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Reconnaissance Study of Ground-Water Levels and Withdrawals in the Vicinity of DeWitt and Piatt Counties

by
Mark A. Anliker and Ellis W. Sanderson
Office of Ground-Water Resources Evaluation & Management

Prepared for the
Mahomet Valley Water Authority

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Illinois State Water Survey
Hydrology Division
Champaign, Illinois

A Division of the Illinois Department of Natural Resources

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Mark A. Anliker
Ellis W. Sanderson, P.E.

Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820

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Mark A. Anliker, Assistant Hydrologist
Ellis W. Sanderson, Senior Engineer

ABSTRACT

Water-bearing sand and gravel deposits underlying large portions of DeWitt and Piatt Counties comprise a substantial ground-water resource that supplies all of the area's water needs except power generation. Ground-water resources include the saturated sand and gravel deposits associated with the deep, buried Mahomet Bedrock Valley, which traverses both counties and extends across several other counties in Illinois. Wells tapping this aquifer system are generally 200 feet (ft) deep or more. Additional significant ground-water resources are associated with shallower, less continuous sand and gravel deposits, which are found beneath most areas within Piatt and DeWitt Counties. Wells tapping these shallower aquifers range in depth from about 50 to 200 ft and serve as a significant source of water for rural and municipal use. This project established a network of about 550 existing wells in which to measure water levels during Fall 1994. The data from this "mass measurement" of water levels resulted in maps of the potentiometric surfaces associated with the two predominant aquifer systems in the vicinity of DeWitt and Piatt Counties. Ground-water withdrawal data for both counties were extracted from the existing statewide water inventory program and tabulated for the period 1980-1994. Estimated and reported ground-water withdrawals for 1994 were segregated by township for the two counties to accompany the water-level data and for possible use in future ground-water modeling efforts.

INTRODUCTION

Beneath central Illinois lies an ancient river valley—the Mahomet Bedrock Valley—which was carved into the underlying bedrock before the glaciers advanced and covered much of Illinois. The valley was filled with unconsolidated deposits of sand, gravel, silts, clays, and tills left by the continental glaciers. Of major interest to planners, city, state, and local officials, agriculture, and industry are the highly productive sand and gravel aquifers that were deposited when meltwaters from the glaciers flowed within the Mahomet Bedrock Valley system.

It was estimated by Visocky and Schicht (1969) that the quantity of renewable ground water that could be withdrawn from the sand and gravel aquifers within the Mahomet Bedrock Valley and its major tributaries in east-central Illinois, an area of about 3,700 square miles, is about 445 million gallons per day (mgd). Kirk (1987) estimated that in 1986 ground-water withdrawals from sand and gravel aquifers in those counties overlying major portions of the valley system were about 66 mgd, or only about 15 percent of the renewable resource.

During 1989, interest in the development of east-central Illinois ground-water resources within the Mahomet Bedrock Valley began increasing. The severe drought of 1988-1989 motivated many farmers throughout Illinois to invest in irrigation systems. In Piatt and DeWitt Counties, Cisco and Clinton added new supply wells to their water systems to meet increased demands caused by the drought and additional users. Also during this time period, the city of Decatur began a ground-water exploration program to develop an emergency supplemental source of water for use during drought periods. This program culminated in the construction of a well field in southeastern DeWitt County designed to pump about 25 mgd.

This increased awareness of the Mahomet Bedrock Valley aquifer system and its potential for meeting regional water demands for individual, municipal, agricultural, and commercial uses led to a desire to learn more about the ground-water resource and to more effectively support future resource development plans by diverse interests in the region. In addition, the lack of information about cumulative interference drawdowns between existing and planned wells prompted the voters of Piatt and DeWitt Counties to form the Mahomet Valley Water Authority (MVWA). During this same approximate time period, voters in Decatur and northeast Macon County voted to form the Mahomet Aquifer Water Authority.

Purpose of Study

As a result of the increased interest in the Mahomet Bedrock Valley and its associated aquifer systems, the MVWA sponsored this study, the focus of which is to determine the elevation of the ground-water surface, or potentiometric head, associated with the Mahomet Sand aquifer and other sand and gravel aquifers within the study area. Such ground-water-level data, usually presented as maps, are required to monitor the long-term impacts of regional ground-water resource development and as input for any regional resource modeling effort.

In addition to documenting ground-water-level information for 1994, the other purpose of this study is to collect and quantify reported ground-water pumpage information, supplemented with estimates for unreported water pumpage. This pumpage information, together with data on the present ground-water levels, will provide the benchmark information needed to monitor the impacts of new withdrawals.

Previous Ground-Water Studies

A significant study of the ground-water resources in an area encompassing DeWitt and Piatt Counties was published in 1969 by the Water Survey (Visocky and Schicht, 1969). The study area included portions of 20 counties in east-central Illinois, with DeWitt and Piatt Counties centrally located. The report described the geologic setting and hydrologic characteristics of the Mahomet Sand aquifer, as well as the sands and gravels of the Dlinoian deposits, called the middle aquifer. Water-level hydrographs for observation wells in the study area were presented, including the hydrograph for a shallow (water-table) Piatt County well (well PIA 20N6E-31.6h[†]), for which measurements began in 1954. The emphasis in this 1969 study was on the Champaign-Urbana area because of the significant ground-water pumpage in that area. Estimated historical pumpage for several municipalities was documented according to use (i.e., public or industrial) and source (aquifer), and pumpage for rural supplies was estimated for 1965.

Sanderson (1971) summarized ground-water conditions in Piatt County, including pertinent geological factors, occurrence and movement, temperature and chemical quality, and well development. Municipal water-supply wells were described and construction features for private rural domestic wells were tabulated by location to aid in appraising further ground-water resource development in the county.

A cooperative study (Kempton et al., 1982) conducted by the Illinois State Water Survey (ISWS) and Illinois State Geological Survey (ISGS) presented a preliminary mapping and stratigraphic delineation of the sand and gravel deposits in an approximately eight-county study area that included portions of DeWitt and Piatt Counties. In addition to documenting the distribution and water-yielding characteristics of the Mahomet Sand aquifer, the study presented characteristics and distribution of other previously undefined aquifers.

A more recent study concentrating on the geology of the Mahomet Bedrock Valley in east-central Illinois was conducted by Kempton et al. (1991). This study discussed the tributary bedrock valleys associated with the Mahomet Bedrock Valley and the stratigraphy of the fill within the valley, and it summarized the hydrogeologic setting based on the geologic framework and available hydrologic data.

Acknowledgments

Sponsorship of this project was provided by the Mahomet Valley Water Authority, David Holt, Chairman (1991-1994), and Richard Helton, Chairman (1994-1995). In addition, this project would not have been possible without the willing cooperation and interest of the many residents of DeWitt, Macon, Piatt, McLean, Champaign, Douglas, Moultrie, and Logan Counties whose private domestic wells were accessed for ground-water-level measurements. Thanks to each of them.

College students Suzanne R. Delay and Dale A. Gick (Purdue University) and Heath Merlak (University of Illinois) inventoried the majority of wells used in the study. Water Survey staff members Andrew G. Buck, Bryan G. Coulson, and Robert D. Olson participated in the mass measurement of ground-water levels. George S. Roadcap, Sean V. Sinclair, and Mark E. Sievers provided assistance for computer mapping efforts. Kristopher K. Klindworth assisted with database management activities. State

[†] The well numbering system used in this report is explained in Appendix A.

Climatologist Wayne Wendland prepared the climate overview and provided climate data from weather stations at Clinton, Farmer City, and Monticello.

Adrian P. Visocky, Senior Hydrologist and Director, Office of Ground-Water Resources Evaluation & Management, provided technical guidance throughout the project and reviewed the report manuscript. Word processing to prepare the reproducible copy of this report was done by Pamela Lovett. Linda Hascall finalized the graphics, and Sarah Hibbeler edited the report.

DESCRIPTION OF STUDY AREA

The study area (figure 1) includes DeWitt and Piatt Counties and, for the purposes of mapping continuous ground-water elevation contours for the major aquifer systems in the region, the two northernmost tiers of townships in Macon County. This area covers approximately 1,100 square miles, and additional ground-water-level measurements were taken in a 3-mile-wide "border" area in Logan, McLean, Champaign, Douglas, and Moultrie Counties to help interpret ground-water-level data at the boundaries of the primary study area.

Topography of the study area is generally flat with little relief, characteristic of the glaciated till plains throughout Illinois. Land surface elevations range from approximately 805 ft above mean sea level (msl) in north-central DeWitt County to approximately 620 ft msl where the Salt Creek exits southwestern DeWitt County and the Sangamon River exits Piatt County between Cisco and Cerro Gordo. In southeastern Piatt County the lowest land surface elevation is approximately 650 ft msl where the Lake Fork Creek exits Piatt County near Atwood.

Climate

The climate of DeWitt and Piatt Counties is that of a mid-continental location, with rather cold winters and warm, humid summers, with most precipitation falling during the warm season. Average high temperatures are near 32° F in January and 86° F in July. Average lows are about 21 degrees lower. The warmest daily temperature since 1947 was 105° F, and the lowest was -24° F. Average annual precipitation is 37.59 inches, with 6.19 inches falling from December through February and 11.23 inches from June through August. Average annual snowfall is 14.5 inches, but there is much interannual variability.

The wettest and driest years since 1948 occurred in the last few years. The wettest was 1993 (the year of the great Mississippi River Valley flood), with 53.94 inches (19.31 inches from June through August), and the driest was 1988 (the year of the midsummer drought), with 25.74 inches (only 2.37 inches from June through August). This area of Illinois exhibits a maximum frequency of freezing precipitation events, generally two to

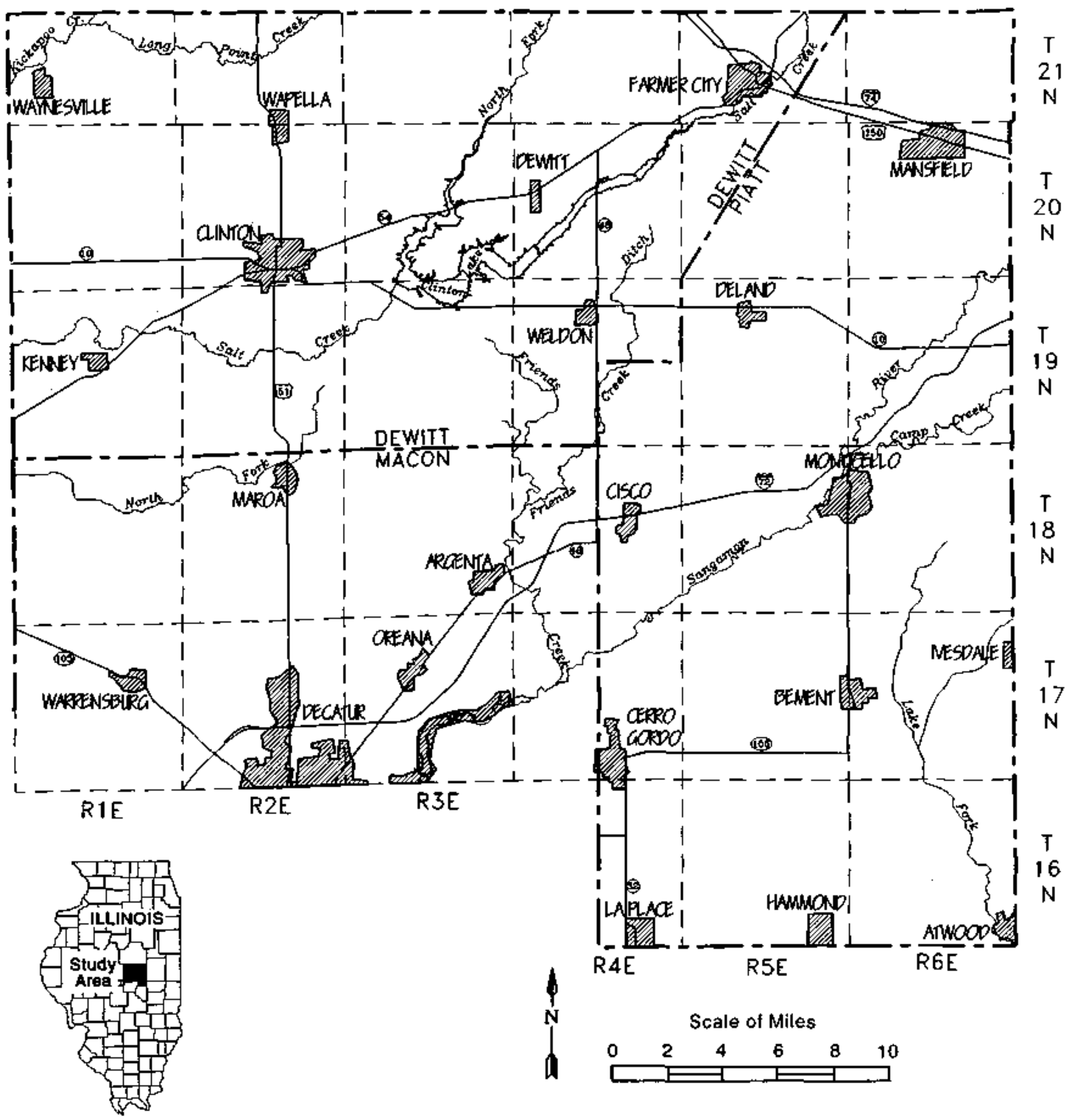


Figure 1. Location of study area

four per year. The last major glaze storm with substantial damage was February 14, 1990.

Human Activity

The predominant economic activity in the 1,100-square-mile study area is crop farming. Census information from 1990 (Ryan, 1993) lists DeWitt County with a population of 16,516; Clinton, the county seat, has a population of 7,437. Piatt County has a population of 15,548; and Monticello, the county seat, has a population of 4,549. Both county seats have significant light industrial activity. The Illinois Power Company nuclear power plant located east of Clinton is the largest employer in the area, with approximately 900 employees, and it supplies electricity to several of the cities, towns, and villages in both Piatt and DeWitt Counties. Clinton Lake, which covers an area of approximately 5,000 acres, supplies cooling water for the generation of electricity and provides significant recreational facilities for the area.

GEOLOGY

The geology of the study area has been previously summarized in various ISGS publications, including Circular 248, *Groundwater Geology in East-Central Illinois* (Selkregg and Kempton, 1958), and Circular 409, *Hydrogeology of Glacial Deposits of the Mahomet Bedrock Valley in East Central Illinois* (Stephenson, 1967). Additionally, ISGS Environmental Geology Notes 83, *Geology for Planning in DeWitt County, Illinois* (Hunt and Kempton, 1977), was produced during construction of the nuclear power generating plant east of Clinton. A more recent study on the geology of the study area is contained in "Mahomet Bedrock Valley in East-Central Illinois; Topography, glacial drift stratigraphy, and hydrogeology" (Kempton et al., 1991).

The following brief discussion of geology in the study area is taken largely from these publications. A more detailed definition of the geology in this part of Illinois may be obtained from the ISGS, which is located on the University of Dlinois campus in Urbana.

Regional Bedrock Topography

Underlying the unconsolidated deposits (i.e., silts, clays, sands, and gravels) of continental glaciation in the study area are the consolidated bedrock formations of Pennsylvanian age. This bedrock consists of beds of shale, limestone, and sandstone arranged one upon the other. Originally, the bedrock formations were unconsolidated materials, deposited over many years as sediments in shallow seas or bordering marshes. They were then buried and hardened into solid rock during the several million years after the seas retreated from the area.

Erosion of the bedrock was not uniform throughout the study area. In areas where soft shales and sandstone formations were exposed to weathering, valleys were formed by water and ice action, while hard sandstone and limestone formations in other areas resisted erosion and remained to form ridges and hills on the bedrock surface. The predominant feature in the regional bedrock topography is a wide, deep valley in the bedrock surface called the Mahomet Bedrock Valley. According to Horberg (1950), well records and outcrop data suggested that the Mahomet Bedrock Valley enters Illinois from Indiana as part of the ancient Teays River and that it represents the lower course of a master preglacial stream, which headed in North Carolina and discharged into the ancient Mississippi River Valley. More recent studies indicate that this now-buried major drainage system originated in southeastern West Virginia (Kempton et al., 1991). This ancient drainage system is considered the preglacial ancestor of the present Ohio River. Figure 2 shows the deepest portion (or thalweg) of the Mahomet Bedrock Valley and the smaller "tributary" bedrock valleys associated with the Mahomet. Horberg (1950) reported that the main valley floor has a gradual slope downstream (east to west) descending about 1.65 inches per mile.

From the Illinois-Indiana state line, the Mahomet Bedrock Valley enters Illinois in northern Vermilion County, where it is joined by the Danville Valley from the south. It then enters the southeastern corner of Ford County and is joined by the relatively large Onarga Valley from the north. From there, the Mahomet Bedrock Valley cuts diagonally across the northwestern corner of Champaign County and continues into Piatt County where it is joined by the Pesotum Valley from the south. From the Monticello area, it continues westward to the northeast corner of Macon County and then turns towards the northwest. Before the valley passes below the Clinton region, an elongated bedrock "high" or ridge just southwest of Clinton separates the main Mahomet Bedrock Valley from a narrower channel to the southwest. The Mahomet Bedrock Valley then continues to the northwest and passes beneath the southwest corner of McLean County and into the southeast corner of Tazewell County, where it joins the wide lowland of the Mackinaw Valley segment of the "Ancient Mississippi Bedrock Valley."

The narrow channel resulting from the elongated bedrock "high" southwest of Clinton has been named the Kenney Valley (Kempton et al., 1991). From the point of its departure from the Mahomet Bedrock Valley, southeast of Clinton, the Kenney Valley passes below the village of Kenney in southwestern DeWitt County, trends northwest-ward across northeastern Logan County, and joins the Mackinaw Valley as described above.

Local Bedrock Topography

Figure 3 presents a contour map showing a more detailed, local topography of the bedrock surface. This figure shows the Mahomet Bedrock Valley generally to be outlined by the 500-ft elevation (msl) contour, an area Kempton et al. (1991) refer to as the "Mahomet Valley Lowland." Areas within these contour lines contain bedrock

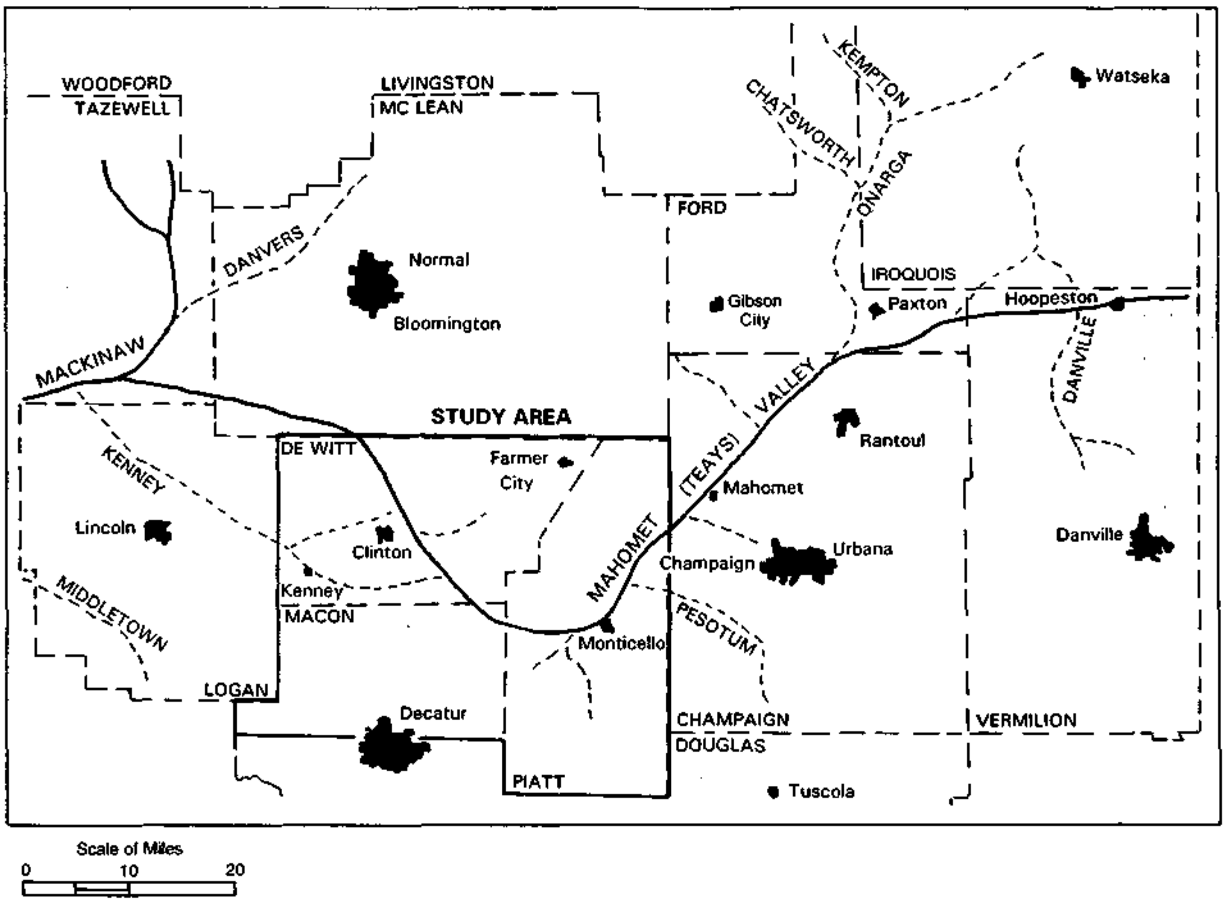


Figure 2. Axes of principal bedrock valleys in east-central Illinois (after Kempton et al., 1991)

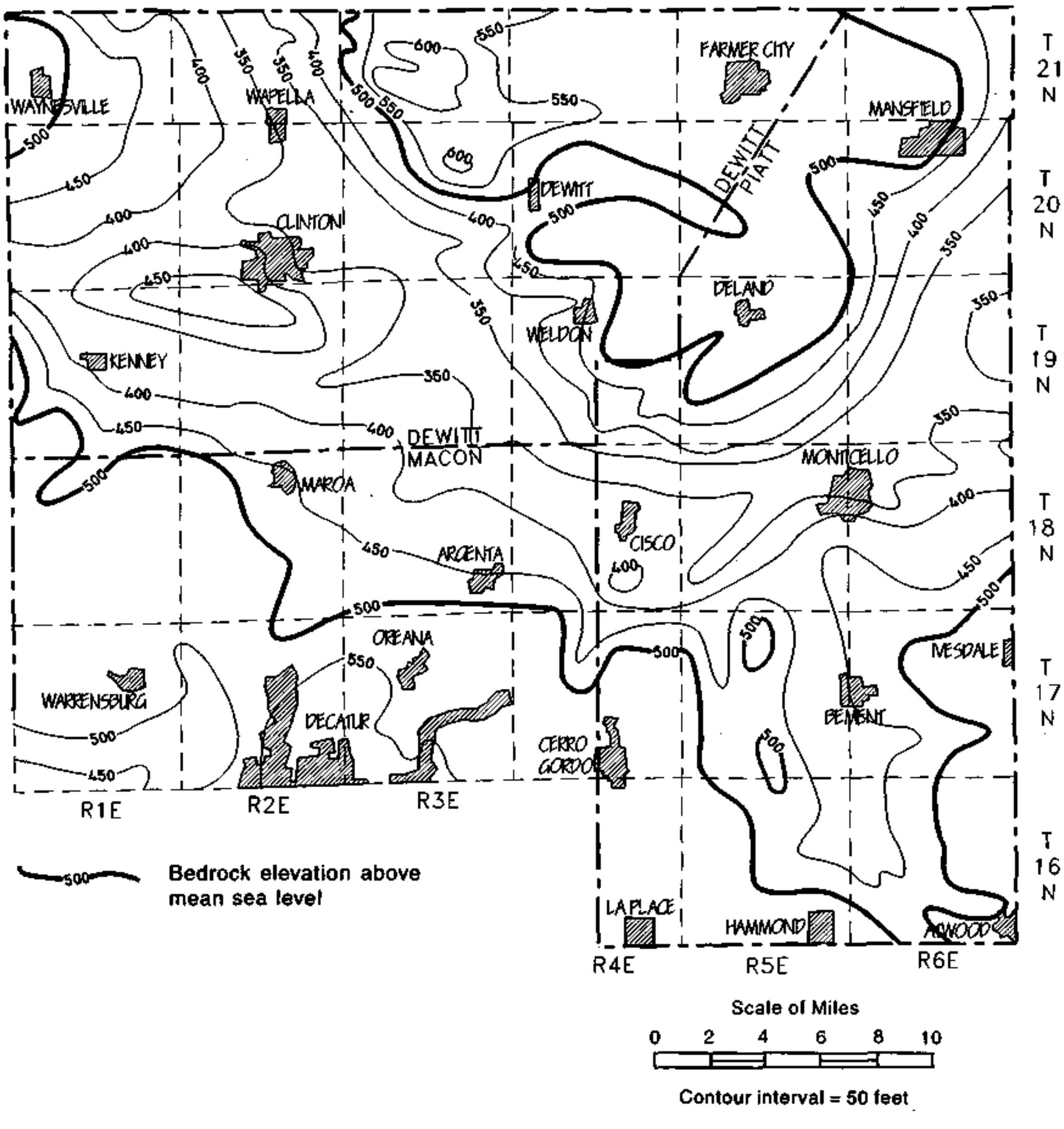


Figure 3. Bedrock topography in the study area (after Kempton et al., 1991)

surfaces of lower (deeper) elevation, perhaps down to an elevation of approximately 350 ft msl. This region, therefore, generally forms the boundaries of the deep glacial deposits containing the sands and gravels of the Mahomet aquifer. The following description of the significant geological features of this lowland in DeWitt and Piatt Counties is taken from Kempton et al. (1991):

> ...the lowland narrows progressively across northwestern Champaign County into Piatt County, where it reaches a minimum width of about 8 mi just west of Monticello and then turns rather sharply northwestward, almost 90° .
>
> From western Piatt County the lowland then widens again through northeastern Macon County and southern DeWitt County to just north of Clinton, where it attains a width of more than 15 mi (24 km). At that point an elongate bedrock ridge, slightly above elevation 500 ft (152 m), separates the "main" channel from a narrower channel to the southwest. The "main" channel turns nearly west in southwestern McLean County, then opens into the wide lowland of the Mackinaw Valley segment of the "Ancient Mississippi Bedrock Valley" at the southeastern corner of Tazewell County. The narrower channel, about 5 mi (8 km) wide, beginning at the Village of Kenney in southwestern DeWitt County, is here named the Kenney Valley. It trends northwestward across northeastern Logan County, joining the Mackinaw Valley about 12 mi west of the confluence of the "main" Mahomet Channel ...

Unconsolidated Deposits

Unconsolidated glacial deposits of Wisconsinan, Illinoian, and pre-Illinoian (Kansan) stages of continental glaciation blanket almost all of the study area, resulting in a relatively level plain broken only by isolated knobs, stream valleys, and long ridges (end moraines) formed at the front of glaciers. These features were developed long ago when the glaciers, nourished by snow accumulation in Canada, repeatedly advanced across the study area and melted away, leaving vast quantities of rock debris. In front of the ice, sediment-laden meltwaters escaped down valleys, partially filling them with outwash materials of sorted and stratified formations of clay, silt, sand, and gravel. Thick, extensive till sheets of unsorted clay, silt, sand, and pebbles also were laid down under the advancing ice or dumped in place during melting. The glacial deposits that overlie the bedrock range in thickness from slightly more than 50 ft to more than 400 ft, the thicker sections being associated with end moraines and the bedrock valleys.

The upper (Wisconsinan) glacial deposits overlie all older materials and form the present-day land surface over the majority of the study area. These deposits consist primarily of till except for thin narrow strips or areally limited pockets of sand and gravel. Thicker and more extensive occurrences of sand and gravel usually are found in the vicinity of the Champaign, Cerro Gordo, Shelbyville, and Heyworth moraines (figure 4).

