Francois aquifer, and Basement confining unit. The Ozark aquifer is the principal source of ground water in the study area and is the focus of this report. The Ozark aquifer is composed of, in order of increasing age: the Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite, Eminence Dolomite, and Potosi Dolomite. The underlying St. Francois confining unit is composed of the Derby-Doe Run Dolomite and the Davis Formation.

Early Ordovician-age dolostones and sandstones form the bedrock surface throughout most of the study area. Sedimentary strata are nearly horizontal, except along folds and collapse zones where dips can be steep. Stream incision of these nearly horizontal strata has produced a dendritic pattern on the geologic map of the study area, with younger strata underlying the uplands and older strata exposed along streams. The study area is cut by numerous faults, most of which trend generally northwest-southeast. The Fort Leonard Wood Anticline trends generally north-south through the northern part of the FLWMR.

The Upper Cambrian-age Potosi Dolomite is a massive bedded, vuggy dolostone with quartz druse that is associated with chert. The large porosity and permeability of the formation causes it to be a good source of water to wells, and it is utilized by many public water-supply wells in the study area. The Potosi Dolomite is between 200 and 400 ft (feet) thick throughout most of the study area. The Upper Cambrian-age Eminence Dolomite is a massive bedded dolostone with small amounts of chert and quartz druse and is less vuggy than the underlying Potosi Dolomite or the overlying Gasconade Dolomite. The Eminence Dolomite is 200 to 400 ft thick throughout most of the study area.

The Canadian Series Ordovician-age Gasconade Dolomite overlies the Eminence Dolomite. It is the oldest formation to crop out in the study area and forms the bedrock surface along the major streams and their tributaries. The Gasconade Dolomite primarily is a cherty dolostone, and is divisible into informal upper and lower units based on chert content and a basal sandstone unit called the Gunter Sandstone. The lower Gasconade Dolomite generally is medium to thin bedded and medium to finely crystalline dolostone and may have greater than 50 percent chert by volume, whereas the upper Gasconade Dolomite is massive, medium to finely crystalline dolostone and may contain small amounts of chert and sandstone stringers. Most caves and large springs in and around the FLWMR are in the upper Gasconade Dolomite. The pre-erosional thickness of the Gasconade Dolomite generally decreases from greater than 400 ft in the southwestern part of the study area to less than 300 ft in the northeastern part of the study area.

The Canadian Series Ordovician-age Roubidoux Formation overlies the Gasconade Dolomite. It forms the bedrock surface throughout a large part of the study area, including a large part of the FLWMR. The lithology of the Roubidoux Formation ranges from dolostone to cherty dolostone to sandy dolostone to sandstone. The amount of sandstone ranges throughout the study area from less than 5 percent west of the FLWMR to more than 40 percent in the southern part of the study area and is about 10 to 25 percent throughout most of the FLWMR. Although bedding normally is nearly horizontal, numerous irregular small folds occur in sandstone beds at the FLWMR and are interpreted to be the result of collapse in response to dissolution of interbedded or underlying dolostone. Most of the observed sinkholes in the upland areas of the FLWMR are formed in the Roubidoux Formation. The pre-erosional thickness of the Roubidoux Formation ranges from 100 to 200 ft throughout a large part of the study area.

The Canadian Series Ordovician-age Jefferson City Dolomite and Cotter Dolomite overlie the Roubidoux Formation. These two formations underlie the upland areas in the approximately southern two-thirds of the study area and in a few upland areas in the northern one-third of the study area. The Jefferson City Dolomite is the youngest formation at the FLWMR and underlies the central upland ridge that trends north-south through the FLWMR. The Jefferson City Dolomite is a medium to finely crystalline dolostone and argillaceous dolostone with chert, and may contain lenses of orthoquartzite, conglomerate, and shale. The Cotter Dolomite is medium to thin bedded medium to finely crystalline cherty and non-cherty dolostone. The combined thickness of the Jefferson City and Cotter Dolomites ranges from 0 to more than 400 ft.

The Jefferson City Dolomite and Cotter Dolomite generally are less permeable than the stratigraphically lower rocks of the Ozark aquifer and yield little water to wells. Wells completed in the Roubidoux Formation and Gasconade Dolomite commonly yield from several tens to several hundred gallons per minute of water. The Eminence Dolomite may form a weak hydrologic barrier to vertical ground-water flow between the overlying Gasconade Dolomite and the underlying Potosi Dolomite. The Potosi Dolomite is the most permeable formation in the Ozark aquifer and can yield from several hundred to 1,000 gallons per minute of water.

Low water-table gradients along the right bank of the Gasconade River in the area between the mouths of Osage Fork and Roubidoux Creek and along the left bank of the Big Piney River between Miller Spring and the mouth of the Big Piney River indicate high permeability karst terrain. Ground-water levels may be as deep as 300 ft below the land surface beneath upland areas where karst features are prevalent. Generally, the water table occurs in younger formations in the southern part of the study area, and occurs in progressively older formations to the north. The Jefferson City Dolomite and possibly the Cotter Dolomite are saturated in the southern part of the study area. The Roubidoux Formation is fully saturated throughout most of the southern one-third of the study area, and the Gasconade Dolomite is fully saturated in most of the southern one-half of the study area. Although the Jefferson City Dolomite and the Roubidoux Formation are the uppermost bedrock formations in the upland areas of the FLWMR, the water table generally is deep enough to occur in the underlying Gasconade Dolomite throughout most of the FLWMR.

A composite stream discharge was determined for streams by scaling discharge measurements made in September 1995 and September 1998 to measurements made in August 1999. The composite discharge of the Gasconade River at Jerome was 552 ft^3/s (cubic feet per second), and discharges of main tributaries to the Gasconade River were 86.1 ft^3/s at the mouth of the Little Piney Creek, 246 ft^3/s at the mouth of the Big Piney River, 25.9 ft^3/s at the mouth of Roubidoux Creek, and 34.7 ft^3/s at the mouth of Osage Fork. Of the 552 ft^3/s discharged at Jerome, 393 ft^3/s were supplied by the four main tributaries of the Gasconade River and 159 ft^3/s were derived from the Gasconade River and its smaller tributaries. Discharge from springs represented 56 percent (311 ft^3/s) of the 552 ft^3/s total discharge from the upper Gasconade River Basin at Jerome, 27 percent (23.3 ft^3/s) of the discharge of the Little Piney Creek, 54 percent (133 ft^3/s) of the discharge of the Big Piney River, 92 percent (23.8 ft^3/s) of the discharge of Roubidoux Creek, and 49 percent (17.1 ft^3/s) of the discharge of Osage Fork. Spring discharge also represented 72 percent (114 ft^3/s) of the 159 ft^3/s of discharge derived from the Gasconade River and its smaller tributaries.

Except for water withdrawn from the Big Piney River for use at the FLWMR, all water used in the study area is ground water. Annual pumpage from all public water-supply wells in the study area from 1993 through 1997 ranged from 1,820 Mgal [million gallons; an average daily rate of 4.99 Mgal/d (million gallons per day)] in 1993 to 2,030 Mgal (an average daily rate of 5.56 Mgal/d) in 1997. The daily pumping rate from domestic wells in the study area is estimated at about 4

Mgal/d. The average daily pumping rate for all wells in the study area from 1993 through 1997 is thus estimated to range from 8.99 Mgal/d in 1993 to 9.56 Mgal/d in 1997. Most of the water used at the FLWMR is supplied from a pumping station on the Big Piney River. A smaller quantity of water is supplied from eight (as of 1998) public water-supply wells at the FLWMR. Most of the ground water used at the FLWMR is pumped from the Indiana Avenue well. From 1993 through 1997, the Indiana Avenue well supplied from 1.6 percent (in 1994) to 2.9 percent (in 1997) of the total water use at the FLWMR. Annual pumpage from the Big Piney River during the same period ranged from 1,136 Mgal (an average of 3.11 Mgal/d) in 1997 to 1,334 Mgal (an average of 3.65 Mgal/d) in 1995. Total water use in the study area ranged from a daily average of about 12.6 Mgal/d (9.12 Mgal/d ground water and 3.46 Mgal/d surface water) in 1994 to a daily average of about 12.8 Mgal/d (9.18 Mgal/d ground water and 3.65 Mgal/d surface water) in 1995 during the same period. Surface-water pumpage by the FLWMR as a percentage of total water use in the study area ranged from about 24.5 percent in 1997 to about 28.8 percent in 1993.

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TABLES

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998

[ddmmss, degrees-minutes-seconds; NGVD 29, National Geodetic Vertical Datum of 1929; μS/cm, microsiemens per centimeter at 25 degrees Celsius; yyyymmdd, year-month-day; --, no data]

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
374138	921423	910	55	--	22.1	--	19980604
373238	921133	1,172	--	--	109.2	--	19980603
373056	921613	1,205	--	--	45.6	--	19980428
372624	922818	1,125	60	--	32.1	--	19980417
372309	915427	1,200	420	--	128.0	308	19980415
375449	914530	1,110	350	--	210.6	--	19980429
373139	922228	1,030	--	--	46.4	--	19980429
375040	921102	992	350	--	194.7	--	19980603
372753	924005	1,303	270	--	144.3	--	19980416
374153	922920	895	130	--	6.6	--	19980430
372545	923615	1,380	246	--	144.9	--	19980415
373621	920057	970	--	--	14.3	422	19980514
373455	922852	1,100	240	--	118.2	--	19980416
371022	920808	1,440	285	--	183.0	490	19980403
375444	914201	1,055	250	--	96.6	--	19980428
373517	923204	1,203	185	--	130.3	--	19980416
372003	922946	1,400	325	100	106.8	--	19980409
371000	923829	1,280	80	--	13.2	--	19980408
371911	923637	1,562	335	--	176.7	--	19980410
371656	915521	1,225	180	--	78.2	460	19980415
372702	915951	1,175	250	--	171.9	--	19980417
373955	922058	1,105	287	--	127.3	--	19980512
375548	914851	970	230	--	142.3	583	19980430
374902	922723	980	330	--	108.4	--	19980513
370541	922932	1,510	420	210	320.3	--	19980402
373921	923026	1,175	410	--	151.8	--	19980416
373810	922943	1,110	250	--	60.1	--	19980430
373809	922943	1,110	50	--	12.5	--	19980430
370604	920050	1,375	--	--	42.7	438	19980408
372011	914758	1,342	352	--	250.0	368	19980414
370804	924728	1,658	540	--	238.4	--	19980402
373335	924723	1,385	406	--	213.6	--	19980416
370511	922449	1,425	603	405	325.2	--	19980402
370631	914948	1,266	--	--	84.8	--	19980409
371140	921634	1,485	380	105	150.0	--	19980408
373941	922224	1,205	320	--	231.9	--	19980430
373855	922313	1,220	170	--	75.7	--	19980429
372215	923133	1,385	230	--	108.2	--	19980415
370736	920552	1,275	1,360	--	119.0	--	19980323
370751	920648	1,360	1,300	441	197.0	--	19980323
370720	920739	1,323	1,000	450	201.0	--	19980323
372908	923116	1,280	290	--	143.2	--	19980422
373233	921541	1,191	--	--	97.9	--	19980608
373857	914518	1,283	--	--	95.8	313	19980506
372002	924909	1,390	500	--	83.9	--	19980409

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
371828	925459	1,535	325	147	206.4	--	19980402
372100	925710	1,445	235	--	54.1	--	19980402
375032	914824	1,020	210	--	80.2	455	19980429
372749	922809	1,302	210	--	139.7	--	19980417
372617	922844	1,130	151	--	49.8	--	19980417
380201	921647	920	190	--	54.2	--	19980514
371818	920128	1,190	258	210	96.4	--	19980414
370812	925103	1,520	--	--	100.3	--	19980408
374714	922840	1,010	450	--	130.5	--	19980514
371737	924447	1,440	370	--	91.4	427	19980410
374626	915109	1,105	370	--	203.1	363	19980429
371619	922958	1,255	155	84	26.6	--	19980410
375330	915846	775	350	115	20.6	--	19980506
374515	923030	1,112	--	--	140.2	--	19980512
372911	921749	1,415	200	--	54.2	--	19980424
375104	920010	1,073	350	--	233.0	--	19980521
374011	924304	1,235	--	--	182.6	--	19980422
373155	915801	1,215	--	--	221.7	--	19980421
372043	920155	1,270	400	--	193.2	--	19980415
372154	922728	1,336	400	--	178.7	--	19980422
375335	921339	890	285	--	79.4	--	19980514
373938	920301	910	230	--	60.1	407	19980514
370910	923024	1,400	340	--	267.6	--	19980402
375721	921546	1,123	995	--	218.0	--	19980313
375636	921600	1,123	950	--	197.0	--	19980313
374054	922548	1,233	360	--	254.5	--	19980430
374832	920014	1,100	--	--	140.0	--	19980519
372423	921035	1,420	430	--	225.4	--	19980415
370715	922338	1,450	575	168	382.2	375	19980408
370816	921858	1,380	1,040	--	132.3	--	19981125
371125	925315	1,640	--	--	160.0	--	19980408
373454	922422	1,222	180	--	152.7	--	19980429
373453	922421	1,222	50	--	22.2	--	19980429
373029	923510	1,290	375	--	216.3	--	19980422
375827	914237	1,165	--	--	225.0	--	19980430
370346	921719	1,465	360	100	132.8	--	19980403
373616	921810	1,075	240	--	101.2	--	19980604
375748	914750	1,192	450	212	303.2	--	19980429
375625	914803	974	650	420	183.2	--	19980429
371812	923226	1,465	260	--	84.3	--	19980415
375940	920600	1,162	889	--	310.0	--	19980313
371339	923905	1,487	312	80	172.7	--	19980409
373457	914702	1,375	260	--	155.7	374	19980422
374312	920648	1,092	600	--	261.9	--	19980310
370912	923446	1,415	370	--	209.3	--	19980331

