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State Water Survey Division

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ASSESSMENT OF PUBLIC GROUNDWATER SUPPLIES IN ILLINOIS

by

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ABSTRACT

Illinois aquifers furnish approximately 233 mgd of water to 677 public water supplies outside the six-county area of northeastern Illinois. Ground-water is usually obtained from sand and gravel deposits in the glacial drift or from limestone or sandstone formations in the underlying bedrock. The most favorable groundwater conditions are found in the northern third and the southern tip of the state, while, elsewhere, major aquifers are sand and gravel deposits of the Mississippi, Illinois, buried Mahomet, Wabash, Ohio, Kaskaskia, and Embarrass valleys.

A brief review was made of data and information in the State Water Survey files for each public groundwater supply, and an assessment was given as adequate, marginal, or deficient, in terms of present demands. Twenty four supplies were studied in greater detail, including calculations of aquifer sustained yields. The study indicated that 39 supplies were marginal and four were judged deficient in meeting current demands. The majority of the marginal and deficient supplies are located in the central third of the state; but so are most of the supplies, themselves.

The study represents the first of a three-part plan to: 1) define problem areas and determine priorities for studies in greater detail, 2) conduct regional studies in problem areas, including test drilling, to determine how great the water resource is (how much can be pumped), and 3) determine the water resource alternatives available to public groundwater supplies that are found to be inadequate.

INTRODUCTION

Scope of Study

Illinois aquifers furnish approximately 233 mgd of water to 677 public water supplies outside the 6-county area of northeastern Illinois. Obviously, any planning related to the efficient use of this important resource must be made with information on hand as to quantities pumped, aquifers developed, water resource availability, and anticipated water demand.

This report summarizes available information regarding the current status of public groundwater supplies outside of northeastern Illinois. Each supply has been evaluated as to its adequacy in meeting present day needs, by applying flexible criteria and reported operational experiences.

Twenty-four supplies, known to have recently experienced difficulty in meeting water demands, were selected for additional detailed study. Each supply was evaluated as to its adequacy in meeting the demand for the year 2000, which has been estimated by the State Division of Water Resources.

This study represents the first phase of a three-part plan by the State Division of Water Resources to: 1) define problem areas and determine priorities for studies in greater detail, 2) conduct regional studies in problem areas, including test drilling, to determine how great the water resource is (how much can be pumped), and 3) determine the water resource alternatives available to public groundwater supplies that are found to be inadequate.

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Craig W. Ronto of the State Geological Survey prepared the geologic cross-sections for the detailed assessments. Members of the Geological Survey staff reviewed the cross sections as well as the geological portions of the manuscript. All other illustrations were prepared at the State Water Survey under the direction of John W. Brother, Jr.

PUBLIC GROUNDWATER SUPPLIES

Aquifers in Illinois

Groundwater in Illinois is usually obtained from sand and gravel deposits, mainly in the glacial drift, or from limestone or sandstone formations in the underlying bedrock. The most favorable groundwater conditions are found in the northern third of the State, where there are dependable sandstone and limestone aquifers in the bedrock and extensive sand and gravel aquifers in the glacial drift. Similar conditions occur at the southern tip of the State. In the remainder of Illinois, the major aquifers are sand and gravel deposits of the Mississippi, Illinois, buried Mahomet, Wabash, Ohio, Kaskaskia, and Embarrass valleys (Water for Illinois, a plan for action, 1967).

Figure 1 shows estimated yields of sand and gravel wells. It indicates general areas where conditions are favorable for drilling wells with large yields (500 gpm or more). These areas are generally associated with the principal sand and gravel aquifers that are within the major bedrock valley systems above. Moderate supplies (100 gpm or more) are usually available in sand and gravel aquifers that are associated with bedrock uplands, minor bedrock valleys, or deposits with moderate-to-high permeability. Sand and gravel wells with lower yields (20 gpm or more) are probable in areas with similar conditions, but with deposits of only low to moderate permeabilities.

In the northern third of the State, large quantities of groundwater for industrial and municipal use are withdrawn from wells in the deep sandstone aquifers of Cambrian and Ordovician age and from the shallow dolomite aquifers of Silurian and Ordovician age (Water for Illinois, a plan for action, 1967). In the southern two-thirds of the state, where the glacial drift is thin or relatively impermeable, small water supplies are developed from thin beds of sandstone and limestone of Pennsylvanian and Mississippian age. In the southern tip of Illinois, moderate supplies of groundwater may be withdrawn from wells in creviced limestones of Mississippian, Devonian, and Silurian age.

Figure 2 shows estimated yields of wells in bedrock aquifers. Several hundred industrial and municipal wells in the northern third of Illinois take large quantities of groundwater from deep sandstone aquifers. Deep sandstone wells often have yields exceeding 700 gpm. Most high-capacity deep sandstone wells in the northern part of the State tap several units and are multi-unit wells. The Galena-Platteville Dolomite, Glenwood-St. Peter Sandstone, and Prairie du Chien Group of Ordovician, age and the Eminence-Potosi Dolomite, Franconia Formation, Ironton-Galesville Sandstone, and Mt. Simon Sandstone of Cambrian age yield appreciable quantities of water. The yields of multi-unit deep sandstone wells above the Mt. Simon Sandstone are shown in Figure 2. Water from the deep sandstone is highly mineralized south of the Illinois River. The line D-D' in Figure 2 is approximately the southern limit of drinkable water (less than 1500 mg/1 total dissolved minerals) in the deep sandstone. For lack of more suitable water supplies, wells are drilled locally to the sandstones a short distance south of this line (to F-F'). In parts of northern Illinois, yields of deep sandstone

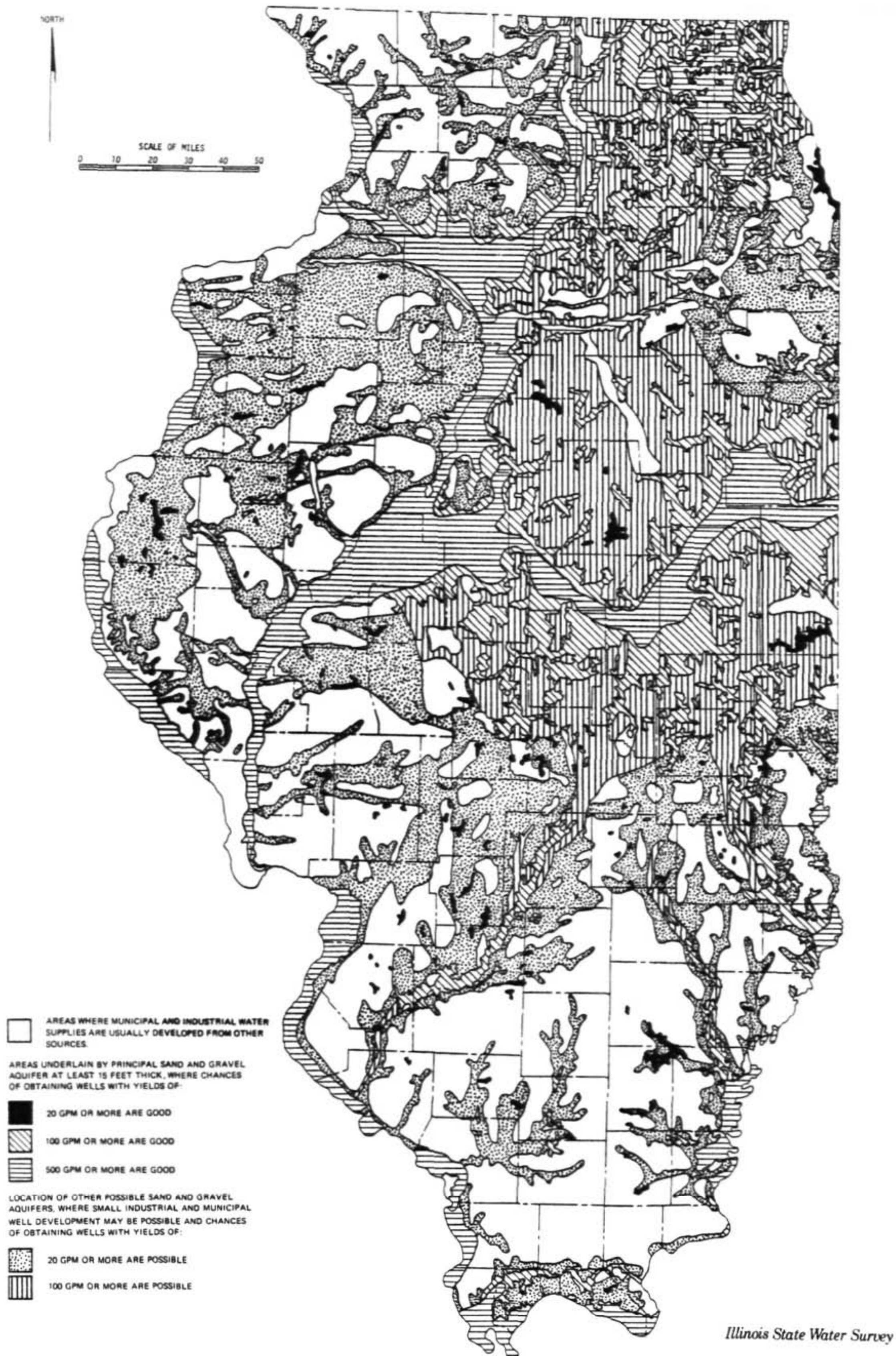
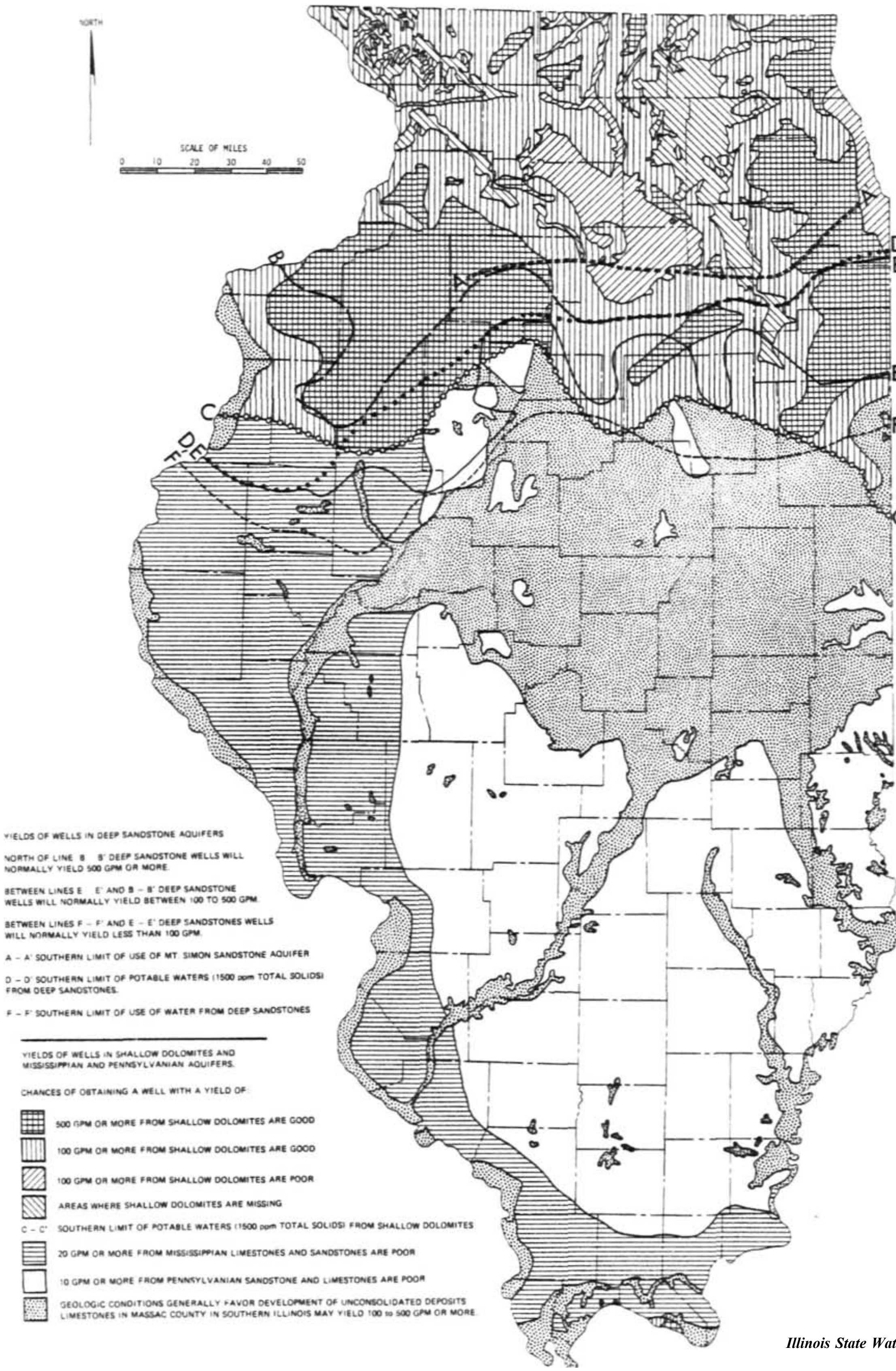


Figure 1. Estimated yields of wells in sand and gravel aquifers



Illinois State Water Survey

Figure 2. Estimated yields of wells in bedrock aquifers

wells are increased by penetrating into the Mt. Simon aquifer (lower sandstones of the Eau Claire Formation and upper beds of the Mt. Simon Sandstone). No water wells have penetrated the entire thickness of the Mt. Simon in Illinois, because water below an elevation of about 1300 feet below sea level is commonly too salty for municipal use. Line A-A' in Figure 2 indicates the southern limit of use of the Mt. Simon aquifer.