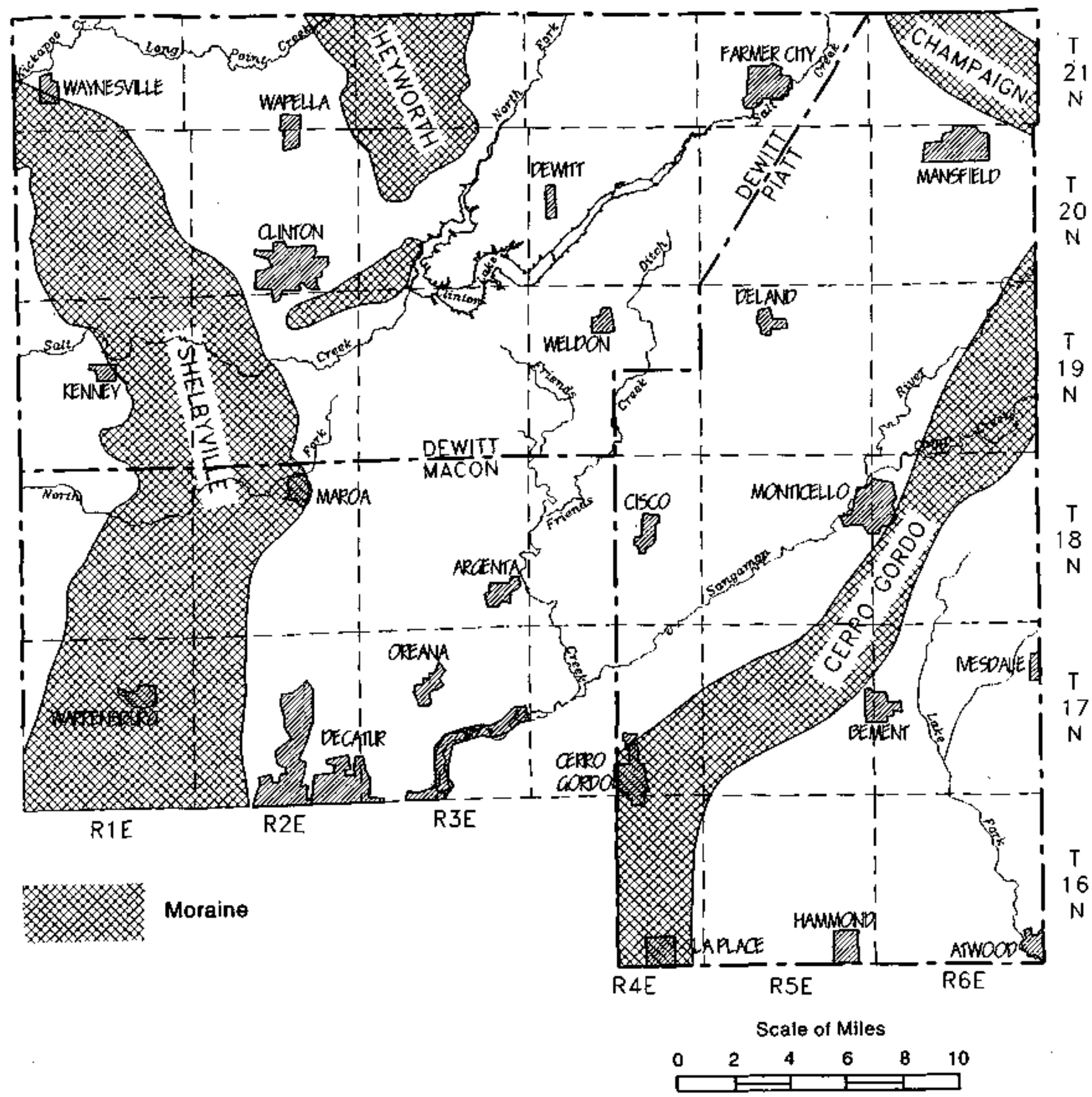


Figure 4. Moraines in the study area (after Sanderson, 1971; Hunt and Kempton, 1977)

The middle (Dlinoian) glacial deposits consist of relatively impermeable till interbedded with fairly continuous layers of sand and gravel. The thicker (10 to 50 ft) and generally more permeable sand and gravel zones within the middle drift section normally occur near the base of these materials. Several thinner, less continuous sand and gravel zones also are present in the upper part of these materials in several areas of the study area.

Underlying the middle drift materials are the lower (pre-Dlinoian) glacial deposits, which consist primarily of sand and gravel and are as much as 200 ft thick in the deeper part of the bedrock valley. In the bedrock upland areas away from the bedrock valley, these sand and gravel deposits become thinner and may be absent at some locations.

HYDROLOGY

Aquifers

In the past, aquifer selection for farm and domestic well construction was often influenced by the quantity of water required, the type of drilling equipment available, and in some instances the amount of money the farmer or homeowner was willing to pay. In most cases, the shallowest water-bearing sand and gravel deposit encountered was capable of satisfying the relatively small water demands, could be easily developed, and provided the most economical solution to the water supply problem. However, with a general trend towards increased use of water on the farm and in the home, higher yielding (perhaps deeper) wells are often now required.

Throughout many areas in DeWitt and Piatt Counties there are two or three layers of glacial deposits, each containing one or more layers or zones of water-bearing sand and gravel. In many areas, the deeper deposits are more productive than the shallower sands and gravels. However, drilling into the underlying bedrock formations for water resource development is not recommended in either county.

As described above, glacial deposits containing aquifers in the study area can be identified, separated, and classified according to the stages of glaciation during which the materials were deposited (e.g., Wisconsinan, Dlinoian, and pre-Illinoian). These glacial deposits can also be classified lithostratigraphically, or according to the physical characteristics of the deposits, with names assigned based on the most significant, extensive, and recognizable units within a formation. In DeWitt, Piatt, and northern Macon Counties, for the purposes of this study and to be consistent with Kempton et al. (1991), the various water-bearing units within the glacial deposits are grouped lithostratigraphically into three bundles: 1) the Wedron (upper), 2) the Glasford (middle), and 3) the Banner (lower) Formations. These three formations are consistent with the Wisconsinan, Dlinoian, and pre-Dlinoian stages of glaciation, respectively. Figure 5 is a north-south cross section of the Mahomet Bedrock Valley from southeastern DeWitt

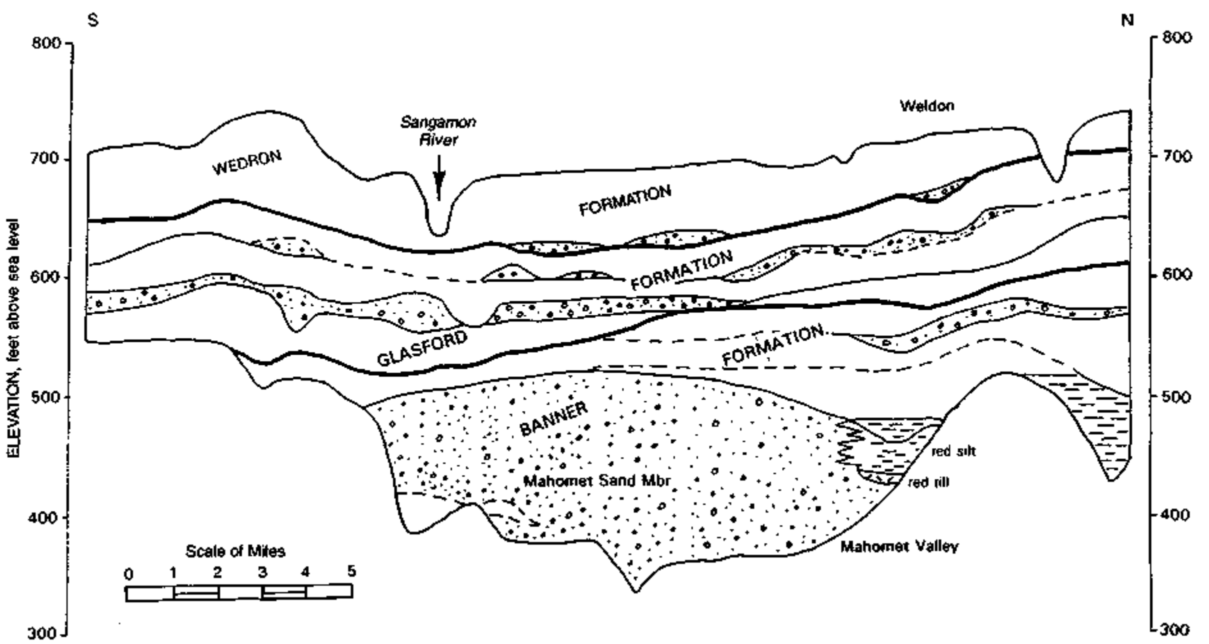


Figure 5. North-south cross section of the Mahomet Bedrock Valley, from southeastern DeWitt County to southwestern Piatt County (after Kempton et al., 1991)

County to southwestern Piatt County and shows the general lithostratigraphic relationship of the hydrogeologic formations containing aquifers in the study area.

Banner Formation Aquifers

Banner Formation deposits occur extensively along the Mahomet Bedrock Valley and consist of silty till underlain by thick beds of sand and gravel. The largest source of ground water consists of the sands and gravels that occupy the deepest portions of the Mahomet Bedrock Valley channel. Horberg (1953) gave the name "Mahomet Sand" to these thick sand and gravel deposits overlying the bedrock in the valley. Figure 6 shows the approximate boundary and 100-ft thickness contour for this Banner Formation aquifer (Mahomet Sand) in relation to the 500-ft elevation (msl) contour line for the bedrock surface.

The Mahomet Sand is restricted primarily to the main valley and is more than 100 ft thick, except along the valley margins and where it overlies hills within the lowland. In the deepest part of the valley, the sand is commonly more than 150 ft thick. Kempton et al. (1991) list the elevation tops of the Mahomet Sand at 530 to 490 ft msl in southwestern Champaign and central Piatt Counties and at 510 to 470 ft msl in DeWitt County.

Sanderson (1971) reported that sand and gravel deposits in the Banner Formation served as a source of ground water for approximately 15 percent of the farm and domestic wells in Piatt County. Private farm and domestic drilled wells tapping this deep aquifer range in depth from about 140 to 345 ft below land surface (Sanderson, 1971). Larger capacity wells tapping the full thickness of the deposits in the Mahomet Bedrock Valley may range in depth from approximately 250 to 340 ft below land surface. Yields range from approximately 5 gallons per minute (gpm) for farm and domestic wells (generally limited by the installed pump capacity) to about 2,500 gpm for one of the Decatur standby wells located southeast of Cisco. Sanderson (1971) reported that municipal wells finished in Banner Formation aquifers at Cisco, Mansfield, Monticello, and Robert Allerton Park produced approximately 68 percent of the municipal pumpage in Piatt County. About 42 percent of the county's total ground-water pumpage was reported to come from Banner Formation aquifers.

Another Banner Formation aquifer that is considerably less extensive than the Mahomet Sand lies beneath the area in and around Farmer City. Kempton and Herzog (1995) report that this locally significant sand and gravel aquifer lies between two Banner Formation tills and, hence, is probably not directly related (connected) to the Mahomet Sand. This aquifer is reported to attain thicknesses greater than 20 ft and to occur locally elsewhere, although thinner, in northern DeWitt County. This "upland Banner Formation aquifer" seems to be limited in occurrence to the bedrock uplands north of the Mahomet Bedrock Valley and to lie about 50 ft above the top of the Mahomet Sand.

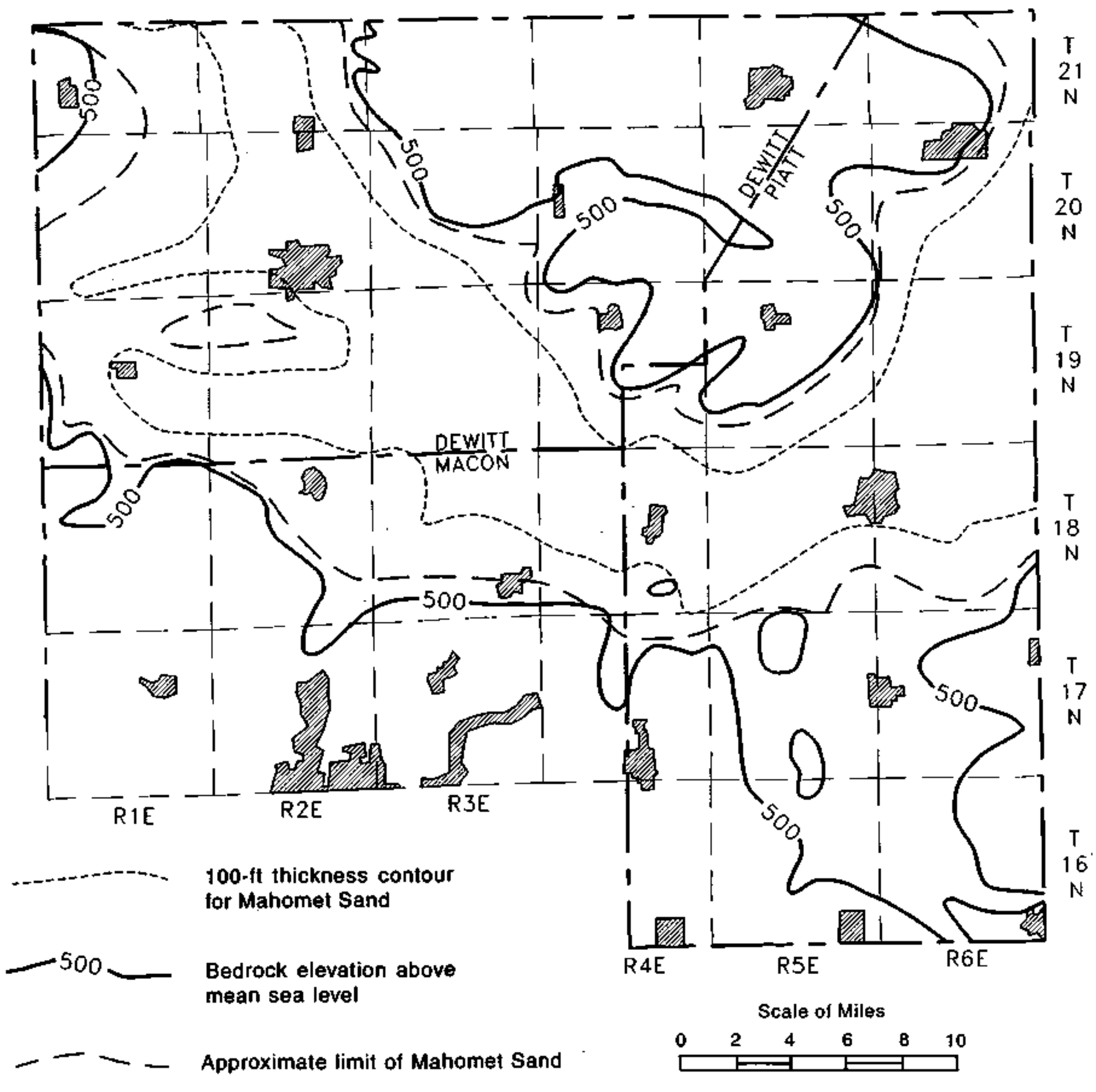


Figure 6. Approximate boundary and thickness of the Mahomet Sand aquifer in relation to the 500-ft bedrock elevation contour (after Kempton et al., 1991)

Glasford Formation Aquifers

Overlying the Banner Formation and its aquifers is the Glasford Formation (see figure 5). Glasford Formation sand and gravel deposits are fairly extensive in the study area and occur above and between Glasford Formation tills. Figure 7 shows the areas where sand and gravel deposits are generally present greater than 20 ft thick. While additional sand and gravel deposits (aquifers) are locally present throughout the remainder of the area, they are seldom greater than a few feet thick.

Sanderson (1971) reported that Glasford Formation sand and gravel deposits served as a source of ground water for approximately 56 percent of the farm and domestic wells in Piatt County. Additionally, private farm and domestic drilled wells in the county were reported to range in depth from about 50 ft, in the lowland areas of the Sangamon River Valley, to more than 200 ft in the upland areas of the Champaign and Cerro Gordo moraines (figure 4). Well yields were reported to range from 5 gpm for farm and domestic wells (generally limited by the installed pump capacity) to about 250 gpm for the larger-capacity municipal wells finished in the thicker sections of sand and gravel.

Municipal wells finished in the Glasford Formation deposits at Atwood, Bement, Cisco, Deland, and Hammond were reported to produce approximately 26 percent of the municipal pumpage in Piatt County (Sanderson, 1971). These deposits were reported to furnish about 41 percent of the total ground water withdrawn in Piatt County.

Wedron Formation Aquifers

Overlying the Glasford Formation and its associated aquifers is the Wedron Formation (see figure 5), which was deposited during the last (Wisconsinan) stage of glaciation. The Wedron Formation forms the bulk of the surface deposits throughout the study area and is generally the thinnest of the three formations (Hunt and Kempton, 1977). Water-bearing sand and gravel deposits contained within the Wedron Formation occur only as scattered pockets, as the formation consists principally of glacial till.

Sanderson (1971) reported the existence of approximately 450 records from Water Survey files and from a direct inventory conducted during Summer 1967 for large-diameter dug and bored wells in Piatt County. These wells ranged in depth from 9 to 65 ft below ground level and from 24 to 60 inches in diameter. Additionally, Water Survey files from this time period included records of 80 drilled wells finished in the Wedron Formation aquifers in Piatt County. These wells ranged in depth from 25 to 120 ft, and most were located in the northeastern township (T21N, R6E) of Piatt County on the Champaign moraine and in a southwest-trending band south of the Sangamon River Valley on the Cerro Gordo moraine (see figure 4).

Wedron Formation wells served as a source of water for approximately 29 percent of the individual farm and domestic wells in Piatt County (Sanderson, 1971). Yields from municipal wells at LaPlace and west of Cerro Gordo ranged from 75 to 70 gpm, and

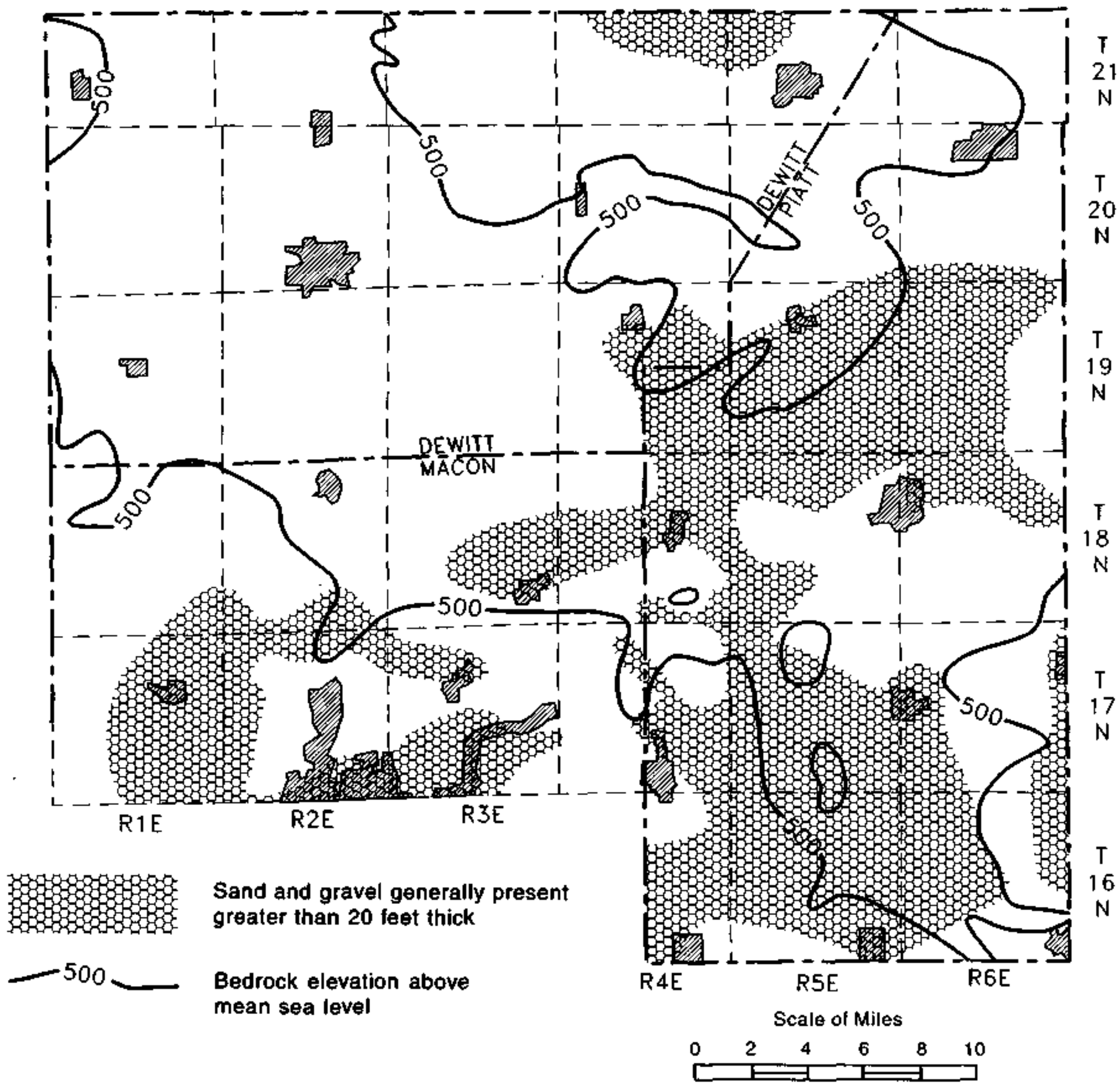


Figure 7. Distribution of sand and gravel within the Glasford Formation in relation to the Mahomet Bedrock Valley (after Kempton et al., 1991)

total ground-water pumpage from the Wedron Formation in Piatt County was estimated to be approximately 0.2 mgd, or about 17 percent of Piatt County's total ground-water withdrawals at that time.

Ground-Water Occurrence and Movement

Ground water in DeWitt and Piatt Counties begins as precipitation (rainfall or melting snow and ice) that seeps downward into the ground through the soils. Most of this rainfall or meltwater either runs off directly to surface water bodies, such as streams, or evaporates into the air. A small portion, perhaps 10 or 20 percent, infiltrates the soil and percolates downward until it reaches a level where all available voids are completely water-filled. Water thus contained in this zone of saturation is ground water, and its upper surface is the water table.

Figure 8 shows the generalized cycle of water movement from the atmosphere as precipitation to the surface and into the ground, and then away from the area either through the ground and into flowing streams or again into the atmosphere through transpiration of plants and evaporation.

Under normal conditions, the upper glacial drift deposits are regularly **recharged** (refilled) by precipitation occurring in the immediate vicinity of the aquifer. Water continues to move freely downward under the influence of pressure and gravity to recharge the lower drift deposits and in some cases the underlying bedrock formations. However, layers of very dense (almost impermeable) materials separating water-bearing units may impede the downward movement of water. These layers, or confining beds, are usually clays or shales so compact that they cannot yield enough water to be classified as an aquifer. When such confining beds are present, water reaching the aquifer may come from a somewhat distant recharge area where the confining beds are missing or where the aquifer crops out at the land surface.

Water entering permeable formations in an outcrop or recharge area may become confined downslope beneath impermeable beds. Pressure is exerted on the ground water in the confined aquifer by the weight of water at higher levels in the aquifer system. When a well penetrates such an aquifer downslope from the recharge area, the pressure forces the water to rise in the well above the top of the aquifer. The water in this instance is confined (or **artesian)** water, the well is an artesian well, and the upper surface of the water in the well is the **potentiometric surface** of the aquifer. When the potentiometric surface of the aquifer is above land surface, wells tapping the aquifer are flowing artesian wells (figure 8).

Ground-water movement from recharge areas to discharge points is influenced by gravity and head differences. Major points of discharge include springs, lakes, streams, swamps, drainage tiles, and pumping wells. The rate of movement towards points of discharge may amount to a few hundred feet per year in unconsolidated materials to only

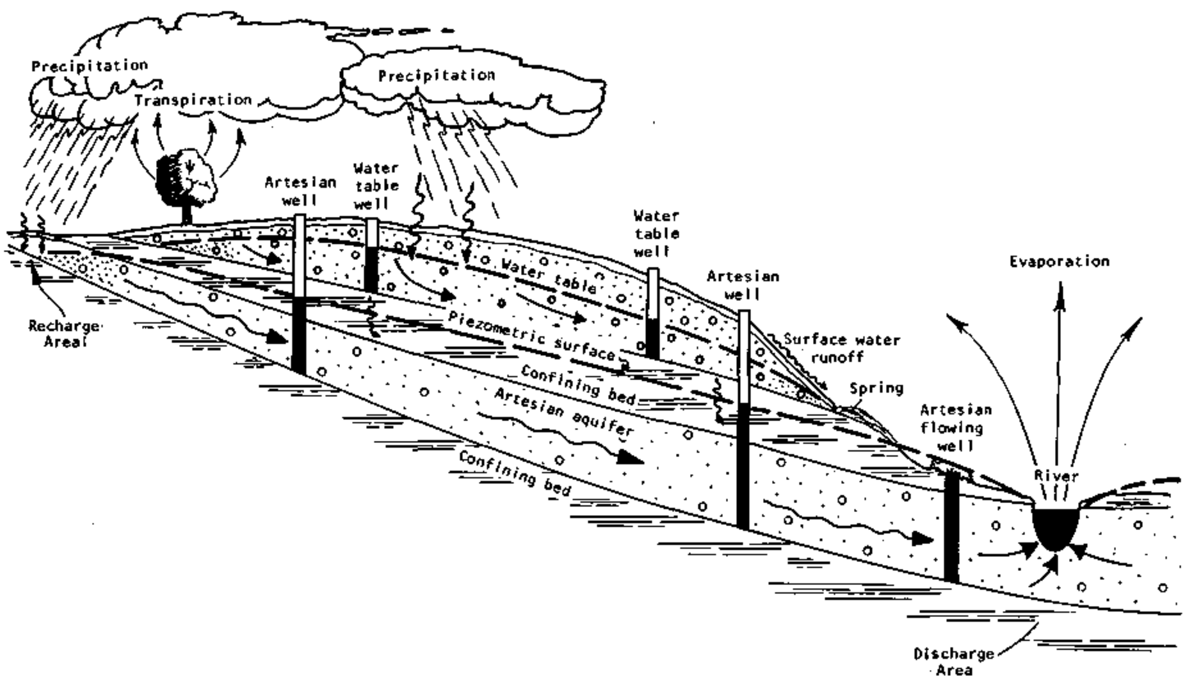


Figure 8. Cycle of water movement (from Ivens, 1969)

a few feet per year in sandstone formations. Water may be held in bedrock aquifers for many years.

In a previous study of ground-water availability in Piatt County (Sanderson, 1971), the general direction of movement of ground water in Piatt County was presented as in figure 9, and described as follows:

> Precipitation falling in the upland areas near Mansfield and Bement infiltrates into the upper drift deposits where a portion of it is diverted to discharge into local streams and drainage ditches. The water not discharged locally continues to move downward to recharge the middle and lower drift deposits. Along with the general downward migration of water in these formations, there is movement downslope (on the piezometric surfaces) generally from the north, south, and east toward the central part of the buried Mahomet Valley and the present day Sangamon River Valley lowlands. Available hydrologic and chemical quality data also imply that water moves into the middle and lower aquifers in Piatt County from recharge areas immediately north and east of the county where the overlying deposits are thin. Near Monticello and downstream, the piezometric surfaces of the middle and lower deposits are slightly above or near land surface.

Recharge

Recharge from precipitation occurs irregularly throughout the year. General trends are that recharge is greatest during spring months when rainfall is greater and evapotranspiration losses are low. Recharge is characteristically lower during the summer and early fall months when evapotranspiration and soil moisture requirements prevent most of the total precipitation from reaching the water table.

Previous studies have produced estimates of ground-water recharge for the MVWA study area. Schicht and Walton (1961) collected extensive information on hydrologic processes in the Goose Creek drainage basin during a 3½-year period from January 1955 through September 1958. A ground-water budget was then established and analyzed for this basin, which encompasses areas in both DeWitt and Piatt Counties. Those interested in a detailed discussion of recharge for these counties should consult that study.