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
373939	921601	1,195	296	--	193.3	--	19980604
374425	923517	1,090	--	--	30.3	--	19980512
372037	922151	1,180	--	--	95.3	--	19980423
371743	921736	1,280	138	--	105.1	--	19980409
372504	921556	1,465	--	--	253.5	--	19980423
371014	924907	1,603	519	--	149.5	--	19980408
374923	922541	1,003	--	--	113.2	--	19980513
372733	914736	1,300	290	--	181.9	458	19980421
370910	921550	1,455	1,490	19	173.0	--	19980328
374440	922120	1,100	280	--	154.7	--	19980604
380018	915159	830	212	100	62.8	--	19980506
373757	914019	1,180	210	--	73.5	--	19980521
373200	922654	1,095	450	--	46.2	--	19980416
372116	924034	1,420	195	--	108.8	--	19980410
371444	924256	1,523	353	--	65.2	475	19980409
371844	922607	1,390	--	--	144.5	--	19980422
374620	915508	1,100	300	--	167.8	448	19980505
374358	920412	870	187	--	57.3	--	19980317
374313	920651	1,100	--	--	283.8	--	19980310
374107	920911	1,125	--	--	168.4	--	19980310
374103	920928	1,142	692	--	200.8	--	19980310
373857	921255	1,125	975	--	162.0	--	19980311
374428	920300	820	773	223	39.3	--	19980310
374634	920823	1,122	1,020	--	302.1	--	19980310
374327	921116	1,080	525	400	240.0	--	19980410
380041	920715	1,182	290	--	132.3	--	19980521
375112	915703	825	300	--	19.5	--	19980515
374943	921331	1,010	320	--	216.1	--	19980603
373725	922553	1,165	230	--	168.6	--	19980429
375150	921611	972	290	--	205.4	--	19980311
375627	920807	1,005	--	--	182.3	--	19980518
374841	915430	1,080	290	--	184.7	281	19980501
373109	925010	1,350	--	90	47.2	--	19980415
372933	920937	1,350	--	--	154.9	--	19980417
372716	923222	1,255	260	--	112.2	--	19980417
375018	921909	1,031	360	--	250.8	--	19980603
371452	925155	1,405	235	--	48.9	523	19980409
375056	920848	1,065	--	--	310.4	--	19980603
375203	920402	830	230	--	123.4	--	19980603
375855	921338	975	210	--	28.7	--	19980518
371446	924650	1,605	--	--	63.5	--	19980409
375915	921048	1,113	--	--	163.4	--	19980518
370933	922456	1,480	507	105	221.2	--	19980401
375329	920229	740	150	--	51.7	--	19980521
373630	920822	1,190	--	--	89.4	--	19980603

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
373911	923424	1,225	460	--	226.8	--	19980501
375135	922540	1,096	120	--	69.1	--	19980513
374038	923120	1,120	300	--	160.8	--	19980501
373304	925245	1,326	181	--	94.9	--	19980416
372159	920922	1,420	385	--	224.0	--	19980415
373349	920647	1,222	--	--	196.0	--	19980603
370826	915420	1,300	235	162	45.9	--	19980409
371704	924910	1,533	374	--	173.1	865	19980409
371450	920019	1,200	250	90	90.0	666	19980403
371923	920743	1,330	--	--	127.8	--	19980414
371835	915040	1,395	380	--	219.0	552	19980414
371843	921401	1,545	408	105	286.3	--	19980409
373503	925003	1,280	340	--	99.6	--	19980415
371910	915750	1,225	1,150	--	164.0	--	19980318
371828	915748	1,280	1,170	--	212.0	--	19980318
372024	915645	1,273	1,200	450	210.0	--	19980318
372737	920606	1,410	--	--	176.6	--	19980604
372610	920801	1,350	360	--	186.5	--	19980417
373111	923829	1,280	350	190	166.4	--	19980423
375445	921757	980	--	--	166.2	--	19980514
374106	921713	1,100	220	--	89.5	--	19980604
374303	923052	1,145	260	--	211.2	--	19980512
373356	922422	1,262	51	--	21.0	--	19980429
372609	925727	1,270	295	--	89.3	573	19980403
372230	923635	1,360	202	--	50.9	--	19980415
374409	922914	1,010	200	--	68.3	--	19980512
371235	923202	1,235	250	--	78.5	--	19980331
375528	913921	1,005	270	--	152.2	365	19980428
371326	925500	1,490	247	--	90.3	--	19980409
373441	915639	1,160	--	--	45.8	--	19980421
375528	914705	1,141	380	--	302.0	--	19980213
372843	915156	1,280	550	--	153.8	174	19980423
373605	924235	1,360	350	--	211.5	--	19980423
373909	915051	1,132	200	--	73.3	381	19980423
373142	925429	1,295	145	--	57.4	--	19980417
373955	923606	1,333	1,280	--	351.0	--	19980501
373550	924118	1,360	1,220	525	383.0	--	19980501
374006	923621	1,310	1,300	550	330.0	--	19980501
373452	923916	1,300	452	--	229.6	--	19980423
372449	925120	1,365	310	--	109.5	--	19980402
373359	915141	1,255	210	--	90.9	287	19980423
371158	924949	1,585	499	--	147.9	--	19980408
371945	915544	1,222	200	40	72.0	524	19980415
374115	924032	1,233	1,640	--	336.3	--	19980430
372418	922454	1,305	--	--	247.1	--	19980422

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
370847	924132	1,400	394	--	37.5	--	19980402
371115	915943	1,150	280	100	-2.5	500	19980409
372939	915149	1,290	903	--	187.0	--	19980318
372924	915121	1,320	1,100	600	270.0	--	19980000
373611	925649	1,230	360	105	107.7	--	19980415
374257	914312	1,215	350	--	133.3	438	19980506
373625	924656	1,305	500	--	209.2	--	19980414
373738	923815	1,275	302	--	188.9	--	19980423
374313	922654	1,083	--	--	158.3	--	19980430
370531	920341	1,360	312	89	24.9	496	19980403
371309	922400	1,310	160	84	111.5	--	19980331
374816	913734	1,100	272	--	130.9	409	19980429
370711	923420	1,440	1,550	845	433.0	431	19980409
375533	920604	1,010	--	--	207.4	--	19980518
371438	922300	1,220	--	--	41.9	--	19980331
373018	924710	1,265	225	--	59.4	--	19980416
373635	922338	1,235	385	--	110.3	--	19980429
371318	923630	1,465	205	--	94.3	--	19980331
372318	921348	1,443	440	189	211.3	459	19980410
374131	922930	975	170	--	77.6	521	19980430
373156	922023	1,115	154	--	76.9	--	19980608
373111	922014	1,153	--	--	56.4	--	19980429
374500	922743	1,070	301	--	158.6	--	19980513
371617	923412	1,355	120	--	45.2	--	19980410
373503	923513	1,300	255	--	164.4	--	19980422
374158	923304	1,160	--	--	69.7	--	19980512
374257	915857	830	170	--	11.1	472	19980506
371654	924006	1,518	220	105	106.5	--	19980409
371800	920948	1,465	481	--	255.1	--	19980417
373338	915310	1,165	950	--	18.0	--	19980319
375951	914131	1,035	--	--	72.2	--	19980429
373045	922806	1,238	380	--	177.9	392	19980422
374156	915156	1,228	280	--	193.2	306	19980423
372236	922429	1,322	530	--	269.2	--	19980423
375434	922219	1,180	460	106	277.8	--	19980513
375721	920512	1,070	195	84	167.6	--	19980518
375105	920549	1,010	395	--	275.6	--	19980603
372805	923459	1,350	175	--	84.5	--	19980416
370544	915329	1,160	180	80	62.9	441	19980409
374157	922315	1,153	400	--	204.0	--	19980430
374422	921316	1,052	490	--	218.0	--	19980604
370633	921641	1,505	510	105	228.4	--	19980403
373200	923432	1,232	319	--	225.7	--	19980416
370848	921538	1,530	--	--	206.0	--	19980326
374225	923451	1,300	--	--	239.8	--	19980424

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
373801	922100	1,110	115	30	71.5	--	19980512
371122	921304	1,450	360	--	121.2	--	19980409
370612	924246	1,650	519	--	300.9	--	19980401
375425	922503	1,005	--	--	130.4	--	19980513
372938	920316	1,250	300	--	182.2	--	19980604
372329	924958	1,447	1,050	--	186.9	--	19980408
370450	924821	1,585	538	--	213.7	--	19980402
372542	915523	1,215	290	--	161.5	290	19980417
370616	922500	1,530	1,480	600	543.0	--	19980402
372701	925203	1,372	315	--	84.5	--	19980403
373330	923254	1,123	--	--	92.0	499	19980422
374755	922445	973	165	--	128.6	--	19980514
371526	922159	1,245	117	45	34.2	--	19980409
373416	920131	939	--	--	60.4	--	19980603
375912	920204	915	290	--	152.4	--	19980518
375238	922715	1,000	240	--	141.5	--	19980513
372741	922304	1,225	610	--	191.7	--	19980424
373919	920558	1,078	--	--	159.5	--	19980604
380151	914856	885	167	--	69.7	948	19980429
380046	915008	950	252	--	116.6	809	19980430
371631	925355	1,520	432	168	151.7	--	19980402
375703	914150	1,040	230	--	103.2	--	19980428
374831	922835	915	310	80	86.4	--	19980513
375135	920206	850	150	--	23.3	--	19980521
372500	923904	1,320	235	147	127.9	495	19980415
370910	921928	1,470	220	90	74.4	--	19980331
374210	915150	1,203	960	--	302.0	--	19980318
371836	924043	1,505	310	--	89.0	--	19980409
373650	923333	1,145	--	--	107.7	--	19980424
372429	923248	1,410	531	--	320.9	--	19980415
374842	923659	1,130	312	--	167.5	--	19980512
370529	921457	1,340	340	252	172.4	--	19980408
373041	922616	1,170	260	--	136.4	--	19980417
374612	921719	1,048	885	--	255.0	--	19980317
374705	921543	1,160	1,000	--	380.0	--	19980317
374717	921607	1,125	1,130	--	352.0	--	19980311
374940	920800	1,085	1,000	--	403.0	--	19980311
375036	920858	1,063	1,040	--	312.0	--	19980311
374924	920652	1,100	975	--	368.0	--	19980311
372740	924309	1,145	110	--	18.7	--	19980410
373816	913903	1,160	600	--	73.0	379	19980506
370903	924359	1,625	560	146	216.0	--	19980401
371259	922553	1,370	310	105	166.6	--	19980401
372108	914936	1,362	842	--	222.0	--	19980331
372636	922022	1,260	380	--	201.0	--	19980423

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
371351	923016	1,180	200	105	35.4	--	19980401
374515	914605	1,150	235	--	141.8	--	19980519
371535	920736	1,210	175	--	68.2	--	19980414
375733	915609	980	--	--	132.2	--	19980503
375145	922325	1,085	1,220	--	270.0	--	19980313
372959	915813	1,185	370	--	238.8	--	19980416
372036	922637	1,380	80	--	22.5	--	19980422
374146	915707	865	210	82	9.5	476	19980508
375758	921922	1,025	200	--	100.3	--	19980514
374809	920918	1,075	390	--	273.6	--	19980603
372950	914601	1,230	210	--	108.2	377	19980423
375648	914620	1,085	1,740	--	445.2	--	19980225
375642	914647	1,080	1,130	--	410.0	--	19980223
375240	920852	920	300	--	128.1	--	19980521
371442	914751	1,305	--	--	71.0	289	19980409
370558	923755	1,590	580	--	286.6	--	19980401
373659	923514	1,225	195	--	119.3	--	19980422
374907	920634	1,030	420	--	308.6	--	19980603
372403	921710	1,360	165	--	113.0	--	19980423
371216	924432	1,618	251	--	157.0	--	19980409
375115	914004	960	120	--	57.7	--	19980429
370906	924603	1,650	1,220	--	237.0	--	19980401
372055	923242	1,440	330	--	144.3	--	19980410
372735	925503	1,201	206	--	54.9	--	19980403
372837	922554	1,180	260	--	146.2	--	19980422
373410	922551	1,250	270	100	213.2	--	19980429
373932	915919	1,172	175	--	171.5	404	19980514
371737	925837	1,490	360	--	225.9	--	19980401
375717	921044	965	200	--	55.6	--	19980518
370604	924623	1,505	165	--	85.9	--	19980402
371936	922019	1,330	310	87	195.6	--	19980409
372217	924611	1,415	310	--	124.5	--	19980409
374932	921016	1,080	945	--	264.0	--	19980317
374930	920843	1,152	1,100	--	369.0	--	19980317
375422	915353	715	--	--	14.3	--	19980501
372443	924619	1,278	160	--	65.2	523	19980408
373038	924257	1,340	125	--	77.9	--	19980423
375623	915252	1,005	--	--	143.1	--	19980501
372615	921718	1,380	410	--	185.8	--	19980424
374644	923319	1,180	280	--	174.4	--	19980512
375801	915821	740	275	--	129.8	--	19980512
373646	925212	1,212	--	--	45.3	--	19980415
375308	920853	920	--	--	79.1	--	19980521
375307	920859	955	320	120	218.9	--	19980521
370525	921940	1,480	--	--	147.6	420	19980403