Shallow dolomite aquifers of Silurian age and the Galena-Platteville Dolomite of Ordovician age are the main source of groundwater for many moderate-to-large public and industrial supplies in the northern third of Illinois. Despite the fact that these shallow dolomite aquifers are inconsistent in productivity and the yields of wells vary greatly from place to place, shallow dolomite wells have been prolific sources of water for over 75 years. The probable yields of shallow dolomite wells are shown in Figure 2. Line C-C' shows the southern limit of potable waters from shallow dolomites.

In the southern two-thirds of Illinois, thin sandstone and limestone beds of Pennsylvanian age and sandstone and limestone formations of Mississippian age yield small quantities of groundwater. Although wells in these rocks commonly yield less than 25 gpm, they are the only source of water for many domestic and small municipal and industrial supplies. Yields of wells in Pennsylvanian and Mississippian aquifers are shown in Figure 2.

In a small area in extreme southern Illinois, wells which penetrate rocks of Mississippian, Devonian, and Silurian age have yields of 100 to 500 gpm or more.

Adequacy of Public Groundwater Supplies

Criteria for Assessment

The investigation into assessing the adequacy of existing public groundwater supplies proceeded along the following outline of tasks:

1. A list was prepared of all public groundwater supplies outside of the six-county northeastern Illinois area. Subdivisions with estimated populations of 500 or more were included in the study; however, state parks and institutions were not.

2. A brief review was made of data and information in the State Water Survey files for each public groundwater supply, and an assessment was given as adequate, marginal, or deficient, in terms of present demands. The results of the assessment review are presented in the appendix.

3. Supplies with adequate data for analysis and either designated as marginal or deficient or known to have recently experienced water supply problems were studied in greater detail by the State Geological Survey and the State Water Survey. Aquifer safe yields were estimated for each supply.

4. The aquifer yields were compared with projected water demands for the year 2000 (provided by the State Division of Water Resources) in order to assess the long-term adequacy of these supplies.

5. Recommendations were made by the State Geological Survey for areas in which future groundwater exploration could be undertaken.

The results of the detailed studies are presented in the next chapter, entitled "Detailed Data Summaries."

The determination of aquifer assessment for the 677 public groundwater supplies was based on the following criteria:

Adequate Supply - No apparent problems (based on EPA reports) in meetings present demand. Usually 10 hours or less pumpage required to produce average daily consumption.

Marginal Supply - Aquifer can supply present demand by operating longer hours. 1) usually 10-18 hours of pumpage required, or 2) several wells with relatively small pumping rates (less than 30 gpm) operate to meet the demand (usually the case where the aquifer is shallow or has low permeability).

Deficient Supply - Aquifer has difficulty supplying present demand. 1) generally 18 hours or more of pumpage is necessary to produce daily consumption, 2) aquifer test data indicate that the aquifer is shallow and of limited areal extent, or 3) need of additional sources of water is indicated by reports of the State Water Survey or the State Environmental Protection Agency.

The criterion of operating time was not a strict one, and the adequate, marginal, or deficient designations overlapped due to other considerations. For instance, one water supply system (Depue-Bureau County) was judged to be adequate, even though 14.7 to 17.5 hours per day were required to meet the average demands. The extenuating factor in this case was that the operating time was caused by limitations in the plant low-service pumps rather than in the wells or aquifer.

Summary

The results of the data review and assessment for the 677 public groundwater supplies studied are tabulated in the appendix.

All facilities with public groundwater supplies or combined surface-groundwater supplies were included except: a) all facilities in the six-county northeastern Illinois area, b) subdivisions serving less than 500 people, and c) state parks and state institutions.

Population figures listed in the special census column were from State Environmental Protection Agency Public Water Supply reports, as were the average daily pumpages (although several of the figures for supplies studied in detail were updated by personal telephone communications).

Aquifer descriptions were based on well logs or reports by the State Geological Survey on the groundwater geology of each well field.

Aquifer tests conducted and analyzed by the State Water Survey were labeled, SWS.

The results of the study indicate that the 677 public groundwater supplies outside northeastern Illinois have an estimated daily pumpage of 233 million gallons. Among individual counties, Winnebago County topped the list with a pumpage of 43.1 mgd. Other large public groundwater-consuming counties are Peoria (20.7 mgd), Champaign (18.2 mgd), Tazewell (12.3 mgd), and LaSalle (10.1 mgd). The largest individual supply is the City of Rockford, which pumps an average of 37.0 mgd. Seven counties - all in the southern third of the State - have no public groundwater supplies: Clay, Franklin, Hamilton, Jefferson, Johnson, Pope, and Williamson. Champaign, LaSalle, Bureau, and Madison Counties each have 20 or more supplies.

As summarized below in table 1, thirty-nine supplies were assessed as marginal and four were judged deficient in meeting current demands. The majority of the marginal and deficient supplies are located in the central third of the state; however, so are most of the supplies, themselves. Thirty counties were found to have one or more supplies that are less than adequate. Adams, Champaign, Henry, Madison, and Pike Counties all have three such supplies, while counties with two less-than-adequate supplies include Effingham, Montgomery, and Vermilion. Figure 3a indicates the number of public groundwater supplies in each county as well as the number of marginal and deficient supplies, while figure 3 b shows locations of the marginal and deficient supplies.

Table 1. Groundwater Supplies Assessed as Less Than Adequate

County	Supply	Assessment
Adams	Camp Point	D
	Golden	M
	Loraine	M
Brown	Versailles	M
Bureau	Princeton	H
Champaign	Broadlands	M
	Homer	M
	Philo	M
Christian	Edinburg	M
Clinton	Germantown	M
Coles	Lerna	D
Cumberland	Toledo	M
Douglas	Hindsboro	M
Effingham	Dieterich	M
	Watson	M
Fulton	Dunfermline-St.David Water Commission	M
Henry	Bishop Hill	M
	Colona	M
	Osco	M
Lawrence	Birds-Pinkstaff Public Water District	M
Macon	Oreana	M
Madison	Hamel	M
	Marine	M
	Worden	M
McDonough	Colchester	M
McLean	Chenoa	M
Menard	Tallula	M
Montgomery	Farmersville	M
	Fillmore	M
Moultrie	Gays	M
Pike	Baylis	D
	Nebo	M
	Pearl	M
Randolph	Red Bud	M
Richland	Noble	M
Rock Island	Coal Valley	D
Sangamon	DeKalb Agricultural Research, Incorporated	M
Scott	Winchester	M
Shelby	Windsor	M
St. Clair	Millstadt	M
Vermilion	Indianola	M
	Oakwood	M
Warren	Roseville	M