MASS MEASUREMENT NETWORK OF WELLS

This reconnaissance ground-water-level study focused on the measurement of water levels in a network of existing domestic and municipal wells (see Appendix B). The plan was to establish a network of 500 to 600 existing wells in the study area in which to measure ground-water levels during Fall 1994. The fall timing of the

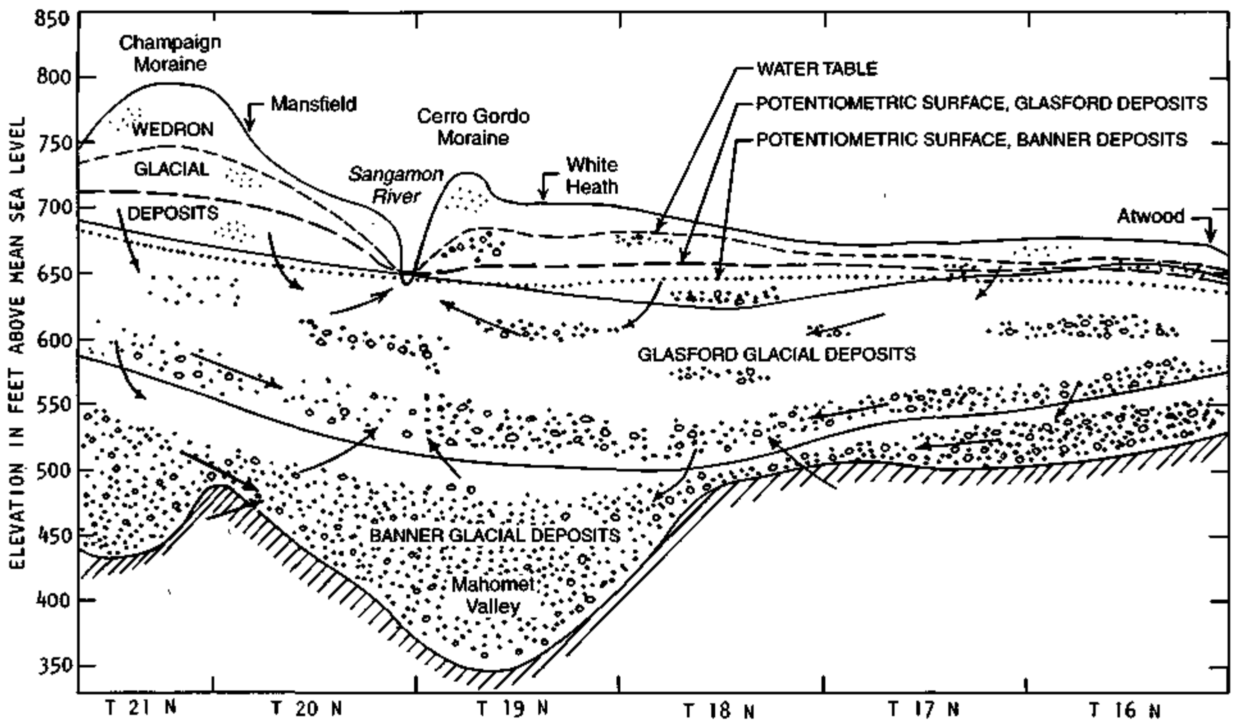


Figure 9. Generalized ground-water movement in Piatt County (after Sanderson, 1971)

measurements was chosen to map ground-water levels when they are near their seasonal low. The water-level data collected were used to construct maps of the ground-water levels (potentiometric surface) associated with aquifers in the Banner and Glasford Formations. This study, therefore, is a major step toward providing the MVWA with reconnaissance-level documentation of the present condition of the aquifer systems in the study area before major changes in water resource use occur.

The network of existing wells was established during Summer and Fall 1993 and Summer 1994. Existing private domestic wells were surveyed or "inventoried" to determine which wells might be suitable for inclusion in a network of wells for subsequent water-level measurements. For the wells that were determined to be accessible for measurement and for which the well owner had granted permission for access, information was collected regarding the well location, measuring point, construction features, owner name and address, etc. This documentation then permitted others to locate the wells and measure water levels for the mass measurement conducted during Fall 1994.

Field Inventory of Existing Wells - Summer 1993

The process of inventorying the wells to be included in the network involved both office and field work. Three college students were hired on May 19, 1993, as summer field staff to conduct the majority of the inventory work during Summer 1993. Ellis Sanderson, ISWS, spent the first four days with the summer field staff, familiarizing them with the project objectives, features of well construction, use of water-level measurement equipment, and hydrogeology of the study area. This orientation included a visit to a local well drilling firm where the field staff were shown the various well casing, pitless adapter, and well-cap configurations that would be encountered during the field work.

Mr. Robert Stain, administrative consultant for the MVWA, also met with field staff to summarize the regional issues that led to the formation of the Water Authority. He reviewed the Water Authority's goals for the project along with other MVWA activities including well registration and permitting. Mr. Stain also made arrangements with a few private well owners in the study area so that he and Ellis Sanderson could "walk through" the well-inventory process with the summer field staff.

The office work conducted prior to the actual field inventory included obtaining topographic maps, county road maps, plat books, telephone books, and related information to enable documentation of well locations, measuring point elevations, and routes of access. Available data for wells in the study area were also retrieved from the well information databases maintained at the Water Survey. As it was desirable to have records for those wells included in the network, existing well records were selected and copied when it was deemed likely that the subject well still existed and would allow easy access for water-level measurements. To establish a consistent routine for the collection of well and water-level information, a Ground-Water Level Record Sheet (Appendix C) was produced and used to record appropriate well information and to allow the recording of future measurements of ground-water levels.

Before the field work began, DeWitt and Piatt County sheriff's offices were notified of the project, in case rural residents became concerned about the presence of field staff in their area. Also, the MVWA mailed an informational flyer to all rural box holders in DeWitt and Piatt Counties, informing area residents of the project and asking those interested to contact the MVWA or Water Survey for possible inclusion of their well in the network.

The field inventory started near the center of the MVWA study area and progressed roughly concentrically outward to the study area boundaries. Given that the study area encompasses approximately 1,100 square miles and the goal of the well inventory was to establish a network of 500 to 600 wells, it was considered desirable to inventory approximately one well per 2 square miles, or approximately 18 wells per 36-square-mile legal township. In townships where it was not possible to inventory a substantial number of wells using existing well records, the field staff visually surveyed the township for prospective wells and attempted to inventory them by contacting the land owner or resident on a "door-to-door" basis. In these cases, measurements of well depths were made if not determined from well records or from the property owner or resident.

When a resident granted permission to have his or her well included in the well network and the well was determined to be accessible for water-level measurements, the Ground-Water Level Record Sheet was completed, and the depth to water in the well was measured using either a chalked steel tape or an electric drop line. Additional information collected during the inventory process included the name of the well owner or property resident, his or her mailing address, legal description of the well location, well depth, reference point on the well from which the water-level measurement was taken, and land surface elevation (above mean sea level) at the well location as determined via topographic maps. Also, to help field staff locate the well quickly during the mass measurement, a sketch of the well site was made, including the orientation of the house, driveway, garage, etc., as well as surrounding distinguishing features such as roads, highways, streams, and trees.

Not all of the wells identified during the well-inventory task were considered suitable for inclusion in the mass measurement network. Some wells were eliminated from consideration on the basis of well and pump configurations. For instance, wells equipped with working-head pumps were not inventoried due to construction features that prevented access for the measurement of ground-water levels. Additionally, wells that were located in pits and inaccessible for measurement from the land surface were not inventoried for safety reasons.

The well inventory work for the 1993 inventory season progressed from May 21 to August 20, 1993. While cooperation from area residents was quite good when the residents were found to be at home, approximately half of the visits to area residences found no one at home. Approximately one in four (total) visits to area residences resulted in the inventorying of a well in the network. Each staff member conducting the field work inventoried approximately 10 to 15 wells per week, or about one 36-square-mile township per week per person. At the conclusion of this first season of well inventorying, the three field staff had inventoried 440 wells and driven approximately 20,000 miles. At this time a letter of appreciation and thanks was sent to those property owners and residents who granted permission for field staff to access their wells for inclusion in the well network.

Field Inventory of Municipal Wells - Fall 1993

In addition to inventorying private residential wells for inclusion in the water-level network, municipal water departments in the study area were contacted, and at least one well per village, town, or city was inventoried. As a result of this effort, the well network includes a total of 21 wells from the locations shown in table 1.

Table 1. Public Water-Supply Wells Included in Well Network

DeWitt County	*Piatt County*	
Clinton (1)	Mansfield (1)	Cerro Gordo (1)
DeWitt (1)	Deland (1)	Monticello (1)
Farmer City (1)	White Heath (1)	Hammond (1)
Kenney(l)	Cisco (1)	Atwood(l)
Wapella(l)	Ivesdale(l)	
Waynesville (2)	La Place (1)	
Weldon (3)	Bement (1)	

Note: Number of inventoried well(s) for each public water system shown in parentheses.

Incorporation of Decatur's Observation Well Network

During Fall and Winter 1993-1994, the Water Survey contacted Mr. William Sands, Director of Public Works, city of Decatur, and his successor, Mr. Bruce McNabb, to request access to the ground-water-level data Decatur is collecting from nine observation wells surrounding the city's DeWitt County well field. During March 1994, following authorization from the city of Decatur, the city's consulting engineer, Guillou & Associates, provided the Water Survey with the ground-water-level data that had been collected since 1989. These nine wells were thus incorporated into the MVWA water-level network with the intent of incorporating water-level data for the time period of the mass measurement. These observation wells and the associated water-level data are discussed later in this report.

Field Inventory of Existing Wells - Summer 1994

By the beginning of Summer 1994, approximately 470 wells had been inventoried for the MVWA water-level network. As it was the goal to establish a network of 500 to 600 wells, additional inventory efforts were directed at accomplishing three main goals: 1) inventorying additional wells in the areas encompassing an approximate 3-mile "border" surrounding DeWitt and Piatt Counties to prevent "boundary line faults," or gaps in water-level data at the study area boundaries; 2) reinvestigating study area locations with seemingly few inventoried wells to see if, in fact, additional wells could be inventoried at these locations; and 3) incorporating newly registered wells into the water-level network, based on MVWA well registration records. One field staff member who had participated in the Summer 1993 well inventory work returned during Summer 1994 to continue inventory efforts.

This second season of inventorying progressed from May 16 to August 19. An additional 75 wells were added to the mass measurement network, and 5,000 miles were traveled in one car. At the conclusion of Summer 1994, the total number of wells in the measurement network was 545. Figure 10 shows the spatial distribution of all the inventoried wells, including Decatur's nine observation wells.

Project Database Development

In order to manage the data collected during the well inventory process and the mass measurement, a computerized database was developed to help store, query, manipulate, and export selected data. Paradox® (Borland International, 1990) was chosen as the computer software for the study, as it provides convenient facilities for creating data-entry screens, querying the database, and exporting data for use by other software applications. Data fields were created for the storage of specific information collected during the well inventory process and mass measurement of water levels. The project database field headings are summarized as follows.

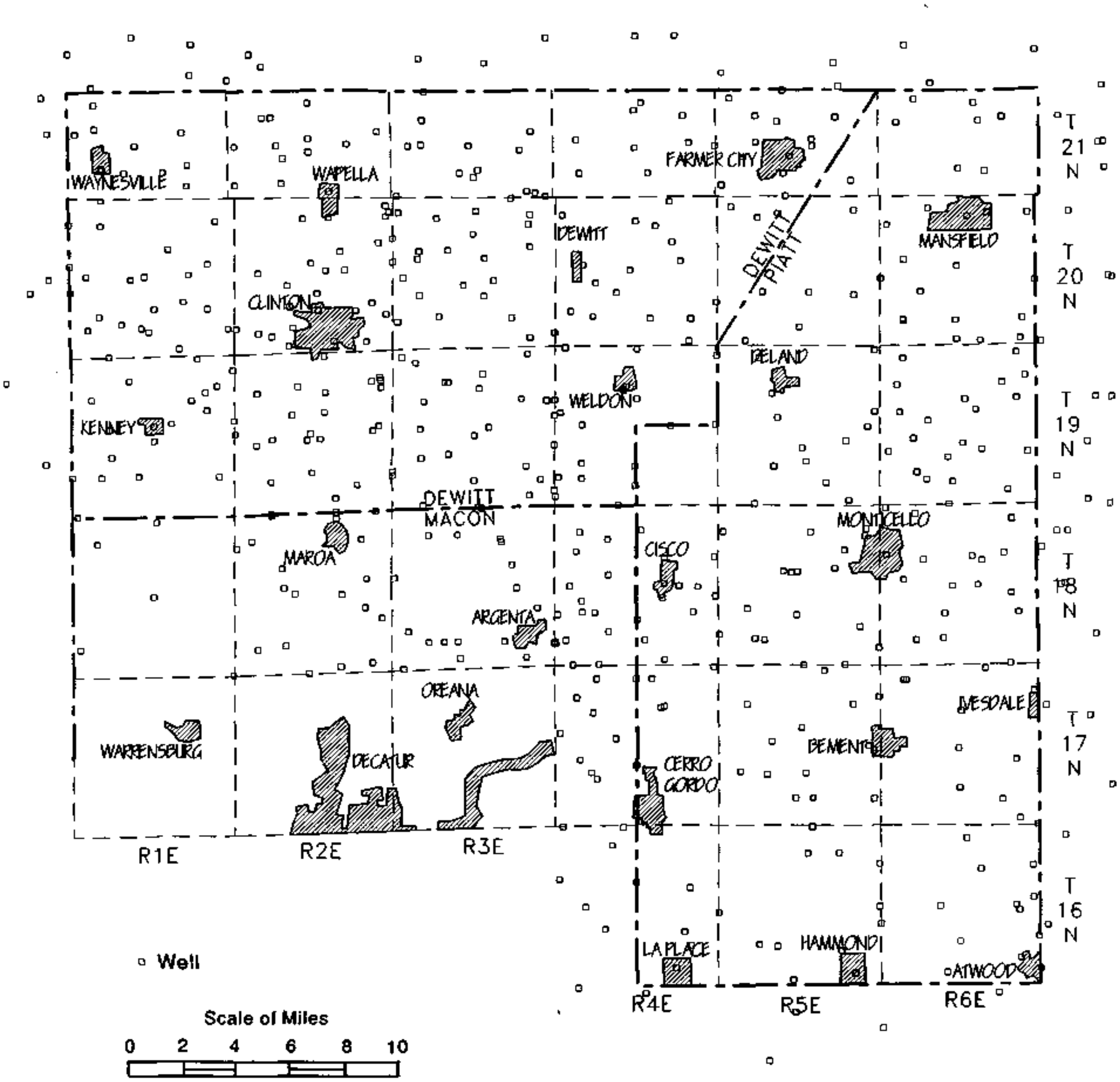


Figure 10. Location of wells used for mass measurement

Well Inventory Number	Well-bottom Elevation
USGS Quad. Map	Aquifer Classification
Owner/Resident	X Lambert Coordinate
Street Address	Y Lambert Coordinate
City	Comment
Zip	Depth to Pump
Phone	Have Well Log?
Township	Inventory Depth to Water
Range	Inventory Water-Level Elev.
Section	1994 Depth to Water
10-acre plot	1994 Meas. by Whom
County	1994 Meas. Date
Land Surface Elevation 1994	1994 Water-Level Elev.
Measuring Point (and elev.)	
Well Depth	

MASS MEASUREMENT OF WELLS

Water Survey staff visited each of the inventoried well sites to measure water levels during the three-week period from September 19 to October 8, 1994. During this period, four staff members were involved in the field work. At most times, two staff members were in the field on weekdays and one staff member was in the field on Saturdays. A total of about 6,000 miles was traveled.

Depth-to-water measurements were taken while the wells were not pumping, and more than one reading was taken to ensure that water levels were static and not changing significantly. The depth-to-water readings were then subtracted from the land surface elevation for each well site, as estimated from U.S. Geological Survey (USGS) topographic maps. Hence, the depth-to-water measurements were converted to water-level elevations above mean sea level.

POTENTIOMETRIC SURFACES OF THE AQUIFERS

As discussed previously, when a well is drilled through an impermeable layer into an artesian aquifer, water rises in the well to some level above the top of the aquifer. This water level represents the artesian pressure within the aquifer. If an aquifer is extensively tapped by wells for water supply, the elevations of the corresponding water levels can be used to create a map of the resulting water-level surface. This surface is called the **potentiometric surface,** as it represents the "potentiometric" or "hydraulic" head; that is, the level to which water will rise in a properly constructed well. This three-dimensional surface is displayed on paper in two dimensions by drawing contour lines signifying locations of equal potentiometric head.

When these potentiometric surface maps are created from water-level information collected in a short period of time, a near instantaneous or "snapshot" view of regional water levels (potentiometric surface) results, free of significant temporal variation. This potentiometric surface provides an indication of the directions of ground-water movement in the aquifer(s) and can be used as a benchmark to monitor the effects of changes in regional ground-water withdrawals.

Methodology for Map Development

To produce potentiometric surface maps for aquifers in both the Banner and Glasford hydrogeological formations, the wells in the mass measurement network were categorized according to well depth. Generally, those wells finished below 500 ft msl and located within the mapped limits of the Mahomet Sand were categorized as Banner Formation wells. Wells finished above 500 ft msl were generally categorized as Glasford Formation wells. Given that stratigraphic mapping efforts were ongoing at the ISGS for this study area, both published and unpublished stratigraphic maps depicting the base and surface elevations of the Banner and Glasford Formations were used to categorize the wells. Geological cross sections from published reports were also used. It was determined that only a few wells in the inventoried network of wells are finished in the Wedron Formations above the Glasford Formation. Therefore, a potentiometric surface was not mapped for the uppermost Wedron Formation.

For each geological formation (i.e., Banner and Glasford) the corresponding water-level-elevation and well-location data were transferred from the Paradox® database to the contouring software package, SURFER® (Golden Software, 1989). Using SURFER®, preliminary potentiometric surface maps were developed.

The final potentiometric surface maps were constructed by using the preliminary computer-generated maps and incorporating information not available to the contouring algorithms of SURFER®. Specifically, the computer-generated contours were smoothed manually in areas where the use of estimated land surface elevations (from topographic maps) was believed to cause ripples or suggestions of shallow hills or depressions in the potentiometric surface maps. Also, where surface water was determined to affect the ground-water potentiometric surface, this influence was incorporated into the final potentiometric surface map. This process is discussed below for the potentiometric surface corresponding to aquifers within the Glasford Formation.

Potentiometric Surface within the Banner Formation - Fall 1994

The potentiometric surface map for the Banner Formation is shown in figure 11. Contour lines in the figure are shown for the two different aquifer systems within the Banner Formation. Solid line contours represent the potentiometric surface associated with the Mahomet Sand aquifer, and dashed line contours represent the potentiometric surface most likely associated with aquifers in upland Banner Formation glacial deposits. As discussed previously, these aquifers are significantly less extensive than the Mahomet

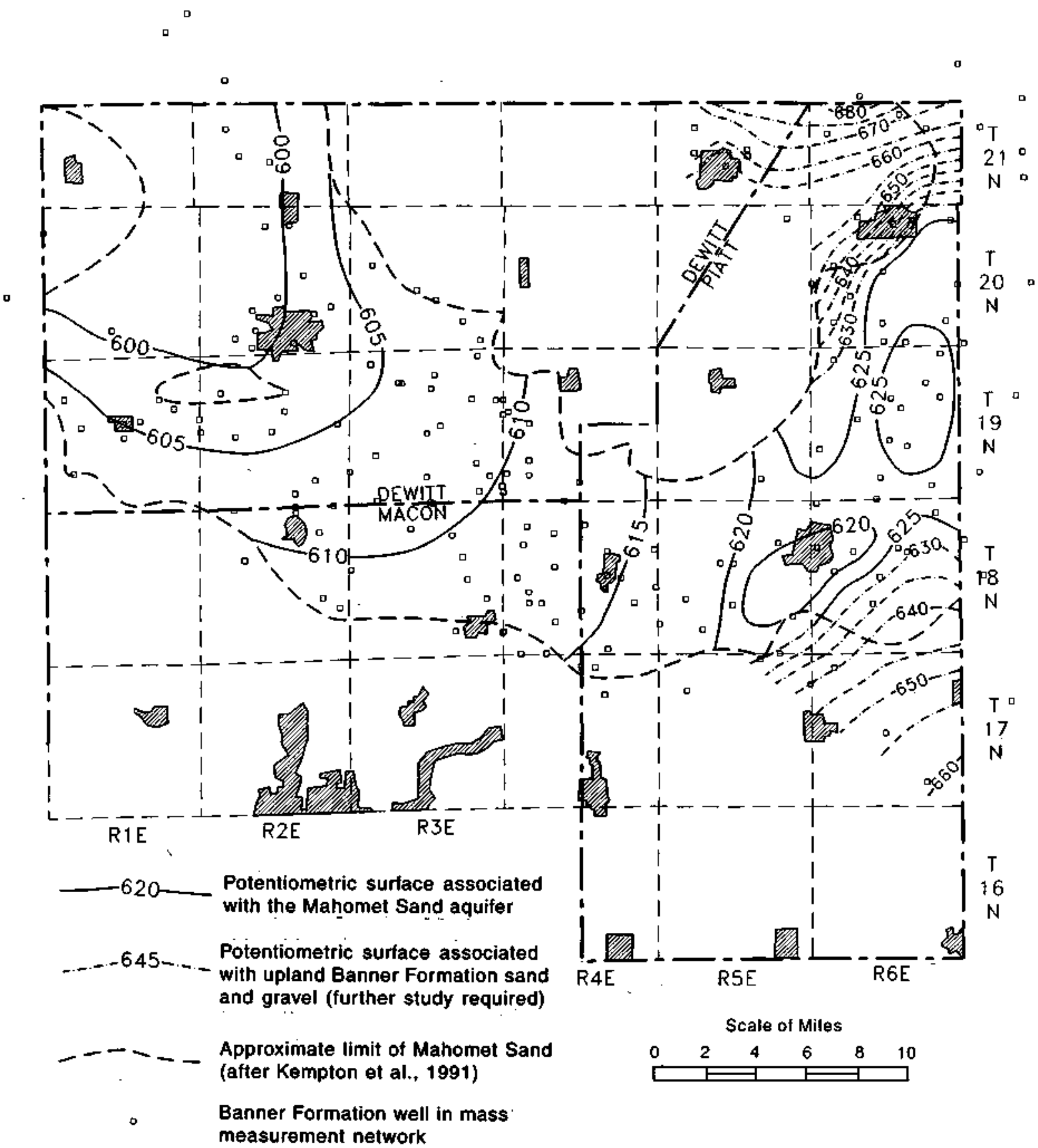


Figure 11. Potentiometric surface for Banner Formation aquifers

Sand aquifer and are known to lie beneath the area in and around Farmer City and possibly in the bedrock upland areas in southern Piatt County. Given the very limited availability of published information concerning the areal extent, thickness, and depth of these upland Banner Formation aquifer(s), further geological studies will be required before significant hydrological interpretations and analysis can be conducted. The corresponding potentiometric surfaces presented herein should, therefore, be considered preliminary.

In the Mahomet Sand aquifer, the potentiometric surface attains its highest elevation of 625 ft msl near the Piatt/Champaign County line in east-central Piatt County. Moving westward from this area, the potentiometric surface slopes downward to an elevation of 620 ft msl in T18N, R5E, with a slight depression in the potentiometric surface around Monticello due to municipal and industrial ground-water withdrawal. From the 620-ft contour line, the potentiometric surface gradually slopes downward to the west, attaining an elevation of 615 ft msl near Cisco in west-central Piatt County. From the Cisco area the potentiometric surface slopes gradually downward towards the northwest, reaching an elevation of 610 ft msl near the border of DeWitt and Macon Counties. The surface continues sloping downward, reaching an elevation of 605 ft msl in the areas just east, south, and southwest of Clinton. The potentiometric surface in northwestern DeWitt County is nearly 600 ft msl where the Mahomet Bedrock Valley exits the county to the north, and it is between 600 and 605 ft msl where the narrower Kenney (Bedrock) Valley exits the county to the west.

Overall, the potentiometric surface associated with the Mahomet Sand aquifer gradually slopes downward, east to west, with a gradient (slope) of approximately 1 ft per mile. Hence, as ground water flows through an aquifer from higher to lower potentiometric head, ground water in the Mahomet Sand aquifer flows from east to west.

Potentiometric Surface within the Glasford Formation - Fall 1994

Figure 12 shows the locations of the Glasford Formation wells in the mass measurement network of wells. Additional interpretation was involved in producing the potentiometric surface map for the Glasford Formation. In a study of DeWitt County geology, Hunt and Kempton (1977) reported that the Glasford Formation consists of several individual till layers, which are commonly separated by thin, discontinuous layers of sand and gravel. The uppermost of these layers may be found within 20 ft of the land surface and is the uppermost till in the southwestern corner of DeWitt County. It was further stated that the top of the Glasford Formation is most often found in the northern part of the county where the overlying Wedron Formation is less than 20 ft thick and where the valleys of the Salt Creek and Kickapoo Creek cut through the Wedron Formation.

Given this information and the observation that the water-level contours "bend" around these surface-water bodies on the preliminary computer-generated potentiometric surface maps, the discharge of ground water from the Glasford Formation to these surface-water bodies was assumed to be significant along Long Point and Kickapoo

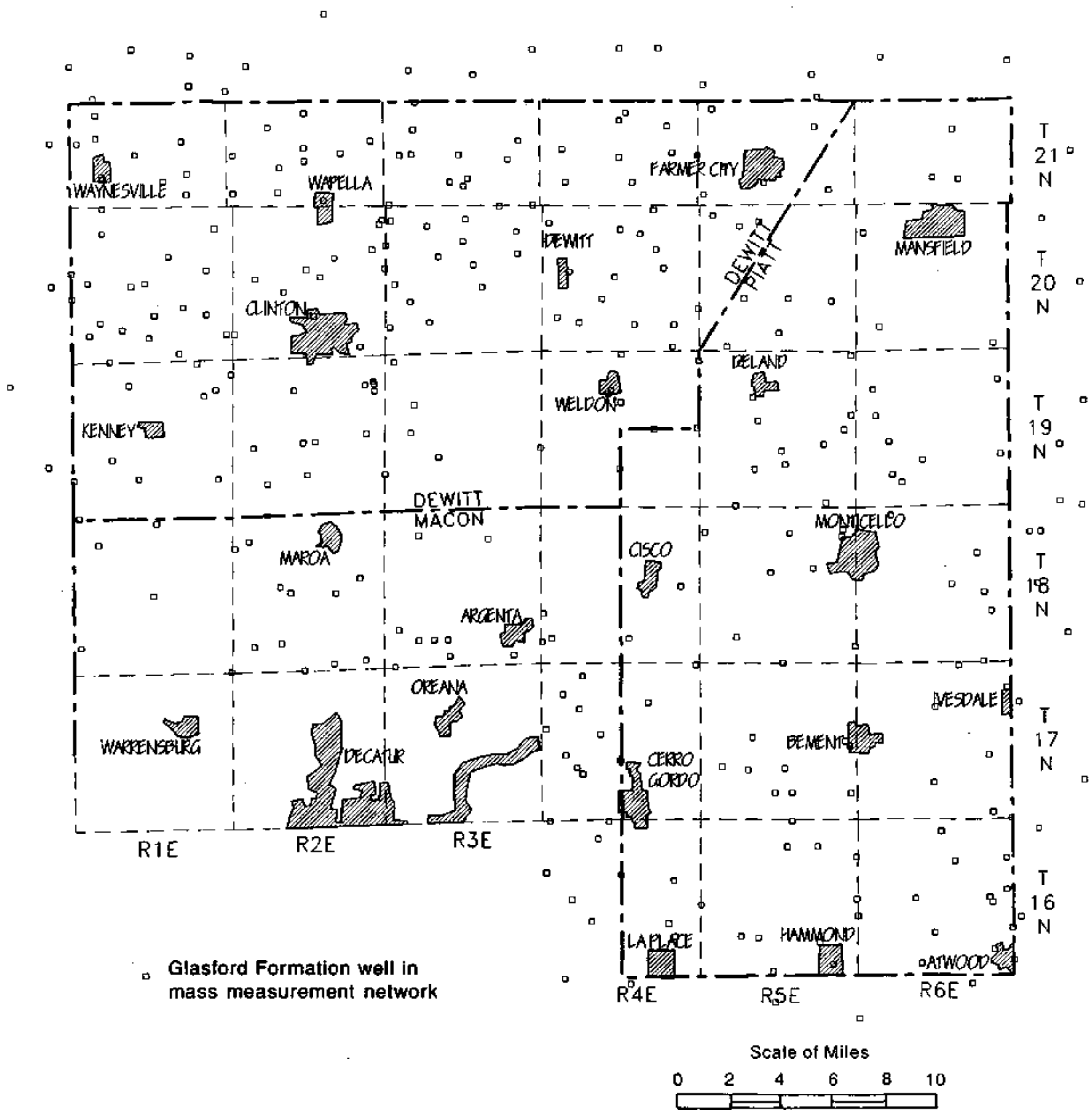


Figure 12. Location of wells in Glasford Formation aquifers

Creeks (northwestern DeWitt County), Salt Creek, the North Fork, and the Sangamon River. Therefore, additional data points representing the approximate water-level elevation in these creeks and rivers were added along these surface water bodies to represent the hydraulic head in Glasford Formation aquifers. The final potentiometric surface map (figure 13) for the Glasford Formation was constructed by manually incorporating these additional data points and smoothing the contour lines in areas where the use of estimated land surface elevations was believed to erroneously cause ripples in the computer-generated contour lines.