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
372103	921823	1,305	180	--	134.6	--	19980423
372057	921741	1,260	230	--	96.5	--	19980423
372520	915717	995	280	105	16.2	373	19980416
374100	914032	1,185	325	--	133.0	397	19980507
371936	925948	1,390	333	--	98.7	--	19980401
372650	920520	1,370	1,300	32	279.0	--	19980319
373206	920736	1,472	1,100	--	408.0	--	19980330
372056	920414	1,450	1,200	--	344.0	--	19980319
372040	915510	1,310	1,050	--	177.0	--	19980330
372142	915513	1,280	1,180	--	205.0	--	19980330
372848	915101	1,360	1,160	50	236.0	--	19980319
372957	914947	1,400	--	--	280.0	--	19980319
371226	915304	1,455	--	--	185.1	--	19980409
372704	924805	1,382	450	--	178.4	623	19980408
375153	923127	935	240	--	76.7	--	19980513
372139	925508	1,395	260	--	95.8	--	19980402
375138	922507	1,090	--	--	219.9	--	19980513
375250	914235	1,110	245	--	33.5	--	19980429
372409	922224	1,160	83	--	29.4	--	19980422
373303	923621	1,285	--	--	112.8	--	19980422
375832	914825	1,090	210	--	115.1	--	19980430
373922	922654	1,112	200	--	160.0	--	19980430
374755	914947	1,012	450	--	159.7	460	19980424
375224	915544	751	140	102	-2.3	438	19980501
373439	921624	1,312	254	--	165.2	--	19980608
371246	923238	1,385	435	180	298.2	--	19980331
370838	920431	1,200	195	84	-3.5	448	19980403
372934	922035	1,185	100	--	32.4	--	19980424
372442	915017	1,310	210	--	154.2	290	19980416
375609	920208	955	380	180	157.7	--	19980518
371146	921839	1,460	405	86	210.6	--	19980331
370348	915745	1,436	350	--	92.9	356	19980408
374848	921321	834	775	--	136.0	--	19980317
374843	921408	877	950	360	148.0	--	19980317
374612	921810	1,050	--	--	261.1	--	19980603
375109	915348	1,025	--	--	184.2	524	19980508
375149	914222	1,130	240	100	78.4	--	19980429
373731	915503	1,130	300	--	122.1	519	19980423
373030	920753	1,370	--	--	136.6	--	19980603
380013	915604	740	140	--	52.0	--	19980506
375415	921114	1,010	495	--	235.3	--	19980514
374400	915650	1,140	375	--	243.7	375	19980429
373302	924428	1,210	172	--	18.6	--	19980423
375641	921512	985	300	--	61.3	--	19980518
372351	923601	1,340	950	375	340.0	--	19980714

Table 1. Location, well construction, depth to water, and specific conductance data for inventoried wells in the study area and in a 6-mile wide band surrounding the study area, spring 1998—Continued

Latitude (ddmmss)	Longitude (ddmmss)	Land surface altitude (feet above NGVD 29)	Well depth (feet below land surface)	Casing depth (feet below land surface)	Depth to water (feet below land surface)	Specific conductance (μS/cm)	Date of depth to water measurement (yyyymmdd)
373458	924458	1,370	305	100	167.4	--	19980416
374435	923829	1,185	276	--	189.9	--	19980512
372514	924220	1,325	200	105	73.6	--	19980410
373442	921039	1,185	--	--	57.2	--	19980603
374706	921251	1,025	400	--	188.4	--	19980603
373802	924648	1,130	145	--	5.3	--	19980512
373757	924652	1,170	--	--	77.8	--	19980512

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; --, no data; N, north; Hwy, highway; dnst, downstream; upst, upstream; FLWMR, Fort Leonard Wood Military Reservation; S, south]

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (µS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Gasconade River and associated springs and tributaries									
1	Gasconade River at Jerome	--	--	552	08/20/1999	333	26.4	fair-poor	552	--
	Gasconade River at Jerome	--	[b]642	--	09/11/1998	--	--	--	--	--
2	Little Piney Creek at mouth	--	--	86.1	08/20/1999	343	23.0	good-fair	86.1	--
	Boiling Spring (N)	--	--	--	--	--	--	--	--	[d]64.7
3	Big Piney River near mouth	--	--	246	08/19/1999	339	26.7	good-fair	246	--
4	Gasconade River near Hwy 28	--	--	150	08/20/1999	367	28.9	good-fair	150	--
	Mossy Spring	--	--	--	--	--	--	--	--	[d].8
5	Gasconade River at Riddle	--	--	156	08/18/1999	381	29.4	good-fair	[c]155	--
	Gasconade River at Riddle	--	--	154	08/19/1999	385	26.9	good-fair	--	--
	Cole Spring	--	--	--	--	--	--	--	--	[d]3.7
6	Gasconade River dnst Roubidoux Creek	--	--	144	08/18/1999	383	25.2	fair	144	--
7	Roubidoux Creek near mouth	--	--	25.9	--	--	--	--	25.9	--
	Bartlett Mill Spring	--	--	--	--	--	--	--	--	[d]15.6
	Creasy Spring	--	--	--	--	--	--	--	--	[d]21.9
	Falling Spring	--	--	--	--	--	--	--	--	[d]2.1
8	Gasconade River near Collie Hollow	--	--	39.3	08/18/1999	357	28.8	fair	39.3	--
9	Gasconade River at Riverside	--	--	43.3	08/17/1999	354	29.4	good-fair	[c]41.6	--
	Gasconade River at Riverside	--	--	39.9	08/18/1999	357	27.8	good-fair	--	--
10	Gasconade River Hwy T	--	--	39.3	08/17/1999	352	28.7	good-fair	39.3	--
	Gasconade River Hwy T	--	79.1	--	09/11/1998	365	23.0	fair	--	--
11	Gasconade River at Cave Restaurant	--	--	47.1	08/17/1999	355	26.6	fair	47.1	--
	Gasconade River at Cave Restaurant	--	79.5	--	09/11/1998	368	22.0	fair	--	--
12	Gasconade River at Hwy 7	--	--	69.1	08/16/1999	--	--	good-fair	[c]66.1	--
	Gasconade River at Hwy 7	--	--	63.0	08/17/1999	356	25.7	good-fair	--	--
	Gasconade River at Hwy 7	--	105	--	09/11/1998	370	21.8	fair	--	--
13	Gasconade River at Hwy 133	--	--	80.7	08/16/1999	--	--	good	80.7	--
	Gasconade River at Hwy 133	--	124	--	09/10/1998	--	--	fair	--	--
14	Jordan Creek	--	0	--	09/10/1998	--	--	--	0	--
	Cliff Spring	--	--	--	--	--	--	--	--	[d]1.3
15	Gasconade River near I-44	--	122	--	09/10/1998	--	--	fair	79.3	--

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data—Continued

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (μS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Gasconade River and associated springs and tributaries—Continued									
16	Osage Fork near mouth	--	--	34.7	08/16/1999	--	--	good	34.7	--
17	Gasconade River upst Osage Fork	--	--	42.6	08/16/1999	--	--	good	42.6	--
	Gasconade River upst Osage Fork	--	61.7	--	09/10/1998	--	--	--	--	--
	Land Spring	--	--	--	--	--	--	--	--	[d]0.2
18	Gasconade River at Brownfield	--	62.5	--	09/10/1998	--	--	--	43.2	--
19	Gasconade River at Hwy 32	--	63.0	--	09/10/1998	--	--	--	43.5	--
	Mayfield Spring	--	--	--	--	--	--	--	--	[d]2.6
20	Elk Creek	--	4.2	--	09/09/1998	--	--	--	2.9	--
21	Gasconade River	--	39.4	--	09/09/1998	--	--	--	27.2	--
	Unnamed Spring	--	1.3	--	09/09/1998	--	--	--	--	.9
22	Beaver Creek	--	2.7	--	09/09/1998	--	--	--	1.9	--
23	Beaver Creek	--	3.4	--	09/08/1998	--	--	fair	2.3	--
24	Beaver Creek	--	1.5	--	09/08/1998	421	25.6	fair	1.0	--
25	North Fork Beaver Creek	--	0	--	09/09/1998	--	--	--	0	--
26	North Fork Sycamore Creek	--	1.0	--	09/09/1998	432	19.7	fair	.7	--
27	Gasconade River upst Beaver Creek	--	36.3	--	09/09/1998	--	--	fair	25.1	--
28	Dove Creek	--	.9	--	09/08/1998	438	26.8	good-fair	.6	--
29	Whetstone Creek	--	5.9	--	09/08/1998	411	25.6	fair	4.1	--
	Sparks Spring	--	--	--	--	--	--	--	--	[d].1
30	East Whetstone Creek	--	.9	--	09/08/1998	449	27.4	good-fair	.6	--
31	Whetstone Creek	--	.6	--	09/08/1998	453	24.5	fair	.4	--
32	Gasconade River at Hwy E	--	13.4	--	09/08/1998	--	--	good	9.3	--
33	Clark Creek	--	1.7	--	09/08/1998	--	--	fair	1.2	--
34	Gasconade River at Hwy 38	--	7.4	--	09/08/1998	--	--	fair	5.1	--
35	East Fork Gasconade River	--	.3	--	09/08/1998	--	--	poor	.2	--
36	Wolf Creek	--	0	--	09/09/1998	--	--	--	0	--
37	Gasconade River at Hwy 5	--	0	--	09/08/1998	--	--	--	0	--
38	West Fork Gasconade River	--	4.3	--	09/08/1998	--	--	fair	3.0	--
39	Little Creek	--	.5	--	09/09/1998	432	23.1	good-fair	.3	--
40	Bowman Creek	--	.9	--	09/09/1998	415	22.3	good-fair	.6	--

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data—Continued

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (μS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Little Piney Creek and associated springs and tributaries									
2	Little Piney Creek at mouth	--	--	86.1	08/20/1999	343	23.0	good-fair	86.1	--
	Little Piney Creek at mouth	--	113	--	09/23/1998	--	--	good	--	--
	Rolufs Spring	--	--	--	--	--	--	--	--	[d]0.5
41	Mill Creek at mouth	--	15.6	--	09/23/1998	--	--	fair	11.9	--
	Elm Spring	--	--	--	--	--	--	--	--	[d].1
	Wilkins Spring	--	--	--	--	--	--	--	--	[d]5.8
42	Mill Creek at Yelton Spring	--	6.8	--	09/23/1998	--	--	good	5.2	--
43	Little Piney Creek tributary	--	0	--	09/23/1998	--	--	estimated	0	--
44	Little Piney Creek at Newburg	--	88.3	--	09/23/1998	--	--	good-fair	67.3	--
45	Little Piney Creek tributary	--	.1	--	09/23/1998	--	--	estimated	.08	--
46	Beaver Creek at mouth	--	11.8	--	09/23/1998	380	20.4	good-fair	9.0	--
47	Little Beaver Creek	--	2.0	--	09/23/1998	168	21.1	poor	1.5	--
	Gollahon Spring	--	--	--	--	--	--	--	--	[d].2
48	Little Beaver Creek	--	.1	--	09/23/1998	--	--	estimated	.08	--
	Martin Spring	--	--	--	--	--	--	--	--	[d].3
49	Wolf Creek	--	.2	--	09/22/1998	--	--	estimated	.15	--
50	Little Piney Creek at Hwy CC	--	79.7	--	09/23/1998	317	17.2	good-fair	60.7	--
51	Little Piney Creek tributary	--	0	--	09/22/1998	--	--	estimated	0	--
52	Little Piney Creek dnst Gourd Creek	--	70.7	--	09/22/1998	313	19.2	good-fair	53.9	--
53	Little Piney Creek	--	67.3	--	09/22/1998	313	16.1	fair	51.3	--
	Lane Spring	--	--	--	--	--	--	--	--	[d]11.5
	Yancy Mills Spring	--	--	--	--	--	--	--	--	[d]2.4
54	Little Piney Creek at Hwy 63	--	33.5	--	09/22/1998	309	16.8	fair	25.5	--
55	Little Piney Creek tributary	--	0	--	09/22/1998	--	--	--	0	--
	Piney Spring	--	--	--	--	--	--	--	--	[d]2.5
56	Bean Creek	--	0	--	09/22/1998	--	--	--	0	--
57	Little Piney Creek	--	0	--	09/22/1998	--	--	--	0	--
58	Little Piney Creek	--	0	--	09/22/1998	--	--	--	0	--
59	Little Piney Creek tributary	--	.1	--	09/22/1998	383	21.9	--	.08	--
60	Corn Creek at mouth	--	.6	--	09/22/1998	360	22.7	fair	.5	--