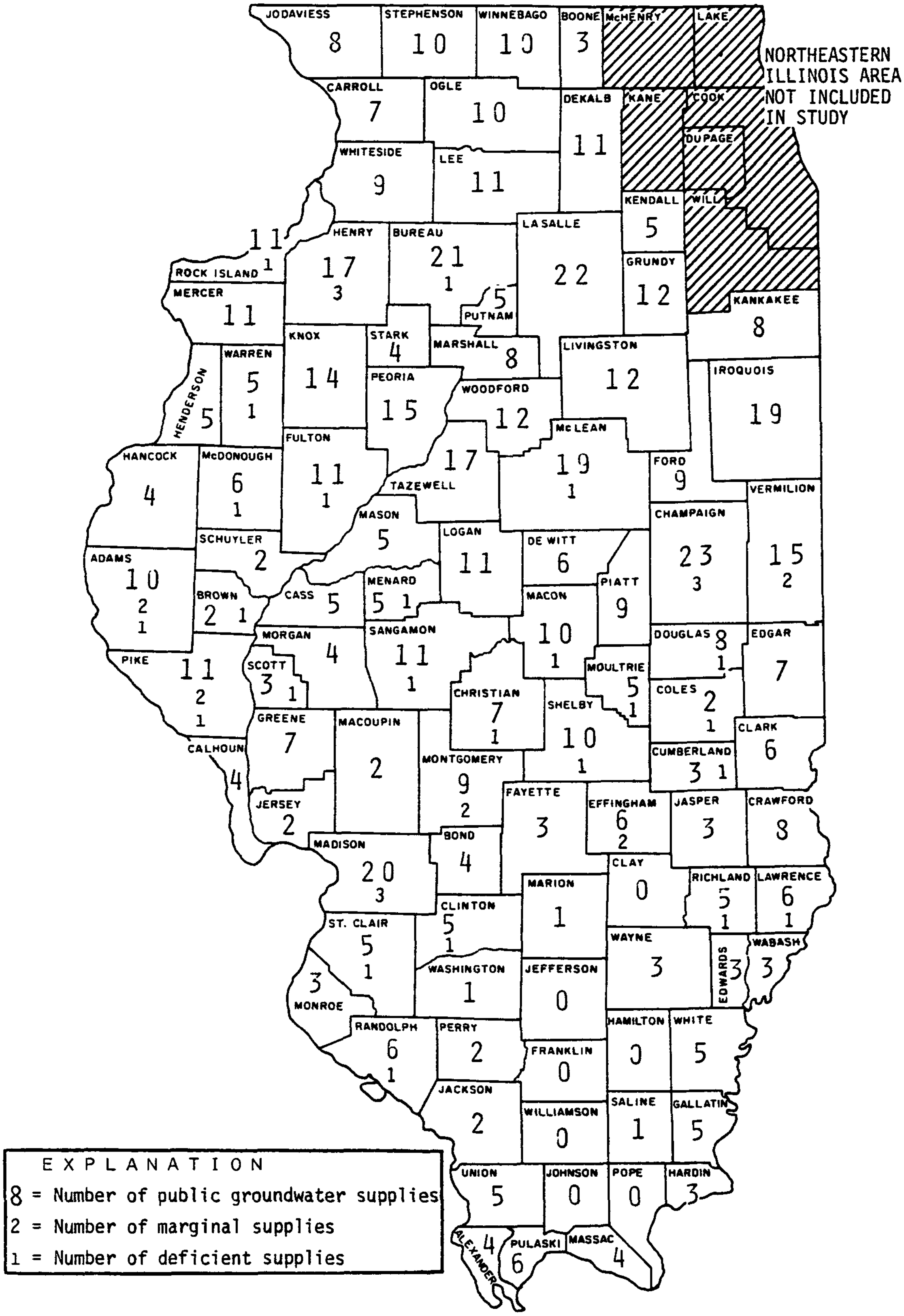


Figure 3a. Public groundwater supplies in Illinois

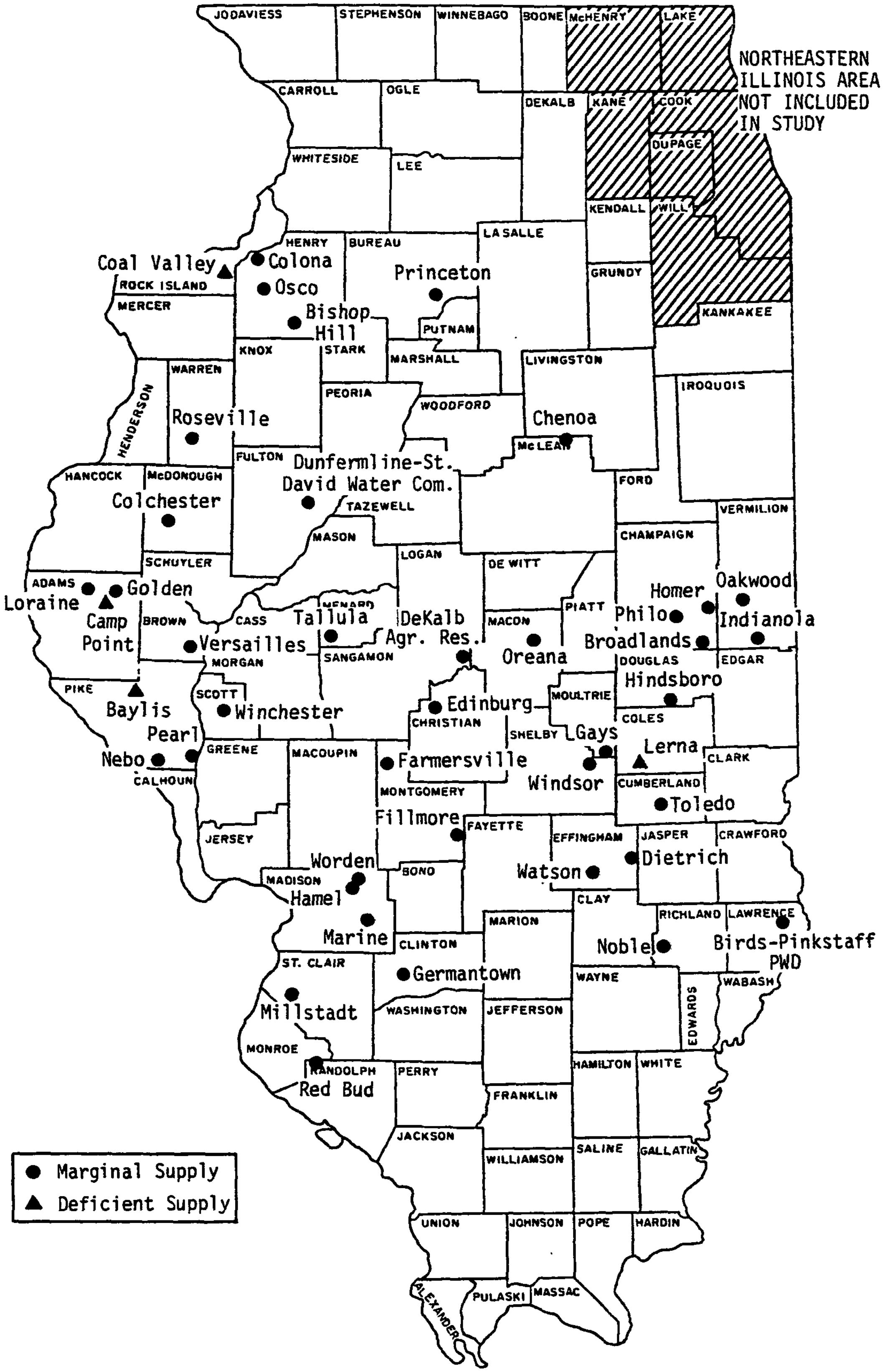


Figure 3b. Locations of marginal and deficient groundwater supplies.

DETAILED DATA SUMMARIES

The following summaries are based on joint reports by the State Geological Survey and State Water Survey. Sections on the geography (location and extent of the study area, topography, and drawings), geology (Pleistocene and bedrock formations), and hydrogeology (discussion of present municipal supply), were condensed from the reports of the State Geological Survey. Geologic interpretations, including cross-sections were developed from available drillers logs, resistivity surveys, and earlier reports.

Sections on the history of groundwater development, aquifer properties, model aquifers, and practical sustained yield were condensed from the reports of the State Water Survey. Aquifer property determinations and model aquifer analyses were based on conventional graphical methods of well test data analysis and on assumed idealized aquifer models, image-well theory, and geologic descriptions of the aquifers. The Red Bud summary also includes a digital model solution for the aquifer there.

The final section of each summary includes a projected water demand for the year 2000. This estimated demand was furnished by the State Division of Water Resources and takes into account projections of both population and per capita water consumption, both of which involve trends of many socio-economic factors.

BIRDS-PINKSTAFF PUBLIC WATER DISTRICT

The Birds-Pinkstaff Water District is in north-central Lawrence County in southeastern Illinois. The town of Birds is in Sections 29-32, T5N, R11W, and Pinkstaff is in Sections 7,8,17 and 18, T4N, R11W, approximately 4 miles north of Lawrenceville. The area is served by two-lane state and county highways, State Route 1 and the CONRAIL Railroad. The study area is comprised of the portions of Townships 4 and 5N, Ranges 11 and 12W, shown on Figure 4, taken from the topographic map of the Birds 7 1/2-minute quadrangle.

Birds and Pinkstaff are in a north-south trending partially buried bedrock valley containing the southerly-flowing Brushy Creek. The floor of the valley is flat and has several tributary valleys leading into it from the northeast. Brushy Creek empties into the Embarras River Valley on the south. The uplands along the sides of the valley are rough and rolling, and well dissected by streams. The Brushy Creek Valley widens from approximately 4000 feet, north of Birds, to over 6000 feet at Pinkstaff. Maximum topographic relief is over 150 feet.

The unconsolidated Pleistocene glacial deposits in the study area are a complex of ice-laid till, water-laid outwash and alluvium, and wind-blown silt (loess). The drift cover on the uplands is mainly Illinoian-age till, 5 to 25 feet thick. The deposits filling the bedrock valley over which Brushy Creek now flows are much thicker—up to 105 feet thick—south of Pinkstaff near the Embarras River, but are normally 70 to 80 feet thick between Birds and Pinkstaff. The basal portion of the valley fill is sand and gravel, probably pre-Illinoian in age. It is overlain by progressively finer-grained, Illinoian-age materials composed of silty sand, silty clay, and clay (Figure 5).

The shallow bedrock in the study area is composed of sandstones, shales, limestones, coals, and siltstones of the Pennsylvanian Bond Formation. Most wells drilled outside the river valley in the study area receive small amounts of water from sandstones at depths of 50 to 237 feet. Although the beds appear to be discontinuous, there are two intervals which seem to have some lateral continuity. The upper interval occurs above elevations of 430 feet in the uplands east and west of Birds and is cut out by the stream valley. The lower unit occurs between elevations 240 and 305 feet generally south of Birds. The lower sandstone appears to be about 40 to 60 feet thick, but not all of it is water-yielding.

The Birds-Pinkstaff Water District obtains its municipal water supply from a sand and gravel unit at the base of the drift in the Brushy Creek Valley in the southern part of Section 30, T5N, R11W. The well penetrates 7 feet of water-bearing material just above the bedrock surface. Another well to the east has 15 feet of sand and gravel present (Figure 5). Although well data are inadequate to accurately define the deposit, some observations on its likely extent can be made from an analysis of the local geology and surface topography. Figure 5 is a representation of the shape of the buried bedrock valley in which the deposit occurs. From this, it appears the deposit has a maximum width of 3000 to 4000 feet, or slightly less than the width of the valley at Birds. Well data suggest the deposit