The potentiometric surface map shown in figure 13 represents the ground-water levels, or hydraulic heads, measured in wells finished in sand and gravel aquifers within the Glasford Formation. Although a continuous potentiometric surface suggests, perhaps, a continuous aquifer, the continuity and hydraulic interconnectivity of aquifers within the Glasford Formation will need to be defined (delineated) in future studies.

The potentiometric surface in the Glasford Formation is highest in north-central DeWitt County (T21N, R3E), at an elevation of approximately 770 ft msl. This area has a land surface elevation reaching about 800 ft msl, which is approximately the highest land surface elevation attained in the study area. The lowest elevations on the Glasford potentiometric surface occur where the Salt Fork exits DeWitt County to the west and where the Sangamon River approaches Lake Decatur in Macon County.

In DeWitt County, the North Fork, Salt Creek (Clinton Lake), and Kickapoo Creek appear to significantly influence the Glasford potentiometric surface, as ground-water discharge to these bodies of water is believed to be significant. From its high point in north-central DeWitt County, the potentiometric surface slopes downward to the west towards Waynesville, downward to the southwest through Clinton to Salt Creek, and downward to the south and east towards Clinton Lake and Salt Creek, respectively.

South of Clinton Lake the regional high in the potentiometric surface in DeWitt County is approximately 700 ft msl, both northeast and southwest of Weldon. Again, the potentiometric surface slopes downward towards Salt Creek and Clinton Lake. In southeastern DeWitt County (T19N, R4E) there is a large area within which the potentiometric surface is approximately 680 ft msl. A very localized depression exists at Weldon, where local water levels approach approximately 630 ft msl due to public water-supply pumpage.

The Sangamon River is the dominant hydrologic feature in Piatt County, cutting northeast to southwest, approximately bisecting the county. The highest elevation on the potentiometric surface is 720 ft msl at the northern tip of the county. From this location, water levels slope downward to approximately 650 ft msl, where the Sangamon River enters Piatt County from the east, and downward to approximately 620 ft msl, where the Sangamon River exits Piatt County to the west.

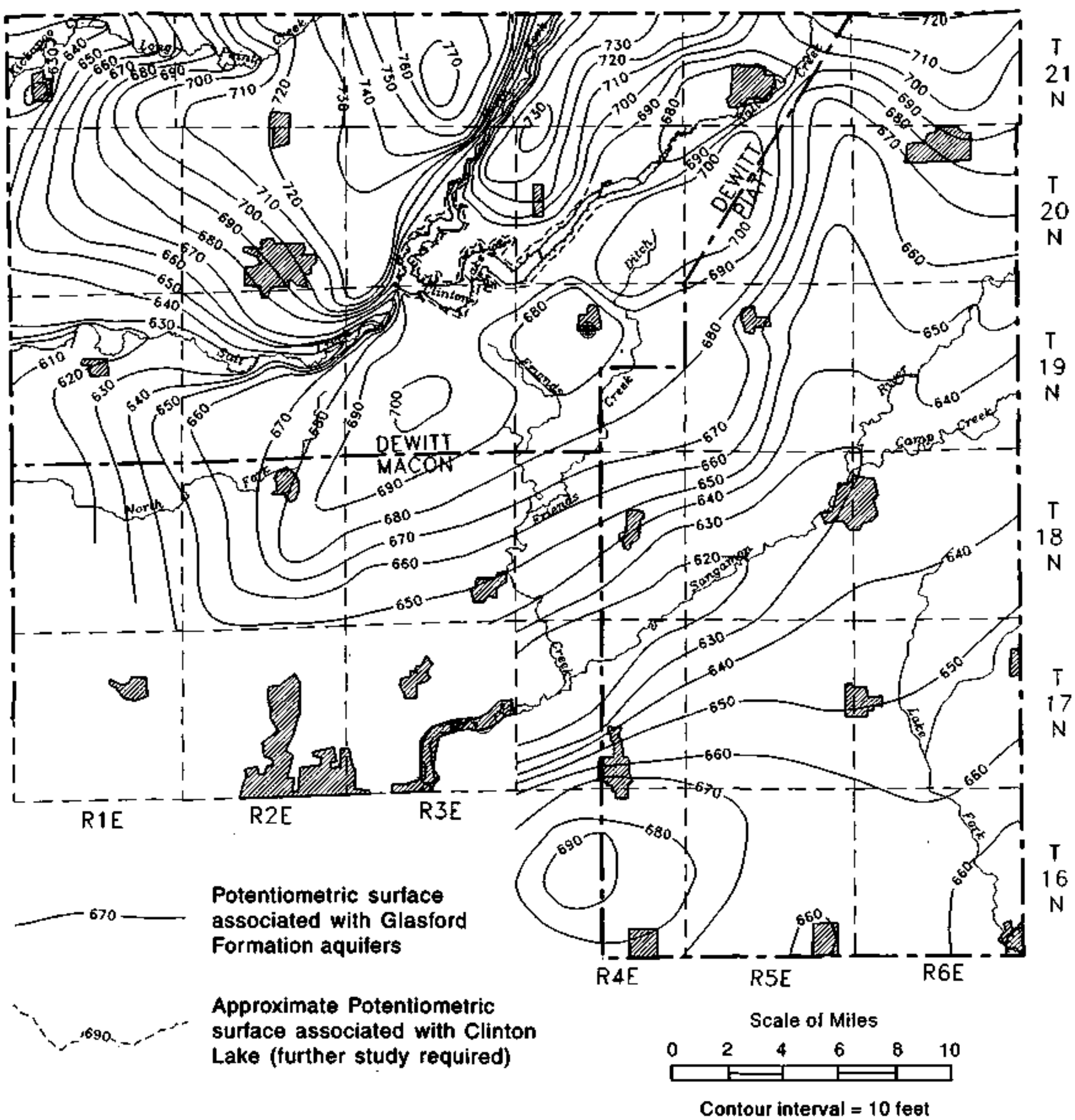


Figure 13. Potentiometric surface for Glasford Formation aquifers

In the southern half of Piatt County, the highest elevation of the potentiometric surface is approximately 690 ft msl near the southwest corner of the county. From there, water levels slope downward to the north and northeast, again towards the Sangamon River. To the east of this potentiometric surface high, water levels decline to about 660 ft msl over a large area in the southeast corner of Piatt County where water levels are relatively flat. A localized depression in the potentiometric surface occurs at Atwood due to public water-supply pumpage from a Glasford Formation aquifer there.

GROUND-WATER USE

Information on present statewide ground-water withdrawals is inventoried annually by the Water Survey's Illinois Water Inventory Program (IWIP). This program categorizes reported ground-water withdrawals as public water supply, self-supplied industry, or fish and wildlife management water uses. This information is solicited by mailings and follow-up phone calls and then entered into a computer database.

Ground-water withdrawal data from 1980, 1982, 1984, and 1986 for all counties in Illinois were extracted from the IWIP database and described, tabulated, and published by Kirk et al. (1982, 1984, 1985) and Kirk (1987). These publications also describe and tabulate rural water use estimates for all counties in the state.

In this study, pumpage data were manually extracted from the IWIP database and divided into ground-water "use" and "source" categories, as discussed below. Estimates for rural water use have also been calculated. As much as possible, this report follows the methodologies used in previous reports (Kirk et al., 1982, 1984, 1985; and Kirk, 1987) for the categorization and tabulation of reported ground-water withdrawals and the estimation of unreported (rural) ground-water use.

Terminology

Illinois defines a "public water supply" (PWS) as a system for the provision of piped water to the public for human consumption, if the system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days per year. Public water supplies serve domestic, commercial, and industrial users.

If a public supply is neither available nor used, the water is "self-supplied." Individual families and small communities not served by a PWS are categorized as "rural" with regard to water use. Industries and commercial establishments using their own water source are categorized as "self-supplied industry" (SSI).

In previous studies (Kirk, 1987), "Fish and Wildlife" water use was used to categorize statewide water use in areas managed by the Illinois Department of Conservation, the U.S. Fish and Wildlife Service, and U.S. Forest Service. In this study the corresponding category has been termed "State Parks and Conservation Areas" (SPCA) water use to better describe similar water use in DeWitt and Piatt Counties.

Ground-water "use" refers to *how* the withdrawn ground water is utilized, and hence refers to the above defined uses of PWS, SSI, SPCA, and to rural use (described below).

Ground-water "source" refers to the geohydrologic formation from which the ground water is withdrawn. As described previously these are the Wedron, Glasford, and Banner Formations.

Water withdrawal data are reported as average daily quantities, usually derived from annual use. The use is expressed in million gallons per day (mgd).

Rural Use

As has been done previously (Kirk, 1987), this report divides rural water use (withdrawals) into three classifications: domestic, livestock, and irrigation.

Domestic

Rural domestic water use was computed by multiplying the estimated county population that is not served by a public water supply by the estimated rural per capita water use. County populations and populations for the cities, towns, or villages with public water supplies were based on 1980 and 1990 census figures (Bryan and Hartter, 1993). Estimated rural per capita water use values were taken from Kirk et al. (1982, 1984, 1985) and Kirk (1987) for DeWitt and Piatt Counties. For years in which these values were not published, values were interpolated or extrapolated from data for the closest adjacent year(s) during which these values were published. For DeWitt County, published rural per capita water use is given as 68.8, 63.8, 75.2, and 75.2 gpd for 1980, 1982, 1984, and 1986, respectively. For the same years in Piatt County, the respective values are given as 80.6, 78.4, 79.7, and 72.1 gpd.

Livestock

The water use estimates for livestock were based on a fixed amount of water use per head for each type of animal. County livestock populations for total cattle, hogs, milk cows, sheep, chickens, and turkeys were provided by the annual Illinois agricultural census (Illinois Cooperative Crop Reporting Service) for each year during the period 1980-1994. Where populations were presented on either a statewide basis or according to the Illinois Agricultural Statistics districts, county livestock populations were estimated (prorated) on an areal basis. Daily consumption rates provide the basis for these calculations and are shown in table 2.

Table 2. Livestock Water Requirements*

Livestock	*Water use (gpd)*
milk cow	35
cattle	12
hog	4
stock sheep	2
chicken	0.06
turkey	0.12

* From Kirk (1987)

Irrigation

Estimates of water withdrawals for irrigation were based on weekly rainfall deficits and the number of acres irrigated. Specifically, the methodology employed for this report follows that of Kirk (1987), which assumes that the weekly precipitation requirement for irrigated crops is 1.25 inches. If for any week during the period beginning June 1 and extending ten weeks, 1.25 inches of precipitation was not received, the precipitation deficit that week was assumed to be made up with irrigation. Also, for weeks receiving precipitation in excess of 1.25 inches, one-half of this excess precipitation was considered available during the following week and was therefore added to the precipitation total for the following week. Daily precipitation records from National Weather Service stations at Clinton and Monticello were used to calculate the rainfall deficit in DeWitt and Piatt Counties, respectively. Irrigated acreages were determined using data listed in the Census of Agriculture (U.S. Department of Commerce, 1984, 1989, 1994) along with well record information for existing irrigation wells.

Trends in Ground-Water Withdrawals

Historical ground-water withdrawals (by use) are shown in figures 14a and 14b for DeWitt and Piatt Counties, respectively, for the period 1980-1994. The pumpage estimates calculated herein are in close agreement with previously published values (Appendix D), and minor differences are believed to occur due to a manipulation of the available data on a finer scale for a smaller area (county vs. state).

DeWitt County

Withdrawal data for DeWitt County show that most ground water withdrawn is for public water supply. Throughout most of the 1980s the county PWS ground-water withdrawals varied between approximately 1.4 and 1.8 mgd. In 1989, PWS withdrawals reached about 2.2 mgd and continued to grow toward a peak of about 2.7 mgd in 1992.

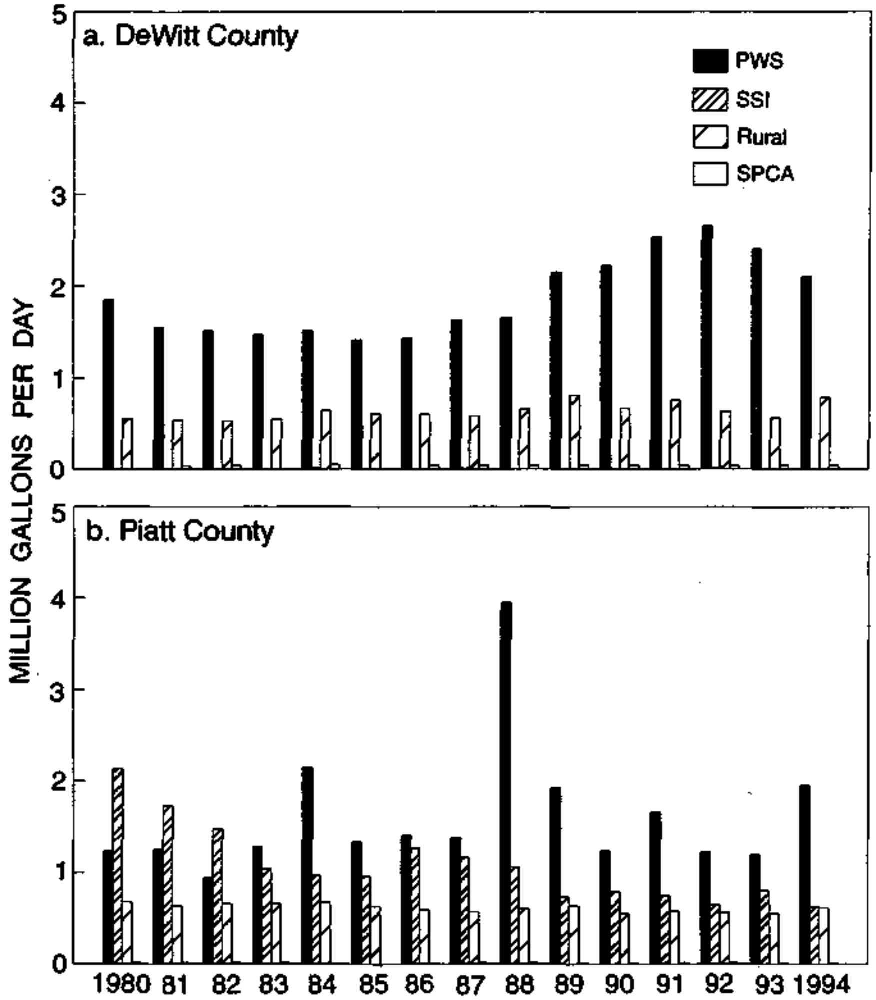


Figure 14. Ground-water withdrawal trends by use
in (a) DeWitt County and (b) Piatt County

During 1993 and 1994 there was a small decline in PWS withdrawals each year, with withdrawals of about 2.1 mgd in 1994.

There were no reported withdrawals by self-supplied industries from 1980 to 1994, and withdrawals for rural water use remained relatively constant and averaged approximately 0.6 mgd. A peak in rural withdrawals occurred in 1989 with pumpage reaching approximately 0.81 mgd. This is attributable to an increase in estimated irrigation pumpage due to the 1988-1989 drought. State park and conservation area withdrawals were relatively insignificant, never reaching more than 0.05 mgd.

Piatt County

Although PWS withdrawals for Piatt County are generally less than those for DeWitt County, relatively large peaks in ground-water withdrawals are evident and attributable, in part, to ground-water withdrawals and pumpage to the Sangamon River by municipal wells owned and operated for emergency supply by the city of Decatur. Prior to 1994, this pumpage was from Decatur municipal Wells 1 and 2 located along the Sangamon River in Piatt County, T18N R5E, Sec. 31. In 1994, ground water was withdrawn and transferred to the Sangamon River with Decatur municipal Wells 1 and 2 as well as from Decatur's newly constructed well field (Wells 3-10), located in DeWitt County, T19N R3E, Sec. 36.

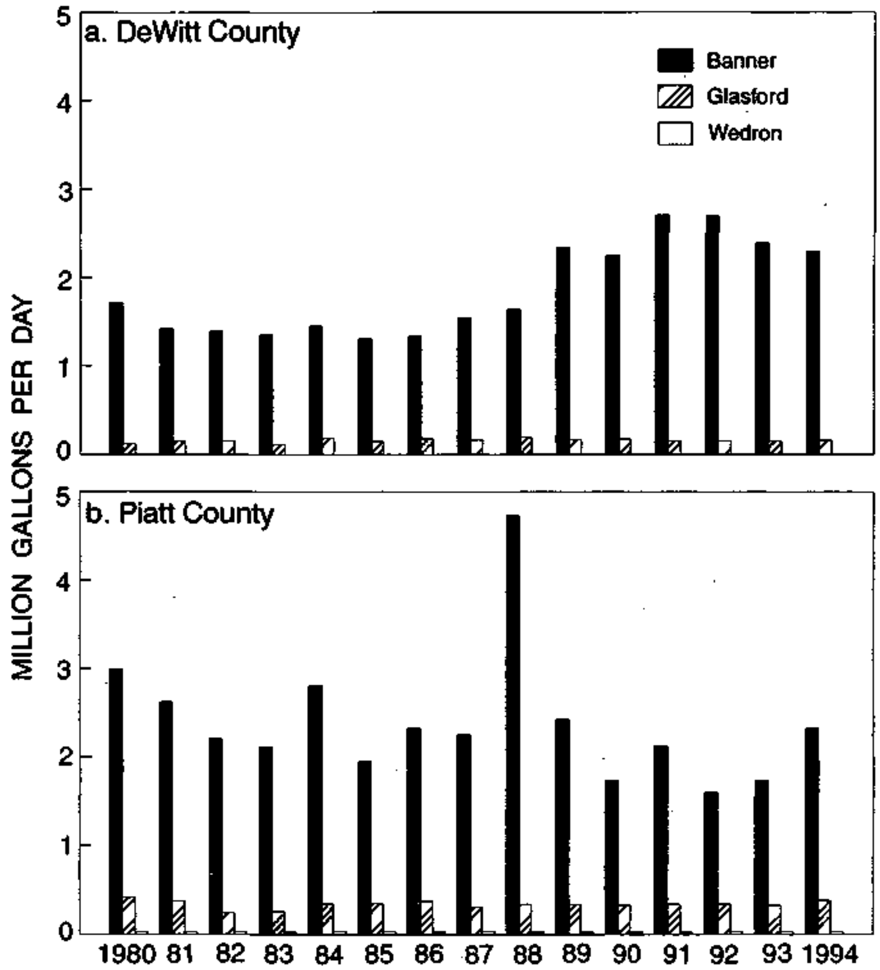
For the period 1980-1987, daily PWS withdrawals were approximately 0.94 to 1.41 mgd, with a peak in withdrawals of about 2.16 mgd in 1984. A large portion of this peak was due to above average withdrawals at Decatur municipal Wells 1 and 2. A large peak in withdrawals occurred in 1988 at approximately 3.95 mgd. Again, a large portion of this peak (about 2.60 mgd) was attributable to withdrawals at Decatur municipal Wells 1 and 2. PWS pumpage for the period 1989-1994 varied between approximately 1.20 and 1.96 mgd.

Self-supplied industrial pumpage was highest from 1980 to 1982, declining from approximately 2.14 mgd in 1980 to approximately 0.95 mgd in 1985. This was followed by a small increase in SSI withdrawals, with average withdrawals of approximately 1.17 mgd during the period 1986-1988. Between 1989 and 1994, SSI withdrawals were fairly constant at approximately 0.7 mgd.

Rural ground-water withdrawals for Piatt County were quite constant at approximately 0.6 mgd for the period 1980-1994, and withdrawals for use by SPCA were consistently below 0.02 mgd.

Historical Ground-Water Withdrawals by Source

Figures 15a and 15b show ground-water withdrawals, except for rural domestic and livestock use, categorized by the geohydrologic formation, or source, from which the water was withdrawn in DeWitt County and Piatt County, respectively. In both counties



(Note: Excludes rural domestic and livestock use)

Figure 15. Ground-water withdrawal trends by source in (a) DeWitt County and (b) Piatt County

the vast majority of the ground water was withdrawn from the (lower) Banner Formation. In DeWitt County, the reported withdrawals from the Banner Formation averaged approximately 1.47 mgd for the period 1980-1988 and gradually increased to about 2.70 mgd in 1991. The period 1992-1994 shows a gradual decrease, with about 2.30 mgd withdrawn in 1994.

In Piatt County, pumpage from the Banner Formation during the 1980s ranged between approximately 2 and 3 mgd for most years, with a definite peak in withdrawals of about 4.73 mgd in 1988. Again, this peak in pumpage is predominantly the result of ground-water withdrawals and pumpage into the Sangamon River at Decatur's Piatt County Wells 1 and 2 during the drought of 1988-1989.

Ground-water withdrawals, except for rural domestic and livestock use, from the (middle) Glasford Formation were relatively small, yet consistent, for both counties. These withdrawals averaged approximately 0.16 and 0.34 mgd for DeWitt and Piatt Counties, respectively, for the period 1980-1994.

There were no reported withdrawals from the (upper) Wedron Formation in DeWitt County, and less than 0.04 mgd was withdrawn in Piatt County for the period 1980-1994.

1994 Ground-Water Withdrawals by Township

To provide a more detailed insight into ground-water use in DeWitt and Piatt Counties and to complement future ground-water studies and modeling efforts, ground-water withdrawals for each township were compiled (Appendix E) and shown in figures 16 and 17. Both figures incorporate total rural withdrawals, which include estimates for rural domestic and livestock water use and rural irrigation water use as reported by the user (irrigator). For the purposes of producing figure 17, the rural domestic and livestock water withdrawals were assumed to come from the corresponding hydrogeological formations (i.e., Banner, Glasford, and Wedron) in proportion to the number of wells in the mass measurement network finished in each hydrogeological formation for each township.

Perhaps most noteworthy in both figures 16 and 17 is the magnitude of ground-water withdrawals in the few townships with significant pumping centers compared to withdrawals in the remaining townships. Both figures show significant withdrawals in townships T20N, R2E; T19N, R3E; T18N, R5E; and T18N, R6E; corresponding to ground-water withdrawals at Clinton, Decatur's DeWitt County well field, Decatur's Piatt County Wells 1 & 2, and Monticello, respectively. Ground-water withdrawals in the remaining townships are small in comparison. Notably, as figure 17 shows, these larger "township" withdrawals are almost exclusively from deeper, Banner Formation wells.

Figure 16 illustrates additional information regarding industrial water use. An examination of withdrawals for townships T20N, R2E and T18N, R6E, which include

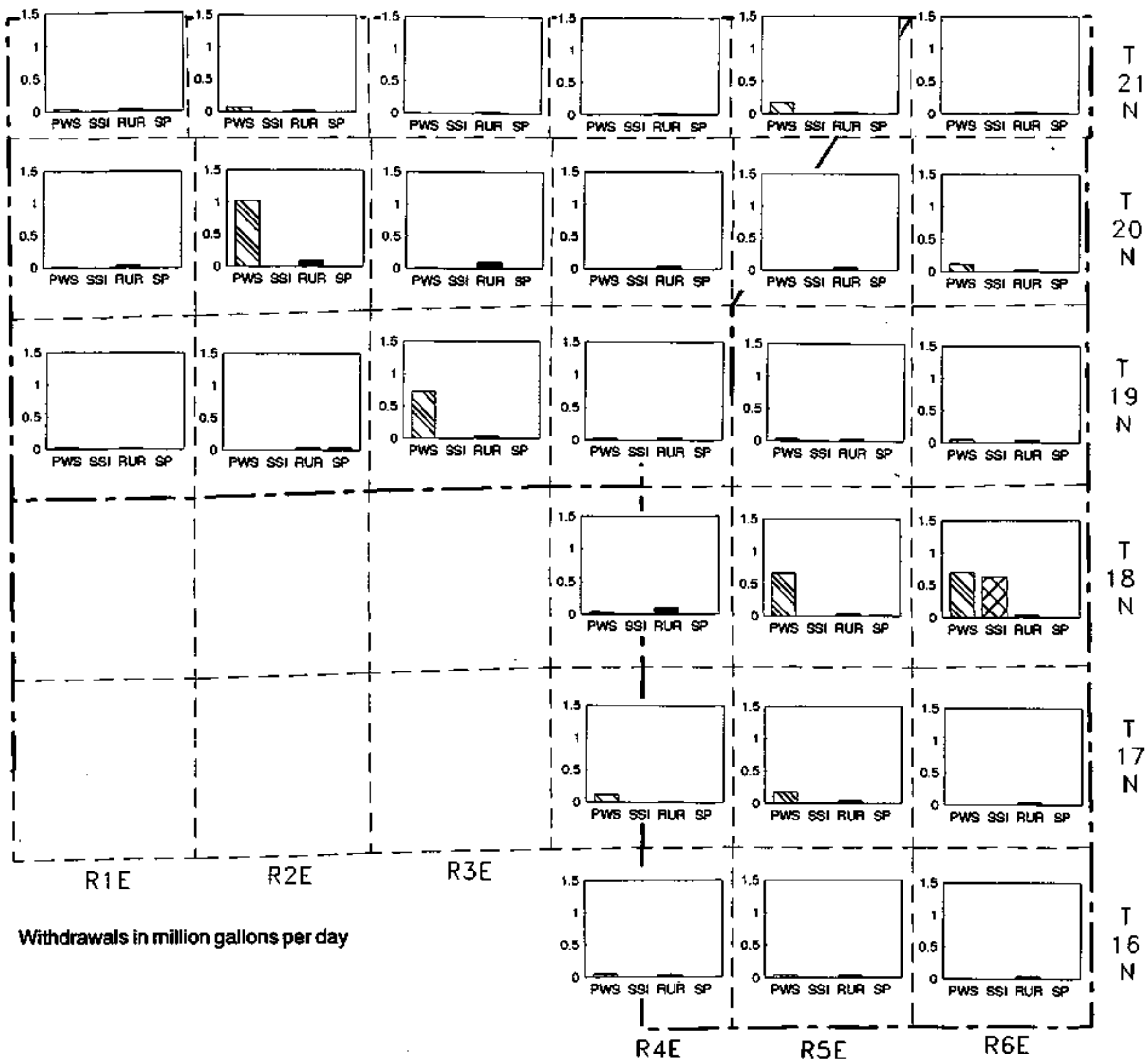


Figure 16. Township ground-water withdrawals by use for 1994

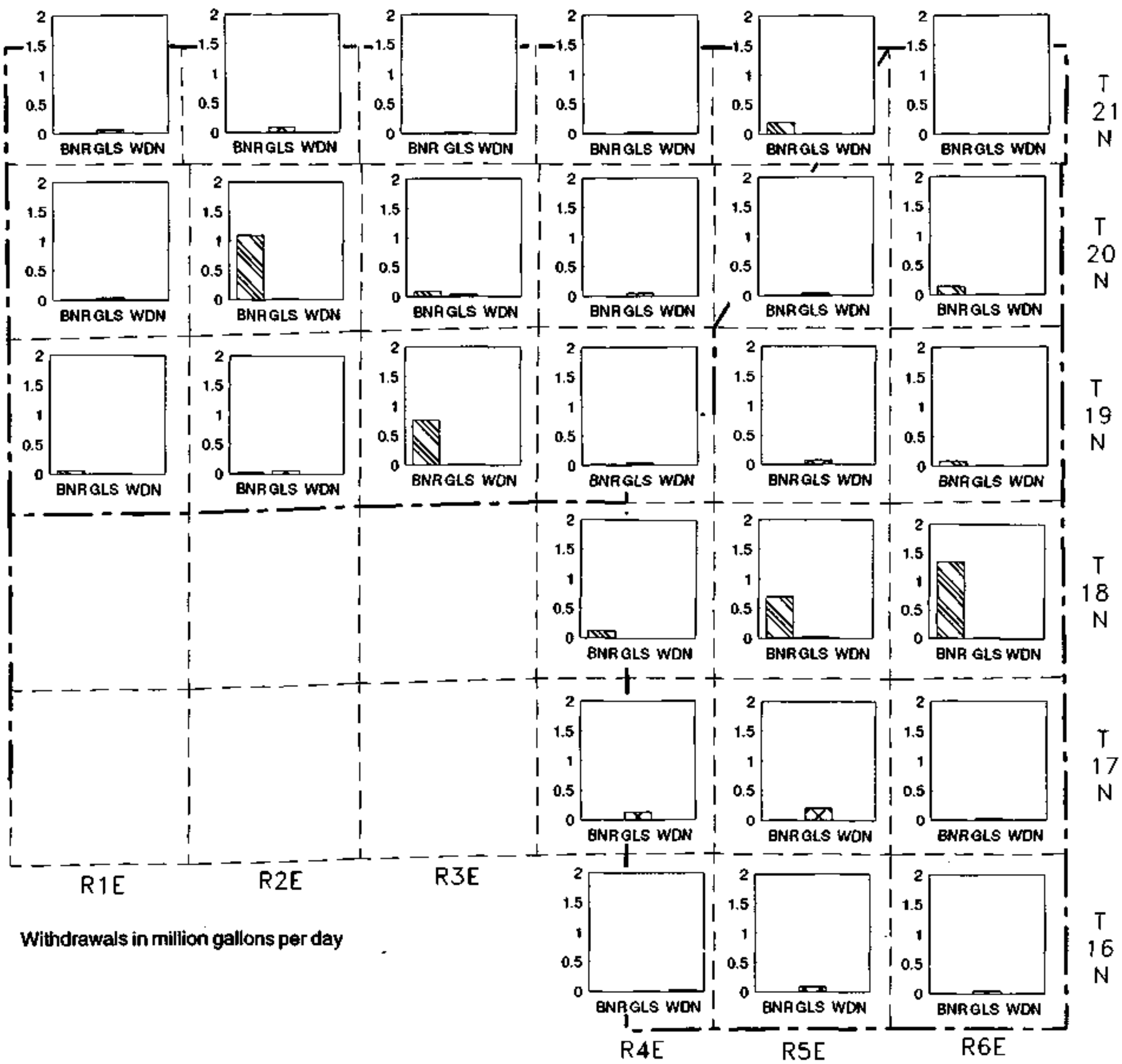


Figure 17. Township ground-water withdrawals by source for 1994

Clinton and Monticello, respectively, reveals that although both cities contain significant industry, industrial water use in Clinton is supplied by the PWS system, whereas a significant portion of the industrial water use in Monticello is self-supplied.