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data—Continued

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (μS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Big Piney River and associated springs and tributaries									
3	Big Piney River near mouth	--	--	246	08/19/1999	339	26.7	good-fair	246	--
	Big Piney River near mouth	267	--	--	09/25/1995	342	15.9	fair	--	--
	Shanghai Spring	22.7	--	--	09/25/1995	469	15.2	fair-poor	--	20.9
61	Big Piney River upst Shanghai Spring	252	--	--	09/25/1995	335	14.8	fair-poor	232	--
	Ousley Spring	1.2	--	--	09/22/1995	470	13.7	poor	--	1.1
62	Spring Creek at mouth	31.8	--	--	09/22/1995	324	13.0	good	29.3	--
	Spring Creek at mouth	--	33.8	--	09/22/1998	--	--	good	--	--
63	Spring Creek	--	35.1	--	09/11/1998	--	--	fair	30.4	--
64	Spring Creek	--	.1	--	09/22/1998	--	--	flow begin	.09	--
65	Sherrill Creek	--	0	--	09/22/1998	--	--	--	0	--
66	Spring Creek	--	0	--	09/22/1998	--	--	--	0	--
	Relfe (Coppedge) Spring	--	--	--	--	--	--	--	--	[d]19.4
67	Big Piney River upst Spring Creek	229	--	--	09/21/1995	332	14.1	good	211	--
	Big Piney River upst Spring Creek	--	208	--	09/11/1998	--	--	fair	--	--
	Big Piney River upst Spring Creek	--	235	--	09/22/1998	--	--	fair	--	--
68	Big Piney River	237.4	--	--	09/22/1995	330	16.6	good-fair	219	--
	Stone Mill Spring	35.0	--	--	09/21/1995	340	14.8	poor	--	32.2
	Stone Mill Spring	--	39.6	--	09/11/1998	--	--	poor	--	--
	Sandstone Spring	--	.5	--	09/11/1998	--	--	estimated	--	.5
69	Big Piney River at FLWMR Quarry	200	--	--	09/19/1995	325	19.3	fair	184	--
	Miller Spring	7.3	--	--	09/20/1995	370	13.8	fair	--	6.7
	Miller Spring	--	10.5	--	09/11/1998	--	--	--	--	--
70	Bald Ridge Creek	--	.4	--	09/10/1998	--	--	poor	.4	--
71	Big Piney River upst Bald Ridge Creek	173	--	--	09/18/1995	--	--	good-fair	159	--
	Big Piney River upst Bald Ridge Creek	--	161	--	09/10/1998	--	--	--	--	--
	Prewett Spring	--	--	--	--	--	--	--	--	[d]17.5
	Slabtown Spring	--	--	--	--	--	--	--	--	[d]16.8
72	Paddy Creek	--	.4	--	09/10/1998	--	--	poor	.4	--
73	Big Piney River upst Big Paddy Creek	--	133	--	09/10/1998	--	--	good	132	--
	Boiling Spring (S)	--	--	--	--	--	--	--	--	[d]13.4
74	Arthur Creek at mouth	--	15.7	--	09/09/1998	--	--	poor	15.5	--

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data—Continued

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (μS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Big Piney River and associated springs and tributaries—Continued									
75	Big Piney River upst Arthur Creek	--	32.2	--	09/09/1998	--	--	good	31.9	--
76	West Piney Creek at mouth	--	11.2	--	09/08/1998	--	--	poor	11.1	--
77	Hamilton Creek	--	.8	--	09/08/1998	--	--	poor	.8	--
78	West Piney Creek	--	4.4	--	09/08/1998	--	--	fair	4.4	--
79	Big Piney River upst West Piney Creek	--	24.4	--	09/08/1998	--	--	fair	24.2	--
80	Hog Creek at mouth	--	1.4	--	09/08/1998	--	--	fair	1.4	--
81	Big Piney River upst Hog Creek	--	18.9	--	09/08/1998	--	--	fair	18.7	--
82	Elk Creek at mouth	--	1.9	--	09/09/1998	--	--	fair	1.9	--
83	Big Piney River upst Elk Creek	--	7.2	--	09/09/1998	--	--	poor	7.1	--
84	Potter Creek at mouth	--	1.2	--	09/09/1998	--	--	fair	1.2	--
85	Big Piney River upst Potter Creek	--	1.6	--	09/09/1998	--	--	poor	1.6	--
	Roubidoux Creek and associated springs and tributaries									
7	Roubidoux Creek near mouth	--	--	25.9	08/18/1999	363	22.0	fair-poor	25.9	--
	Roubidoux Creek near mouth	23.7	--	--	09/06/1995	400	21.1	good	--	--
	Roubidoux Spring	21.8	--	--	09/05/1995	--	--	--	--	23.8
86	Roubidoux Creek upst Roubidoux Spring	.7	--	--	09/05/1995	380	29.2	fair-poor	.8	--
87	Roubidoux Creek dnst Ballard Hollow	.1	--	--	09/05/1995	401	26.9	good	.1	--
88	Roubidoux Creek upst Ballard Hollow	0	--	--	09/05/1995	--	--	flow begins	0	--
89	Roubidoux Creek at Quesenberry Ford	0	--	--	09/13/1995	--	--	flow ends	0	--
90	Roubidoux Creek at Dundas Ford	8.5	--	--	09/12/1995	328	22.7	good	9.3	--
91	Roubidoux Creek at Cooksville Ford	9.6	--	--	09/11/1995	354	20.4	good-fair	10.5	--
92	Musgrave Hollow	.5	--	--	09/12/1995	--	--	--	.5	--
93	Roubidoux Creek upst Musgrave Hollow	7.3	--	--	09/11/1995	356	21.7	good-fair	8.0	--
94	Roubidoux Creek at Bernard Ford	7.6	--	--	09/12/1995	354	20.6	good	8.3	--
95	Roubidoux Creek at Hwy 17	6.3	--	--	09/05/1995	358	22.2	--	6.9	--

Table 2. Stream and spring low-flow discharge measurements made in September 1995, September 1998, and August 1999, estimated spring low-flow discharge measurements from published data, and composite stream and spring discharge data scaled to August 1999 discharge data—Continued

Site number (fig. 22)	Stream, spring, or tributary name and measurement location[a]	Measured discharge			Date	Specific conductance (μS/cm)	Temperature (°C)	Remark or measurement rating	Composite discharge	
		Sept 1995 (ft^3/s)	Sept 1998 (ft^3/s)	Aug 1999 (ft^3/s)					Stream (ft^3/s)	Spring (ft^3/s)
	Osage Fork and associated springs and tributaries									
16	Osage Fork near mouth	--	--	34.7	08/16/1999	--	--	good	34.7	--
	Osage Fork near mouth	--	42.5	--	09/10/1998	368	22.8	good-fair	--	--
96	Mill Creek	--	0	--	09/10/1998	--	--	--	0	--
97	Osage Fork at Garrett Road	--	45.0	--	09/10/1998	360	24.6	fair	36.7	--
98	Cobbs Creek at Hwy 32	--	.7	--	09/10/1998	368	25.9	fair	.6	--
99	Osage Fork at Cobb Creek	--	36.1	--	09/10/1998	370	21.9	good	29.5	--
100	Steins Creek	--	0	--	09/09/1998	--	--	--	0	--
101	Osage Fork near Orla	--	36.4	--	09/09/1998	--	--	fair	29.7	--
102	Brush Creek near Twin Bridge	--	.4	--	09/10/1998	377	20.4	good-fair	.3	--
103	Osage Fork upst Brush Creek	--	41.8	--	09/10/1998	392	17.0	good-fair	[c]32.2	--
	Osage Fork upst Brush Creek	--	37.0	--	09/11/1998	395	--	good	--	--
	Big Spring	--	--	--	--	--	--	--	--	[d]17.1
104	Parks Creek at Hwy J	--	.9	--	09/09/1998	359	25.4	fair-poor	1.0	--
105	Osage Fork at Hwy J	--	11.5	--	09/09/1998	367	25.6	good	9.4	--
106	Cantrell Creek at mouth	--	2.8	--	09/09/1998	407	24.1	good	2.3	--
107	Osage Fork at Hwy F	--	5.0	--	09/09/1998	410	24.7	good	4.1	--

[a] Location of September 1995 discharge measurements is shown in table 18 and figure 19 (Imes and others, 1996). Location of composite discharge values is shown in figure 22. Location of springs is shown in figure 23.

[b] Discharge from U.S. Geological Survey continuous streamflow gaging station (number 06933500) located at Jerome, Missouri (Hauck and others, 1999).

[c] Discharge is average of two measurements.

[d] Estimated value from average discharge or average of selected low-flow discharge measurements published in Vineyard and Feder (1974).

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998

[no., number; ddmmss, degrees, minutes, seconds; ft, feet; NGVD 29, National Geodetic Vertical Datum of 1929; gal/min-ft, gallons per minute per foot of drawdown; Mgal/d, million gallons per day; MG, millions of gallons; TP, Trailer Park; --, no data; MHP, Mobil Home Park; FLW, Fort Leonard Wood; MTOC, Motor Transport Operator Course]

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	
			Wells located inside the study area																	
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	2.74
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	2.74
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.194	.178	.139	.101	.100	.117	.109	.129	.112	.099	.139	.081	45.4
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.000	.001	.076	.149	.127	.119	.138	.123	.096	.108	.125	.123	36.3
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.146	.145	.117	.085	.075	.072	.090	.078	.174	.084	.086	.085	37.5
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
8	372955	924918	Conway; Well 1	1,405	954	303	--	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	11.0
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.68
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.73
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.054	.062	.068	.038	.028	.035	.033	.037	.035	.020	.000	.000	12.4
12	374633	920822	FLW Indiana Avenue Well	1,122	1,025	440	--	.146	.060	.051	.053	.028	.185	.255	.118	.062	.025	.063	.049	33.4
13	374103	920928	FLW MTOC Well	1,149	692	295	--	--	--	--	--	--	--	--	--	--	--	--	--	-
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--	--	--	--	--	--	-
15	374313	920652	FLW Old Ammo Dump Well	1,100	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-
16	374320	920438	FLW Quarry	805	--	-	--	--	--	--	--	--	--	--	--	--	--	--	--	-
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--	--	--	--	--	--	-
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--	--	--	--	--	--	-
19	374358	920412	FLW Golf Course Well	870	187	-	--	--	--	--	--	--	--	--	--	--	--	--	--	-
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--	--	--	--	--	--	-
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
22	374941	920849	Green Acres; Well 2	1,080	-	--	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	7.30
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.100	.100	.100	.100	.100	.100	.100	.100	.100	.100	.100	.100	36.4
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102	37.0
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.101	.101	.101	.101	.101	.101	.101	.101	.101	.101	.101	.101	37.0
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	13.1
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	30.4
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.055	.061	.055	.057	.055	.057	.055	.055	.057	.055	.057	.055	20.6
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.077	.086	.077	.080	.077	.080	.077	.077	.080	.077	.080	.077	28.8
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.166	.136	.149	.132	.168	.084	.146	.147	.125	.120	.145	.130	50.2
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.104	.121	.106	.112	.097	.167	.139	.141	.175	.172	.112	.140	48.2
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.200	.221	.200	.207	.200	.207	.200	.200	.207	.200	.207	.200	74.4
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.112	.124	.112	.116	.112	.116	.112	.112	.116	.112	.116	.112	41.7
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.031	.034	.031	.032	.031	.032	.031	.031	.032	.031	.032	.031	11.4
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.249	.275	.249	.257	.249	.257	.249	.249	.257	.249	.257	.249	92.5
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	8.03
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.3
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.169	.169	.148	.182	.145	.143	.195	.193	.167	.150	.173	.167	60.8
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.145	.150	.161	.164	.165	.063	.000	.085	.232	.201	.178	.214	53.4
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
64	374932	921015	St. Robert; Well 1a	1,090	945	476	--	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	42.0
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.133	.133	.133	.133	.133	.133	.133	.133	.133	.133	.133	.133	48.5
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.288	.288	.288	.288	.288	.288	.288	.288	.288	.288	.288	.288	105
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.059	.061	.059	.064	.069	.067	.080	.079	.108	.105	.108	.105	29.4
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.115	.110	.114	.114	.114	.120	.118	.109	.090	.087	.090	.087	38.6
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	36.0
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	4.51
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	10.2
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.137	.153	.013	.150	.135	.145	.140	.185	.166	.129	.154	.143	50.1
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.230	.254	.183	.210	.171	.200	.261	.203	.182	.176	.194	.158	73.6
78	374848	921321	Waynesville; Well 3	834	865	250	--	.036	.027	.073	.112	.109	.127	.119	.117	.106	.108	.106	.088	34.4
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.009	.014	.038	.046	.040	.045	.062	.040	.046	.046	.048	.040	14.5
80	374843	921408	Waynesville; Well 5	878	950	360	--	.220	.240	.148	.164	.124	.167	.163	.175	.165	.161	.177	.142	62.0
			Cumulative average daily pumping rate and annual pumpage, 1993					5.05	5.08	4.76	5.02	4.81	5.00	5.16	5.08	5.18	4.91	5.04	4.87	1,820