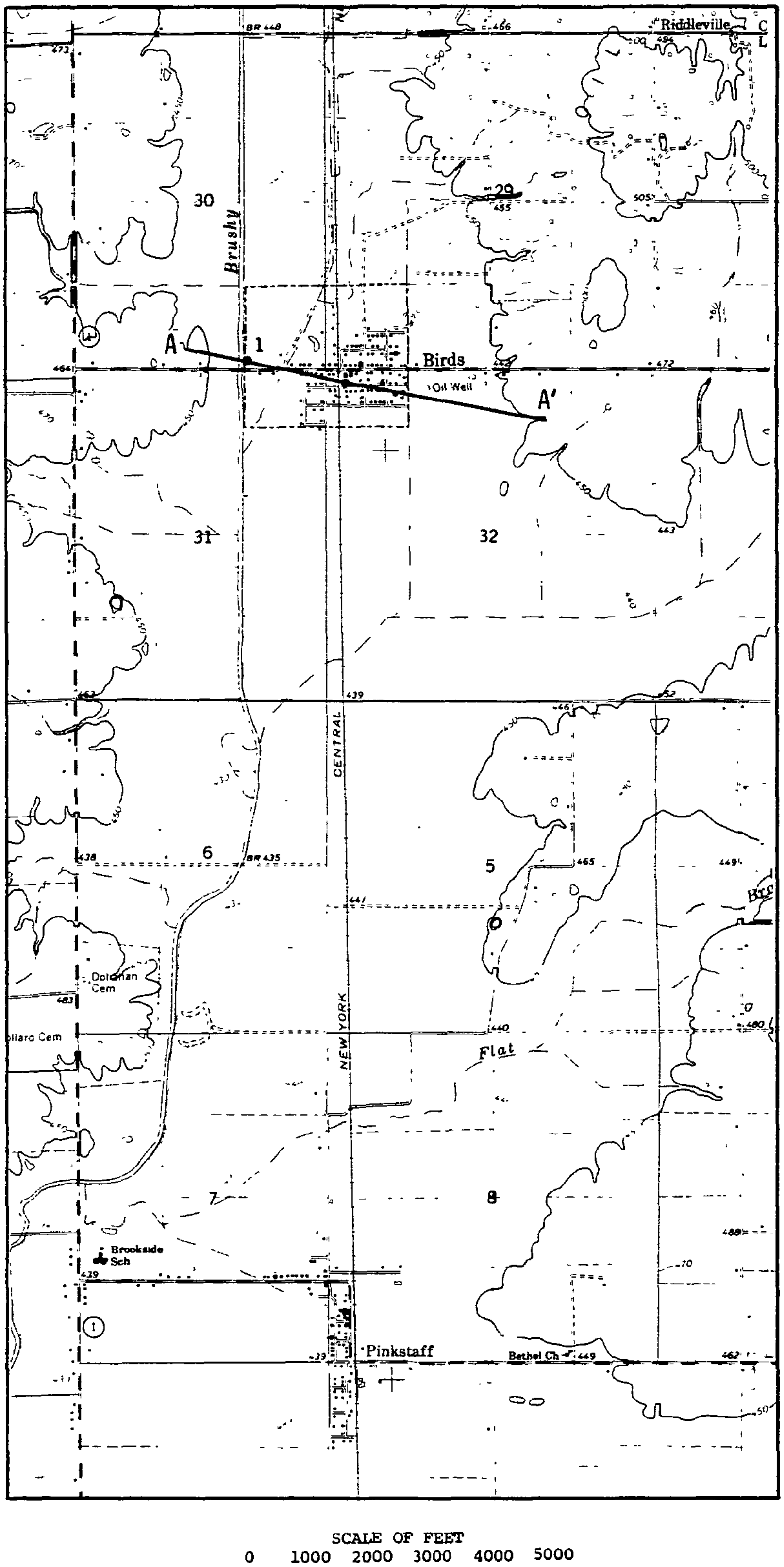


Figure 4. Birds - Pinkstaff Public Water District study area

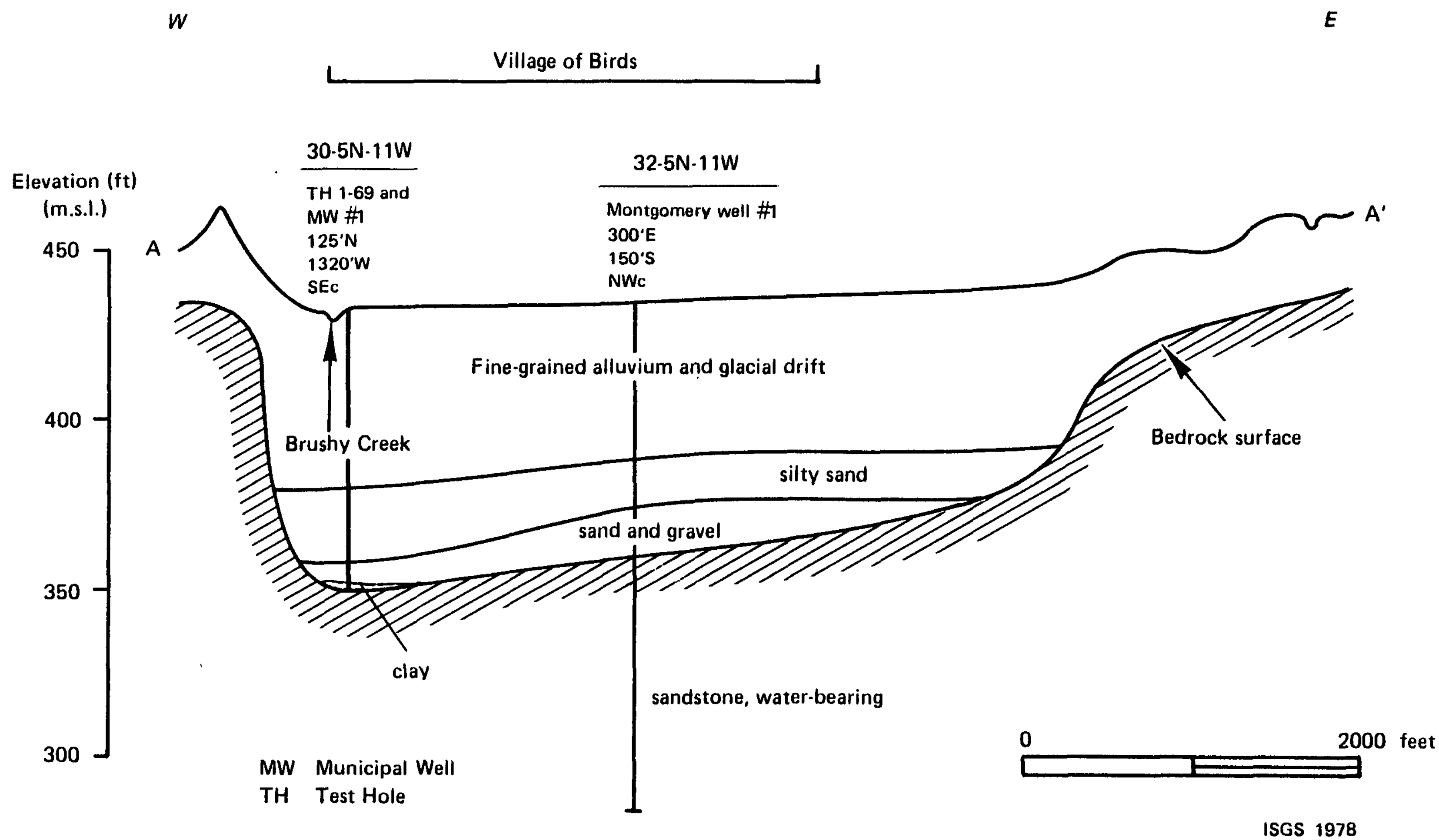


Figure 5. Cross Section A-A', showing surface topography, glacial deposits, and approximate position of bedrock surface near Birds, Illinois. By Robert W. Ringler

extends along the floor of the bedrock valley and becomes siltier south of Pinkstaff. Thus, it appears the deposit is approximately 3000 feet wide, and is probably present along the base of the bedrock valley from several miles north of Birds, southward to its confluence with the Embarras River Valley.

A public water supply was installed in 1970 for the Birds-Pinkstaff area. Well No. 1 was drilled in January 1969 on the west edge of Birds, approximately 125 feet N and 1320 feet W of the SE corner of Section 30, T5N, R11W. The well was drilled to a depth of 82 feet and was cased with six-inch pipe to a depth of 77 feet, followed by No. 18 slot screen from 77 to 80 feet and by No. 20 slot screen from 80 to 82 feet. This well remains the only source for the water supply and reportedly operates 24 hours per day at a rate of 45 gpm (64,800 gpd). Pumpage in 1972 averaged 35,000 gpd.

A well production test was conducted January 17, 1969 on Well No. 1. A coefficient of transmissivity of only 700 gpd/ft was calculated from the early time-drawndown data, while pumping water levels suggested a form of recharge. No observation wells were available, and the coefficient of storage could not be determined. Time-drawdown data indicated that the cone of depression had not intersected any geohydrologic boundaries during the test.

An idealized aquifer model was conceptualized to aid in determining long-term drawdowns caused by sustained pumpage. The aquifer was assumed to be an infinite strip whose width was just larger than the extent of the cone of depression created by the production test of January 17, 1969 (estimated by theoretical analysis to be 1500 feet). A coefficient of transmissivity of 700 gpd/ft was assumed, while a value of 0.1 was selected for a long-term water-table storage coefficient. The effects of geohydrologic boundaries were estimated, using image-well theory.

The long-term sustained yield of the aquifer at Well No. 1 was estimated by considering theoretical time-drawdown and distance-drawdown relationships in the model aquifer. Long-term pumping levels were constrained so as to remain above the top of the aquifer. Based on available information, the long-term sustained yield of the aquifer in the vicinity of Well No. 1 was estimated to be about 75,000 gpd.

The State Division of Water Resources has estimated the water consumption at Birds-Pinkstaff in the year 2000 to average 40,000 gpd. Should additional supplies be needed, a test drilling program would be needed. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for further groundwater development in the area.

Sand and gravel 7 to 15 feet thick at the base of the glacial drift in a buried bedrock valley provide the municipal groundwater supply for the Birds-Pinkstaff Water District. The deposit appears to be about 3000 feet wide and present along the entire length of the buried valley in the study area, a distance of at least 4 miles. The present municipal well is the first recorded attempt to provide a municipal water supply for the district.

Previously, water was supplied from small, privately owned wells finished in the glacial drift in the valley. Future possibilities for further development of the present aquifer appear very good. A resistivity survey is recommended to locate optimal test drilling sites. Another possible area for exploration by resistivity methods is the Embarras River valley south of Pinkstaff.

BROADLANDS

Broadlands is in the southeastern corner of Champaign County in east-central Illinois (Sections 19 and 30, T17N, R11E and Sections 19 and 30, T17N, R14W), approximately 25 miles southeast of Urbana and 12 miles east-northeast of Villa Grove. Two-lane county and state highways and the Missouri-Pacific Railroad serve the study area, which includes the portions of Ts 16 and 17 N, Rs. 10E, HE and 14W, shown on Figure 6, from the topographic maps of the Villa Grove and Newman 15-minute quadrangles.

Broadlands lies in a shallow valley which slopes gently westward between two moraines, the Ridge Farm Moraine to the north and the Hildreth Moraine to the south. Maximum topographic relief in the study area is 110 feet.

The unconsolidated glacial deposits in the Broadlands area consist of drift of Pre-Illinoian, Illinoian, and Wisconsinan age with a range in thickness from 56 to 255 feet, including a surface blanket of Wisconsinan loess 2 to 4 feet thick. The glacial deposits are a complex of ice-laid till, water-laid sand, silt, and gravel outwash and wind-blown silt (loess). The glacial till is relatively impermeable, although where the texture is sufficiently coarse, it can yield small groundwater supplies for private use. The sand and gravel outwash is generally permeable, and where thick enough, can yield moderate to large quantities of water to wells. Outwash deposits occur in three intervals within the drift in the vicinity of Broadlands. The uppermost interval occurs at the base of the Wisconsinan drift as a thin, discontinuous layer of sand. It is 10 feet thick at Broadlands, thins to the west, and pinches out north, east, and south of town (Figure 7).

The middle interval occurs at the base of the Illinoian drift and appears to contain several tongues of till. Its maximum observed thickness is 35 feet. The third interval occurs near the base of the pre-Illinoian drift and has an observed thickness of 5 to 15 feet. Figure 7 indicates possible water-bearing deposits of sand and gravel at depths of 60 to 90 feet, 105 to 160 feet, and below 190 feet to bedrock.

The shallow bedrock in the Broadlands area consists of sandstones, shales, limestone, and coals of the Pennsylvanian Carbondale Formation. Only one recorded water well (Section 19, T17N, R10E) has been developed in bedrock, yielding a maximum of 4 gallons per minute. Oil well records indicate the presence of water-bearing strata at depths below 250 feet, although no mention is made of the amount or quality of water encountered. Drilling into bedrock for a municipal water supply is not recommended until the potential for sand and gravel deposits in the glacial drift to provide the desired supply of groundwater is evaluated.

A public water supply was installed for the village in 1955. Two wells have been drilled and are still in use.

Well No. 1: Drilled in March 1955 to a depth of 71 feet, 7 inches, in the northwest part of town, approximately 600 feet N and 1300 feet W of the