Figure 16 also shows that rural water use is consistently relatively small, showing only slightly larger withdrawals in townships T20N, R2E and T18N, R4E, due to irrigation operations in those townships.

LONG-TERM OBSERVATION WELLS

The Water Survey began systematic measurement of ground-water levels in the study area in 1954, when an automatic water-level recorder was installed in a shallow (Wedron Formation) water-table observation well in Piatt County (PIA 20N6E-31.6h). Survey staff began manual measurements of water levels in additional wells on a monthly basis in 1979 in response to drought conditions in the mid-1970s. Monthly water-level measurements in a deep (Banner Formation) well are currently taken at a well southeast of Cisco (PIA 18N4E-24.8a), and measurements from both a shallow (Wedron Formation) well and a middle (Glasford Formation) well are obtained northeast of Cerro Gordo in wells PIA 17N4E-12.7hl&2.

In conjunction with construction of its DeWitt County well field from 1989 to 1991, Decatur installed nine deep (Banner Formation) water-level observation wells with continuous water-level recorders. Of these nine wells, one is located at the approximate center of the well field. The others are spaced approximately 1.5, 3, and 5 miles from the well field. These nine observation wells have been in operation since 1989. The locations of these wells and the privately-owned observation wells (described above) measured by the Water Survey in Piatt County are shown in figure 18.

Water-level fluctuations in Decatur's observation wells and in the observation wells measured by the Water Survey are shown by the hydrographs in figures 19 and 20, respectively. Corresponding annual precipitation hydrographs are also shown in these figures. In general, the water levels in all the wells, under natural conditions, recede in late spring, summer, and early fall when discharge from the ground-water reservoir by evapotranspiration and ground-water runoff exceeds recharge from precipitation. In the winter, water levels begin to recover, and they reach their peaks during the spring when conditions for recharge are most favorable.

City of Decatur Observation Wells

The water-level hydrographs in figure 19 for each of the nine observation wells all exhibit very similar trends. Where the existence of data allows, two sets of water-level data points are shown in each of the hydrographs, corresponding to "monthly minimum" and "manual reading" water-level data. The monthly minimum water level is determined

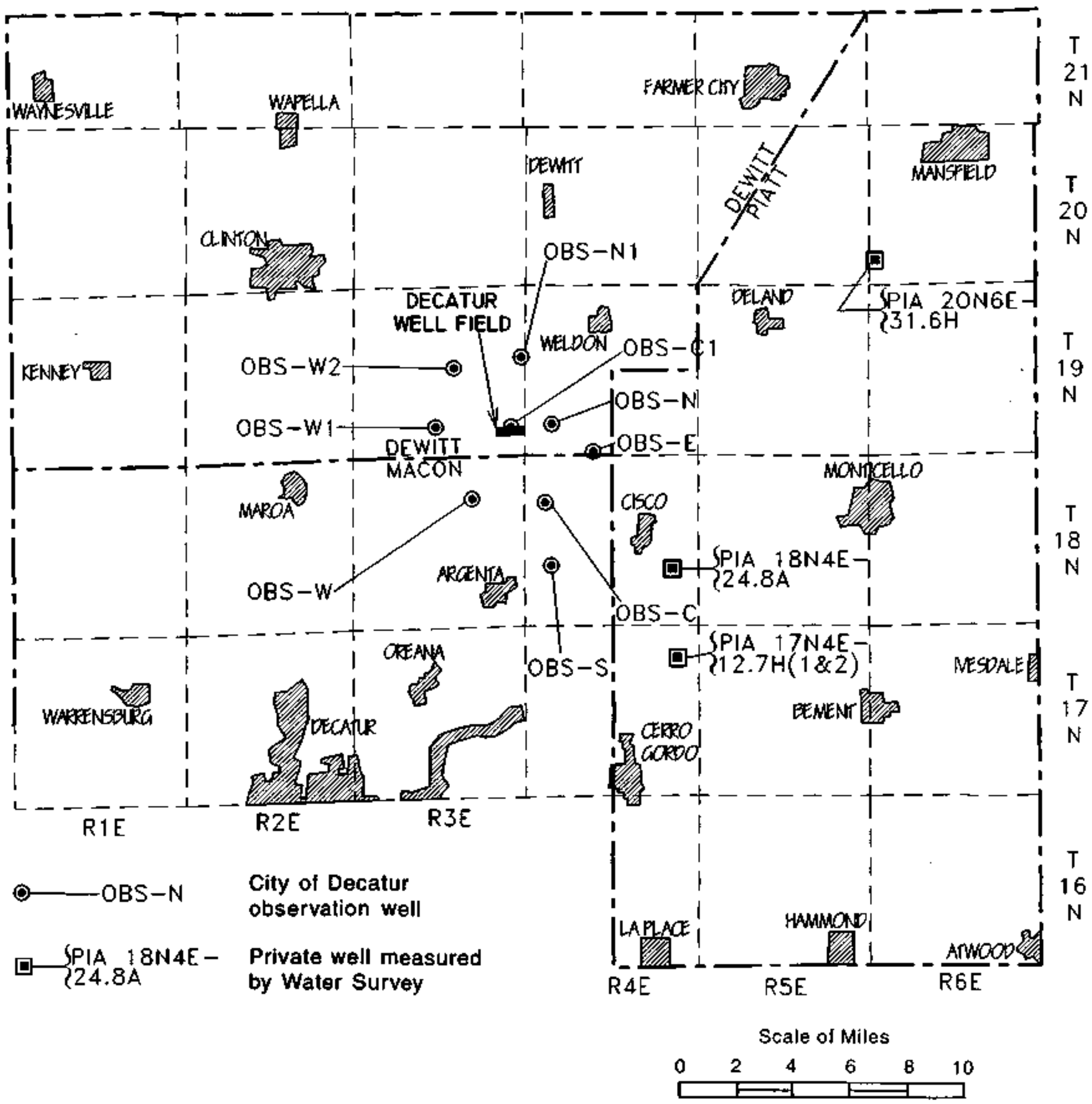


Figure 18. Location of observation wells

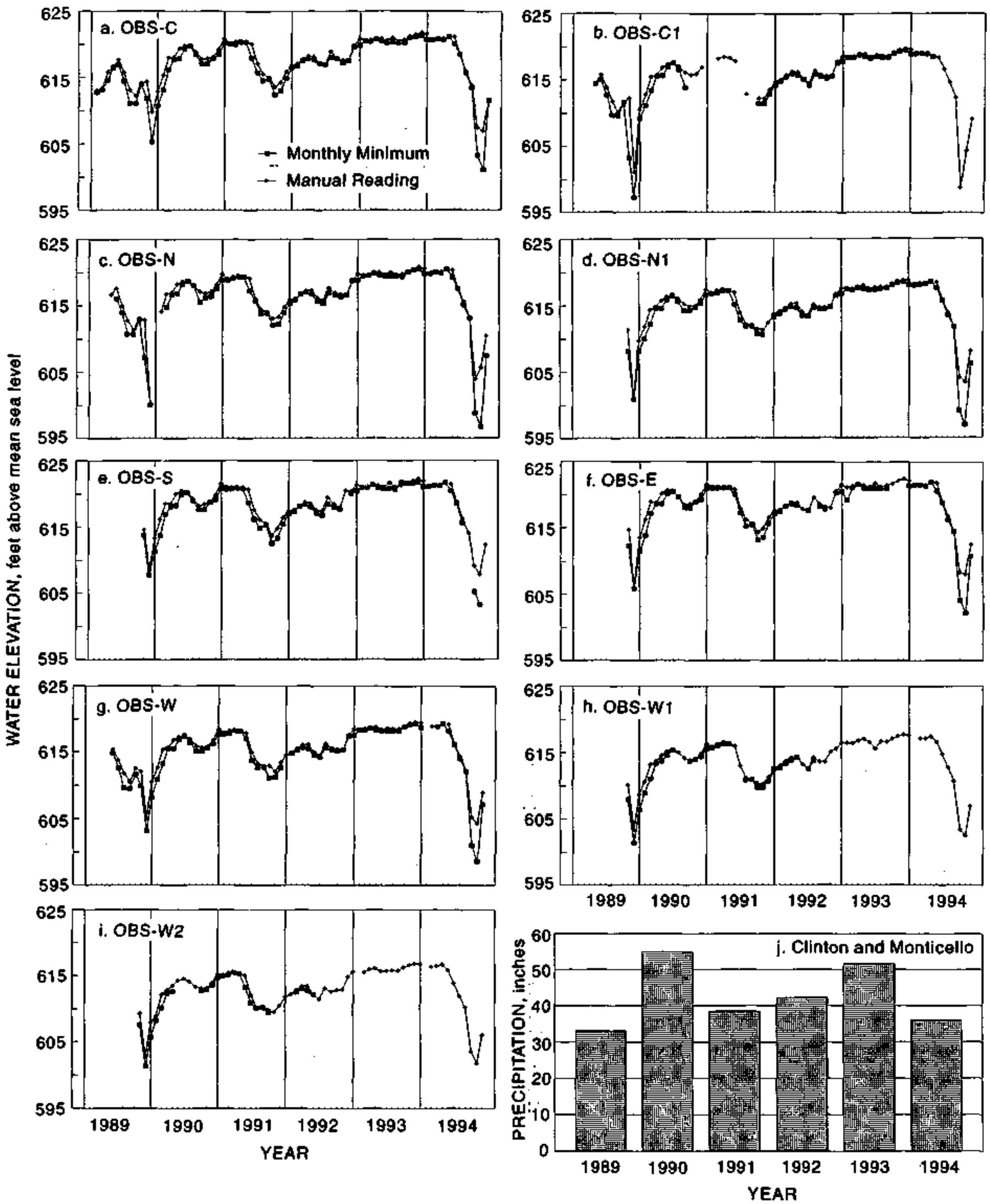


Figure 19. Hydrographs for Decatur observation wells and average annual precipitation at Clinton and Monticello

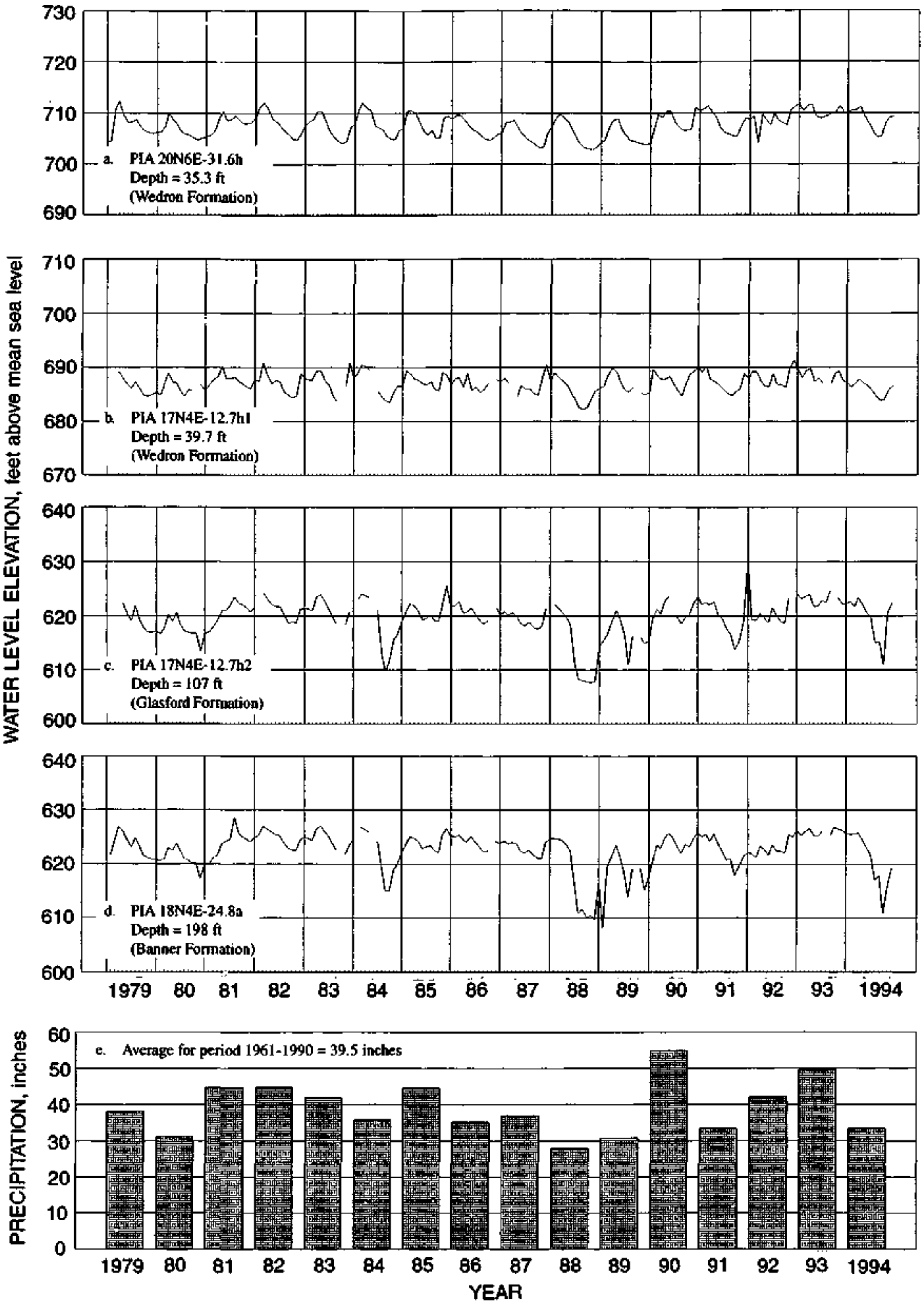


Figure 20. (a - d) Water-level elevations in privately-owned observation wells measured by the Water Survey and (e) annual precipitation at Monticello

from an analysis of data taken from the continuous water-level recorders maintained by Decatur. The manual water-level reading is taken at the time the continuous recording devices are serviced (usually monthly) by Decatur staff or the city's consultant. These monthly readings allow for the calibration of the water-level recorders and ensure data collection in the event of automatic equipment malfunction. Generally, both data sets display very similar water-level (elevation) trends, with "monthly minimum" water levels being slightly less than or equal to "manual readings." At times when water levels are changing relatively quickly, such as during a pumping event, the "monthly minimum" data usually reflect significantly lower water levels. The ability to record these "spikes" in water levels is a significant benefit of using continuous water-level recorders, although the data may be missing more often than the manually collected data due to periodic malfunctioning of the continuous water-level recording equipment.

All nine water-level hydrographs show the effects on water levels of below-normal precipitation as well as pumping events at Decatur's DeWitt County well field. Data collection at the nine observation wells began in 1989. During November 20-22, 1989, a 48-hour aquifer test was conducted on the first two newly constructed production wells. A second, longer test was conducted between November 28 and December 15, 1989, with a constant pumping rate of approximately 7.2 mgd. The effects of these pumping tests are reflected in the lower water-level data during November and December 1989, for each of the nine hydrographs in figure 19.

From 1990 to 1993 no ground water was pumped at Decatur's DeWitt County well field, and normal seasonal fluctuations in water levels are observed. The effects of varying precipitation are also observed during this period, as the water-level hydrographs show slightly higher water levels during the years with above-normal precipitation (1990 and 1993) and slightly lower water levels during 1991-1992, when annual precipitation was very near the average of about 39.5 inches.

Seasonal lowering of water levels occurred during Summer 1994, while a more pronounced lowering of water levels occurred in October and November 1994, as a result of ground-water withdrawals at the Decatur well field. The well field was in operation from October 8 to November 11, 1994, and the total average pumping rate for this period was approximately 7.5 mgd. Maximum drawdowns as a result of this pumpage were about 12, 10, and 8 ft at distances from the well field of 1.5, 3, and 5 miles, respectively (wells OBS-N, OBS-C, and OBS-S in figures 18 and 19).

Water Survey Observation Wells

As stated above, figure 20 shows water-level hydrographs for the observation wells measured regularly by the Water Survey along with a hydrograph for annual precipitation at Monticello. Figures 20a and 20b are hydrographs for two shallow (Wedron Formation) wells; figure 20c is the hydrograph for a middle (Glasford Formation) well; and figure 20d is a hydrograph for a deep (Banner Formation) well. Figure 20e is the precipitation hydrograph for the nearby National Weather Service

(NWS) station at Monticello. All four water-level hydrographs show seasonal fluctuations in water levels. This cyclic fluctuation is perhaps most easily discernable in the shallower, Wedron Formation wells, where the seasonal variation is consistently about 5 ft.

Comparing the deeper Glasford and Banner Formation hydrographs, which notably show very similar trends, to the shallower Wedron Formation hydrographs shows that larger water-level variations due to varying precipitation amounts occur in these deeper formations (aquifers). This is most evident during the drought of 1988-1989, as water levels in 1988 dropped approximately 10 ft below the normal seasonal low. Corresponding water-level declines in Wedron Formation aquifers for that year were negligible in well PIA 20N6E-31.6h and only about 2 to 3 ft lower in well PIA 17N4E-12.7hl.

A smaller drop in water levels in Glasford and Banner Formation wells occurred in mid- to late-1984, when the total departure (deficit) from normal precipitation for the months of June, July, and August was approximately 6.8 inches at the nearby NWS station in Monticello. A similar drop in water levels appears to have occurred during the latter months of 1994, when the total departure (deficit) from normal precipitation for the months of August, September, and October was approximately 3.8 inches at the Monticello station. Partial operation of Decatur's DeWitt County well field from October 8 to November 11, 1994, also may have contributed to the lowering of water levels during late-1994.

SUMMARY

This reconnaissance study has established a network of wells to permit the measurement of ground-water levels in many wells within a short period of time, or a "mass measurement." The network presently consists of 545 existing wells, with an average of about 17 wells per 36-square-mile legal township. The number of wells in each legal township within the study area ranges from 6 to 28.

A mass measurement of water levels was conducted during Fall 1994. Water-level data were categorized by the geological formation in which the wells were finished (i.e., Wedron, Glasford, or Banner), and potentiometric surface maps were produced for the aquifer systems within the Glasford and Banner Formations.

Ground-water withdrawal data were extracted from the statewide water inventory database maintained by the Water Survey and then compiled for DeWitt and Piatt Counties for the period 1980-1994. These data were categorized by both water use and source. The ground-water data for 1994 were subdivided into pumpages for each legal township to accompany the 1994 water-level data and for use in future ground-water resource evaluation and modeling efforts.

Water-level hydrographs were presented for four privately owned, long-term observation wells in Piatt County, which have been regularly measured by the Water Survey for several years. Historical water-level trends were shown for aquifers in the Wedron, Glasford, and Banner Formations. Additionally, water-level hydrographs for nine observation wells associated with Decatur's DeWitt County well field were presented and discussed in relation to annual rainfall amounts and short-term pumping events at that well field.

CONCLUSIONS AND RECOMMENDATIONS

The potentiometric surfaces for the aquifers within the Glasford and Banner Formations reflect only limited effects of present ground-water withdrawals. In the Banner Formation, only a slight lowering of water levels is observed around Monticello. In the Glasford Formation, the most noticeable depression in the potentiometric surface is at Weldon, but this depression is very localized and probably due to pumpages from a sand and gravel aquifer of very limited areal extent. Other minor depressions in the Glasford Formation potentiometric surface occur at Waynesville and Atwood, in the northwest and southeast corners of the study area, respectively. Except for these local areas, present ground-water withdrawals probably have not had much influence on ground-water levels in the Glasford and Banner Formation aquifers.

A finding in this study was the strong suggestion of a hydraulic connection between the major streams and rivers and the aquifers within the Glasford Formation. More specifically, contour lines defining the potentiometric surface were found to "bend" around the study area's larger streams and rivers, and the potentiometric surface for the Glasford Formation aquifers sloped downward to the approximate local elevations of the corresponding streams and rivers. This suggests that the major streams and rivers in the study area receive substantial ground-water discharge from the Glasford Formation aquifers, especially during low flow conditions. Ground-water discharge from the Banner Formation aquifers to surface water was not indicated within the study area.

Several recommendations for further study and action relating to management of the ground-water resources in the study area can be given. Regarding possible future mass measurement activities, communication should continue with Decatur officials regarding the conditions that might lead to operation of the city's DeWitt County well field. If an extended pumping event can be predicted far enough in advance, then a mass measurement can be scheduled near the end of the pumping event, and considerable insight can be gained from an analysis of the resulting potentiometric surfaces for the Glasford and Banner Formations. As no dedicated observation wells have been constructed to measure water levels in the Glasford Formation, documenting the effects of pumpage from this well field on the Glasford Formation via a mass measurement would be particularly insightful. In the absence of extended pumping events at the Decatur well field, the next mass measurement could be planned for the year 2000 to document possible changes in ground-water levels due to changes in regional ground-water usage.

Effective public relations should be maintained with the residents and well owners who allowed access to their wells for the first mass measurement conducted in 1994. For possible subsequent mass measurements to be conducted quickly and successfully, continued cooperation and permission to access the wells in the existing network is necessary. An up-to-date computer database with accompanying field notebooks will also facilitate and expedite possible future mass measurements.

While a mass measurement of water levels from an extensive network of wells provides a valuable "snapshot" of water levels where aquifers are present in the study area, consideration may be given to establishing a network of a limited number of wells to enable monitoring of ground-water levels on a long-term, regional basis. This network would consist of newly constructed wells and/or existing wells no longer used for water-supply purposes. Ground-water levels could be measured more frequently, perhaps monthly, or continuous water-level recorders could be installed. Ground-water-level data collected from this limited network of observation wells would help monitor the natural fluctuations of ground-water levels and possible regional impacts of newly constructed large wells or well fields. Expansion of the network could be considered whenever fiscal resources allow.

Suggested locations and general construction guidelines for the inclusion of wells in a long-term observation well network as described above are as follows: 1) Consider establishing observation wells in the Glasford Formation in the vicinity of the Decatur well field. 2) Consider establishing observation wells in the Glasford and Wedron Formations at Lane, where pumpage from the Decatur well field in October and November 1994 possibly impacted ground-water levels and quality. 3) Consider additional Banner Formation wells in areas expected to be less influenced by withdrawals at the Decatur well field.

Further studies to better define the geometry, geology, and hydraulic characteristics of the significant aquifers in the study area are suggested. A study directed at assembling and reviewing available aquifer hydraulic property data, as determined from historical pumping tests, is also suggested. This information will enable meaningful analysis of the ground-water resources, aid in resolving possible water use conflicts, and will be required for future ground-water modeling efforts. Given that Glasford Formation wells account for approximately 63 percent of the total number of wells inventoried during this project and that they are used for water supply throughout almost the entire study area (see figure 12), the Glasford Formation aquifers should be emphasized in future studies.

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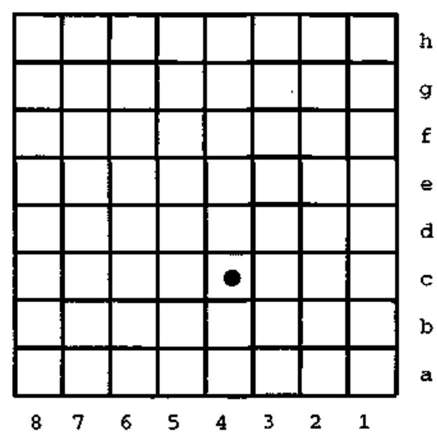
Appendix A.

Well numbering system

Appendix A. Well Numbering System

The well numbering system used in this report is based on the location of the well and uses the township, range, and section for identification. The well number consists of five parts: county abbreviation, township, range, section, and coordinate within the section. Sections are divided into rows of 1/8-mile squares. Each 1/8-mile square contains 10 acres and corresponds to a quarter of a quarter of a quarter section. A normal section of one square mile contains eight rows of 1/8-mile squares; an odd-sized section contains more or fewer rows. Rows are numbered from east to west and lettered from south to north as shown in the diagram.

Piatt County
T18N, R5E
Section 23



The number of the well shown is PIA 18N5E-23.4c. Where there is more than one well in a 10-acre square, the wells are identified by Arabic numerals after the lowercase letter in the well number. Any number assigned to a well by its owner is shown in parentheses after the location well number.

Appendix B.