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	2.74
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	2.74
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.097	.095	.093	.089	.108	.120	.153	.157	.227	.106	.075	.052	41.7
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.113	.113	.120	.159	.139	.134	.213	.231	.215	.071	.012	.017	46.8
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.079	.076	.077	.071	.089	.095	.126	.143	.191	.218	.243	.239	50.3
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
8	372955	924918	Conway; Well 1	1,405	954	303	--	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	11.0
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.68
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.73
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.017	.054	.045	.033	.036	.022	.075	.067	.071	.072	.076	.045	18.6
12	374633	920822	FLW Indiana Street Well	1,122	1,025	440	--	.038	.033	.007	.078	.031	.137	.064	.094	.018	.015	.011	.136	20.1
13	374103	920928	FLW New Range Control Well	1,149	692	295	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	374313	920652	FLW Ammo Dump Well	1,100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	
			Wells located inside the study area—Continued																	
16	374305	920426	FLW Quarry	805	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	374358	920412	FLW Golf Course Well	870	187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--	--	--	--	--	--	--
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	5.48
22	374941	920849	Green Acres; Well 2	1,080	--	--	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	7.30
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.127	.127	.127	.127	.127	.127	.127	.127	.127	.127	.127	.127	46.3
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	48.9
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	41.9
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	13.1
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.076	.078	.081	.080	.079	.087	.096	.073	.092	.106	.093	.085	31.3
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.047	.051	.056	.055	.053	.066	.073	.079	.063	.048	.055	.050	21.2
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.145	.136	.129	.130	.139	.110	.155	.151	.123	.091	.091	.088	45.2
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.126	.132	.132	.109	.140	.180	.156	.143	.126	.095	.096	.094	46.5
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.132	.146	.132	.136	.132	.136	.132	.132	.136	.132	.136	.132	49.1
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.115	.128	.115	.119	.115	.119	.115	.115	.119	.115	.119	.115	42.9
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.066	.073	.066	.068	.066	.068	.066	.066	.068	.066	.068	.066	24.4
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.255	.283	.255	.264	.255	.264	.255	.255	.264	.255	.264	.255	95.0
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.40
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.3

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	
			Wells located inside the study area—Continued																	
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	23.5
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.163	.164	.199	.172	.142	.176	.135	.168	.152	.134	.157	.178	59.0
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.293	.030	.052	.156	.180	.192	.201	.190	.249	.190	.187	.209	65.1
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
64	374932	921016	St. Robert; Well 1a	1,090	945	476	--	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	37.6
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.079	.054	.023	.017	.014	.020	.024	.024	.021	.022	.060	.059	12.6
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.104	.123	.138	.118	.128	.118	.119	.126	.117	.116	.118	.109	43.6
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.025	.042	.042	.038	.059	.059	.057	.054	.053	.053	.027	.021	16.1
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	.009	.004	.002	.001	.000	.000	.024	.037	.009	.019	.024	.044	5.30
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.075	.137	.085	.119	.110	.091	.080	.110	.119	.084	.087	.060	35.0
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	10.2
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.153	.196	.145	.161	.146	.170	.177	.104	.110	.083	.088	.082	48.9
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.218	.241	.191	.202	.184	.235	.183	.213	.197	.197	.194	.175	73.8
78	374848	921321	Waynesville; Well 3	834	865	250	--	.110	.120	.108	.118	.120	.133	.124	.143	.123	.089	.099	.088	41.7
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.047	.051	.043	.054	.050	.054	.061	.068	.077	.052	.074	.051	20.7
80	374843	921408	Waynesville; Well 5	878	950	360	--	.210	.262	.134	.155	.156	.199	.159	.180	.163	.121	.126	.114	59.9
			Cumulative average daily pumping rate and annual pumpage, 1994					5.13	5.16	4.81	5.04	5.01	5.33	5.36	5.46	5.44	4.89	4.92	4.91	1,870

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	
			Wells located inside the study area—Continued																	
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	2.74
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	2.74
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.094	.065	.052	.058	.064	.071	.070	.101	.109	.096	.088	.070	28.6
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.033	.007	.047	.054	.022	.066	.133	.118	.042	.014	.016	.063	18.9
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.164	.242	.203	.239	.241	.204	.229	.229	.225	.223	.220	.184	79.1
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
8	372955	924918	Conway; Well 1	1,405	954	303	--	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	11.0
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.68
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.73
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.076	.071	.074	.075	.066	.079	.075	.076	.078	.080	.079	.074	27.5
12	374633	920822	FLW Indiana Street Well	1,122	1,025	440	--	.289	.000	.002	.011	.117	.078	.090	.326	.016	.025	.006	.034	30.7
13	374103	920928	FLW New Range Control Well	1,149	692	295	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	374313	920652	FLW Ammo Dump Well	1,100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16	374305	920426	FLW Quarry	805	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	374358	920412	FLW Golf Course Well	870	187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--	--	--	--	--	--	--
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
22	374941	920849	Green Acres; Well 2	1,080	--	--	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	7.30
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.117	.107	.112	.106	.090	.097	.101	.115	.092	.114	.130	.105	39.1
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.109	.114	.118	.125	.117	.107	.106	.121	.096	.171	.139	.138	44.4
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.071	.060	.067	.070	.098	.113	.143	.171	.186	.037	.023	.065	33.6
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	13.1
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	30.4
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.076	.083	.079	.089	.082	.100	.095	.104	.093	.105	.087	.079	32.7
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.063	.060	.068	.069	.070	.060	.075	.079	.074	.068	.064	.054	24.4
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.111	.217	.200	.104	.114	.189	.078	.139	.114	.086	.096	.134	47.9
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.104	.007	.012	.096	.113	.083	.205	.186	.120	.136	.107	.077	38.2
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.129	.143	.129	.133	.129	.133	.129	.129	.133	.129	.133	.129	48.0
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.097	.107	.097	.100	.097	.100	.097	.097	.100	.097	.100	.097	36.1
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.061	.068	.061	.063	.061	.063	.061	.061	.063	.061	.063	.061	22.8
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.183	.203	.183	.189	.183	.189	.183	.183	.189	.183	.189	.183	68.2
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.061	.067	.061	.063	.061	.063	.061	.061	.063	.061	.063	.061	22.5
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.76
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.3
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	23.5
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159	57.9
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.017	.019	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.25
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.127	.136	.157	.156	.153	.132	.141	.172	.090	.164	.114	.120	50.6
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.190	.172	.217	.188	.189	.304	.337	.451	.486	.407	.359	.352	111
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
64	374932	921016	St. Robert; Well 1a	1,090	945	476	--	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	37.6
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	75.9
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.024	.021	.039	.010	.048	.057	.067	.079	.040	.028	.037	.035	14.8
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.130	.137	.139	.128	.121	.140	.154	.178	.172	.156	.138	.111	51.8
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.052	.052	.032	.031	.032	.037	.039	.046	.058	.060	.060	.060	16.9

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	0.030	0.028	0.022	0.032	0.029	0.032	0.037	0.048	0.051	0.033	0.034	0.030	12.3
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.083	.089	.067	.093	.074	.084	.076	.094	.089	.086	.082	.074	30.1
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	10.2
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.097	.106	.080	.022	.000	.100	.126	.096	.123	.109	.103	.103	32.4
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.219	.243	.209	.240	.224	.240	.215	.219	.236	.198	.222	.211	81.2
78	374848	921321	Waynesville; Well 3	834	865	250	--	.109	.111	.092	.119	.113	.130	.141	.161	.150	.141	.172	.116	47.3
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.051	.054	.046	.056	.051	.051	.054	.080	.053	.058	.053	.047	19.9
80	374843	921408	Waynesville; Well 5	878	950	360	--	.138	.144	.127	.155	.140	.174	.188	.202	.183	.147	.155	.130	57.3
			Cumulative average daily pumping rate and annual pumpage, 1995					5.05	4.88	4.76	4.84	4.86	5.24	5.47	6.09	5.49	5.24	5.10	4.96	1,890

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	2.74
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	2.74
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.065	.093	.081	.192	.180	.135	.245	.072	.070	.049	.058	.049	39.3
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.034	.058	.026	.102	.105	.049	.104	.069	.045	.048	.046	.035	22.0
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.213	.221	.211	.074	.120	.249	.209	.240	.229	.235	.237	.238	75.3
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
8	372955	924918	Conway; Well 1	1,405	954	303	--	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	12.8
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.68
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.73
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.070	.074	.071	.070	.072	.073	.068	.070	.067	.069	.067	.065	25.4
12	374633	920822	FLW Indiana Street Well	1,122	1,025	440	--	.025	.008	.024	.004	.046	.164	.046	.071	.092	.078	.189	.060	24.5
13	374103	920928	FLW New Range Control Well	1,149	692	295	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	374313	920652	FLW Ammo Dump Well	1,100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
16	374305	920426	FLW Quarry	805	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	374358	920412	FLW Golf Course Well	870	187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--	--	--	--	--	--	--
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	5.48
22	374941	920849	Green Acres; Well 2	1,080	--	--	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	7.30
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.101	.116	.131	.125	.129	.124	.060	.012	.063	.047	.069	.154	34.4
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.105	.116	.134	.127	.124	.146	.186	.181	.141	.175	.074	.099	49.0
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.112	.096	.037	.046	.059	.093	.168	.194	.119	.087	.146	.133	39.3
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	13.1
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.076	.099	.090	.079	.090	.107	.101	.114	.093	.087	.089	.097	34.1
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.038	.067	.065	.080	.068	.102	.078	.069	.071	.074	.064	.068	25.6
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.141	.082	.212	.209	.226	.243	.179	.183	.162	.158	.214	.172	66.5
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.086	.163	.000	.000	.000	.006	.098	.124	.082	.082	.036	.076	22.7
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.087	.097	.087	.090	.087	.090	.087	.087	.090	.087	.090	.087	32.5
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.087	.097	.087	.090	.087	.090	.087	.087	.090	.087	.090	.087	32.5
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.087	.097	.087	.090	.087	.090	.087	.087	.090	.087	.090	.087	32.5
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.087	.097	.087	.090	.087	.090	.087	.087	.090	.087	.090	.087	32.5
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.087	.097	.087	.090	.087	.090	.087	.087	.090	.087	.090	.087	32.5
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	9.13
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.3

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	
			Wells located inside the study area—Continued																	
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	31.9
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.014	.016	.014	.015	.014	.015	.014	.014	.015	.014	.015	.014	5.30
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.014	.016	.014	.015	.014	.015	.014	.014	.015	.014	.015	.014	5.30
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.120	.154	.143	.145	.164	.143	.116	.111	.139	.163	.144	.114	50.3
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.294	.205	.173	.150	.206	.270	.503	.545	.442	.000	.321	.437	108
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
64	374932	921016	St. Robert; Well 1a	1,090	945	476	--	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	37.6
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208	75.9
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.034	.040	.031	.034	.031	.044	.028	.022	.040	.030	.043	.049	12.9
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.118	.125	.101	.118	.121	.146	.107	.067	.126	.143	.138	.136	43.9
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.059	.068	.057	.060	.064	.069	.044	.033	.069	.072	.062	.065	21.9
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	.078	.126	.028	.032	.050	.020	.033	.032	.022	.015	.029	.020	14.5
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.053	.028	.077	.077	.058	.087	.098	.092	.086	.094	.075	.094	28.1
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	10.2
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.109	.147	.095	.063	.080	.057	.074	.065	.075	.092	.063	.134	32.0
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.238	.296	.210	.229	.210	.244	.240	.269	.275	.263	.273	.278	91.9
78	374848	921321	Waynesville; Well 3	834	865	250	--	.126	.142	.108	.099	.113	.129	.133	.124	.128	.106	.108	.108	43.2
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.051	.062	.045	.056	.050	.054	.072	.069	.067	.051	.055	.058	21.0
80	374843	921408	Waynesville; Well 5	878	950	360	--	.140	.170	.127	.155	.135	.159	.158	.165	.168	.140	.144	.143	54.8
			Cumulative average daily pumping rate and annual pumpage, 1996					5.04	5.36	4.83	4.89	5.05	5.48	5.70	5.54	5.44	4.91	5.31	5.43	1,920