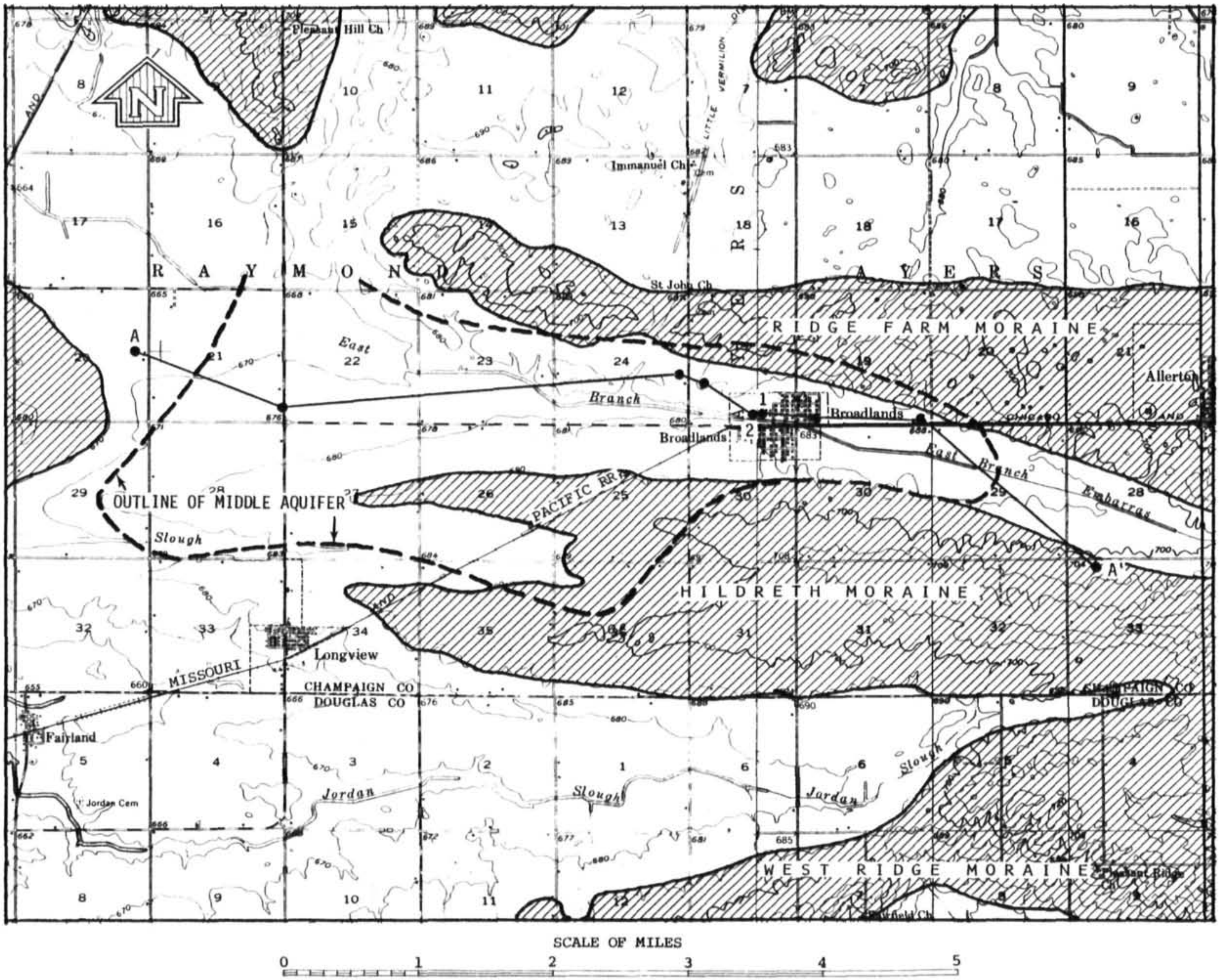


Figure 6. Broadlands study area

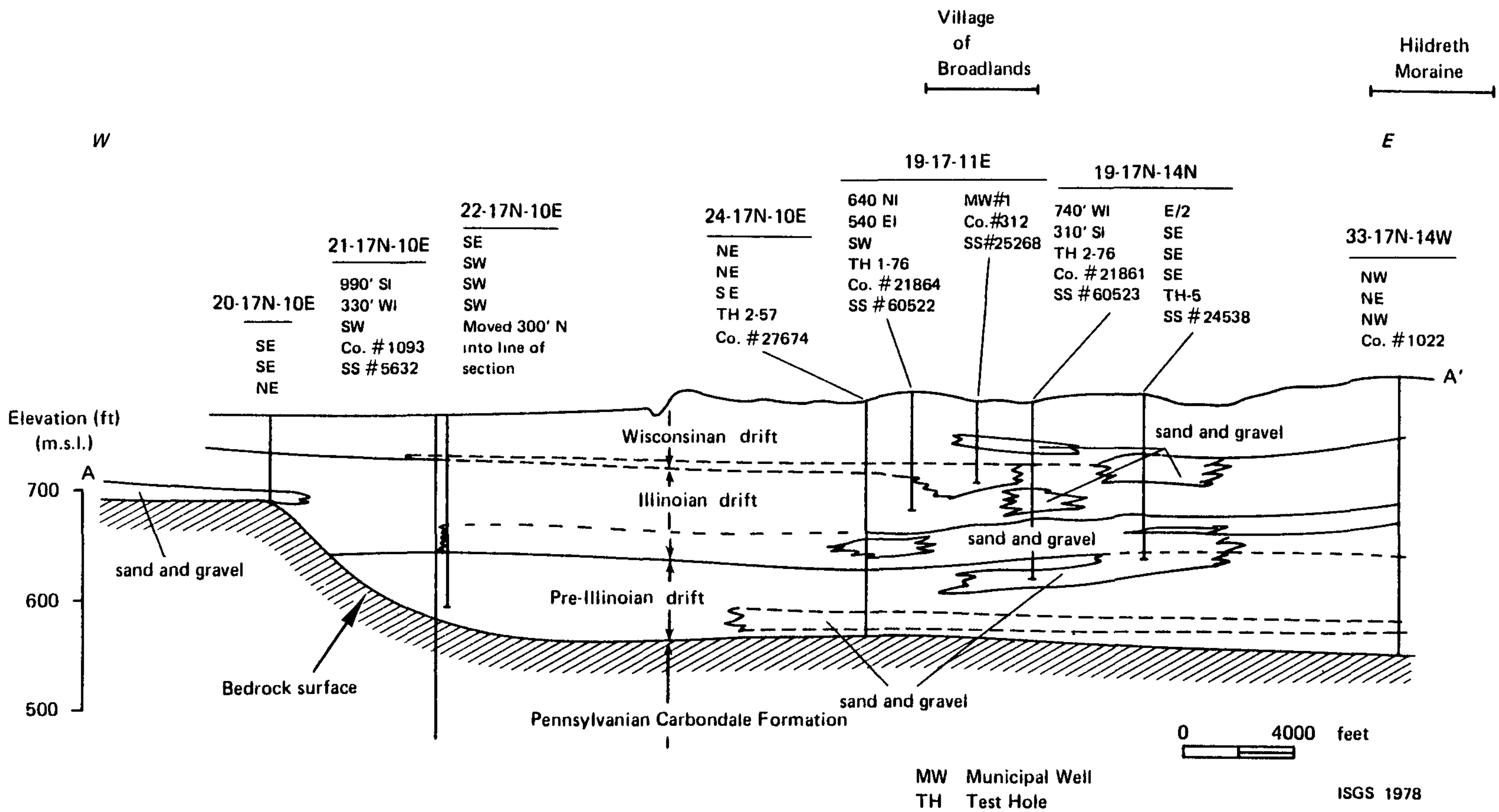


Figure 7. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Broadlands, Illinois. By Robert W. Ringler.

SE corner of Section 19, T17N, R11E. Constructed with 10-inch casing to a depth of 64 feet, followed by No. 80 slot screen to the bottom. Reportedly operates at 35 gpm.

Well No. 2: Drilled in September 1977 to a depth of 78 feet, 150 feet west of Well No. 1. Constructed with 8-inch casing to a depth of 68 feet, and with No. 40 slot screen from 68 to 78 feet. Size of pump unknown but well capacity rated at 10 gpm.

In 1957, when pumpage records were first kept, the daily average pumpage was estimated to be 17,500 gallons. At that time services were not metered. Pumpage exhibited an irregular growth, possibly due to the combined effects of per-capita consumption changes and reductions in use which generally accompany the installation of meters. In 1969, after metering was 100% complete, water consumption dropped to only 14,000 gpd, but since that time pumpage has fluctuated about an average value of 21,000 gpd, which was the reported 1977 withdrawal.

Aquifer tests at Broadlands were conducted on the 1954 test well, Well No. 1, and Well No. 2 on September 30, 1954, March 14, 1955, and October 3, 1977, respectively. Data from all three tests were affected by the presence of geohydrologic boundaries, and it was determined that the aquifer in the vicinity of the well field is very limited in width—approximately 330 feet. A value of transmissivity of 8800 gpd/ft was calculated, while the coefficient of storage was 5×10^{-4}.

The aquifer can be simulated--for calculating sustained yields--by an idealized infinite strip aquifer, 330 feet wide, with a transmissivity of 8800 gpd/ft. Historical drawdowns were duplicated by assuming a steady-state leaky artesian system with a leakage coefficient of 6×10^{-4} gpd/ft .

The idealized model aquifer was used to estimate the sustained yield of the aquifer by utilizing steady-state leaky artesian equations and image-well theory, and by limiting long-term pumping levels to the tops of the screens in the wells. It was determined that a maximum of 25,000 to 30,000 gpd can be developed from either Well No. 1 alone or in combination with Well No. 2.

Estimates of groundwater demand in the year 2000 made by the State Division of Water Resources indicate that 17,250 gpd will be needed at Broadlands by that date. This compares to the estimated 25,000 to 30,000 gpd capability of the aquifer currently being developed. Should additional supplies prove to be necessary in the future, groundwater exploration will be required. The State Geological Survey has offered below their suggestions for such exploration.

The Village of Broadlands has several alternatives to increase their future groundwater supply. The first is to develop the deeper sand and gravel deposits in the glacial drift beneath the town (Figure 7). These occur in the range 515 to 605 feet elevation, depth 80 to 170 feet, and below495 feet, depth 190 feet. Possibilities are good for development of the deposits to the west in Sections 22-24, T17N, R10E along the south flank of the Ridge Farm Moraine. An electrical earth resistivity survey is recommended for this area as a guide to locate test drilling sites. Test drilling into the bedrock for a municipal or supplemental supply is not recommended.

CHENOA

Chenoa is in central Illinois along the northern border of McLean County, approximately 9 miles southwest of Pontiac and 22 miles northeast of Normal. The town of Chenoa lies in Sections 1, 2, 11, and 12, T26N, R4E, and is served by U.S. Route 24, Interstate 55 and the Toledo, Peoria & Western and Illinois Central Gulf Railroads. The study area includes the portions of Townships 26 and 27N, Ranges 3E, 4E, and 5E, shown on Figure 8 taken from the topographic maps of the Flanagan, Pontiac, Colfax, and Normal 15-minute quadrangles.

The surface topography around Chenoa is a product of Wisconsinan glaciation. Approximately two miles southwest of town the broad, rather subdued northwest-southeast trending Minonk Moraine drains to the northeast and southwest. North of the Minonk Moraine, a number of small tributaries flow easterly and empty into the southeasterly flowing Rook's Creek. South of the moraine, Buck Creek and Turkey Creek carry water to the Mackinaw River farther to the south. The total relief is over 80 feet.

The unconsolidated glacial deposits in the Chenoa area consist of drift of Wisconsinan, Illinoian, and pre-Illinoian age with a total thickness ranging from as little as 19 feet, northeast of Chenoa, to nearly 300 feet, at Gridley, west of Chenoa. A tributary of a buried bedrock valley known as the Danvers Valley (indicated by a dashed line on Figure 8), begins in the vicinity of Chenoa and trends westward beyond Gridley. The glacial deposits are a complex of ice-laid till, water-laid sand, silt and gravel outwash, and windblown silt called loess. Illinoian drift only occurs in the western half of the study area (Figure 9), although there may be remnants left in the buried valley east of town. Wisconsinan drift covers the entire area, including a surficial loess blanket 2 to 6 feet thick.

The glacial till is generally impermeable, although where the texture becomes sufficiently sandy, it can yield small supplies sufficient for domestic use. Associated with the tills are sand and gravel outwash deposits. The outwash is generally permeable, and, where present in sufficient thickness, is capable of yielding small to moderately large supplies of groundwater to wells. Sand and gravel deposits occur in three intervals in the drift: the uppermost at elevations of about 665 to 700 feet, depth of 40 to 75 feet; the middle at elevations of approximately 575 to 600 feet, depth of 115 to 135 feet; and the lowermost at or near the base of the buried bedrock valley west of Chenoa, at depths ranging from 174 to 296 feet. The lowest deposit slopes to the west, dropping from elevations of 523 to 540 feet in Chenoa to 454 to 477 feet in Gridley.

The shallow bedrock in the Chenoa area contains predominately gray shales and limestones, with some red shale and claystone, siltstone, and sandstone of the Pennsylvanian Bond Formation.

In the deeper bedrock the Ordovician St. Peter Sandstone at 1410 to 1650 feet depth and the Prairie du Chien Group below about 1900 feet are known aquifers. The 240 foot thickness of the St. Peter is fairly uniform