Water-level data for wells in the mass measurement network

Appendix B. Water-Level Data for Wells in the Mass Measurement Network

					Inventory (1993-1994)			Mass Measurement (1994)		
Well legal location	*Owner/resident*	*Well depth (ft)*	*Source aquifer*	*Estimated land surface elevation (ft above msl)*	*Measuring point (MP) height (ft)*	*Depth to water below MP (ft)*	*Ground-water elevation (ft above msl)*	*Measuring point (MP) height (ft)*	*Depth to water below MP (ft)*	*Ground-water elevation (ft above msl)*
CHM17N07E-07.6d	MR. AUTH C/O IVESDALE WATER DEPT.	85	G	684	1.6	24.65	660.95	1.6	29.6	656
CHM17N07E-09.8a	RON BACEVICH	195	B	684	0.9	23.57	661.33	1.4	27.45	657.95
CHM17N07E-28.2d	META N. MILLER	118	G	694	1.4	29.34	666.06	1.9	32.31	663.59
CHM18N07E-04.1h	JIM MAGSAMEN	165	G	700	1.1	62.78	638.32	1.6	67.76	633.84
CHM18N07E-07.2h	STEVE CARR	155	G	700	1.1	56.14	644.96	1.1	61.49	639.61
CHM18N07E-07.7d	STEVE CARR	248	B	745	1	117.09	628.91	1	120.92	625.08
CHM18N07E-08.7h	JEFF MILLER	154	G	700	1	57.45	643.55	1.3	62.24	639.06
CHM18N07E-17.8a	PAUL WHITE	126	G	683	1.9	38.76	646.14	1.9	41.35	643.55
CHM18N07E-19.1h	RICHARD KEITH STANDERFER	190	B	682	1.1	53.94	629.16	1.1	57.36	625.74
CHM18N07E-28.6a	MARY ELLEN FLAVIN	77	G	694	1.1	39.57	655.53	1.1	44.12	650.98
CHM19N07E-09.6a	JAMES C. KARR	242	B	706	1.1	79.74	627.36	1.1	84.67	622.43
CHM19N07E-16.1h	SUE PITTMAN	150	G	710	0.9	88.03	622.87	0.9	92.78	618.12
CHM19N07E-21.8c	RONALD O'CONNER	135	G	706	1.2	78	629.2	1.2	82.86	624.34
CHM19N07E-30.2a	WILLIAM CRESAP	242	B	707	0.8	81.41	626.39	1.3	87.19	621.11
CHM19N07E-33.8b	J. CHRIS KARR	149	G	702	0.8	68.5	634.3	0.8	71.75	631.05
CHM20N07E-05.6a	ALVIN HEATH	211	G	800	1.2	118.6	682.6	1.2	118 96	682.24
CHM20N07E-21.1d	DALE HANSLOW	210	B	704.	0.5	80.02	624.48	1	85 36	619.64
CHM20N07E-21.2e	DONALD DAVISON	102	G	700	1	32.96	668.04	1.5	35.57	665.93
CHM20N07E-31.6a	LYNN & ED SMITH	210	B	700	1.2	73.48	627.72	12	77 23	623.97
CHM21N07E-09.6a	PEOPLES GAS (ATTN: JIM WHITMORE)	212	B	743	1.9	76.98	667.92	1.9	80 02	664.88
CHM21N07E-19.2h	IRVIN LIESTMAN	239	B	758	0.5	92.53	665.97	0.5	95 35	663.15
CHM21N07E-21.5a	CHARLES HERRING	300	B	741	1	83.69	658.31	1	86.69	655.31
CHM21N07E-28.5a	DOUG TURNER	267	B	757	1.4	121.68	636.72	1.4	124 12	634.28
CHM21N07E-28.6h	FRED KRONER	135	G	743	0.7	85.16	658.54	0.7	87.04	656.66
DWT19N01E-01.2d	M.H. STEIN	100	G	725	0.75	84.05	641.7	1.25	84.67	641.58
DWT19N01E-02.4g	DAVID GIBSON	160	G	735	2	85.75	651.25	2.5	94.05	643.45
DWT19N01E-04.8c	RONALD BENZ	53	G	674	0.4	30.93	643.47	0.4	36.31	638.09
DWT19N01E-07.2d	ALLEN KUYKENDELL		B	635	0.3	17.87	617.43	0.3	21.29	614.01
DWT19N01E-ll.lf	BOB LONG	54	G	640	0	9.75	630.25	0	12.9	627.1
DWT19N0IE-11.5c	DEAN CARTER	260	B	695	0.75	76.25	619.5	1.25	81.05	615.2
DWT19N01E-12.6g	JEFF SPRAGUE	185	G	725	1.6	111.4	615.2	1.6	106.33	620.27
DWT19N01E-13.1e	WILBUR SCOTT	285	B	727	1	123.15	604.85	1	128.05	599.95
DWT19N01E-14.1h	FREDWRAGE	275	B	730	1.2	116.92	614.28	1.2	121.31	609.89
DWT19N01E-15.3d	DR. KLEIST	204	B	650	1	41	610	1	45.27	605.73
DWT19N01E-16.1d	MR. SPARROW C/O WATER DEPT.	248	B	651	1.8	50.45	602.35	1.8	51.4	601.4
DWT19N01E-17.5e	ROGER IRVIN	175	B	627	1	35.12	592.88	1	39.12	588.88
DWT19N01E-20.6c	ROBERT LEVESQUE	90	G	635	1	11.6	624.4	1	15.57	620.43
DWT19N01E-21.1g	ROBERT GAULTNEY	196	B	642	1	36.19	606.81	1.5	40.83	602.67

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
DWT19N01E-25.5d	DARRELL MILLER	137	G	754	1	90.39	664.61	1	95.88	659.12
DWT19N01E-28.5e	HAROLD IRBIN	40	G	633	0.7	5.51	628.19	1.2	10.11	624.09
DWT19N01E-29.8e	LOWELL MONTS	200	B	625	0.5	8.59	616.91	0.5	11.21	614.29
DWT19N01E-30.8d	CORN BELTF.S.	91	G	630	0.2	15.21	614.99	0.2	18.95	611.25
DWT19N01E-31.7a	GENE BLUE	110	G	620	2	8.32	613.68	2	11.56	610.44
DWT19N02E-01.4a	WELDON SPRINGS STATE PARK	72	G	720	1.3	8.96	712.34	1.7	11.5	710.2
DWT19N02E-03.5g	RON SAVAGE	295	G	700	0.8	51.86	648.94	1.4	31.02	670.38
DWT19N02E-07.1e	BEN MCNEES	253	B	717	1.7	105.64	613.06	1.7	109.95	608.75
DWT19N02E-09.5f	DAN DUNHAM	72	G	720	0.9	43.83	677.07	1.4	45.44	675.96
DWT19N02E-10.5e	ALBERT W. MORGAN	280	B	717	0.9	113.42	604.48	1.5	118.68	599.82
DWT19N02E-12.4e	WELDON SPRINGS STATE PARK	55	G	720	1.3	40.4	680.9	1.3	38.62	682.68
DWT19N02E-12.4h	WELDON SPRINGS STATE PARK	38	G	702	2.3	2.15	702.15	2.3	3.78	700.52
DWT19N02E-12.8g	JOE HOLT	0	G	727.	1	26.16	701.84	1.35	28.27	700.08
DWT19N02E-13.4d	LARRY AUSTIN	282	B	730	0.9	123.35	607.55	1.3	128.68	602.62
DWT19N02E-13.6a	MERLE WEAVER	127	G	727	1.4	56.61	671.79	1.4	57.71	670.69
DWT19N02E-15.5g	MARTIN AUCTION COMPANY, INC.	230	B	643	1	46.46	597.54	-0.5	50.11	592.39
DWT19N02E-18.8a	ROBERT HAMBLIN	293	B	745	0.8	136.91	608.89	0.8	141.3	604.5
DWT19N02E-19.1e	DAVID BRADEN	168	G	755	0.9	107.16	648.74	1.2	109.5	646.7
DWT19N02E-20.4g	BLAIR WAGNER - GALILEE CAMP	179	B	745	1.9	135.7	611.2	1.9	139.28	607.62
DWT19N02E-21.1h	MIKE McCULLEY	272	B	690	1.3	85.97	605.33	1.3	90.43	600.87
DWT19N02E-21.2f	ARTHUR BIRCH	76	G	716	0.9	49.53	667.37	0.9	50.83	666.07
DWT19N02E-22.6g	ART SANDERS	78	G	713	1.4	54.04	660.36	1.4	55.58	658.82
DWT19N02E-26.3a	DALE WADE JR.	265	B	715	1	102.62	613.38	1.5	108.41	608.09
DWT19N02E-27.8e	GENE HOFFMAN	91	G	734	0.7	68.01	666.69	0.7	70.21	664.49
DWT19N02E-29.4b	CHARLES DISBROW	140	G	748	1.6	86.04	663.56	2.1	89.67	660.43
DWT19N02E-32.5a	MIKE HARDEN	124	G	721	1	55.87	666.13	1.5	60.32	662.18
DWT19N02E-34.1a	KENBJELLAND	220	B	710	0.7	94.22	616.48	1.3	99.53	611.77
DWT19N02E-34.2e	H.G.N. INC.	277	B	705	1.5	93.49	613.01	1.2	98.47	607.73
DWT19N02E-36.5a	ROBERT O. DAGGETT	265	B	728	0.7	110.07	618.63	1.2	115.5	613.7
DWT19N03E-02.lf	CLINTON MARINA	360	B	718	1.5	103.18	616.32	1.9	109.27	610.63
DWT19N03E-03.6a	DANNY M. WILLIAMS	335	B	722	2.2	111.58	612.62	2.2	114.48	609.72
DWT19N03E-06.2d	MARY JORDAN	320	B	730	1.8	121.07	610.73	1.8	124.8	607
DWT19N03E-06.6f	MICHAEL R. ARNOLD	61	G	735	0.8	9.22	726.58	0.8	13.3	722.5
DWT19N03E-08.1f	CARLDULANY	275	B	722	1.7	122.34	601.36	1.9	127.6	596.3
DWT19N03E-08.2g	RUSSELL UTTERBACK	282	B	710	1.1	105.67	605.43	1.1	110.91	600.19
DWT19N03E-08.8a	ED MARTIN	103	G	738	2.7	53.92	686.78	2.8	54.77	686.03
DWT19N03E-10.7d	RICK DEERWESTER	290	B	725	0.8	109.46	616.34	1.35	115.17	611.18
DWT19N03E-11.3a	TIMOTHY TRIMBLE	246	B	720	1.5	117.43	604.07	1	112.9	608.1
DWT19N03E-13.1d	MR. BRUCE McNABB	316	B	709.21	2.17	93.93	617.45	2.17	99.76	611.62
DWT19N03E-13.1h	MR. BURTON C/O WATER DEPT.	293	B	715	2.7	101.78	615.92	2. 7	107.75	609.95
DWT19N03E-13.3h	HERMAN CHRISPEN	255	B	720	0.85	104.69	616.16	1.5	111.16	610.34

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
DWT19N03E-15.4a	MR. BRUCE McNABB	319	B	713.83	2.3	100.08	616.05	2.3	105.54	610.59
DWT19N03E-19.1h	DONALD MASSEY	87	G	728	1.4	31.52	697.88	1.4	35.05	694.35
DWT19N03E-21.1f	PAULD. MILLER	275	B	717	1.8	102.08	616.72	1.3	106.75	611.55
DWT19N03E-21.8a	TIM LUALLEN	55	G	710	0.7	4.43	706.27	0.7	7.7	703
DWT19N03E-24.1c	RODNEY STROH	78	G	706	1.3	15.52	691.78	1.5	16.6	690.9
DWT19N03E-26.1e	ALBERTTOTTEN	270	B	710	1.2	91.76	619.44	1.8	97.42	614.38
DWT19N03E-28.1a	MR. BRUCE McNABB	294	B	706.58	2.37	92.07	616.88	2.37	97.85	611.1
DWT19N03E-30.1h	LEE McCAMMON	265	B	720	0.9	106.64	614.26	0.9	111.87	609.03
DWT19N03E-30.8c	BRENDA LIVINGOOD	260	B	718	0.8	103.19	615.61	1.4	108.84	610.56
DWT19N03E-30.8d	RILEY THOMPSON	162	G	721	1.5	34.35	688.15	1.7	36.02	686.68
DWT19N03E-32.8a	MAX HEINZ	230	B	715	1	99.3	616.7	1.2	105.12	611.08
DWT19N03E-34.7a	HAROLD A. GROVES	257	B	705	1.1	93.68	612.42	1.1	99.56	606.54
DWT19N03E-36.1f	COY AGEE	260	B	700	0.9	85.49	615.41	1.5	92.71	608.79
DWT19N03E-36.4h	MR. BRUCE McNABB	328	B	698	2.65	82.19	618.46	2.65	88.34	612.31
DWT19N03E-36.8d	WILLIAM AGEE	208	B	703	1.8	86	618.8	1.8	93.65	611.15
DWT19N04E-01.1f	DAVELEISNER	96	G	712	1	24.92	688.08	1	35	678
DWT19N04E-03.8g	ALAN REESER	73	G	720	0.7	17.37	703.33	0.7	18.14	702.56
DWT19N04E-09.3d	MR. BURTON C/O WATER DEPT.	163	G	705	2	71.81	635.19	2	78.27	628.73
DWT19N04E-09.4c	MR. BURTON C/O WATER DEPT.	167	G	710	0.6	90.4	620.2	0.6	80.29	630.31
DWT19N04E-10.8a	GALE GOBLE	127	G	705	2.2	35.5	671.7	2.2	34.9	672.3
DWT19N04E-13.1a	KENNETH BAKER	97	G	705	0.7	26.8	678.9	1.2	26.11	680.09
DWT19N04E-18.1a	JEFF PEARL	260	B	712	0.7	98.72	613.98	0.7	104.77	607.93
DWT19N04E-18.8d	DOUG STROH	275	B	715	0.8	96.33	619.47	1.5	102.66	613.84
DWT19N04E-28.1c	BRUCE WILSON	90	G	698	1.3	13.09	686.21	1.8	14.98	684.82
DWT19N04E-30.1a	MR. BRUCE McNABB	317	B	690	4.13	74.52	619.61	4.13	81.05	613.08
DWT19N04E-30.1e	SHARON SCHERLE	318	B	700	0.8	87.89	612.91	0.8	94	606.8
DWT19N04E-30.8a	ARTHUR L. BRIGHTON	190	B	700	2	90.7	611.3	2	97.21	604.79
DWT19N04E-31.8C	JEFFNELSON	280	B	700	1	83.11	617.89	1.35	89.61	611.74
DWT19N04E-33.1f	ICI SEEDS	258	B	695	0.5	78.4	617.1	1	85.69	610.31
DWT19N04E-33.6a	MR. BRUCE McNABB	299	B	693.35	2.39	74.55	621.19	2.39	81.29	614.45
DWT20N01E-05.8h	ROY MARTIN	145	G	755	1.4	106.66	649.74	1.4	107.34	649.06
DWT20N01E-07.8h	DON PAYNE	240	B	705	0.6	78.99	626.61	0.6	108.53	597.07
DWT20N01E-08.8h	DAN & KATHY SENTERS	114	G	723	1.4	67.73	656.67	1.4	69.5	654.9
DWT20N01E-12.6h	JAMES MOLLET	70	G	751	1.4	51.23	701.17	1.4	51.18	701.22
DWT20N01E-14.1d	MELVIN MURPHY	180	G	753	0.9	74.61	679.29	1.2	74.38	679.82
DWT20N01E-15.5h	LLOYD HARPENAU	138	G	777	0.7	100.57	677.13	0.7	100.52	677.18
DWT20N01E-18.5a	JIM HABRICH	50	G	670	1.2	4.73	666.47	1.2	8.51	662.69
DWT20N01E-18.8d	MARTY STEFFENS	73	G	652	0.5	52.53	599.97	1	56.11	596.89
DWT20N01E-19.8d	LEO PARKS	100	G	660	0.4	9.88	650.52	0.4	14.61	645.79
DWT20N01E-21.3h	BRIAN GARDNER	140	G	781	1.3	116	666.3	1.6	118.67	663.93
DWT20N01E-21.8h	ROBERT MCMATH	166	G	767	1.2	106.28	661.92	1.2	108.15	660.05

Appendix B. (Continued)

Well legal location	*Owner/resident*	*Well depth (ft)*	*Source aquifer*	*Estimated land surface elevation (ft above msl)*	*Inventory (1993-1994)* Measuring point (MP) height (ft)	*Inventory (1993-1994)* Depth to water below MP (ft)	*Inventory (1993-1994)* Ground-water elevation (ft above msl)	*Mass Measurement (1994)* Measuring point (MP) height (ft)	*Mass Measurement (1994)* Depth to water below MP (ft)	*Mass Measurement (1994)* Ground-water elevation (ft above msl)
DWT20N01E-23.8a	VELDAH TURNER	200	G	773	1.4	106.27	668.13	1.9	107.38	667.52
DWT20N01E-26.1f	AUBREY FINK	127	G	761	1.3	94.41	667.89	1.6	95.34	667.26
DWT20N01E-28.1g	LARRY HUMPHREYS	120	G	763	0.9	99	664.9	1.2	98.56	665.64
DWT20N01E-28.4a	DEWITT CO. NURSING HOME (T. INGRAM)	331	B	746	1.4	145.79	601.61	1.4	149.58	597.82
DWT20N01E-29.2b	JACKIE DUNHAM	161	G	730	1.4	80.19	651.21	1.4	91.2	640.2
DWT20N01E-30.1e	DOUGLAS & LAURA KOONS	73	G	690	1	37.26	653.74	1	40.32	650.68
DWT20N01E-30.4a	TERRY DEAVERS	57	G	671	0.6	28.05	643.55	1.1	32.12	639.98
DWT20N01E-32.6a	DAVID L. STEWARD	69	G	669	1	27.71	642.29	1	32.57	637.43
DWT20N01E-33.2h	HALLSVEXE GRAIN ELEVATOR	142	G	745	0.9	97.18	648.72	0.9	99.83	646.07
DWT20N01E-34.1c	HELEN KOSHINSKI	200	G	735	1	101.86	634.14	1	102.06	633.94
DWT20N01E-36.2h	HALLSVEXE GRAIN ELEVATOR	186	G	735	0.6	95.42	640.18	0.6	95.76	639.84
DWT20N02E-01.2b	THORP SEED COMPANY	89	G	750	0.6	15.62	734.98	0.6	19.65	730.95
DWT20N02E-09.3h	JIM HULL	365	B	746	0.9	143.49	603.41	1.3	147.25	600.05
DWT20N02E-10.3h	MARY FLEENER	347	B	745	2	139.12	607.88	2	142.4	604.6
DWT20N02E-12.1a	JACK MORRIS	57	G	750	0	12.51	737.49	0.6	17.25	733.35
DWT20N02E-12.3h	SARA THORP	50	G	750	0.4	15.62	734.78	0.4	19.52	730.88
DWT20N02E-12.5a	RICHARD TURNEY	60	G	750	1.4	19.37	732.03	1.4	24.85	726.55
DWT20N02E-13.1C	FRANCES LAMAR	86	G	750	3.2	21.33	731.87	3.9	25.48	728.42
DWT20N02E-14.7a	KEVIN MOCK	300	B	736	1	133.43	603.57	1.5	137.9	599.6
DWT20N02E-14.8f	CHARLES DAVENPORT	55	G	740	1.1	12.5	728.6	1.5	13.72	727.78
DWT20N02E-15.4a	MORRIS LOCKARD	75	G	735	1.4	12.34	724.06	1.4	14.7	721.7
DWT20N02E-16.1c	MERLE MILLER	185	G	735	1.3	54.16	682.14	1.3	58.72	677.58
DWT20N02E-17.8a	MARVIN THAYER	137	G	742	1.1	33.84	709.26	1.6	32.36	711.24
DWT20N02E-21.8e	BRUCE COOPER	69	G	740	0.6	62	678.6	1.1	60	681.1
DWT20N02E-22.7b	CLINTONIA TOWNSHIP RD. DIST.	320	B	730	1.4	130.28	601.12	2	134.9	597.1
DWT20N02E-25.2d	THORP SEED COMPANY	342	B	738	0.6	128.05	610.55	0.6	128.7	609.9
DWT20N02E-26.4e	CHUCK MOORE	200	B	735	0.8	130.75	605.05	1.3	131.63	604.67
DWT20N02E-27.7e	JOHN & KAY WERTS	109	G	735	1.4	48.01	688.39	2	49.9	687.1
DWT20N02E-28.7f	MARK POOL	285	B	725	1.5	122.17	604.33	1.5	126	600.5
DWT20N02E-31.8h	GARY SHAFFER	75	G	727	1.3	65.94	662.36	1.8	67.76	661.04
DWT20N02E-32.4f	CHARLES LEHMAN	306	B	705	0.5	120.72	584.78	0.8	125.01	580.79
DWT20N02E-33.5h	JOHN H. STAPLETON	200	B	727	1.1	122.42	605.68	1.1	125.4	602.7
DWT20N02E-33.7c	RON SAVAGE - H & M TRUCKING	300	B	735	1.7	130	606.7	1.7	136.08	600.62
DWT20N02E-34.2d	MR. FOLLOWELL C/O WATER DEPT	345	B	710	1.8	108.67	603.13	1.8	113.21	598.59
DWT20N02E-36.8c	M.C.HOKE	46	G	720	1.9	16.29	705.61	1.9	19.98	701.92
DWT20N03E-02.6e	STEVE KUNTZ	98	G	785	1.5	31.07	755.43	2	33.02	753.98
DWT20N03E-04.lb	RODNEY WILSON	67	G	777	0.9	29.56	748.34	1.4	30.8	747.6
DWT20N03E-06.7a	THORP SEED COMPANY	56	G	752	1.3	19.74	733.56	1.8	24.89	728.91
DWT20N03E-08.4h	LYNN LAMONT	68	G	765	5	24.56	745.44	5	25.7	744.3
DWT20N03E-09.2c	RICHARD E. LORD SR.	94	G	767	1.2	38.84	729.36	1.2	40.07	728.13
DWT20N03E-ll.lf	BILL BOYD	77	G	755	1.4	17.44	738.96	1.9	20.55	736.35

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
DWT20N03E-12.8h	GEORGE SNYDER	289	G	760	1.1	56.04	705.06	2	57.3	704.7
DWT20N03E-13.8g	JESSE SPENCER	54	G	743	1.5	5.9	738.6	2	15.22	729.78
DWT20N03E-15.6c	DAN ENOS	70	G	750	0.6	54.87	695.73	1.2	61.86	689.34
DWT20N03E-17.1f	ELIZABETH BURNS	60	G	760	1.3	29.24	732.06	1.6	35.38	726.22
DWT20N03E-18.2c	THORP SEED COMPANY	365	B	755	0.5			0.5	147.82	607.68
DWT20N03E-19.6f	CAROLINE W. AMOCK	46	G	746	0.7	13.81	732.89	0.7	18.02	728.68
DWT20N03E-21.4c	MONTE CAMPBELL	352	B	745	0.6	136.77	608.83	1	142.13	603.87
DWT20N03E-22.3d	ILLINOIS POWER - INFO CENTER	40	G	703	1.1	11.78	692.32	1.7	14.57	690.13
DWT20N03E-26.5a	MR. PAUL RHODES C/O WATER DEPT.	326	B	725	3.5	116.4	612.1	3.5	122.39	606.11
DWT20N03E-27.7h	ILLINOIS POWER, GREG FORREST	280	B	705	1.6	88.9	617.7	1.6	92.86	613.74
DWT20N03E-29.3b	BOB RICE	62	G	760	1	29.15	731.85	1	38.55	722.45
DWT20N03E-30.1h	DOUG NORTH	45	G	740	1.8	11.04	730.76	2	16.02	725.98
DWT20N03E-30.8a	R.D. AND VIVIAN BRUCE	53	G	730	1.6	3.63	727.97	2.2	8.85	723.35
DWT20N03E-36.8C	ILLINOIS POWER, GREG FORREST	340	B	720	1.85	109.69	612.16	1.85	114.99	606.86
DWT20N04E-02.7c	BILL SNOW	193	G	740	1.5	52.64	688.86	2	53.79	688.21
DWT20N04E-07.6h	DON SESSIONS	72	G	765	0.5	21.43	744.07	0.5	25.05	740.45
DWT20N04E-09.1f	JOHN DANILSON, M.A.C., INC.	200	G	751	0.8	62.45	689.35	0.8	66.95	684.85
DWT20N04E-10.2e	VICTOR W.FEHR	160	G	731	1.2	50.97	681.23	1.9	49.58	683.32
DWT20N04E-14.4b	FRED L. REYNOLDS	84	G	734	1.3	20.51	714.79	1.6	23.3	712.3
DWT20N04E-14.6h	RICHARD K. & JOY DRAKE	170	G	738	1.3	77.23	662.07	1.3	76.59	662.71
DWT20N04E-17.8a	HARROLD D. REYNOLDS	65	G	737	1.7	12.24	726.46	2	15	724
DWT20N04E-21.2g	ILLINOIS POWER, GREG FORREST	68	G	725	1.1	26.75	699.35	1.6	30.67	695.93
DWT20N04E-25.1f	JOHN REESER	100	G	725	1.4	14.49	711.91	1.4	17.3	709.1
DWT20N04E-25.8a	JOHN FLANNAGAN	186	G	720	1.2	41.07	680.13	1.2	40.8	680.4
DWT20N04E-27.4a	BRUCE WILSON	90	G	722	1.4	16.65	706.75	1.9	18.67	705.23
DWT20N04E-28.6h	DAN SHOFNER	196	G	725	1.4	46.53	679.87	1.7	46.86	679.84
DWT20N04E-29.5a	JEFF STOFFER	186	G	720	1.2	49.74	671.46	1.6	52.18	669.42
DWT20N04E-30.4c	ILLINOIS POWER, GREG FORREST	56	G	720	0.7	30.8	689.9	1.3	40.36	680.94
DWT20N04E-35.1b	JEFF MARCUM	92	G	716	0.8	18.04	698.76	1.3	18.56	698.74
DWT20N05E-06.5b	STEVEN R.BELL	172	G	728	0.3	54.82	673.48	0.3	57.78	670.52
DWT20N05E-08.5g	DENNIS MAXWELL	75	G	721	0.4	38.38	683.02	0.4	12.14	70.26
DWT20N05E-09.7h	JOSEPH BECK	53	G	716	1.7	6.75	710.95	2.2	9.38	708.82
DWT21N01E-17.8e	WAYNE FANNIN	77	G	673	2.7	29.62	646.08	3.2	32.21	643.99
DWT21N01E-19.6d	MONTY SHAFFER	62	G	660	0.6	28.66	631.94	0.6	33.12	627.48
DWT21N01E-20.8f	ANSELBRISTOW	68	G	672	1.5	38.44	635.06	1.5	41.63	631.87
DWT21N01E-23.6d	ROGER MARTENS	150	G	712	1.1	50.47	662.63	1.6	52.9	660.7
DWT21N01E-26.5b	RICHARD D. SCHMID	67	G	742	0.8	47.16	695.64	0.8	45.84	696.96
DWT21N01E-28.4h	RONALD HOLT	200	G	717	0.9	65.23	652.67	0.9	67.35	650.55
DWT21N01E-29.6a	MR. RICH C/O WATER DEPT.	162	G	735	0.4	94.6	640.8	0.4	96	639.4
DWT21N01E-29.7b	MR. RICH C/O WATER DEPT.	212	G	725	2	98.65	628.35	2	111.53	61547
DWT21N01E-34.4h	MARTIN SCHMID	92	G	740	1.3	56.41	684.89	1.6	57.12	*684.48*