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	
			Wells located inside the study area—Continued																	
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	2.74
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	2.74
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.061	.090	.185	.205	.193	.217	.280	.310	.071	.061	.045	.093	55.4
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.083	.077	.148	.137	.162	.150	.235	.271	.041	.101	.044	.075	46.7
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.235	.169	.101	.117	.122	.177	.204	.261	.223	.187	.166	.120	63.4
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
8	372955	924918	Conway; Well 1	1,405	954	303	--	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	12.8
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.68
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.73
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.090	.065	.064	.064	.068	.065	.067	.067	.068	.065	.067	.063	24.7
12	374633	920822	FLW Indiana Street Well	1,122	1,025	440	--	.098	.015	.039	.076	.162	.169	.301	.100	.028	.092	.035	.000	34.2
13	374103	920928	FLW New Range Control Well	1,149	692	295	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	374313	920652	FLW Ammo Dump Well	1,100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16	374305	920426	FLW Quarry	805	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	374358	920412	FLW Golf Course Well	870	187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--	--	--	--	--	--	--
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
22	374941	920849	Green Acres; Well 2	1,080	--	--	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	20.1
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	1.10
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	7.30
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	34.3
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134	48.9
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.108	.108	.108	.108	.108	.108	.108	.108	.108	.108	.108	.108	39.4
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	13.1
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	30.4
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.098	.087	.094	.086	.112	.098	.115	.091	.095	.090	.111	.099	35.8
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.071	.072	.065	.074	.062	.071	.071	.088	.090	.071	.050	.055	25.6
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.080	.052	.065	.134	.167	.181	.191	.008	.003	.026	.138	.146	36.3
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.199	.226	.215	.153	.148	.154	.170	.326	.345	.294	.149	.143	76.7
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.097	.107	.097	.100	.097	.100	.097	.097	.100	.097	.100	.097	35.9
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.073	.081	.073	.076	.073	.076	.073	.073	.076	.073	.076	.073	27.3
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.062	.068	.062	.064	.062	.064	.062	.062	.064	.062	.064	.062	22.9
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.142	.157	.142	.146	.142	.146	.142	.142	.146	.142	.146	.142	52.7
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.155	.172	.155	.160	.155	.160	.155	.155	.160	.155	.160	.155	57.7
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	9.13
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.3
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088	31.9
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	45.6
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.02
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	6.02
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.114	.121	.158	.187	.158	.142	.175	.189	.145	.168	.121	.147	55.6
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.409	.443	.110	.000	.091	.273	.332	.325	.363	.265	.294	.288	96.7
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
64	374932	921016	St. Robert; Well 1a	1,090	945	476	--	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	37.6
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	76.3
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.37
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.065	.053	.056	.055	.064	.092	.086	.111	.096	.095	.076	.067	27.9
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.123	.100	.111	.108	.125	.124	.160	.096	.084	.089	.079	.103	39.7
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.064	.053	.049	.048	.051	.045	.061	.058	.059	.060	.049	.030	19.0

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Annual pumpage (MG)
			Wells located inside the study area—Continued																	
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	0.033	0.022	0.015	0.012	0.015	0.024	0.028	0.042	0.023	0.022	0.011	0.014	7.96
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.071	.112	.079	.088	.091	.095	.084	.095	.093	.083	.083	.085	32.1
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	10.2
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.246	.166	.070	.100	.159	.039	.116	.096	.076	.060	.071	.070	38.5
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.259	.310	.238	.277	.252	.238	.237	.226	.226	.231	.219	.213	88.8
78	374848	921321	Waynesville; Well 3	834	865	250	--	.113	.127	.091	.122	.127	.124	.141	.160	.160	.152	.147	.137	48.7
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.060	.061	.046	.053	.059	.054	.066	.042	.049	.051	.042	.036	18.8
80	374843	921408	Waynesville; Well 5	878	950	360	--	.149	.173	.128	.148	.163	.147	.181	.202	.211	.208	.232	.232	66.1
			Cumulative average daily pumping rate and annual pumpage, 1997					5.71	5.63	5.11	5.25	5.54	5.68	6.29	6.15	5.55	5.46	5.23	5.20	2,030

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Semi-annual pumpage (MG)
			Wells located inside the study area—Continued											
1	374857	920825	Bel-Air TP; Well 1	1,071	425	120	--	0.008	0.008	0.008	0.008	0.008	0.008	1.36
2	374902	920824	Bel-Air TP; Well 2	1,077	410	120	--	.008	.008	.008	.008	.008	.008	1.36
3	370719	920607	Cabool; Well 3	1,262	700	300	--	.000	.000	.000	.000	.000	.000	.00
4	370736	920552	Cabool; Well 4	1,278	1,359	441	0.8	.118	.116	.108	.114	.135	.112	21.2
5	370751	920648	Cabool; Well 5	1,357	1,300	441	2.6	.092	.094	.092	.092	.120	.123	18.5
6	370720	920739	Cabool; Well 6	1,338	1,000	450	--	.075	.059	.077	.073	.068	.103	13.8
7	374801	920823	Chimney & Lakeveiw TP	1,081	800	380	--	.003	.003	.003	.003	.003	.003	.54
8	372955	924918	Conway; Well 1	1,405	954	303	--	.035	.035	.035	.035	.035	.035	6.34
9	370811	920942	Country Aire MHP	1,420	540	425	--	.005	.005	.005	.005	.005	.005	.83
10	375554	914659	Deer Run Apartments	1,110	535	182	--	.002	.002	.002	.002	.002	.002	.36
11	375926	920558	Dixon; Well 3	1,195	1,175	425	--	.059	.061	.061	.060	.059	.062	10.9
12	374633	920822	FLW Indiana Street Well	1,122	1,025	440	--	.023	.043	.043	.104	.016	.193	12.6
13	374103	920928	FLW New Range Control Well	1,149	692	295	--	--	--	--	--	--	--	--
14	374107	920911	FLW Range Control Well	1,120	290	82	--	--	--	--	--	--	--	--
15	374313	920652	FLW Ammo Dump Well	1,100	--	--	--	--	--	--	--	--	--	--

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Semi-annual pumpage (MG)
			Wells located inside the study area—Continued											
16	374305	920426	FLW Quarry	805	--	--	--	--	--	--	--	--	--	--
17	374312	920648	FLW New Ammo Dump Well	1,092	600	488	--	--	--	--	--	--	--	--
18	373857	921255	FLW Cannon Range Well	1,125	400	150	--	--	--	--	--	--	--	--
19	374358	920412	FLW Golf Course Well	870	187	--	--	--	--	--	--	--	--	--
20	374428	920300	FLW Bridge Training Area Well	820	773	223	--	--	--	--	--	--	--	--
21	374935	920843	Green Acres; Well 1	1,141	500	147	--	0.015	0.015	0.015	0.015	0.015	0.015	2.72
22	374941	920849	Green Acres; Well 2	1,080	--	--	--	.015	.015	.015	.015	.015	.015	2.72
23	371508	923060	Hartville; Well 1	1,308	785	364	8.3	.055	.055	.055	.055	.055	.055	9.96
24	371526	923031	Hartville; Well 2	1,330	1,152	200	--	.055	.055	.055	.055	.055	.055	9.96
25	374648	921316	High Point Estates	1,074	990	585	--	.003	.003	.003	.003	.003	.003	.54
26	374814	921228	Highway H Development	1,013	850	360	--	.020	.020	.020	.020	.020	.020	3.62
27	375052	920532	Holland Hills; Well 2	1,036	485	180	--	.007	.007	.007	.007	.007	.007	1.18
28	371908	915747	Houston; Well 2	1,223	1,150	355	2.7	.140	.172	.084	.079	.069	.065	18.2
29	371828	915748	Houston; Well 3	1,280	1,167	450	3.7	.120	.008	.091	.080	.090	.100	15.0
30	372024	915645	Houston; Well 4	1,279	1,200	450	--	.032	.107	.076	.090	.126	.152	17.5
31	374852	923041	Laclede County #2; Well 1	1,162	1,235	350	1.0	.036	.036	.036	.036	.036	.036	6.50
32	373326	924655	Laclede County #3; Well 1	1,425	700	425	--	.083	.083	.083	.083	.083	.083	15.1
33	373955	923606	Laclede County #3; Well 3	1,332	1,275	575	.5	.083	.083	.083	.083	.083	.083	15.1
34	373530	924328	Laclede County #3; Well 4	1,405	1,275	630	--	.083	.083	.083	.083	.083	.083	15.1
35	373324	924654	Laclede County #3; Well 5	1,423	1,300	425	4.1	.083	.083	.083	.083	.083	.083	15.1
36	374006	923621	Laclede County #3; Well 6	1,309	1,297	552	--	.083	.083	.083	.083	.083	.083	15.1
37	372939	915149	Licking; Well 2	1,290	903	325	1.4	.092	.090	.067	.043	.074	.041	12.3
38	372947	915122	Licking; Well 1	1,270	931	310	1.4	.058	.068	.088	.148	.096	.134	17.9
39	370651	923433	Mansfield; Well 3	1,432	1,480	550	.4	.118	.118	.118	.118	.118	.118	21.4
40	370711	923420	Mansfield; Well 4	1,435	1,550	600	7.3	.118	.118	.118	.118	.118	.118	21.4
41	370610	923326	Mansfield Nursing	1,485	250	80	--	.004	.004	.004	.004	.004	.004	.72
42	370812	921556	Mountain Grove; Well 3	1,467	1,520	350	2.9	.080	.080	.080	.080	.080	.080	14.5
43	370807	921520	Mountain Grove; Well 4	1,480	1,550	613	1.7	.080	.080	.080	.080	.080	.080	14.5
44	370712	921541	Mountain Grove; Well 5	1,528	1,575	525	--	.080	.080	.080	.080	.080	.080	14.5
45	370734	921700	Mountain Grove; Well 6	1,493	1,618	600	--	.080	.080	.080	.080	.080	.080	14.5
46	370848	921538	Mountain Grove; Well 7	1,451	1,495	600	--	.080	.080	.080	.080	.080	.080	14.5
47	372329	924958	Niangua; Well 1	1,443	1,050	344	.3	.025	.025	.025	.025	.025	.025	4.53
48	370625	922449	Norwood; Well 1	1,512	1,199	450	1.6	.023	.023	.023	.023	.023	.023	4.22
49	370631	922502	Norwood; Well 2	1,502	1,450	550	1.6	.023	.023	.023	.023	.023	.023	4.22
50	374210	915145	Phelps County #1; Well 1	1,205	960	365	2.8	.050	.050	.050	.050	.050	.050	9.05

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d						Semi-annual pumpage (MG)
								Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	
			Wells located inside the study area—Continued											
51	374612	921719	Pulaski County #1; Well 1	1,049	885	500	--	0.088	0.088	0.088	0.088	0.088	0.088	15.8
52	374705	921543	Pulaski County #1; Well 3	1,157	1,000	500	--	.088	.088	.088	.088	.088	.088	15.8
53	374507	921837	Pulaski County #1; Well 4	1,220	1,000	505	--	.088	.088	.088	.088	.088	.088	15.8
54	374717	921607	Pulaski County #1; Well 5	1,120	1,130	585	--	.088	.088	.088	.088	.088	.088	15.8
55	374940	920800	Pulaski County #2; Well 1	1,080	1,000	450	--	.125	.125	.125	.125	.125	.125	22.6
56	375036	920858	Pulaski County #2; Well 2	1,060	1,043	380	--	.125	.125	.125	.125	.125	.125	22.6
57	374918	920739	Pulaski County #2; Well 3	1,034	975	438	--	.125	.125	.125	.125	.125	.125	22.6
58	372012	914951	Raymondville; Well 1	1,335	850	250	--	.017	.017	.017	.017	.017	.017	2.99
59	372108	914936	Raymondville; Well 2	1,362	842	300	--	.017	.017	.017	.017	.017	.017	2.99
60	375706	914714	Rolla; Well 6	1,055	1,215	378	--	.147	.134	.079	.107	.143	.120	22.0
61	375632	914722	Rolla; Well 9	1,115	1,119	315	--	.242	.243	.221	.229	.243	.313	45.0
62	370655	923740	Shady Oak MHP; Well 1	1,552	550	--	--	.001	.001	.001	.001	.001	.001	.18
63	370653	923740	Shady Oak MHP; Well 2	1,561	--	--	--	.001	.001	.001	.001	.001	.001	.18
64	374932	921016	St. Robert; Well 1a	1,090	945	476	--	.103	.103	.103	.103	.103	.103	18.6
65	374949	921038	St. Robert; Well 2	1,064	1,050	449	--	.209	.209	.209	.209	.209	.209	37.8
66	374930	920843	St. Robert; Well 3	1,150	1,150	500	--	.209	.209	.209	.209	.209	.209	37.8
67	374912	920834	St. Robert; Well 4	1,099	975	450	--	.001	.001	.001	.001	.001	.001	.18
68	372647	920522	Texas County #1; Well 1	1,368	1,300	452	--	.070	.056	.045	.039	.047	.044	9.08
69	373206	920736	Texas County #1; Well 2	1,460	1,100	500	--	.117	.118	.110	.115	.119	.117	21.0
70	372056	920414	Texas County #1; Well 3	1,450	1,200	515	--	.041	.021	.038	.040	.038	.039	6.60
71	372042	915510	Texas County #2; Well 1	1,313	1,046	275	--	.018	.019	.012	.006	.009	.025	2.67
72	372142	915513	Texas County #2; Well 2	1,293	1,180	470	--	.079	.076	.084	.080	.082	.089	14.8
73	371702	915307	Texas County #3; Well 1	1,370	1,204	485	--	.028	.028	.028	.028	.028	.028	5.07
74	372848	915101	Texas County #4; Well 1	1,362	1,160	593	--	.068	.070	.037	.040	.038	.095	10.5
75	375305	914730	Vista View Mobile Villa	920	245	102	--	.004	.004	.004	.004	.004	.004	.72
76	374948	921205	Waynesville; Well 1	795	850	150	--	.000	.000	.000	.000	.000	.000	.00
77	374938	921230	Waynesville; Well 2	790	900	191	--	.268	.255	.209	.268	.228	.232	44.0
78	374848	921321	Waynesville; Well 3	834	865	250	--	.169	.174	.152	.188	.155	.176	30.6
79	374930	921146	Waynesville; Well 4c	985	1,030	435	--	.043	.045	.042	.053	.058	.065	9.24
80	374843	921408	Waynesville; Well 5	878	950	360	--	.221	.172	.158	.167	.153	.175	31.6
		Cumulative average daily pumping rate and semi-annual pumpage, 1998						5.05	4.96	4.73	4.97	4.92	5.34	904