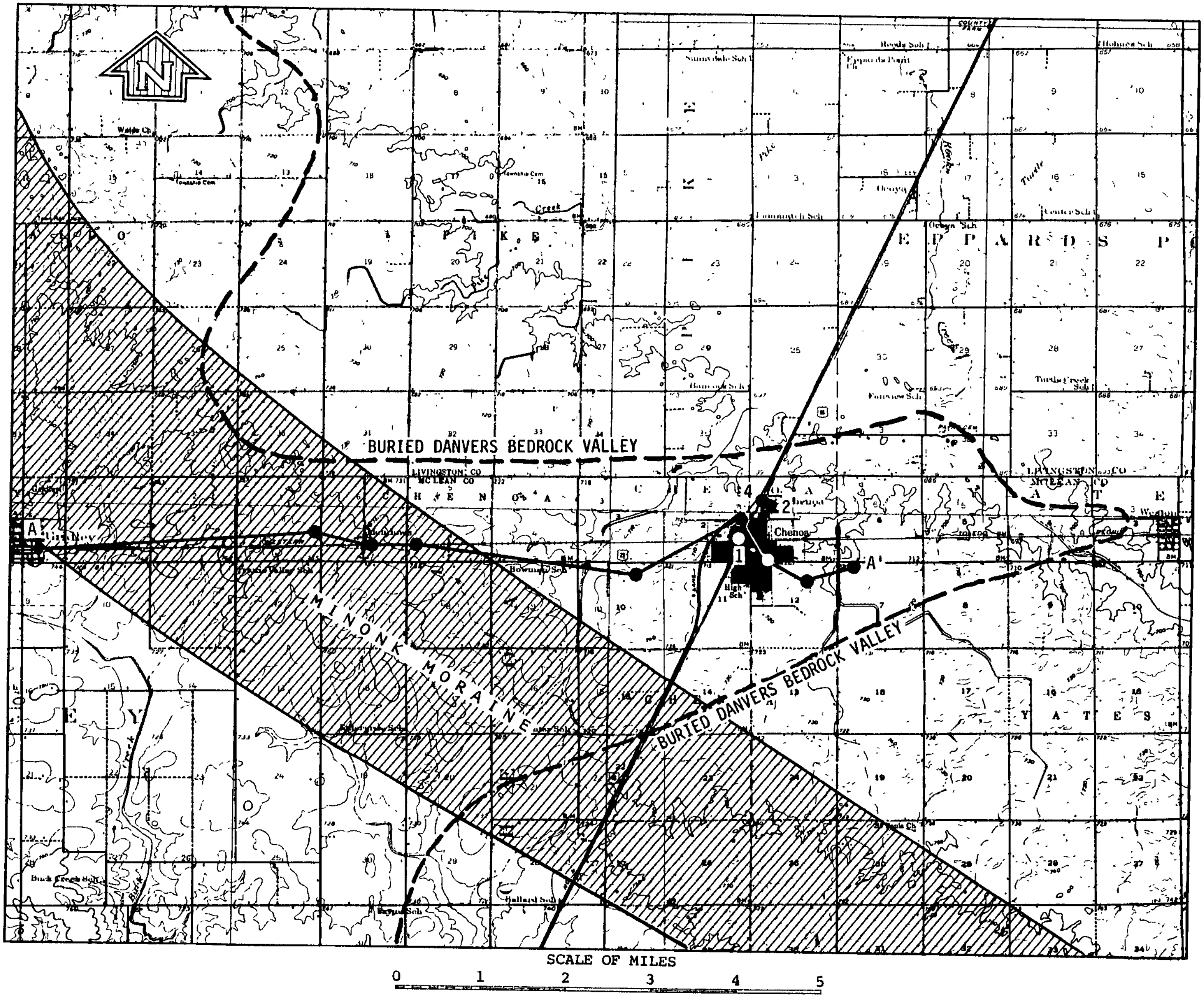


Figure 8. Chenoa study area

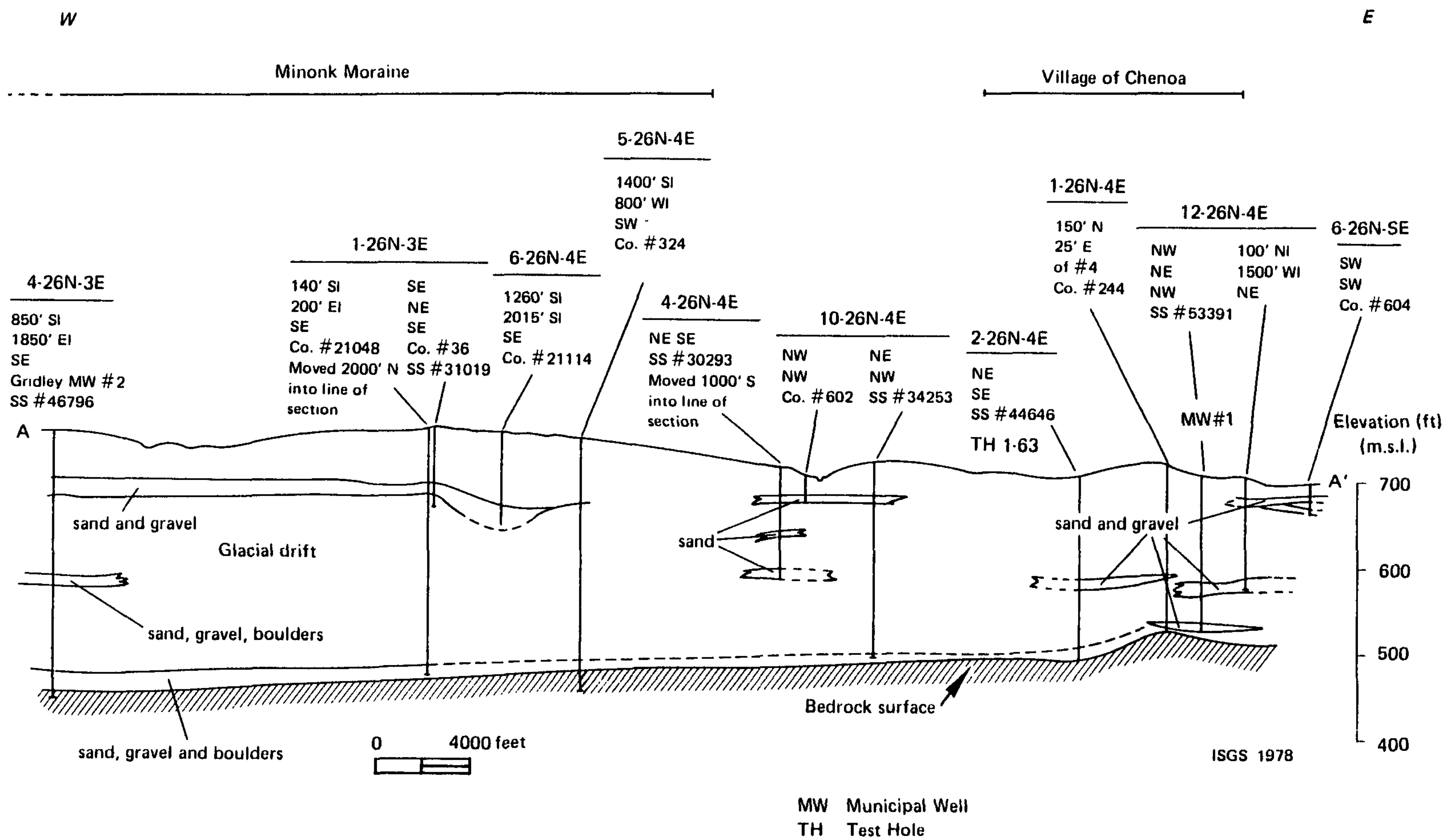


Figure 9. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Chenoa, Illinois. By Robert W. Ringler.

in the study area. In the Prairie du Chien, 16 feet of fine, white sandstone, probably the New Richmond, were penetrated in the bottom of municipal well No. 4. According to the Illinois State Geological Survey Bulletin 95, the New Richmond is 50 to 100 feet thick in this area. Water from the deep bedrock is moderately mineralized.

The city of Chenoa obtains part of its municipal water supply from sand and gravel deposits in the glacial drift and from two deep bedrock wells. One deposit occurring within the drift has a thickness of 10 feet, between 580 and 593 feet elevation. It is approximately 4000 feet or more wide and roughly 1 1/2 miles long. There is some evidence to indicate it becomes thicker and siltier to the south.

A deposit at the base of the drift in the buried bedrock valley also supplies water to village wells. It is 5 feet thick below Chenoa and thickens downstream to the west. It appears to occupy the base of the buried channel with a width of 4000 feet or more, but is probably not continuous along the entire length of the channel, estimated here to be at least 12 miles. The portion of the channel above the village wells is about 4 miles long.

There are no records of wells developed in the shallow bedrock in the study area due to the high percentage of nonwater-bearing shales there. The City of Chenoa has two wells developed in the deep bedrock, obtaining a moderate supply of poor quality water from the St. Peter Sandstone and the Prairie du Chien Group.

A public water supply was installed by the city of Chenoa in 1895. At that time, water was obtained from a 183-foot well, but, due to its low yield, an abandoned coal mine was developed as a supply. In 1897, the mine caved in, as did a nearby well, three years later. From 1900 to 1911, water was purchased from a local cannery in the northern part of town.

Between 1911 and 1973 four wells were drilled in Chenoa, two into the drift and two into the deep bedrock (St. Peter Sandstone and Prairie du Chien group). Three of these wells, Nos. 1, 2, and 4, are still in service, and their locations and construction features are summarized below. Well No. 3 is on emergency standby use.

Well No. 1: Drilled in 1911 to a depth of 2035 feet at the waterworks, approximately 1575 feet N and 725 feet W of the SE corner of Section 2, T26N, R4E. The casing record was as follows: 12 inch, 0-203 feet; 8 inch, 0-478 feet; 5 inch, 796-844 feet; 5 inch, 1680-1780 feet; 4 1/4 inch, 1849-1925 feet; 4 inch, 1925-2003. A four-inch borehole extended from 2003 to 2035 feet. Reportedly operates at 65 gpm on alternate days with Well No. 2.

Well No. 2: Drilled in 1926 to a depth of 194 feet at the Bloomington Canning Company, 1940 feet S and 300 feet E of the NW corner of Section 1. The well was purchased by the city in December 1939. Constructed of eight-inch casing to 174 feet followed by 20 feet of screen. Operates alternately with Well No. 1 at a rate of 42 gpm.

Well No. 4: Drilled in February 1973 to a depth of 1914 feet and located 40 feet northwest of Well No. 2. Sixteen-inch casing was set to a depth of 195 feet and 10-inch casing was set to 1034, below which open hole extended to the bottom. Reportedly operates at 115 gpm.

Pumpage was reported to average 57,000 gpd in 1910. Subsequently, demands declined and reached a low of 35,000 gpd in 1952. Since that year, however, demands have shown a relatively steady increase. By 1976 the average pumpage at Chenoa had reached 218,000 gpd.

The transmissivity of the shallow sand and gravel aquifer tapped by Wells 2 and 3 was estimated from data collected during two production tests. A test was conducted December 9, 1947, on Well No. 2. The transmissivity at this site was estimated from specific capacity data to be 7,400 gpd/ft. A test was conducted on Well No. 3 on April 6, 1966. Data from an observation well 103 feet away (Well No. 2) were used to estimate coefficients of transmissivity and storage. Average values of these coefficients were calculated to be 2700 gpd/ft and 1.2×10^{-4}, respectively.

A well production test was conducted February 9-10, 1973, on Well No. 4 which penetrates the Galena-Platteville Limestone and the St. Peter Sandstone. Data analysis indicated a transmissivity coefficient of about 1970 gpd/ft. The coefficient of storage could not be determined from the data, however, water levels during the test remained well above the top of the aquifer, indicating an artesian condition.

The present operating schedule for the three-well system at Chenoa utilizes the shallow well (Well No. 2) on alternate days for 17.3 hours at a rate of 42 gpm. When not in use, on alternate days, the nonpumping level in Well No. 2 is reportedly 168 feet - six feet above the top of the screen - and when pumping, water levels fall to 186 feet - 12 feet into the screen and only eight feet above the bottom of the well. It is clear that Well No. 2 is being utilized to the extent of its capacity, if not beyond. On a daily use average basis, therefore, the shallow aquifer appears to be limited to 20,000 to 25,000 gpd.

Data from the well production test of February 9-10, 1973, on Well No. 4 suggests that the well might be capable of a sustained yield of as much as 300 gpm. The present pump capacity is 115 gpm. This estimate allows for interference from Well No. 1 and assumes an available drawdown equal to that which was extant at the time of the test - approximately 798 feet. Information concerning Well No. 1 is sparse, indicating only that the daily yield from this well is 65 gpm. Assuming that this is a maximum allowable rate, the total capacity of the two wells could be as much as 365 gpm (525,000 gpd) with the replacement of the pump in Well No. 4 with a pump of larger capacity. It also appears that additional deep wells could be constructed, should pumpage requirements so dictate or should increasing the pump size in Well No. 4 be infeasible. An analysis of theoretical distance-drawdown relationships suggests that such a scheme would require wells spaced one-half mile apart.

Water demands for the year 2000, made by the State Division of Water Resources indicates that 172,000 gpd will be required by the city by that date. The following excerpts from the State Geological Survey Report summarize the recommendations of that agency for exploration to develop additional supplies, should they become necessary.

There are three possibilities for future development of groundwater resources in the Chenoa area. The first is further development of a deposit in the NE 1/4 Section 12 by drilling the suggested location from a 1953 electrical earth resistivity survey. The second is further development of the area west of town. Log descriptions from wells drilled in that area indicate the presence of water-bearing sand and gravel deposits at three different intervals in the drift. The third choice is to drill another deep well to the St. Peter Sandstone and/or a sandstone bed within the Prairie du Chien Group which are found at depths of approximately 1410 and 1900 feet respectively.

COLCHESTER

Colchester is in west-central McDonough County in western Illinois (Figure 10). U.S. 136 and the Burlington-Northern Railroad serve the study area, which includes the portions of Ts 4 & 5N, Rs 3 & 4W, shown on Figure 10, a part of the topographic map of the Colchester 15-minute quadrangle.

The study area lies in the LaMoine River Basin of west-central Illinois. The flat to gently rolling topography of the basin has developed on partially eroded glacial drift overlying the bedrock. The relatively flat drift surface is dissected by a number of steep-walled, southwesterly-trending stream valleys incised to depths of 50 to 80 feet. Surface elevations range from about 495 feet avove sea level in stream valleys in the southwestern part of the area to over 700 feet in the extreme north--a total relief of over 200 feet'. The regional slope of the land surface is southwest toward the southeasterly-flowing LaMoine River.