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
DWT21N01E-35.5d	KENT HOLT	118	G	760	1.7	61.66	700.04	2.2	62.1	700.1
DWT21N02E-16.1e	HILTON WILSON	75	G	750	1.3	33.84	717.46	1.3	32.62	718.68
DWT21N02E-17.3a	TOM WEILAND	84	G	735	0.5	28.71	706.79	1	31.23	704.77
DWT21N02E-17.6a	STEVE WESTFALL	334	B	730	0	139.1	590.9	2	137.61	594.39
DWT21N02E-21.1c	REVEREND ERNEST BREITHAUPT	83	G	725	0.9	35.04	690.86	0.9	36.58	689.32
DWT21N02E-23.6a	RANDY PRESSLEY	43	G	744	1.4	16.79	728.61	1.4	20.46	724.94
DWT21N02E-24.4d	STEVE COPPENBARGER	50	G	758	1.3	25.01	734.29	1.3	29.1	730.2
DWT21N02E-26.8a	RICHARD W. KARR	35	G	746	0.9	19.02	727.88	0.9	22.88	724.02
DWT21N02E-28.1f	DIANE ATCHISON	54	G	725	1	10.1	715.9	1	21.33	704.67
DWT21N02E-28.1f	DIANE ATCHISON	370	B	725	0.6	128.03	597.57	0.9	131.08	594.82
DWT21N02E-28.8e	BILL DEETERS JR.	111	G	743	1.6	37.99	706.61	1.6	39.74	704.86
DWT21N02E-29.2h	GENE WHITTED	340	B	732	1.5	126.96	606.54	2	130.1	603.9
DWT21N02E-30.7h	DOUG WHITTED	104	G	760	0.6	63.91	696.69	0.9	64.23	696.67
DWT21N02E-31.7d	C.C. AND CARMEN SAMUEL	92	G	745	0.4	30.68	714.72	0.4	31.2	714.2
DWT21N02E-32.1e	PAUL IVES	60	G	739	0.7	23.01	716.69	1.3	24.74	715.56
DWT21N02E-34.3b	MR. DAAB C/O WATER DEPT.	78	G	743	0.6	13.28	730.32	0.6	18.5	725.1
DWT21N03E-17.7h	STEVEN KLEIN	129	G	781	0.8	24.21	757.59	0.8	26.08	755.72
DWT21N03E-20.7h	LAWRENCE TOOHILL	115	G	780	1.6	31	750.6	2.1	33.33	748.77
DWT21N03E-24.7d	SMITH M. WALDEN	25	G	775	1.6	9.09	767.51	2.1	14.86	762.24
DWT21N03E-26.3g	ART PRIDE	73	G	775	1.3	14.71	761.59	1.3	17.41	758.89
DWT21N03E-27.7a	JOHN KARR	30	G	795	0.8	5.23	790.57	0.8	13.88	781.92
DWT21N03E-28.2h	TIM WESTFALL	130	G	801	1.6	28.26	774.34	1.9	31.25	771.65
DWT21N03E-29.8h	SHERRI FEATHER	37	G	781	1.2	14.2	768	1.2	16.43	765.77
DWT21N03E-30.4h	LAWRENCE TOOHILL	128	G	775	2.3	42.46	734.84	2.8	46.72	731.08
DWT21N03E-31.7a	JACK MORRIS	57	G	761	1.7	31.11	731.59	2.1	35.63	727.47
DWT21N03E-33.4h	DAVID HICKMAN	90	G	800	1.3	59.38	741.92	2	56.83	745.17
DWT21N03E-34.8g	LLOYD HICKMAN	90	G	794	1	28.93	766.07	1.5	31.45	764.05
DWT21N03E-36.3a	ROBERT & HELEN WILSON	73	G	760	0.3	51.42	708.88	0.3	52.4	707.9
DWT21N03E-36.6b	GEORGE WISSMILLER	269	G	750	1	51.95	699.05	1	52.66	698.34
DWT21N03E-36.8b	KENT SCOTT	293	G	760	0.3	58.24	702.06	0.8	59.5	701.3
DWT21N04E-14.2a	DAVID VANCE	71	G	753	1.7	18.25	736.45	1.7	20.63	734.07
DWT21N04E-15.6e	PETE SCHUMACHER	76	G	763	2.1	20.02	745.08	2.1	21.98	743.12
DWT21N04E-15.8b	MRS. LLOYD VANCE	163	G	755	0.9	25.32	730.58	1.2	24.63	731.57
DWT21N04E-19.2b	DAVID VOEGTLIN	156	G	745	1	23.48	722.52	1.5	24.5	722
DWT21N04E-24.8a	JOHN R. McCARTY	157	G	744	1.4	37.99	707.41	1.4	40.12	705.28
DWT21N04E-25.1h	MARK McMENAMIN	178	G	738	0.4	55.1	683.3	0.9	60.84	678.06
DWT21N04E-27.8g	TIM WRIGHT	120	G	758	0.8	52.27	706.53	1.3	52.63	706.67
DWT21N04E-31.1h	KIRK BRIMBERRY	51	G	757	1	15.79	742.21	1.5	19.8	738.7
DWT21N04E-34.4h	WALTER V. WARREN	227	G	754	1.5	47.62	707.88	2	47.99	708.01
DWT21N05E-16.5h	DALE KIRBY	182	B	735	1	56.48	679.52	1.5	62.93	673.57
DWT21N05E-17.5a	GEORGE COLLINS	162	B	733	0.4	57.52	675.88	0.9	67	666.9

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
DWT21N05E-18.4f	JOE AND CLAUDIA HARPENAU	75	G	748	1.8	14.1	735.7	1.8	17.07	732.73
DWT21N05E-20.5a	ELMER HOPPE	185	B	732	1.2	55.65	677.55	1.5	63.61	669.89
DWT21N05E-22.4b	EUGENE HOUSER	170	B	725	0.7	56.38	669.32	0.7	60.8	664.9
DWT21N05E-23.5h	CHARLES SIMPSON	56	G	720	1.2	10.55	710.65	1.7	14.79	706.91
DWT21N05E-27.4h	JOHN HOUSER	162	B	722	0.3	39.96	682.34	0.6	45.42	677.18
DWT21N05E-28.3e	MR. DARIN GIRDLER C/O WATER DEPT.	167	B	725	2	85.1	641.9	1.3	75.65	650.65
DWT21N05E-29.8d	TOM YEAGLE	164	G	732	0.6	53.74	678.86	0.9	60.66	672.24
DWT21N05E-3l.7d	DICK MERRIKEN	158	G	722	1.7	38.45	685.25	2	43.05	680.95
DWT21N05E-33.4g	CURTIS MILLER	38	G	703	1.2	11	693.2	1.7	13.81	690.89
DGL16N07E-05.8f	RON EAGAN	118	G	685	1.3	22.68	663.62	1.8	25	661.8
DGL16N07E-19.6b	BRIAN DeLONG	97	G	679	1	21.68	658.32	1	22.58	657.42
DGL16N07E-31.8e	MR. ROMINE C/O WATER DEPT.	96	G	671	0	19.05	651.95	0	22.84	648.16
LOG19N01W-03.4b	DARWIN INGRAM	100	G	645	0.5	11.17	634.33	0.5	17.58	627.92
LOG19N01W-24.8a	MILACOERS	86	G	625	1.2	18.23	607.97	1.5	22.75	603.75
LOG20N01W-23.5e	MARVIN WIGGERS	188	B	650	1.6	49.02	602.58	2.1	53.25	598.85
LOG20N01W-24.7h	HAROLD DRAKE	80	G	650	1.3	18	633.3	1.3	15.68	635.62
LOG21N01W-13.8g	MR. KEN CONLIN	280	G	685	0.7	35.67	650.03	0.7	36.88	648.82
LOG21N01W-24.7d	KENNETH YATES	89	G	670	0.6	47.3	623.3	1.1	49.04	622.06
MCN16N04E-04.4h	CAROL KUSSART	46	G	695	0.5	9.66	685.84	0.5	14.63	680.87
MCN16N04E-04.8c	ELLIS HISSONG	140	G	735	1.5	58.31	678.19	1.5	58.08	678.42
MCN16N04E-06.6h	GLENN HENSON	95	G	684	1	24.46	660.54	1	24.1	660.9
MCN16N04E-07.8a	LYNN DAVIS	65	G	680	0.8	6.42	674.38	0.8	7.86	672.94
MCN16N04E-20.2b	ALLAN & TINA WILHELM	94	G	740	1.3	48.31	692.99	1.3	47.32	693.98
MCN16N04E-20.7h	ROY CLARKSON	90	G	718	1.5	23.5	696	1.5	24.81	694.69
MCN17N04E-04.1d	ELLEN CAMIC	199	B	660	1	35.09	625.91	1	44.54	616.46
MCN17N04E-05.4e	FLOYD H. LOGUE	140	G	675	1.9	58.31	618.59	1.9	62.65	614.25
MCN17N04E-07.2g	TIM WITTS	128	G	680	1	64.41	616.59	1	69	612
MCN17N04E-08.5b	NANCY SHOOP	128	G	670	1	56.8	614.2	1	60.89	610.11
MCN17N04E-16.7b	LEROY SHEETS	138	G	690	1	76.44	614.56	1	81.07	609.93
MCN17N04E-18.7d	ETHEL BECK	110	G	655	0.8	39.56	616.24	0.8	43.75	612.05
MCN17N04E-19.1d	BILL PICKERJLL	60	G	655	1	39.11	616 89	1	43	613
MCN17N04E-21.1f	JAMES VAN MATRE	150	G	684	1	58.5	626 5	1	60.08	624.92
MCN17N04E-29.4g	GARY EDGECOMB	100	G	680	1	55.45	625.55	1.5	56.02	625.48
MCN17N04E-29.5h	RUSS EDGECOMB	110	G	655	1	31.6	624.4	1	35.64	620.36
MCN18N01E-03.8g	HERBERT WRAGE	54	G	630	0.2	4.68	625.52	0.7	8.59	622.11
MCN18N01E-07.1h	E.E.RAU	100	G	625	0.75	19.65	606 1	1.25	20.97	605.28
MCN18N01E-16.1a	RICHARD DISBURN	42	G	630	1	6.18	624.82	1.5	10.68	620.82
MCN18N01E-30.7a	MRS. WILBURC. VIETH	53	G	615	0.3	13.44	601.86	0.6	17.7	597.9
MCN18N01E-36.1a	DENNIS ROBY	78	G	690	0.8	44.8	646	0.8	50.13	640.67
MCN18N02E-03.1g	FOUR WINDS OF AMERICA	220	B	705	2	90.85	616.15	2.5	95.93	611.57
MCN18N02E-05.5h	JOHN G. FUNK	270	B	720	1.5	109.45	612.05	1.5	114.15	607.35

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
MCN18N02E-06.2a	TIM WILSON	100	G	720	1.1	63.36	657.74	1.6	67.95	653.65
MCN18N02E-07.7g	MARVIN BLOOMBERG	110	G	695	1	41.7	654.3	1.5	47.05	649.45
MCN18N02E-11.2h	ROBERT MASHBURN	278	B	725	1.4	110.25	616.15	1.8	115.62	611.18
MCN18N02E-13.8d	CALLAN WICKENHAUSER	40	G	705	0.8	15.15	690.65	1.3	19.67	686.63
MCN18N02E-16.5a	KENNY STAHL	196	G	705	1	50.05	655.95	1	50.16	655.84
MCN18N02E-17.1b	MARK STIVERS	181	G	710	1.9	60.26	651.64	2.4	61.29	651.11
MCN18N02E-17.1h	KEN STEMLER	220	B	715	1	99	617	1.6	103.03	613.57
MCN18N02E-23.1d	BERNARD HOEHN	250	B	705	0.8	91.36	614.44	1.4	97.35	609.05
MCN18N02E-23.8h	FARM SERVICE		G	691	1	2.5	689.5	1	1.85	690.15
MCN18N02E-24.4a	STEVE BRADEN	220	B	695	1	82.71	613.29	1	88.27	607.73
MCN18N02E-28.8a	ROSS DENSMORE	135	G	712	0.9	24	688.9	0.9	36.86	676.04
MCN18N02E-31.1h	RICHARD HANES	130	G	715	0.9	65.35	650.55	1.4	65.18	651.22
MCN18N02E-33.1a	GARY C. HOUSE	150	G	683	1.3	39.85	644.45	1.8	46.1	638.7
MCN18N02E-35.8b	ANDREA & RICH SHAFFER	143	G	685	1	37.05	648.95	1	41.48	644.52
MCN18N02E-36.6c	JAMES T. OOTON	118	G	695	1	26.75	669.25	1.5	29.65	666.85
MCN18N03E-03.7h	IVAN & NORMA PORTER	245	B	705	1.1	94.2	611.9	1.7	100.56	606.14
MCN18N03E-04.4a	PHILLIPS PIPELINE COMPANY	305	B	710	1.5	98.16	613.34	1.9	104.18	607.72
MCN18N03E-05.7a	WILLIAM BERRY	70	G	715	0.5	20.2	695.3	1	20.91	695.09
MCN18N03E-10.1h	JIM BECKETT	88	G	695	0	11.7	683.3	0	12.62	682.38
MCN18N03E-11.8f	MR. BRUCE McNABB	283	B	685	5.67	72.39	618.28	5.67	78.61	612.06
MCN18N03E-14.5g	BRADLEY TAYLOR	280	B	690	1.5	69.1	622.4	2.1	75.9	616.2
MCN18N03E-18.8d	WILLIAM VOORHEES	270	B	715	0.4	98.57	616.83	1	104.65	611.35
MCN18N03E-23.4h	JIM EDGECOMBE	215	B	680	0.8	55.91	624.89	1.5	62.94	618.56
MCN18N03E-24.6b	ROBERT MUNZ	220	B	680	1.8	65.07	616.73	1.8	71.91	609.89
MCN18N03E-28.5a	DUANEJACKSON	152	G	690	1.1	38.12	652.98	1.1	40.55	650.55
MCN18N03E-29.2a	TOM BARKER	153	G	690	1.3	41.11	650.19	1.8	43.97	647.83
MCN18N03E-29.7a	MRS. LEO MALONE	168	G	690	1	41.7	649.3	1.3	44.24	647.06
MCN18N03E-30.4d	TOM ATKINS	178	G	700	1.1	52	649.1	1.6	54.74	646.86
MCN18N03E-31.5a	OROS GAYLAN	160	G	685	1.1	31.68	654.42	1.6	35.29	651.31
MCN18N03E-33.5c	ROBERT FERRILL	165	G	690	1	41.11	649.89	1	44.08	646.92
MCN18N03E-35.1c	ELOISE McCONNELL	127	G	690	1.7	44.45	647.25	1.7	46.49	645.21
MCN18N03E-35.8h	DANIELCOOPER	220	B	683	1	64.42	619.58	1	71.08	612.92
MCN18N03E-36.1g	TERRY FRANK	238	B	680	0.5	62.81	617.69	0.5	69.82	610.68
MCN18N04E-07.1h	GENE GOWLER OR CURRENT RES.	345	B	690	1.1	73.69	617.41	1.1	80.42	610.68
MCN18N04E-07.2C	MR. BRUCE McNABB	298	B	680	4.7	64.22	620.48	4.7	70.95	613.75
MCN18N04E-08.1f	ROGER BRIGGS	270	B	680	1.1	60.61	620.49	1.9	68.19	613.71
MCN18N04E-17.1d	HERBERT PORTER	240	B	685	1.1	69.55	616.55	1.1	76.92	609.18
MCN18N04E-19.1a	MR. BRUCE McNABB	239	B	688	1.98	68.93	621.05	1.98	75.89	614.09
MCN18N04E-19.1d	JOE HOLMES	238	B	680	1.5	65.86	615.64	1.75	73.21	608 54
MCN18N04E-19.4h	ELMER CLARKSON	249	B	680	0.7	64.02	616.68	0.85	71.09	609.76
MCN18N04E-29.1c	GREG ROSS	225	B	685	0.8	65.38	620.42	1.3	74.52	611.78

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msI)
MCN18N04E-29.5h	ARDATH KENDALL	199	B	680	0.9	62.5	618.4	0.9	68.2	612.7
MCN18N04E-30.8h	BETTY L. KAUFMAN	98	G	673	1.3	24.72	649.58	1.6	26.64	647.96
MCN18N04E-31.4a	PAULFRANK	210	B	670	2	57.85	614.15	2	65.3	606.7
MCN18N04E-31.4h	GREG ROSS	80	G	645	2.7	0	647.7	2.7	0	647.7
MCN18N04E-31.8h	ELLEN LUTTRELL	220	B	680	1	62.39	618.61	1	69.6	611.4
MCN18N04E-31.8h	KURT K. KAUFMAN	110	G	680	1.5	34.96	646.54	1.5	37.38	644.12
MCN18N04E-32.4a	KAREN FURGUSON	242	B	680	1.5	52.03	629.47	2	60.19	621.81
MCL21N01E-02.3g	BRADLEY D. REINHART	112	G	710	1.5	19.15	692.35	2	24.05	687.95
MCL21N01E-06.8d	GARY HAWKINS	98	G	708	1.1	38.38	670.72	1.1	39.69	669.41
MCL21N01E-07.1b	HOWARD GALE	78	G	680	1.6	33.24	648.36	1.6	34.58	647.02
MCL21N01E-11.3e	JIMHANLIN	50	G	672	0.8	8.46	664.34	1.3	12.42	660.88
MCL21N02E-06.2d	MICHAEL KELLERHALS	150	G	692	1.6	36.05	657.55	1.6	37.7	655.9
MCL21N02E-07.8d	NORMAN CARMICHAEL	81	G	710	1.6	33.51	678.09	2.1	37.23	674.87
MCL21N02E-08.6h	RANDALL BALDWIN	175	B	700	1	104.07	596.93	1.5	105.84	595.66
MCL21N03E-01.2h	KEITH MORGAN	100	G	775	0.8	21.57	754.23	1.2	26.66	749.54
MCL21N03E-03.5a	JERRY DONOVAN	102	G	800	1	38.49	762.51	1.5	40.92	760.58
MCL21N03E-05.8b	STEVE SCHEETS	118	G	792	0.9	35.15	757.75	1.4	37.6	755.8
MCL21N05E-02.5a	KARLSWIGART	134	G	730	1.5	9.8	721.7	2	12.62	719.38
MCL21N05E-07.7f	ED MILLARD	203	G	753	1	51.85	702.15	1.3	54.9	699.4
MCL21N05E-11.4b	MCLEAN CO. SERVICE - WEEDMAN	149	G	723	2	2.88	722.12	2	5.24	719.76
MCL21N06E-01.2d	DENNIS MARTIN	100	G	753	1.5	18.71	735.79	1.8	22.95	731.85
MCL21N06E-01.2d	DENNIS MARTIN	218	B	753	1.1	75.38	678.72	1.6	78.72	675.88
MCL21N06E-06.1f	DARWIN BUILTA	49	G	759	1.7	26.42	734.28	1.7	30.69	730.01
MCL21N06E-08.1c	GUNTER SCHARFF	233	B	768	0.8	82.9	685.9	1.3	84.9	684.4
MCL22N01E-25.1d	JIM HANLIN	370	B	740	1	141.67	599.33	1.5	144.46	597.04
MCL22N01E-33.4a	MIKE FONGER	138	G	732	0.9	47.25	685.65	0.9	49.03	683.87
MCL22N01E-36.8g	DEATRICK BROTHERS	383	B	743	0.8	149.2	594.6	1.3	151.98	592.32
MCL22N02E-27.2c	BOB SHAW	94	G	760	0.7	39.93	720.77	1.2	45.3	715.9
MCL22N04E-34.8a	GARY BRENT	55	G	737	1.2	9.93	728.27	1.7	12.88	725.82
MCL22N04E-35.5a	MCLEAN COUNTY SERVICE CO.	60	G	748	1	8.13	740.87	1	10.93	738.07
MOU15N04E-02.8k	ANDY BOLSEN	130	G	724	1.5	56.05	669.45	1.5	51.14	674.36
MOU15N04E-05.4h	STEPHEN DENNIS	135	G	710	1.5	58.5	653	1.5	44.79	666.71
MOU15N05E-03.4f	IRENE WOLFE	57	G	663	1.1	11.54	652.56	1.1	13.15	650.95
MOU15N05E-16.4g	JOE S. BICKNELL	188	B	664	1.4	20.4	645	1.4	18.28	647.12
MOU15N06E-01.8k	JEFFREY BIRCH	98	G	671	1.2	13.48	658.72	1.7	15.87	656.83
MOU15N06E-07.3h	SAM DICK	65	G	689	1.5	15.52	674.98	1.5	18.29	672.21
PIA16N04E-14.1f	JOE CHAPMAN	60	G	703	1.5	31.35	673.15	1	32.2	67.18
PIA16N04E-15.8h	BYRON DERR	160	G	736	2	47.85	690.15	2	42.25	695.75
PIA16N04E-23.2a	A. LEWIS HULL	95	G	701	1	15.21	686.79	1	16.7	685.3
PIA16N04E-25.8e	A. LEWIS HULL	90	G	699	1	11.3	688.7	1	12.5	687.5
PIA16N04E-35.5f	MR. BLICKENSDERFER,WATER DEP	60	W	697	2.5	13.49	686.01	2.5	16.69	682.81

Appendix B. (Continued)

Well legal location	*Owner/resident*	*Well depth (ft)*	*Source aquifer*	*Estimated land surface elevation (ft above msl)*	*Inventory (1993-1994)* Measuring point (MP) height (ft)	*Depth to water below MP (ft)*	*Ground-water elevation (ft above msl)*	*Mass Measurement (1994)* Measuring point (MP) height (ft)	*Depth to water below MP (ft)*	*Ground-water elevation (ft above msl)*
PIA16N05E-03.4h	DUANE THOMPSON	131	G	692	2	25.09	668.91	2	26.42	667.58
PIA16N05E-10.6h	RAYMOND HOWLAND	60	G	685	2	17.6	669.4	2	19.13	667.87
PIA16N05E-11.5h	RAYMOND HOWLAND	60	G	685	1.3	14.18	672.12	1.8	16.49	670.31
PIA16N05E-12.1e	DOROTHY MOORE	75	G	679	1	12.25	667.75	1	14.38	665.62
PIA16N05E-19.8f	KENNETH EVANS	68	G	699	1.5	16.86	683.64	1.5	17.11	683.39
PIA16N05E-24.1h	MIKE FERGUSON	125	G	674	1	9.16	665.84	1	11.5	663.5
PIA16N05E-26.4c	JEFF & RHONDA DAVIS	88	G	679	0.8	23.25	656.55	0.8	21.16	658.64
PIA16N05E-28.7d	MARY ADAMS	55	G	679	0.8	11.1	668.7	0.8	11.71	668.09
PIA16N05E-29.4e	WALTER ADAMS	68	G	684	2	24.91	661.09	2	25	661
PIA16N05E-33.2b	NATURAL GAS PIPELINE CO.	76	G	667	1.8	5.41	663.39	1.8	8.04	660.76
PIA16N05E-36.8d	MR. JIM BALES C/O WATER DEPT	87	G	676	1.5	14.2	663.3	1.5	19.04	658.46
PIA16N06E-03.6e	DOROTHY JARBOE	90	G	669	0.5	8.61	660.89	1	10.03	659.97
PIA16N06E-10.5h	BRADLEY OSBORNE	80	G	682	1	12.1	670.9	1	16.09	666.91
PIA16N06E-12.2d	ROBERTJUMPER	73	G	674	1.1	15.51	659.59	1.4	16.95	658.45
PIA16N06E-13.2c	DALE HARSHBARGER	130	G	675	1.2	18.31	657.89	1.7	19.56	657.14
PIA16N06E-19.8c	DOROTHY MOORE	82	G	676	0.5	8.1	668.4	0.5	10.12	666.38
PIA16N06E-21.6h	DAVID MARTINS	70	G	672	1.2	13.48	659.72	1.7	14.86	658.84
PIA16N06E-24.6g	RENEE BROWN	85	G	665	1.5	17.92	648.58	1.5	19.2	647.3
PIA16N06E-24.8h	EMERSON CHAPMAN	52	G	664	1	9.52	655.48	1.5	11.22	654.28
PIA16N06E-25.1g	JIM REEDER	65	G	677	1	17.31	660.69	1.5	18.56	659.94
PIA16N06E-27.8f	JACK H. JOHNSON	86	G	682	1	14.35	668.65	1.5	21.45	662.05
PIA16N06E-33.4d	UNITY GRAIN, PIERSON STATION	118	G	679	1.2	17.62	662.58	1.2	18.2	662
PIA16N06E-36.6h	JOHN TERRIL	96	G	664	1.9	9.35	656.55	1.9	10.93	654.97
PIA17N04E-01.1h	MR. BRANDENBURG	124	G	686	1	62.19	624.81	1.5	69.32	618.18
PIA17N04E-03.4e	JOHN DAVIS	207	B	687	0.8	62.02	625.78	0.8	71	616.8
PIA17N04E-10.1d	BRENDA & SCOTT GAITROS	170	B	675	1	61.3	614.7	1	68.18	607.82
PIA17N04E-11.8d	MR. BRATTEN C/O WATER DEPT.	156	G	668	3	44.65	626.35	3	53.93	617.07
PIA17N05E-03.1g	DAVID THOMPSON	190	B	687	1	54.01	633.99	1.3	63.17	625.13
PIA17N05E-08.8e	DON TIMME	198	B	679	1	52.02	627.98	1	61.49	618.51
PIA17N05E-12.1g	DAVID TOTTEN	235	B	703	1	57.92	646.08	1	58.87	645.13
PIA17N05E-12.8e	JODY PARSONS	75	W	713	1	5.79	708.21	1.5	8.44	706.06
PIA17N05E-13.4a	SHIRLEY M. LAMB	155	G	689	1	39.31	650.69	1	40.99	649.01
PIA17N05E-15.8f	STEVE AYERS	125	W	738	0.8	14.41	724.39	0.8	18.27	720.53
PIA17N05E-17.1a	WILMA LUX	196	G	716	1	65.28	651.72	1	66.28	650.72
PIA17N05E-19.2a	THOMAS E DOBSON	65	W	720	1	5.22	715.78	1	8.23	712.77
PIA17N05E-24.3g	MR. CORUM C/O WATER DEPT.	163	G	684	2.3	51.05	635.25	2.3	39.9	646.4
PIA17N05E-25.2a	PIATT COUNTY SERVICE COMPANY	130	G	680	0.8	21.65	659.15	0.8	23.29	657.51
PIA17N05E-27.4a	ROBERT BRADLEY	135	G	692	1	33.81	659.19	1.3	32.26	661.04
PIA17N05E-27.7h	RALPH CLARK	0	G	702	1	43.65	659.35	1	44.67	658.33
PIA17N05E-28.3a	MARK BRADLEY	0	G	695	0.5	35.8	659.7	0.5	35.29	660.21
PIA17N05E-29.2h	JOHN FAIR	120	G	711	0.5	52.95	658.55	0.5	53.67	657.83

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	*Inventory (1993-1994)* Measuring point (MP) height (ft)	*Inventory (1993-1994)* Depth to water below MP (ft)	*Inventory (1993-1994)* Ground-water elevation (ft above msl)	*Mass Measurement (1994)* Measuring point (MP) height (ft)	*Mass Measurement (1994)* Depth to water below MP (ft)	*Mass Measurement (1994)* Ground-water elevation (ft above msl)
PIA17N06E-01.1a	EVERETT McCOPPIN	63	G	678	1	17.27	661.73	1.5	21.19	658.31
PIA17N06E-02.8h	JAMES FENDLEY	136	G	679	0.9	38.51	641.39	0.9	39.4	640.5
PIA17N06E-05.8d	CHALMER HINTON	60	W	700	1	5.57	695.43	1	8.33	692.67
PIA17N06E-06.1d	CHALMER H1NTON	245	B	700	1	69.91	631.09	1.2	65.08	636.12
PIA17N06E-10.8C	ANDY FORAN	130	G	679	1.5	26.52	653.98	1.5	29.69	650.81
PIA17N06E-21.1h	JAY ARD	190	B	670	1.5	15.03	656.47	1.5	17.24	654.26
PIA17N06E-24.8d	JOHN SEBENAS	127	G	674	2.75	18.15	658.6	2.75	20.45	656.3
PIA17N06E-27.8d	MIKE WALSH	127	G	667	1.5	10.62	657.88	1.5	13.81	654.69
PIA17N06E-35.4h	JOHN MORRIS	176	B	674	1.1	15.86	659.24	1.1	17.23	657.87
PIA17N06E-36.1a	DAVID SCHMIDT	93	G	675	0.5	10.85	664.65	0.5	12.6	662.9
PIA17N06E-36.6c	JOANNA TSOULOS	138	G	678	1.5	15.35	664.15	2	17.59	662.41
PIA18N04E-03.7g	PATRICIA RANNEBARGER FORD	218	B	695	1	75.5	620.5	1.3	82.19	614.11
PIA18N04E-11.8a	SHAWN VEEDS	229	B	690	0.7	66.37	624.33	1.2	73.2	618
PIA18N04E-12.2a	CHARLES SIEVERS	240	B	690	1	72.02	618.98	1	78.27	612.73
PIA18N04E-14.8a	MR. CHUMBLEY C/O WATER DEPT.	290	B	688	2.3	65.41	624.89	2.3	75.54	614.76
PIA18N04E-22.1e	JEANE REEVES	210	B	687	0.6	66.4	621.2	0.87	74.18	613.69
PIA18N04E-23.4h	ROBERT HEIDKAMP	230	B	690	1.2	79.8	611.4	1.5	72.46	619.04
PIA18N04E-24.1e	KIM & JULIE BAKER	213	B	690	1.1	62.8	628.3	1.6	70.55	621.05
PIA18N04E-24.6h	KAY GOEGGLE	111	G	686	1	58.95	628.05	1.3	62.95	624.35
PIA18N04E-24.8a	ALBERT HEIM	190	B	690	1.3	66.15	625.15	1.3	76.63	614.67
PIA18N04E-27.8f	JOHN MACKEY	210	B	689	0.6	68.2	621.4	0.6	76.3	613.3
PIA18N04E-34.6h	WILMER L. CLIFTON	112	G	684	1.1	52.17	632.93	1.1	52.74	632.36
PIA18N04E-35.8b	JUDY & BRIAN WILKIN	227	B	679	0.5	56	623.5	0.5	65.67	613.83
PIA18N05E-01.5a	RICH BLYTHE	115	G	660	0.6	30.8	629.8	1.1	31.58	629.52
PIA18N05E-03.5a	DAVE CARNES	110	G	682	1.81	52.37	631.44	2.31	57.03	627.28
PIA18N05E-06.7a	LARRY DYSON	96	G	690	1	32.4	658.6	1	35.29	655.71
PIA18N05E-11.3C	JOE TIPSWORD	205	B	670	2	43.79	628.21	2.5	50.33	622.17
PIA18N05E-12.5h	KENNY & THERESA ALLEN	54	G	665	0	29.36	635.64	-3.2	31.42	630.38
PIA18N05E-14.6f	JOETIPSWORD	105	G	664	0.9	30.59	634.31	0.9	37.5	627.4
PIA18N05E-16.1e	DALE NELSON	165	B	670	0.85	42.8	628.05	1.35	50.61	620.74
PIA18N05E-16.3e	ED RAY	124	G	678	1.2	50.8	628.4	1.7	55.95	623.75
PIA18N05E-16.5e	DONALD WOLFE	210	B	690	1.15	59.85	631.3	1.45	69.75	621.7
PIA18N05E-20.8b	LELAND LOURASH	228	B	679	1	54.7	625.3	1	64.11	615.89
PIA18N05E-25.6d	LINDEN ROBINSON	240	B	722	0.67	93.38	629.29	0.67	117.52	605.15
PIA18N05E-28.1h	EICKMAN OR CURRENT RESIDENT	240	B	674	0.75	45.67	629.08	1.25	52.51	622.74
PIA18N05E-29.5a	MIKE MERRIMAN	114	G	669	0.5	44.71	624.79	0.5	52.73	616.77
PIA18N05E-30.8b	MIKE RAYCRAFT	206	B	665	0.7	43.2	622.5	0.7	53.37	612.33
PIA18N05E-32.3h	CHARLES TACKETT	195	B	669	0.6	40.35	629.25	0.6	51.59	618.01
PIA18N05E-34.7a	TIM THOMPSON	103	G	674	1.1	34.9	640.2	1.1	41.1	634
PIA18N05E-35.1a	HELEN WOOD	247	B	728	0.85	97.4	631.45	1.35	105.17	624.18
PIA18N05E-36.1f	MORTON OAKLEY	170	G	723	1.4	79	645.4	1.4	80.09	644.31