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area																	
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	11.0
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109	39.7
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	18.2
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.69
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.023	.024	.022	.041	.049	.051	.055	.047	.044	.060	.077	.088	17.7
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.066	.067	.056	.059	.064	.054	.061	.066	.063	.068	.068	.070	23.2
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.001	.000	.000	.009	.010	.035	.020	.028	.016	.000	.000	.002	3.73
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.011	.015	.034	.025	.001	.006	.004	.003	.001	.004	.000	.001	3.21
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.024	.022	.027	.025	.031	.027	.032	.034	.028	.034	.049	.042	11.4
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.042	.050	.031	.041	.055	.062	.080	.077	.076	.081	.077	.077	22.8
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.070	.069	.065	.062	.072	.062	.064	.071	.061	.062	.056	.050	23.3
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.071	.078	.071	.073	.071	.073	.071	.071	.073	.071	.073	.071	26.3
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.421	.466	.421	.435	.421	.435	.421	.421	.435	.421	.435	.421	157
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
115	375126	922419	Richland; Well 1	--	--	--	--	.096	.106	.096	.099	.096	.099	.096	.096	.099	.096	.099	.096	35.7

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
116	375120	922341	Richland; Well 2	--	--	--	--	0.096	0.106	0.096	0.099	0.096	0.099	0.096	0.096	0.099	0.096	0.099	0.096	35.7
117	375146	922326	Richland; Well 3	--	--	--	--	.096	.106	.096	.099	.096	.099	.096	.096	.099	.096	.099	.096	35.7
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.134	.112	.117	.155	.118	.124	.158	.156	.139	.119	.124	.143	48.7
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.133	.148	.131	.136	.132	.155	.169	.145	.129	.129	.131	.131	50.8
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.111	.165	.149	.174	.110	.190	.216	.198	.176	.168	.128	.127	58.1
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.083	.097	.121	.104	.099	.118	.103	.131	.139	.096	.101	.098	39.2
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.050	.023	.065	.071	.060	.058	.079	.075	.062	.075	.059	.046	22.1
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.156	.167	.161	.161	.152	.193	.209	.181	.196	.156	.139	.190	62.8
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.045	.051	.052	.073	.080	.098	.121	.149	.060	.094	.054	.087	29.5
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.063	.060	.058	.045	.090	.097	.191	.108	.063	.066	.077	.053	29.6
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.235	.264	.223	.279	.200	.274	.321	.327	.261	.285	.233	.233	95.3
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.153	.169	.158	.163	.159	.130	.000	.100	.155	.147	.157	.100	48.2
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.314	.258	.309	.290	.275	.310	.346	.321	.355	.280	.280	.312	111
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	43.3
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	43.3
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.28
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	4.75
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	5.11
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.201	.200	.186	.215	.215	.221	.242	.248	.238	.229	.218	.224	80.2
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	10.6
			Cumulative average daily pumping rate and annual pumpage, 1993					4.10	4.23	4.15	4.34	4.15	4.47	4.65	4.65	4.47	4.33	4.24	4.26	1,580

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	Annual pumpage (MG)
Wells located inside a 6-mile wide band surrounding the study area—Continued																				
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	11.0
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	42.2
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	16.0
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.079	.034	.038	.047	.056	.069	.028	.051	.046	.053	.030	.030	17.1
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.070	.067	.067	.066	.065	.071	.068	.040	.042	.029	.040	.074	21.3
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.002	.007	.017	.068	.071	.070	.069	.069	.072	.071	.072	.071	20.1
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.000	.000	.000	.004	.003	.027	.004	.009	.007	.016	.005	.006	2.46
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.034	.046	.029	.029	.031	.036	.036	.040	.038	.028	.031	.028	12.3
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.075	.076	.075	.067	.069	.045	.070	.069	.067	.061	.066	.061	24.3
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.062	.063	.057	.026	.030	.042	.045	.049	.037	.028	.020	.022	14.6
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.146	.162	.146	.151	.146	.151	.146	.146	.151	.146	.151	.146	54.3
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.477	.528	.477	.493	.477	.493	.477	.477	.493	.477	.493	.477	178
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
115	375126	922419	Richland; Well 1	--	--	--	--	.096	.106	.096	.099	.096	.099	.096	.096	.099	.096	.099	.096	35.7

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
116	375120	922341	Richland; Well 2	--	--	--	--	0.096	0.106	0.096	0.099	0.096	0.099	0.096	0.096	0.099	0.096	0.099	0.096	35.7
117	375146	922326	Richland; Well 3	--	--	--	--	.096	.106	.096	.099	.096	.099	.096	.096	.099	.096	.099	.096	35.7
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.000	.000	.000	.000	.016	.061	.058	.048	.051	.052	.047	.028	11.0
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.132	.146	.162	.133	.130	.153	.162	.143	.168	.145	.131	.127	52.6
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.132	.121	.171	.138	.142	.141	.166	.162	.162	.113	.126	.144	52.3
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.027	.000	.050	.175	.162	.221	.171	.177	.182	.116	.142	.087	46.0
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.053	.129	.124	.126	.101	.095	.133	.116	.107	.085	.094	.087	37.9
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.046	.064	.077	.065	.064	.000	.045	.082	.085	.054	.000	.000	17.7
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.164	.151	.216	.121	.160	.165	.211	.209	.214	.146	.160	.159	63.2
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.035	.063	.092	.118	.192	.117	.090	.092	.093	.076	.092	.100	35.3
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.059	.042	.100	.123	.123	.189	.136	.111	.074	.080	.086	.086	36.9
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.248	.274	.276	.250	.250	.299	.350	.363	.327	.237	.249	.200	101
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.152	.141	.200	.150	.148	.186	.184	.191	.194	.141	.143	.168	60.9
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.234	.306	.279	.326	.278	.284	.288	.371	.351	.335	.278	.323	111
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	40.6
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	40.6
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.28
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	4.75
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	5.11
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.201	.200	.186	.215	.215	.221	.242	.248	.238	.229	.218	.224	80.2
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	10.6
			Cumulative average daily pumping rate and annual pumpage, 1994					4.10	4.32	4.51	4.58	4.60	4.82	4.85	4.94	4.88	4.39	4.36	4.32	1,660

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Annual pumpage (MG)
Wells located inside a 6-mile wide band surrounding the study area—Continued																				
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	11.0
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	42.2
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	.044	16.0
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.035	.047	.035	.024	.027	.024	.040	.040	.026	.014	.016	.031	10.9
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.048	.040	.043	.053	.056	.056	.060	.064	.065	.063	.061	.065	20.5
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.070	.067	.071	.071	.059	.071	.070	.070	.070	.070	.066	.061	24.8
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.007	.011	.006	.025	.009	.019	.044	.070	.063	.018	.007	.002	8.63
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.032	.032	.033	.018	.032	.034	.040	.044	.038	.033	.032	.032	12.2
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.062	.060	.063	.059	.069	.072	.064	.059	.052	.071	.075	.078	23.8
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.023	.023	.025	.028	.024	.020	.022	.009	.008	.026	.032	.027	8.12
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.142	.158	.142	.147	.142	.147	.142	.142	.147	.142	.147	.142	52.9
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.490	.542	.490	.506	.490	.506	.490	.490	.506	.490	.506	.490	182
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
115	375126	922419	Richland; Well 1	--	--	--	--	.055	.060	.055	.056	.055	.056	.055	.055	.056	.055	.056	.055	20.3

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
116	375120	922341	Richland; Well 2	--	--	--	--	0.055	0.060	0.055	0.056	0.055	0.056	0.055	0.055	0.056	0.055	0.056	0.055	20.3
117	375146	922326	Richland; Well 3	--	--	--	--	.055	.060	.055	.056	.055	.056	.055	.055	.056	.055	.056	.055	20.3
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.035	.030	.050	.044	.044	.049	.038	.035	.006	.024	.149	.184	21.0
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.124	.140	.126	.108	.090	.128	.129	.158	.159	.132	.110	.109	45.9
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.129	.117	.147	.130	.123	.126	.136	.140	.162	.140	.126	.103	48.1
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.121	.129	.164	.122	.163	.184	.118	.162	.120	.112	.112	.114	49.3
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.083	.104	.096	.096	.076	.096	.091	.098	.106	.097	.075	.075	33.2
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.021	.136	.140	.112	.116	.125	.106	.132	.127	.106	.067	.089	38.7
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.160	.167	.184	.135	.159	.153	.140	.190	.231	.138	.163	.157	60.1
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.042	.065	.065	.045	.058	.000	.000	.124	.070	.069	.087	.105	22.2
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.079	.053	.024	.000	.061	.178	.163	.128	.068	.079	.083	.177	33.4
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.245	.225	.286	.211	.286	.251	.306	.357	.328	.190	.274	.178	95.5
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.120	.160	.144	.143	.143	.173	.119	.192	.206	.196	.131	.152	57.1
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.253	.292	.269	.274	.269	.276	.291	.375	.316	.347	.228	.242	104
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	37.9
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104	37.9
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.28
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	4.75
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.000	.000	.130	.000	.000	.000	.000	.006	.056	.046	.059	.081	11.6
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	5.11
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.226	.211	.214	.213	.222	.218	.282	.304	.253	.236	.223	.219	85.9
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	10.6
			Cumulative average daily pumping rate and annual pumpage, 1995					4.08	4.36	4.48	4.10	4.25	4.45	4.43	4.92	4.72	4.38	4.37	4.45	1,630

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

								Average daily pumping rate, in Mgal/d												
Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	12.8
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	60.8
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	22.5
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.049	.059	.044	.044	.044	.052	.046	.050	.034	.025	.023	.023	15.0
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.062	.059	.053	.055	.054	.056	.060	.060	.059	.057	.056	.059	20.9
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.069	.072	.066	.058	.010	.062	.068	.065	.065	.061	.061	.059	21.7
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.002	.009	.005	.006	.065	.008	.010	.021	.074	.074	.066	.059	12.1
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.032	.038	.035	.039	.041	.048	.054	.051	.030	.015	.010	.026	12.8
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.078	.074	.077	.076	.065	.075	.076	.071	.060	.062	.066	.057	25.4
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.045	.037	.028	.030	.017	.048	.049	.052	.009	.014	.022	.014	11.2
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.058	.064	.058	.060	.058	.060	.058	.058	.060	.058	.060	.058	21.6
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.608	.673	.608	.629	.608	.629	.608	.608	.629	.608	.629	.608	226
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
115	375126	922419	Richland; Well 1	--	--	--	--	.060	.066	.060	.062	.060	.062	.060	.060	.062	.060	.062	.060	22.1