The unconsolidated glacial deposits in the study area consist of Wisconsinan, Illinoian, and pre-Illinoian drift. Thickness of the drift ranges from 0 to 60 feet in the uplands and along the East Fork to 165 feet in the deeper portions of the major bedrock valleys (Figure 11). South of Colchester, a buried bedrock valley runs parallel to and slightly south of Troublesome Creek and joins the deeper, southeasterly-trending bedrock valley in which the LaMoine River flows. The main drift units are Illinoian and consist of ice-laid till, water-laid sand, silt, and gravel, and wind-blown silt (loess).

The sand and gravel deposits are generally permeable, and where they are thick enough, are capable of yielding moderate to large quantities of water. The tills are relatively impermeable, although where the texture is sufficiently coarse or where sand and gravel lenses occur, they can yield small supplies for private use. Sand and gravel deposits are common in the larger Pleistocene drainageways such as the LaMoine River Valley and the buried bedrock valley adjacent to Troublesome Creek (Figure 11). The buried valley along Troublesome Creek contains sand and gravel deposits 6 to 11 feet thick. The well field for Colchester lies on the northern edge of this buried valley, where wells encounter sand and gravel deposits 6 to 10 feet thick over limestone bedrock, at a depth of 32 feet. One well was drilled an additional 35 feet into the bedrock and draws water from permeable limestone there. Evidence indicates the deposit may be as much as 10,000 feet wide and extend under the bluffs south of Troublesome Creek. Large sand and gravel deposits, 26 to 72 feet thick, occur where Troublesome Creek joins the LaMoine River Valley. These deposits provide excellent possibilities for developing a moderate to large groundwater supply.

Pennsylvanian sandstone, shale, limestone, claystone, and coal make up much of the bedrock surface in the Colchester area, except locally where erosion has removed these softer rocks in the LaMoine River Valley, East Fork, and the buried valley next to Troublesome Creek. Harder Mississippian limestones and shales occur at the bedrock surface in these areas. Small to moderate supplies of water are commonly produced from the Mississippian Burlington-Keokuk Limestone. Small supplies can also be produced

Figure 10. Colchester study area

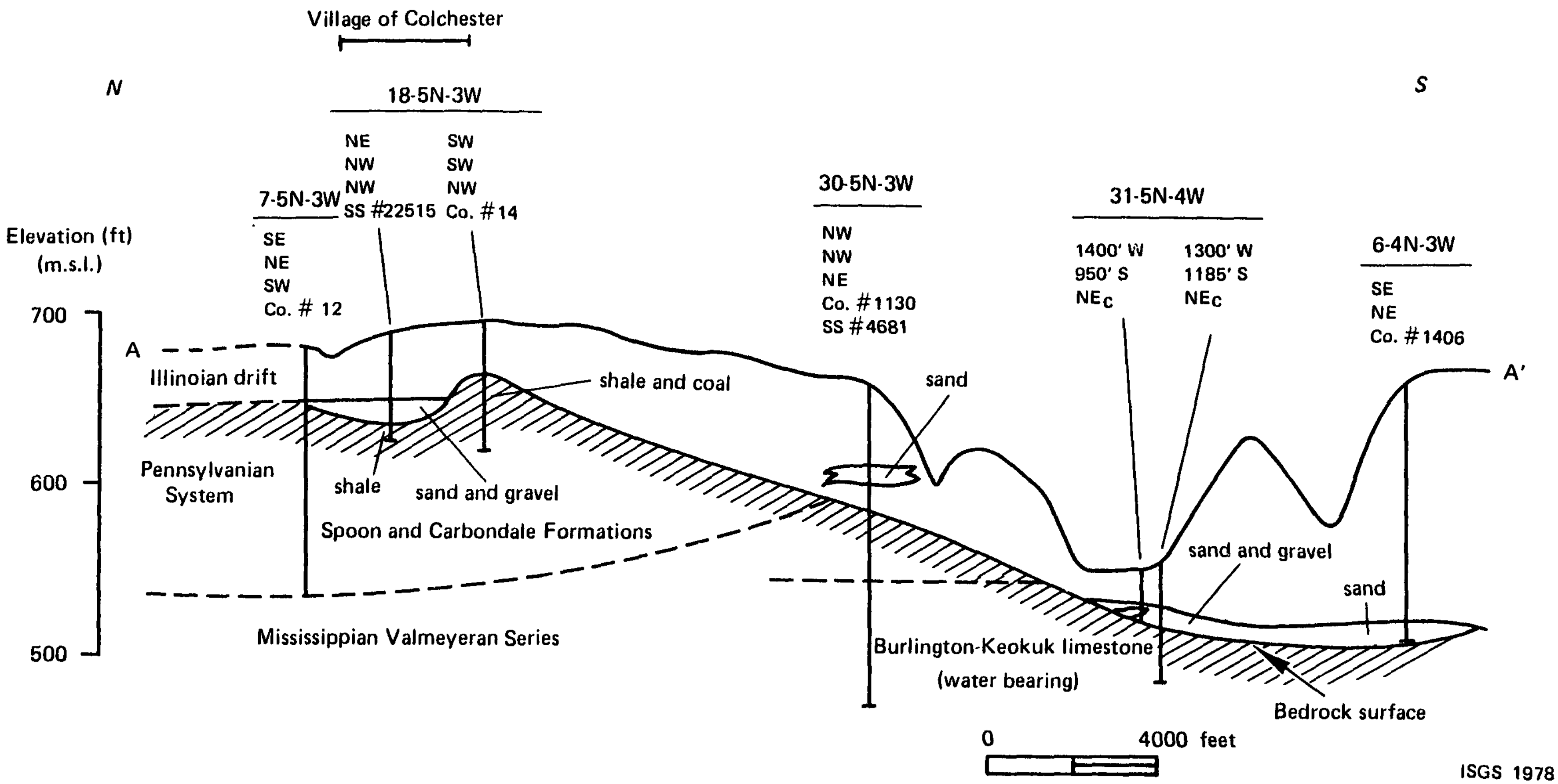


Figure 11. Cross section A-A', showing surface and bedrock topography, glacial deposits, and upper bedrock near Colchester, Illinois. By Robert W. Ringler

from Pennsylvanian sandstones. Possibilities of obtaining a groundwater supply of good quality from deeper bedrock sources are poor because the water is highly mineralized below about 350 feet.

Water was originally obtained from a six-foot diameter well, dug about 1932, and located in the southeast part of town. The well was reportedly 76 feet deep and was connected with abandoned mine workings. Between 1941 and 1972, seven additional wells were drilled, two in town and five in the Troublesome Creek bottoms, three miles south of town. The following summary describes the wells currently in use at Colchester; all others have been abandoned.

Well No. 5: Known locally as No. 1. Drilled to a depth of 32 feet in October 1954 and located in the Troublesome Creek bottoms, 946 feet S and 1412 feet W of the NE corner of Section 31, T5N, R3W. Constructed with 24 feet of 12-inch casing and with 8 feet of screen. Reportedly operates between 80 and 100 gpm, depending on other nearby wells in use.

Well No. 6: Known locally as No. 2. Drilled in May 1955 to a depth of 32 feet and located 1185 feet S and 1300 feet W of the NE corner of Section 31. Deepened in 1972 to 67.5 ft, by drilling 35 feet into underlying limestone. Eight-inch casing was set inside original 12-inch casing and screen to a depth of 32 feet. Depending on other nearby pumpage, operates between 70 and 85 gpm.

Well No. 7: Known locally as No. 3. Drilled in 1969 to a depth of 32 feet and located 1040 feet S and 1300 feet W of the NE corner of Section 31. Constructed with eight-inch casing to a depth of 27 feet and with No. 35 slot screen from 27 to 32 feet. Operates between 65 and 75 gpm.

Well No. 8: Known locally as No. 4. Drilled in 1972 to a depth of 34 feet and located about 200 feet south of Well No. 6. Constructed with eight-inch casing to a depth of 29 feet, followed by five feet of screen. Not operated on daily basis because of high iron content. Operates between 35 and 50 gpm.

The first water consumption figures were not available until 1949, when pumpage was 35,000 gpd. Groundwater withdrawals grew continuously until 1975, when pumpages reached 140,000 gpd. A year-and-a-half of drought forced severe curtailment of water useage, and withdrawals declined to between 80,000 and 90,000 gpd. Present pumpage is reported to be under 100,000 gpd.

Aquifer tests were conducted May 13, 14, and 19, 1975 on Wells 5, 7, and 6, respectively. The wells were pumped for 3 hours each at rates of 60, 50, and 50 gpm, respectively, and it was determined that water table conditions were present at all three wells during the tests. Boundary effects were not apparent, and an average value of transmissivity for Wells 5 and 7, which penetrate sand and gravel, was determined to be 28,500 gpd/ft, while the transmissivity computed for data at Well No. 6 (limestone) was only 5400 gpd/ft. It was felt, nonetheless, that a hydraulic connection existed between the limestone and overlying sand and gravel aquifers.

Recent personal communication with the city consulting engineer determined that a year-and-a-half of drought conditions between 1975 and 1977 forced a curtailment of pumpage to between 80,000 and 90,000 gpd and that as the drought began to end, pumpage approached 100,000 gpd. It became apparent in computing the long-term sustained yield of the well field that, under drought conditions, a total withdrawal in the range of 90,000 gpd was a reasonable figure.

Estimates of mutual interference, based on the more conservative transmissivity value of 5400 gpd/ft and a water table storage coefficient of 0.1, were added to projected long-term drawdowns in each well to determine the optimum combined yield. To simulate drought conditions, nonpumping levels were assumed which corresponded to those extant in 1975, when water levels reflected aquifer conditions under stress. Under these assumptions, it was determined that the practical sustained yield of Wells 5, 6, 7, and 8 would be about 90,000 gpd, which agreed well with the actual operating experience of the city. For this reason, it was concluded that the transmissivity value used in estimating mutual interference was reasonable. For years of normal precipitation it was estimated that the well field could produce about 185,000 gpd on a sustained basis.

Estimates of groundwater demand in the year 2000, made by the State Division of Water Resources, indicate that 171,000 gpd will be needed at Colchester by that date. Additional well fields will need to be developed away from the existing field in order to procure water for continued growth. The following excerpt from the State Geological Survey describes exploration recommended by that agency.

The present municipal well field lies on the northern flank of a shallow, buried bedrock valley. Sand and gravel deposits within the valley are 6 to 11 feet thick, up to 10,000 feet wide, and occur more or less continuously along the lower reaches of the valley. Even more extensive deposits of sand and gravel occur at the confluence of Troublesome Creek and the LaMoine River. Both of these areas have excellent possibilities for further development as groundwater resources. Further testing of the shallow bedrock as a supplement to municipal groundwater supplies is not recommended until the potential of the drift has been fully evaluated.

DIETERICH

The village of Dieterich is in southeastern Illinois at the center of the eastern border of Effingham County (Sections 11-14 and 23, T7N, R7E), approximately 12 miles east-southeast of Effingham. State Route 33 and the Illinois Central-Gulf Railroad serve the study area, which comprises the portion of T7N, R7E and R8E, shown in Figure 12, taken from the topographic map of the Teutopolis 15-minute quadrangle.

Dieterich lies on a gently rolling drift plain that has been partially dissected by a number of southerly and southwesterly flowing streams. Southeast of town, the Big Muddy Creek drains to the south. South and west of town, Dieterich Creek, Bishop Creek and the Little Salt Creek all flow southwestward. North of town, a subdued ridge trends to the north-northeast. Topographic relief is most pronounced along Dieterich and Bishop Creeks which are incised as much as 70 feet below the surrounding drift plain. The maximum relief is over 100 feet.

The unconsolidated glacial deposits in the study area consist of drift of pre-Illinoian, Illinoian, and Wisconsinan age which range in thickness from 5 to 25 feet, beneath the village, to over 100 feet, in south to southwest trending bedrock valleys, several miles west and east of town. Pre-Illinoian drift occurs as the deepest fill in the buried bedrock valleys. Illinoian till comprises most of the glacial drift and is capped by a thin blanket of Wisconsinan loess.

The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash and wind-blown silt (loess). Sand and gravel may be present at any depth in the drift; however, the thicker and more continuous layers appear at elevations of 525 to 530 and 560 feet above sea level. Some of the shallower deposits occur along Dieterich Creek southwest of town in Sections 14, 22, 23, and 27, T7N, R7E. The deeply buried sand and gravel is limited in its distribution to the deeper bedrock valleys. Logs of oil wells, which historically have had a low degree of accuracy in descriptions of glacial drift, report 71 to 116 feet of sand and gravel along Bishop Creek near the SW and NW corners of Section 17, four miles west of town.