Appendix B. (Continued)

Well legal location	Owner/resident	Well depth (ft)	Source aquifer	Estimated land surface elevation (ft above msl)	Inventory (1993-1994) Measuring point (MP) height (ft)	Inventory (1993-1994) Depth to water below MP (ft)	Inventory (1993-1994) Ground-water elevation (ft above msl)	Mass Measurement (1994) Measuring point (MP) height (ft)	Mass Measurement (1994) Depth to water below MP (ft)	Mass Measurement (1994) Ground-water elevation (ft above msl)
PIA18N06E-01.8d	RONMEECE	210	B	693	2.05	66.8	628.25	2.55	72.85	622.7
PIA18N06E-05.5f	J.W. STOWELL	126	G	683	1.2	41.8	642.4	1.7	49.46	635.24
PIA18N06E-06.6h	JIM WALDEN	198	B	666	0.9	38.96	627.94	0.9	41.92	624.98
PIA18N06E-07.6b	MR. GOSSETT C/O WATER DEPT.	274	B	660	2.5	39.6	622.9	2.5	45.74	616.76
PIA18N06E-10.4a	DELBERT LUBBERS	250	B	694	1.1	71.05	624.05	1.6	73.79	621.81
PIA18N06E-11.2a	JACK MUSE	162	G	701	1	62.3	639.7	1.5	66.59	635.91
PIA18N06E-15.1h	DENNIS JAMISON	218	B	715	0.85	63.6	652.25	1.35	70.7	645.65
PIA18N06E-15.2a	KEVIN LUBBERS	145	G	710	0.9	70.07	640.83	1.4	73.45	637.95
PIA18N06E-17.2h	WILBER BLACKER	285	B	733	0.55	112.28	621.27	0.55	114.33	619.22
PIA18N06E-17.8b	GREG GADBURY	298	B	738	0.6	106.61	631.99	1.1	109.75	629.35
PIA18N06E-21.2h	DENNIS MINER	215	B	696	0.7	72	624.7	1.2	76.43	620.77
PIA18N06E-24.8f	WALTER CRESAP, JR.	156	G	697	0.95	52	645.95	0.95	57.18	640.77
PIA18N06E-25.6h	LUCIAWILKIN	117	G	687	0.6	38.13	649.47	0.6	43.12	644.48
PIA18N06E-28.4h	STEVE RHOADES	192	B	705	0.9	64.5	641.4	1.2	67.33	638.87
PIA18N06E-32.5h	PAT COMEFORD	30	W	718	0.9	8.65	710.25	1.2	13.33	705.87
PIA18N06E-35.1a	MARGE TRACY	130	G	675	0.65	26.22	649.43	1.15	29.39	646.76
PIA19N04E-23.6h	TODD & LORI WEAVER	90	G	700	0.7	11.78	688.92	1.2	15.4	685.8
PIA19N05E-01.2g	WALLACE N. BROCK	107	G	712	1.75	74.25	639.5	2.25	78.1	636.15
PIA19N05E-05.4e	STEVETRIMBLE	85	G	710	0.8	30.25	680.55	1.3	31.15	680.15
PIA19N05E-09.8b	MR. NORTON C/O WATER DEPT.	80	G	701	1.3	33.27	669.03	1.4	38.25	664.15
PIA19N05E-13.2e	ROGER DONLEY - UNOCAL 76		G	690	0.75	37.85	652.9	0.75	39.52	651.23
PIA19N05E-16.7c	LELAND KINGSBORO	82	G	702	0.9	26.8	676.1	0.9	27.9	675
PIA19N05E-22.7b	RICHARD STROHL	163	G	697	1.07	50.32	647.75	1.2	54.49	643.71
PIA19N05E-23.2d	PHIL DAVIS	178	G	697	1.6	59.5	639.1	1.7	66.03	632.67
PIA19N05E-24.4h	DAVID DAVIS	164	G	698	0.95	59.9	639.05	0.95	64 85	634.1
PIA19N05E-27.5e	MICHAEL A. HARRIS	147	G	694	1	43	652	1	47.5	647.5
PIA19N05E-28.8d	LARRY D. SCOTT	80	G	700	0.5	22.6	677.9	1	27.01	673.99
PIA19N05E-32.6a	TOM & STEPHANIE STODDARD	70	G	695	2.9	24	673.9	1.9	26.83	670.07
PIA19N05E-35.2b	CLARENCE VOGELZANG	86	G	685	1.2	52.9	633.3	1.65	57.61	629.04
PIA19N05E-35.8g	DALE KIRKLAND	220	B	680	1	53.2	627.8	1.3	62.58	618.72
PIA19N06E-01.5f	LLOYD & DOROTHY HUMPHREYS	211	B	705	1.9	73.5	633.4	1.9	78.1	628.8
PIA19N06E-05.8e	LYNN HISER	208	B	707	0.7	73.12	634.58	0.7	76.68	631.02
PIA19N06E-07.2f	DALE ANDERSON	111	G	701	1.2	52.6	649.6	1.7	54.78	647 92
PIA19N06E-11.3e	PHIL BAUMAN	238	B	705	0.6	74.98	630.62	0.6	79.77	625 83
PIA19N06E-12.4g	JOHN AVELIS	85	G	723	1.7	66.15	658.55	1.7	68.57	656.13
PIA19N06E-13.7h	GARY PAUL	241	B	725	0.97	100.61	625.36	0.97	103.78	622.19
PIA19N06E-15.2g	ROBERT MAY	190	B	695	1	51.83	644.17	1.5	54.68	641.82
PIA19N06E-15.6h	WAYNE CONATSER	207	B	685	1.05	59.78	626.27	1.55	61.55	625
PIA19N06E-17.1a	KAREN McNAMER	195	B	670	1	44.8	626.2	1.5	50.23	621.27
PIA19N06E-18.1e	JOE TAYLOR	118	G	698	1	48.6	650.4	1.3	50.64	648.66
PIA19N06E-19.4a	JOHN CAVENY	190	B	679	1.7	47.1	633.6	1.7	52.44	628.26

Appendix B. (Concluded)

Well legal location	*Owner/resident*	*Well depth (ft)*	*Source aquifer*	*Estimated land surface elevation (ft above msl)*	*Inventory (1993-1994)* *Measuring point (MP) height (ft)*	*Inventory (1993-1994)* *Depth to water below MP (ft)*	*Inventory (1993-1994)* *Ground-water elevation (ft above msl)*	*Mass Measurement (1994)* *Measuring point (MP) height (ft)*	*Mass Measurement (1994)* *Depth to water below MP (ft)*	*Mass Measurement (1994)* *Ground-water elevation (ft above msl)*
PIA19N06E-20.5e	JERRY L.DAVIS	93	G	680	1.5	37.8	643.7	2	42.83	639.17
PIA19N06E-22.1a	STELLA HICKMAN	220	B	700	0.7	62.9	637.8	1.2	67.41	633.79
PIA19N06E-22.6c	MR. RICK HARPER C/O WATER DEPT.	233	B	712	1.45	82.25	631.2	1.45	88.3	625.15
PIA19N06E-25.3h	TOM & MARY MURPHY	140	G	685	1	51.2	634.8	1	54.37	631.63
PIA19N06E-28.1g	DARRYL & PAULA SUE WALTERS	137	G	705	0.55	56.7	648.85	1.05	61.84	644.21
PIA19N06E-29.4b	HARRY MUNSTER	117	G	692	1.2	47.04	646.16	1.7	52.58	641.12
PIA19N06E-32.1h	JOHN DOWNING	158	G	715	1.65	78.8	637.85	2.15	84.53	632.62
PIA19N06E-33.1h	MICHAELHOAG	213	B	692	1.6	66.8	626.8	2.1	71.23	622.87
PIA19N06E-33.3a	WILLIAM A. CAMPBELL	245	B	680	0.7	53.61	627.09	1.2	59.49	621.71
PIA19N06E-35.1e	PAULBELL	225	B	700	0.83	74.05	626.78	1.33	78.63	622.7
PIA20N05E-01.8a	CURTIS RAU	210	B	723	1.1	63.3	660.8	1.1	65.07	659.03
PIA20N05E-20.3a	DAVID TRIMBLE	75	G	720	2.2	14.05	708.15	2.5	15.65	706.85
PIA20N05E-22.5a	DAVID HOLTZ	141	G	716	0.75	32.55	684.2	0.75	32.38	684.37
PIA20N05E-25.8h	DOUG SOSAMON	140	G	720	1.25	70.78	650.47	1.25	73.82	647.43
PIA20N05E-32.8b	DALEZELHART	70	G	710	0.7	14.4	696.3	1.2	15.95	695.25
PIA20N05E-34.8f	MARK & CHRIS WALLACE	135	G	707	1.3	36.15	672.15	1.8	36.17	672.63
PIA20N06E-05.1b	JAMES L. BEAZLY	201	B	730	1.83	73.56	658.27	1.83	76.05	655.78
PIA20N06E-07.5e	KEVIN KEMPLIN	146	G	725	1.2	70.85	655.35	1.2	73.37	652.83
PIA20N06E-10.5g	MR. SCHROCK C/O WATER DEPT.	215	B	730	1.4	76.23	655.17	1.4	80.1	651.3
PIA20N06E-11.7h	HELEN P. FOLK	260	B	725	0.85	98.75	627.1	0.85	103.41	622.44
PIA20N06E-12.3h	CHUCK MAXWELL OR CURRENT RES	295	B	768	0.83	138.76	630.07	0.83	143.52	625.31
PIA20N06E-17.8b	WAYNE JAMES	206	B	725	1.5	77.03	649.47	2	79.97	647.03
PIA20N06E-19.8d	BRUCE BRAGG	177	B	725	1.45	69.81	656.64	1.45	72.47	653.98
PIA20N06E-20.3a	TOM PLUNK	210	B	720	0.9	85.7	635.2	0.9	89.51	631.39
PIA20N06E-22.8h	ARTHUR STEWART	260	B	725	1.55	99.75	626.8	1.55	104.41	622.14
PIA20N06E-24.1d	RICHARD BARR	250	B	707	1.95	82.9	626.05	1.95	87.92	621.03
PIA20N06E-25.5a	CHARLES WIDICK	225	B	696	0.8	69.48	627.32	0.8	74.58	622.22
PIA20N06E-32.8g	DONALD PHELPS	84	G	717	0.3	54.87	662.43	0.3	54.32	662.98
PIA20N06E-32.8h	MIKE McCONKEY	210	B	718	1.85	78.48	641.37	1.85	82.13	637.72
PIA20N06E-33.1g	GARY EDWARDS	206	B	703	1.05	78	626.05	1.55	83.53	621.02
PIA20N06E-34.1b	CYNTHIA BRYANT	220	B	703	0.6	68.84	634.76	0.6	74.03	629.57
PIA20N06E-34.8a	TIMOTHY CURRY	220	B	700	0.95	73.6	627.35	1.45	79.5	621.95
PIA20N06E-36.5b '	FRANK & TERESA CICELA	56	G	683	1.15	25.15	659	1.15	29.07	655.08
PIA21N05E-36.8e	BOBBI KENNEDY	120	G	720	1.85	51.6	670.25	1.85	59.98	661.87
PIA21N06E-15.4e	MR. DAVID SCHNEMAN	274	B	805	1.1	134.67	671.43	1.6	138.99	667.61
PIA21N06E-17.6f	RICHARD PILCHARD	187	B	740	0.85	54.82	686.03	0.85	53.26	687.59
PIA21N06E-19.3f	MAURICE HOWE	189	B	726	1.3	72.78	654.52	1.3	70.47	656.83
PIA21N06E-22.2g	MARVIN BRADD	161	G	802	1.8	92.04	711.76	2.3	90.36	713.94
PIA21N06E-23.4h	WM. KINDRED	258	B	783	1.1	112.89	671.21	1.1	115.72	668.38
PIA21N06E-28.1a	HAROLD ROTH	75	G	735	0.9	30.42	705.48	0.9	33.32	702.58
PIA21N06E-34.1h	SANDRA L. MANUEL	123	G	763	1.15	57.23	706.92	1.15	57.84	706.31

Appendix C.

Ground-water-level record sheet

Well Inventory No: ________

ILLINOIS STATE WATER SURVEY

GROUND-WATER-LEVEL RECORD SHEET

MAHOMET VALLEY WATER AUTHORITY

OWNER/RESIDENT: ________

ADDRESS: ________

________ PHONE: ________

SECTION . plot: ________ TWP: ________ RGE: ________ CO: ________

FT from Section Corner: ________

DEPTH: ________ WELL BOTTOM ELEVATION: ________

CASING DIAMETER/LENGTH: ________

S/G AQUIFER INTERVAL(S): ________

AQUIFER NAME: ________ DATE DRILLED: ________

MEASURING POINT: ________

________ AT ________ feet above LAND SURFACE ELEV: ________

NOTES: ________

INVENTORY DATE: ________ FIELD ASSISTANT: ________

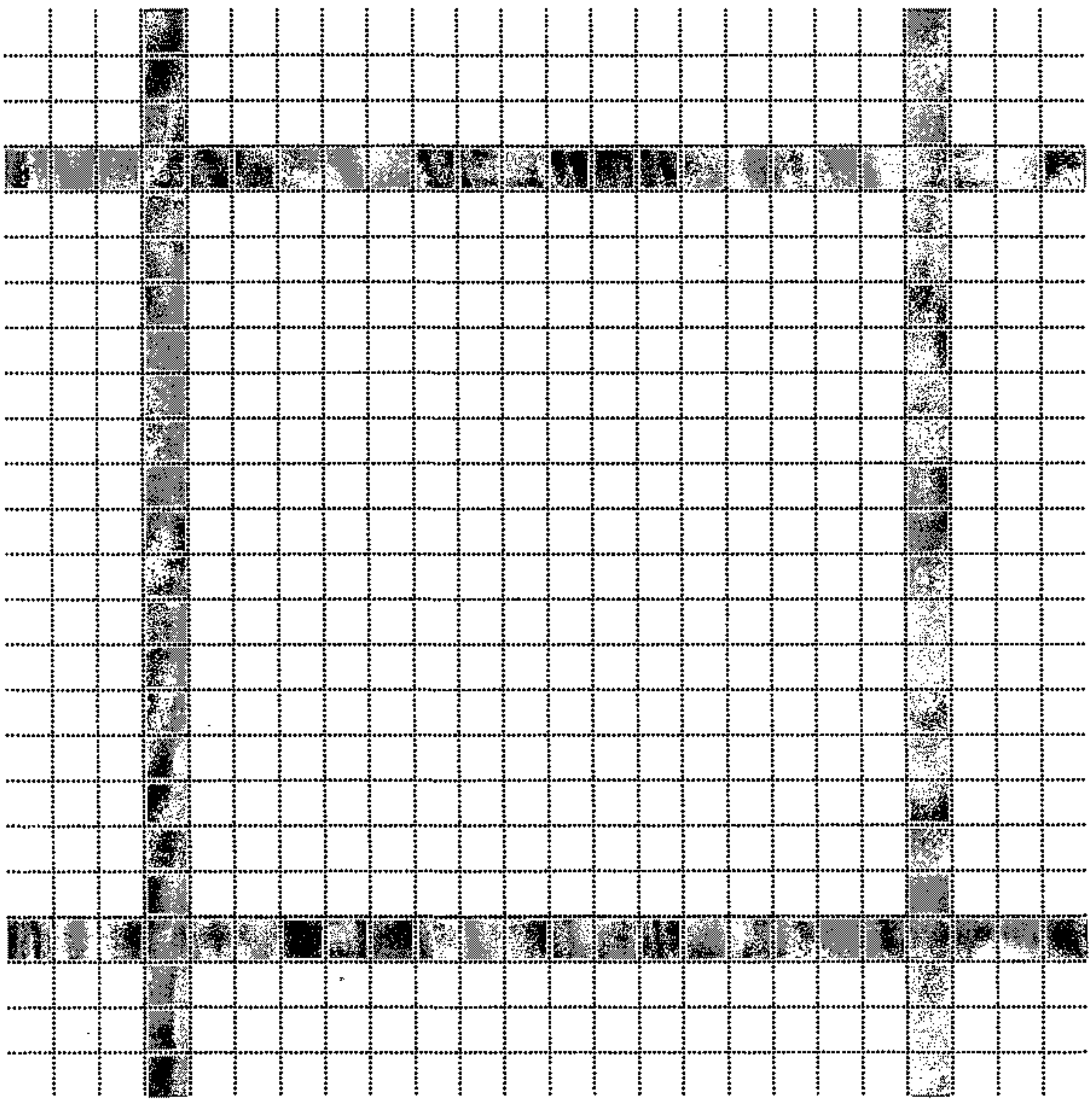
DATE	NONPUMPING WATER LEVEL, feet					REMARKS
	Held	Wet	Depth	MP Ht	Elevation	

Well Inventory No: ________

OWNER/RESIDENT: ____

____

SECTION . plot: ____________ **TWP:** ____________ **RGE:** ____________ **CO:** ____________



Appendix D.

Tabulation of historical ground-water withdrawals

Appendix D. Tabulation of Historical Ground-Water Withdrawals

	DEWITT COUNTY WATER USE, mgd	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	PWS (calculated from IWIP):	1.849	1.546	1.512	1.472	1.513	1.411	1.431	1.622	1.655	2.151	2.218	2.534	2.650	2.401	2.099
	PWS (published previously):	1.844	---	1.551	---	1.519	---	1.436	---	---	---	---	---	---	---	---
	Difference:	0.005	---	-0.039	---	-0.006	---	-0.005	---	---	---	---	---	---	---	---
	SSI (calculated from IWIP):	0.000	0.000	0.000	0.001	0.004	0.004	0.002	0.002	0.000	0.000	0.000	0.000	0.007	0.007	0.009
	SSI (published previously):	0.000	---	0.000	---	0.004	---	0.002	---	---	---	---	---	---	---	---
	Difference:	0.000	---	0.000	---	0.000	---	0.000	---	---	---	---	---	---	---	---
	RURAL (calc. estimate):	0.545	0.534	0.521	0.544	0.642	0.606	0.598	0.575	0.658	0.807	0.662	0.755	0.624	0.556	0.778
	RURAL (published prev.):	0.543	---	0.475	---	0.639	---	0.533	---	---	---	---	---	---	---	---
	Difference:	0.002	---	0.046	---	0.003	---	0.065	---	---	---	---	---	---	---	---
	SPCA (calc. from IWIP):	0.001	0.035	0.038	0.000	0.047	0.000	0.038	0.038	0.043	0.043	0.038	0.038	0.038	0.038	0.038
	SPCA (published prev.):	0.000	---	0.038	---	0.047	---	<.00	---	---	---	---	---	---	---	---
	Difference:	0.001	---	-0.000	---	-0.000	---	0.038	---	---	---	---	---	---	---	---
	TOTAL, MGD:	2.395	2.115	2.071	2.016	2.206	2.021	2.069	2.237	2.356	3.001	2.916	3.327	3.319	3.002	2.922
	TOTAL (published prev.):	2.397	---	2.063	---	2.209	---	1.971	---	---	---	---	---	---	---	---
	Difference:	0.008	---	0.008	---	-0.003	---	0.098	---	---	---	---	---	---	---	---
	BANNER (from IWIP):	1.726	1.426	1.399	1.356	1.376	1.261	1.290	1.500	1.501	2.031	2.081	2.423	2.540	2.292	1.985
SOURCE	BANNER (rural irrig.):	0	0	0	0	0.084	0.05	0.056	0.052	0.146	0.307	0.175	0.28	0.155	0.096	0.312
OF	BANNER TOTAL:	1.726	1.426	1.399	1.356	1.460	1.311	1.346	1.552	1.647	2.338	2.256	2.703	2.695	2.388	2.297
WATER	GLASFORD (frm IWIP):	0.124	0.155	0.151	0.116	0.188	0.154	0.181	0.162	0.197	0.163	0.173	0.149	0.155	0.154	0.160
	WEDRON (from IWIP):	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	RURAL (dom & lstock):	0.545	0.533	0.521	0.544	0.558	0.557	0.543	0.524	0.512	0.5	0.487	0.475	0.47	0.462	0.468
	TOTAL	2.395	2.114	2.071	2.016	2.206	2.022	2.070	2.238	2.356	3.001	2.918	3.327	3.320	3.004	2.924

	PIATT COUNTY WATER USE, mgd	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	PWS (calculated from IWIP):	1.234	1.260	0.944	1.287	2.155	1.335	1.409	1.384	3.952	1.931	1.237	1.854	1.234	1.200	1.959
	PWS (published previously):	1.046	---	0.958	---	2.155	---	1.409	---	---	---	---	---	---	---	---
	Difference:	0.188	---	-0.014	---	-0.000	---	-0.000	---	---	---	---	---	---	---	---
	SSI (calculated from IWIP):	2.135	1.728	1.476	1.044	0.967	0.960	1.265	1.170	1.063	0.737	0.794	0.749	0.651	0.802	0.623
	SSI (published previously):	2.129	---	1.476	---	0.967	---	1.265	---	---	---	---	---	---	---	---
	Difference:	0.006	---	-0.000	---	0.000	---	0.000	---	---	---	---	---	---	---	---
	Total RURAL (calc. est.):	0.678	0.637	0.658	0.669	0.681	0.629	0.593	0.576	0.610	0.637	0.555	0.581	0.567	0.556	0.616
	RURAL (published prev.):	0.662	---	0.642	---	0.654	---	0.526	---	---	---	---	---	---	---	---
	Difference:	0.016	---	0.016	---	0.027	---	0.067	---	---	---	---	---	---	---	---
	SPCA (calc. from IWIP):	0.014	0.013	0.014	0.015	0.012	0.000	0.017	0.016	0.018	0.017	0.015	0.019	0.013	0.015	0.013
	SPCA (published prev.):	0.000	---	0.014	---	0.012	---	0.017	---	---	---	---	---	---	---	---
	Difference:	0.014	---	0.000	---	0.000	---	-0.000	---	---	---	---	---	---	---	---
	TOTAL, MGD:	4.063	3.638	3.092	3.014	3.815	2.924	3.284	3.145	5.644	3.322	2.601	3.002	2.466	2.573	3.212
	TOTAL (published prev.):	3.838	---	3.091	---	3.789	---	3.217	---	---	---	---	---	---	---	---
	Difference:	0.225	---	0.001	---	0.026	---	0.067	---	---	---	---	---	---	---	---
	BANNER (from IWIP):	2.942	2.600	2.162	2.065	2.758	1.911	2.293	2.225	4.665	2.346	1.706	2.065	1.556	1.672	2.192
SOURCE	BANNER (rural irrig):	0.051	0.016	0.042	0.05	0.058	0.035	0.032	0.023	0.069	0.081	0.026	0.065	0.045	0.061	0.13
OF	BANNER TOTAL:	2.993	2.616	2.204	2.115	2.816	1.946	2.325	2.248	4.734	2.427	1.731	2.130	1.600	1.733	2.322
WATER	GLASFORD (IWIP):	0.414	0.375	0.246	0.254	0.344	0.353	0.369	0.310	0.340	0.334	0.330	0.340	0.337	0.325	0.382
	WEDRON (from IWIP):	0.028	0.026	0.026	0.026	0.032	0.030	0.028	0.035	0.028	0.027	0.026	0.026	0.026	0.027	0.028
	RURAL (dom. & lstck):	0.627	0.621	0.616	0.619	0.622	0.594	0.562	0.552	0.542	0.534	0.514	0.506	0.502	0.488	0.480
	TOTAL	4.062	3.638	3.092	3.014	3.814	2.924	3.285	3.145	5.645	3.322	2.601	3.001	2.465	2.572	3.211

Appendix E.

Township pumpages by use and source for 1994

Appendix E. Township Pumpages by Use and Source for 1994

		Withdrawals by use (mgd)				*Pumpage by source (mgd)*		
Township	*Range*	*PWS*	*SSI*	*RUR*	*SPCA*	*BNR*	*GLS*	*WDN*
T21N	R1E	0.028	0.000	0.028	0.000	0.000	0.056	0.000
T21N	R2E	0.062	0.000	0.028	0.000	0.006	0.083	0.000
T21N	R3E	0.000	0.000	0.028	0.000	0.000	0.028	0.000
T21N	R4E	0.000	0.000	0.028	0.000	0.000	0.028	0.000
T21N	R5E	0.180	0.000	0.027	0.000	0.191	0.016	0.000
T21N	R6E	0.000	0.000	0.026	0.000	0.014	0.012	0.000
T20N	R1E	0.005	0.000	0.042	0.000	0.009	0.038	0.000
T20N	R2E	1.027	0.000	0.099	0.000	1.097	0.029	0.000
T20N	R3E	0.017	0.001	0.098	0.001	0.086	0.031	0.000
T20N	R4E	0.000	0.006	0.042	0.000	0.000	0.048	0.000
T20N	R5E	0.000	0.000	0.040	0.000	0.004	0.035	0.000
T20N	R6E	0.110	0.000	0.039	0.000	0.143	0.007	0.000
T19N	R1E	0.031	0.000	0.042	0.000	0.051	0.022	0.000
T19N	R2E	0.003	0.000	0.042	0.037	0.023	0.058	0.000
T19N	R3E	0.726	0.000	0.042	0.000	0.759	0.009	0.000
T19N	R4E	0.019	0.000	0.041	0.000	0.021	0.040	0.000
T19N	R5E	0.034	0.000	0.039	0.000	0.003	0.070	0.000
T19N	R6E	0.050	0.000	0.043	0.000	0.078	0.015	0.000
T18N	R4E	0.032	0.000	0.100	0.000	0.128	0:004	0.000
T18N	R5E	0.662	0.000	0.045	0.013	0.701	0.020	0.000
T18N	R6E	0.700	0.622	0.039	0.000	1.340	0.020	0.002
T17N	R4E	0.120	0.000	0.020	0.000	0.004	0.135	0.000
T17N	R5E	0.174	0.000	0.039	0.000	0.008	0.199	0.006
T17N	R6E	0.000	0.000	0.039	0.000	0.011	0.025	0.004
T16N	R4E	0.028	0.000	0.020	0.000	0.000	0.018	0.029
T16N	R5E	0.048	0.000	0.039	0.000	0.000	0.088	0.000
T16N	R6E	0.000	0.000	0.039	0.000	0.000	0.039	0.000

Note:
PWS = public water supply
SSI = self-supplied industry
RUR = rural
SPCA = state parks and conservation areas
BNR = Banner Formation
GLS = Glasford Formation
WDN = Wedron Formation

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