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
116	375120	922341	Richland; Well 2	--	--	--	--	0.060	0.066	0.060	0.062	0.060	0.062	0.060	0.060	0.062	0.060	0.062	0.060	22.1
117	375146	922326	Richland; Well 3	--	--	--	--	.060	.066	.060	.062	.060	.062	.060	.060	.062	.060	.062	.060	22.1
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.182	.226	.189	.223	.224	.208	.192	.231	.185	.268	.182	.165	75.3
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.109	.139	.146	.000	.123	.128	.090	.123	.130	.126	.112	.078	39.7
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.103	.135	.122	.128	.141	.040	.133	.129	.101	.091	.120	.113	41.3
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.118	.133	.110	.138	.165	.121	.130	.101	.119	.141	.119	.096	45.3
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.072	.076	.056	.072	.074	.068	.050	.069	.071	.097	.070	.013	23.9
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.061	.004	.060	.054	.074	.053	.062	.031	.032	.031	.051	.061	17.5
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.129	.135	.177	.162	.152	.158	.154	.178	.133	.178	.105	.104	53.7
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.141	.137	.137	.152	.161	.139	.167	.181	.100	.110	.090	.080	48.5
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.164	.123	.102	.171	.136	.189	.000	.000	.061	.097	.077	.089	36.6
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.204	.273	.244	.253	.275	.250	.232	.281	.228	.232	.208	.196	87.4
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.127	.140	.152	.155	.171	.168	.128	.144	.157	.154	.134	.099	52.6
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.221	.316	.264	.271	.260	.268	.245	.289	.205	.303	.212	.237	93.9
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.000	.000	.000	.000	.000	.087	.202	.248	.121	.264	.168	.177	38.9
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	35.2
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	35.2
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.28
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	4.75
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.064	.135	.063	.113	.103	.115	.144	.092	.086	.124	.066	.160	38.4
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	5.11
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.226	.229	.215	.213	.226	.240	.284	.238	.243	.244	.228	.243	86.1
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	10.6
			Cumulative average daily pumping rate and annual pumpage, 1996					4.53	4.92	4.62	4.72	4.86	4.88	4.85	4.98	4.61	5.04	4.55	4.48	1,730

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d												Annual pumpage (MG)
								Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	12.8
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	56.2
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	20.8
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	5.48
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.009	.028	.039	.043	.035	.046	.046	.035	.033	.030	.036	.036	12.6
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.052	.047	.049	.051	.050	.050	.053	.054	.051	.050	.046	.044	18.1
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	36.1
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	2.37
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.049	.031	.047	.044	.044	.055	.059	.062	.061	.060	.038	.059	18.6
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.042	.075	.059	.027	.010	.005	.048	.052	.048	.022	.052	.010	13.6
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.039	.015	.039	.040	.044	.045	.044	.038	.040	.036	.028	.025	13.2
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.069	.065	.043	.069	.075	.055	.095	.069	.069	.073	.062	.073	24.8
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.035	.022	.020	.025	.048	.049	.062	.044	.037	.044	.024	.044	13.9
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.46
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	66.9
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	66.9
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	.183	66.9
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	8.52
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	1.83
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	8.85
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	16.6
115	375126	922419	Richland; Well 1	--	--	--	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d: Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued																	
116	375120	922341	Richland; Well 2	--	--	--	--	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	30.4
117	375146	922326	Richland; Well 3	--	--	--	--	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	30.4
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.171	.182	.154	.025	.161	.072	.176	.184	.171	.151	.136	.132	52.2
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.109	.098	.086	.124	.095	.155	.182	.157	.064	.104	.107	.125	42.8
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.079	.132	.119	.095	.137	.122	.148	.141	.091	.150	.119	.109	43.8
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.096	.103	.162	.153	.143	.147	.192	.168	.159	.178	.143	.137	54.3
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.000	.059	.085	.076	.044	.074	.088	.073	.034	.059	.050	.063	21.4
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.031	.045	.030	.073	.069	.057	.059	.049	.041	.046	.031	.050	17.7
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.157	.117	.172	.186	.168	.106	.173	.183	.176	.171	.156	.152	58.5
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.122	.106	.094	.106	.103	.140	.239	.200	.128	.124	.145	.131	50.0
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.134	.098	.099	.085	.086	.103	.173	.124	.206	.195	.109	.090	45.7
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.203	.181	.283	.281	.314	.248	.265	.265	.298	.192	.237	.227	91.2
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.079	.145	.141	.171	.179	.160	.180	.179	.180	.177	.159	.149	57.8
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.197	.211	.278	.321	.269	.247	.282	.270	.293	.277	.243	.223	94.6
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.173	.181	.184	.151	.180	.122	.179	.158	.161	.136	.064	.064	53.3
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	35.2
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097	35.2
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	1.28
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	4.75
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.000	.082	.132	.107	.126	.092	.152	.041	.107	.101	.077	.106	34.2
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	5.11
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	3.65
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.250	.229	.251	.243	.265	.246	.275	.281	.262	.257	.243	.222	92.1
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	10.6
			Cumulative average daily pumping rate and annual pumpage, 1997					4.31	4.46	4.78	4.71	4.86	4.61	5.38	5.04	4.92	4.85	4.52	4.48	1,730

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Semi-annual pumpage (MG)
			Wells located inside a 6-mile wide band surrounding the study area—Continued											
81	372950	924945	Conway; Well 2	1,404	1,150	352	--	0.035	0.035	0.035	0.035	0.035	0.035	6.34
82	375721	921546	Crocker; Well 3	1,145	995	210	--	.154	.154	.154	.154	.154	.154	27.9
83	375700	921557	Crocker; Well 2	1,068	903	350	--	.057	.057	.057	.057	.057	.057	10.3
84	375636	921560	Crocker; Well 1	1,125	950	450	--	.000	.000	.000	.000	.000	.000	.00
85	371024	925108	Diggins; Well 1	1,658	1,100	204	--	.015	.015	.015	.015	.015	.015	2.72
86	371025	925108	Diggins; Well 2	1,660	1,260	902	--	.015	.015	.015	.015	.015	.015	2.72
87	375939	920557	Dixon; Park Well	1,185	889	470	--	.043	.039	.040	.048	.046	.049	8.00
88	375949	920620	Dixon; Well 2	1,178	1,000	400	--	.048	.046	.053	.047	.048	.051	8.85
89	372112	925551	Fountain Plaza MHP	1,465	--	--	--	.010	.010	.010	.010	.010	.010	1.81
90	372055	925546	Gaslight Village	1,479	360	--	--	.004	.004	.004	.004	.004	.004	.72
91	374241	923945	Laclede County #1; Well 1	1,282	1,150	630	--	.099	.099	.099	.099	.099	.099	17.9
92	374200	924322	Laclede County #1; Well 2	1,267	1,100	501	--	.099	.099	.099	.099	.099	.099	17.9
93	373731	924404	Laclede County #1; Well 3	1,358	1,325	520	--	.099	.099	.099	.099	.099	.099	17.9
94	374217	924006	Laclede County #1; Well 4	1,258	1,205	500	--	.099	.099	.099	.099	.099	.099	17.9
95	373523	924427	Laclede County #1; Well 5	1,407	1,755	--	--	.099	.099	.099	.099	.099	.099	17.9
96	374515	924023	Laclede County #1; Well 6	1,226	979	--	--	.099	.099	.099	.099	.099	.099	17.9
97	373550	924118	Laclede County #3; Well 2	1,365	1,215	525	--	.083	.083	.083	.083	.083	.083	15.1
98	375657	915220	Lakeside Estates	--	450	300	--	.007	.007	.007	.007	.007	.007	1.18
99	374025	923931	Lebanon; Well 3	1,276	1,763	556	--	.058	.056	.055	.052	.033	.056	9.33
100	374115	924032	Lebanon; Well 4	1,222	1,170	--	--	.004	.002	.012	.006	.043	.054	3.68
101	373936	923920	Lebanon; Well 5	1,294	1,763	556	--	.033	.030	.035	.035	.032	.050	6.50
102	374128	923947	Lebanon; Well 6	1,264	1,825	590	--	.075	.074	.072	.073	.073	.020	11.7
103	374000	924017	Lebanon; Well 7	1,266	1,780	562	--	.050	.051	.048	.053	.045	.064	9.37
104	375457	914608	Little Oaks MHP	--	--	--	--	.004	.004	.004	.004	.004	.004	.72
105	372022	925422	Marshfield; Well 2	1,471	1,339	363	--	.183	.183	.183	.183	.183	.183	33.2
106	371958	925535	Marshfield; Well 3	1,478	1,420	425	--	.183	.183	.183	.183	.183	.183	33.2
107	371956	925410	Marshfield; Well 4	1,486	1,300	560	--	.183	.183	.183	.183	.183	.183	33.2
108	375842	914435	Northgate MHP	1,190	455	127	--	.005	.005	.005	.005	.005	.005	.91
109	370616	922460	Norwood; Well 3	1,525	1,475	600	--	.023	.023	.023	.023	.023	.023	4.22
110	375517	914633	Ozark Terrace	--	490	60	--	.005	.005	.005	.005	.005	.005	.91
111	375901	914511	Phelps County #2 North; Well 1	--	1,075	505	--	.024	.024	.024	.024	.024	.024	4.39
112	375813	914745	Phelps County #2 North; Well 2	--	1,250	520	--	.024	.024	.024	.024	.024	.024	4.39
113	375817	914403	Phelps County #2 South; Well 1	1,193	1,050	425	--	.046	.046	.046	.046	.046	.046	8.24
114	375820	914245	Phelps County #2 South; Well 2	1,180	1,150	435	--	.046	.046	.046	.046	.046	.046	8.24
115	375126	922419	Richland; Well 1	--	--	--	--	.083	.083	.083	.083	.083	.083	15.1

Table 3. Average daily pumping rate and annual pumpage of public water-supply wells in the study area and in a 6-mile wide band surrounding the study area from January 1993 to June 1998—Continued

Site no. (fig. 24)	Latitude ddmmss	Longitude ddmmss	Well	Land surface (ft above NGVD 29)	Well depth (ft below land surface)	Casing depth (ft below land surface)	Specific capacity (gal/min-ft)	Average daily pumping rate, in Mgal/d						Semi-annual pumpage (MG)
								Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	
			Wells located inside a 6-mile wide band surrounding the study area—Continued											
116	375120	922341	Richland; Well 2	--	--	--	--	0.083	0.083	0.083	0.083	0.083	0.083	15.1
117	375146	922326	Richland; Well 3	--	--	--	--	.083	.083	.083	.083	.083	.083	15.1
118	375648	914620	Rolla; Well 2	--	1,745	395	--	.153	.194	.230	.224	.233	.314	40.6
119	375727	914542	Rolla; Well 3	--	1,169	392	--	.104	.092	.105	.108	.104	.128	19.4
120	375706	914525	Rolla; Well 4	--	1,060	231	--	.134	.064	.077	.098	.115	.115	18.3
121	375642	914647	Rolla; Well 5	--	1,133	280	--	.158	.102	.107	.064	.099	.140	20.3
122	375625	914624	Rolla; Well 7	--	1,107	292	--	.051	.042	.050	.063	.060	.054	9.67
123	375615	914529	Rolla; Well 8	--	1,582	280	--	.060	.045	.048	.050	.049	.058	9.38
124	375742	914609	Rolla; Well 10	--	1,123	323	--	.122	.111	.153	.132	.144	.119	23.6
125	375910	914339	Rolla; Industrial Park 1	1,196	1,155	400	--	.070	.070	.053	.097	.113	.117	15.7
126	375847	914324	Rolla; Industrial Park 2	--	1,155	400	--	.117	.086	.087	.140	.136	.149	21.6
127	375732	914438	Rolla; Well 11	--	1,139	325	--	.212	.197	.185	.197	.225	.211	37.1
128	375815	914441	Rolla; Well 12	1,180	1,370	430	--	.125	.136	.130	.113	.154	.180	25.3
129	375642	914429	Rolla; Well 13	1,020	1,200	400	--	.228	.219	.200	.187	.225	.197	37.9
130	375546	914542	Rolla; Well 14	--	1,016	350	--	.157	.361	.356	.357	.357	.352	58.3
131	370906	924560	Seymour; Well 2	--	1,235	316	--	.147	.134	.079	.107	.143	.120	22.0
132	370845	924611	Seymour; Well 1	1,650	1,235	300	--	.242	.243	.221	.229	.243	.313	45.0
133	375911	914144	Shady Lane TP	1,065	465	235	--	.004	.004	.004	.004	.004	.004	.63
134	375535	914400	Stately Mansion MHP	1,040	670	250	--	.013	.013	.013	.013	.013	.013	2.35
135	372959	914947	Texas County #4; Well 2	1,388	1,200	500	--	.105	.107	.108	.112	.134	.134	21.1
136	380014	914320	Whispering Pines Subdivision	--	550	400	--	.014	.014	.014	.014	.014	.014	2.53
137	375804	914637	Whitson Scenic Veiw MHP	--	437	28	--	.010	.010	.010	.010	.010	.010	1.81
138	370001	915806	Willow Springs; Well 2	1,310	1,495	505	--	.000	.000	.000	.000	.000	.000	.00
139	365930	915814	Willow Springs; Well 3	--	1,545	524	--	.000	.000	.000	.000	.000	.000	.00
140	365910	915842	Willow Springs; Well 4	--	1,600	475	--	.264	.251	.269	.273	.289	.295	49.6
141	375760	914644	Woodcrest MHP	--	750	400	--	.029	.029	.029	.029	.029	.029	5.25
		Cumulative average daily pumping rate and semi-annual pumpage, 1998						4.78	4.77	4.79	4.89	5.16	5.36	898

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