The shallow bedrock in the study area consists mainly of non-water-bearing shale, with small amounts of limestone, sandstone, and coal of the Pennsylvanian Mattoon Formation. The mineral content of groundwater in the bedrock increases rapidly with depth, and wells finished below a depth of 130 to 150 feet will yield water that is too highly mineralized for most uses.

Dieterich obtains its municipal groundwater supply from sand and gravel deposits along Dieterich Creek in the SE 1/4 of Section 22 and the SW 1/4 of Section 23. The deposits appear to be related to pre-existing glacial drainage which flowed southward. Subsequent glaciation may have partially removed the coarser sediments and buried the rest, leaving behind discontinuous, elongate deposits of sand and gravel in the creek bottoms. Thicknesses of the deposits range from 5 to 27 feet with textures grading from silty sand to gravel. The width of the sand and gravel

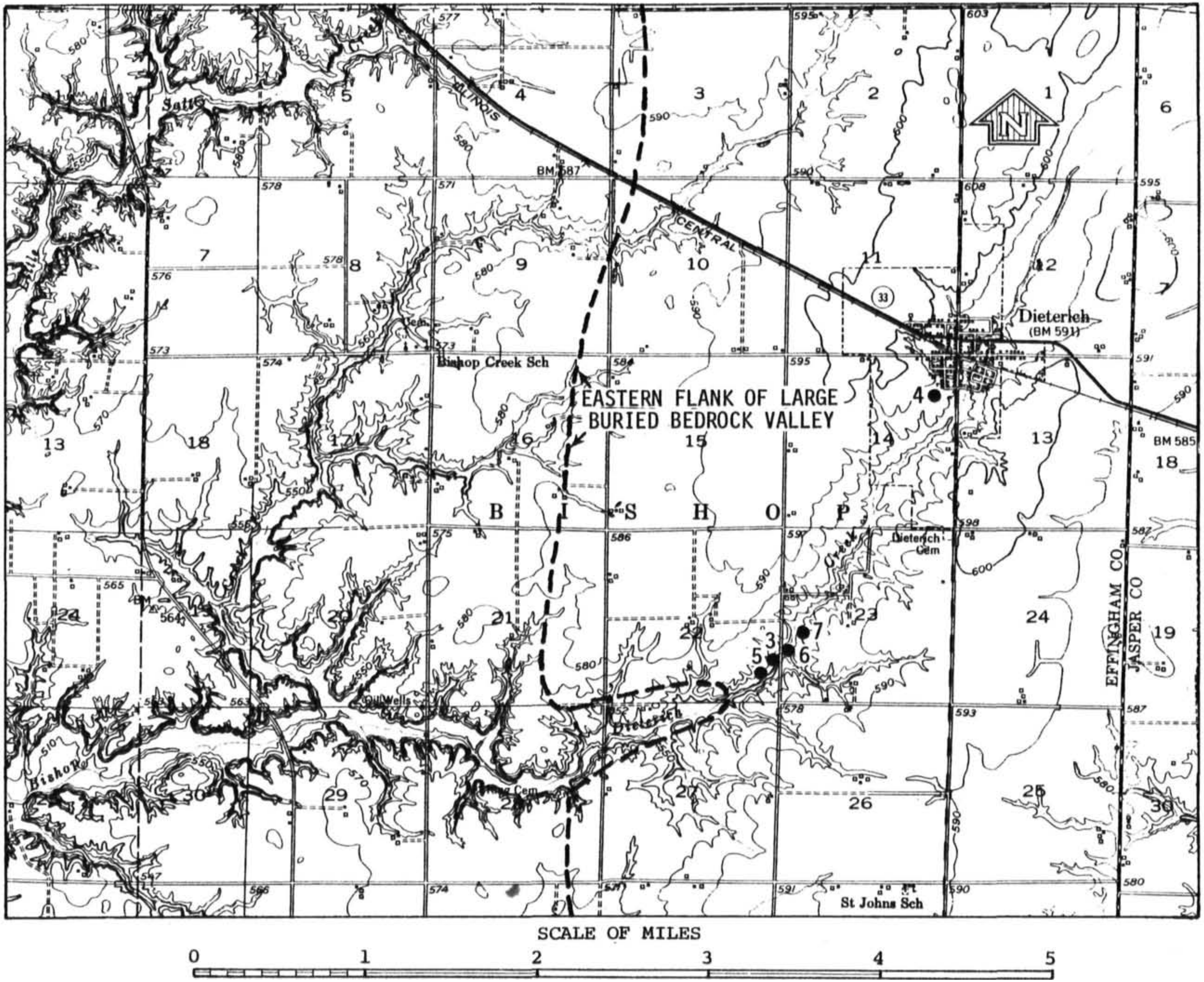


Figure 12. Dieterich study area

beds which supply water to the municipal wells in Sections 22 and 23 is on the order of 100 to 600 feet, with a maximum length of probably not over a quarter mile.

A public water supply was completed in 1953 for the Village of Dieterich (actually, the first well had been drilled in 1949). By 1972, a total of seven wells had been drilled, five of which are still in use. Their locations and construction features are summarized below. Wells 1 and 2 have been abandoned.

Well No. 3: Drilled in March 1956 to a depth of 32.9 feet, 1400 feet N and 50 feet W of the SE corner of Section 22, T7N, R7E. Constructed with 20-inch casing to a depth of 22 feet, eight-inch inner casing to a depth of 24.9 feet, and eight-inch, No. 40 slot screen, from 24.9 feet to the bottom. Gravel was placed in the annulus between the screen and the 24-inch borehole. Reportedly operates at a rate of 25 gpm.

Well No. 4: Drilled in 1959 to a depth of 27 feet, 1300 feet S and 655 feet W of the NE comer of Section 14. Constructed with three-foot sections of 37-inch i.d. concrete tile to a depth of 21 feet. Reportedly operates at a rate of 40 gpm.

Well No. 5: Drilled in October 1960 to a depth of 24 feet, 1000 feet N and 400 feet W of the SE corner of Section 22. A 36-inch concrete tile casing was installed to an unknown depth, and a floor was poured inside the 36-inch casing. An inner casing beginning at the floor extends to an unknown depth. Reportedly operates at 40 gpm.

Well No. 6: Acquired from Fred Goeckner in 1972 (drilling date unknown), 201 feet S and 150 feet W of the NE corner of the SE 1/4 of the NW 1/4 of the SW 1/4 of Section 23. Thirty-inch concrete tile extends from the surface to the bottom at a depth of 30 feet. Reportedly operates at 10 gpm.

Well No. 7: Drilled in 1972 at a location in the NE corner of the SE 1/4 of the NW 1/4 of the SW 1/4 of Section 23. Details of well construction unknown. Reportedly operates at 7 gpm.

Between 1954 and 1960 groundwater withdrawals at Dieterich fluctuated between 11,000 gpd and 13,800 gpd, with no apparent growth trends. In 1964, however, pumpage had increased to 21,000 gpd, and by 1975 it had reached 40,000 gpd, which is the currently reported useage.

A 20-hour aquifer test was conducted on Test Hole 18 (located approximately 1180 feet north and 250 feet west of the southeast corner of Section 22, T7N, R7E) on July 2-3, 1951. The effects of pumping TH 18 at a rate of 25 gpm were observed in observation wells 92 feet to the south, 96 feet to the north and 238 feet northeast of TH 18. The average values of transmissivity and storage coefficient computed by using time-drawdown and distance-drawdown data were 1500 gpd/ft and 0.002, respectively. The data were analyzed using leaky artesian graphical methods, and the coefficients of vertical permeability and leakage for the confining layer were determined to be 0.1 gpd/ft^2 and .000714 gpd/ft^3, respectively.

Using the aquifer and confining bed properties determined above, an idealized aquifer model was assumed — for purposes of computing boundary effects — by assuming, conservatively, that the image wells associated with aquifer boundaries were just beyond the extent reached by the cone of depression in the 1951 aquifer test described above. Image well theory was utilized to compute boundary effects at each well for an aquifer having properties determined from the test. Mutual interference was also calculated and added, together with image effects, to the estimated drawdowns in each well. Available drawdowns were limited to the top of the aquifer and also allowed for seasonal, dry weather declines in nonpumping levels.

By using the idealized aquifer model described above it was estimated that the long-term sustained yield of the 5-well field at Dieterich may be limited to about 45,000 gpd. This agrees quite closely with the operational experience in 1975, when the village found it necessary to purchase additional water as pumpage averaged 40,000 gpd. The aquifer is shallow and quite sensitive to drought conditions as well as periods of heavy recharge, and, therefore, larger withdrawals would be possible on a short-term basis during periods of adequate rainfall.

Projections of groundwater growth at Dieterich made by the State Division of Water Resources indicate that, in the year 2000, daily withdrawals will be about 46,500 gpd. Should additional supplies be needed, exploration will be necessary. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for groundwater exploration.

The area with the greatest potential for future groundwater development lies 2 1/2 to 4 miles west of the village. A well in the NW 1/4 Section 21 (T.H. 11-51) was tested at 25 gpm from sand at 61 to 67 feet. Logs of oil well tests done a mile west of this test at the SW corner Section 17 and the NW 1/4 Section 20 indicate that thick sand and gravel may be present. The reported thickness of the deposits and geologic setting over the buried bedrock valley give this area a high potential for developing an additional municipal water supply for Dieterich.

Exploration for other than small private supplies in the shallow, shaley bedrock is not recommended. Below depths of 130 to 160 feet mineralization increases rapidly with depth and the water becomes too highly mineralized for most uses.

EDINBURG

The Village of Edinburg is in central Illinois in the northwestern portion of Christian County (Sections 13, 14, 23 and 24, T14N, R3W), approximately 8 miles northwest of Taylorville and 16 miles southeast of Springfield. State Route 29 and the Baltimore and Ohio Railroad serve the study area which includes the portion of T14N, R3W shown on Figure 13, taken from the topographic map of the Taylorville 15-minute Quadrangle.

Edinburg lies on a gently rolling drift plain which has been moderately dissected by northwesterly flowing streams and rivers. The South Fork of the Sangamon River flows on the floodplain of an alluvial valley about 2 1/2 miles west of Edinburg. A small stream flowing through town incises a steep-walled gulley in the drift between the village and the river. Bluffs along the east bank of the river have a relief of 40 feet, and the maximum vertical relief in the study area is over 60 feet.

The unconsolidated Pleistocene glacial drift in the study area consists of ice-laid till, water-laid silt, sand and gravel outwash and alluvium and wind-blown silt (loess). The drift is pre-Illinoian, Illinoian and Wisconsinan in age and ranges in thickness from 30 to as much as 60 feet. Water-bearing sand and gravel deposits in the upland drift around Edinburg are generally thin and discontinuous and where present occur in the depth intervals of 30 to 40 feet and 50 to 60 feet (Figure 14).

Deposits of water-bearing, sandy material 25 to 38 feet thick underlie a finer-textured, surficial material 4 to 18 feet thick in the river valley (Figure 14). The lower sediments range from silty sand to sand and gravel and exhibit rapid lateral and vertical variations in texture. Well and test drilling data indicate the lower, sandy deposit extends eastward beyond the confines of the valley bottom. Within the valley, the coarser deposits were deposited on bedrock, but east of the valley the deposits are underlain by glacial drift (Figure 14).

The shallow bedrock in the study area consists of shale, limestone, siltstone, coal and sandstone of the Pennsylvanian Bond Formation. The high proportions of non-water-bearing shale in the shallow bedrock preclude the development of water wells there, and there are no records on file of any wells developed in the shallow bedrock around Edinburg. Generally below a depth of about 200 to 300 feet the water becomes too highly mineralized for most uses, and drilling into the bedrock for a municipal ground-water supply is not recommended.

Edinburg obtains its municipal groundwater supply- from a deposit composed primarily of sand in and near the valley of the South Fork of the Sangamon River. The well field is located in the south-central part of Section 16, T14N, R3E. In the well field the deposit varies in thickness from 25 to 38 feet, with the coarser-textured sands and gravels generally occurring at or near the base. However, textures undergo rapid lateral and vertical gradations, greatly affecting the water-yielding capacity of the sediments. Well logs and resistivity data indicate the deposit extends approximately two miles downstream and at least one-half mile upstream. At the well field, data show it to be over 2000 feet wide, extending from the

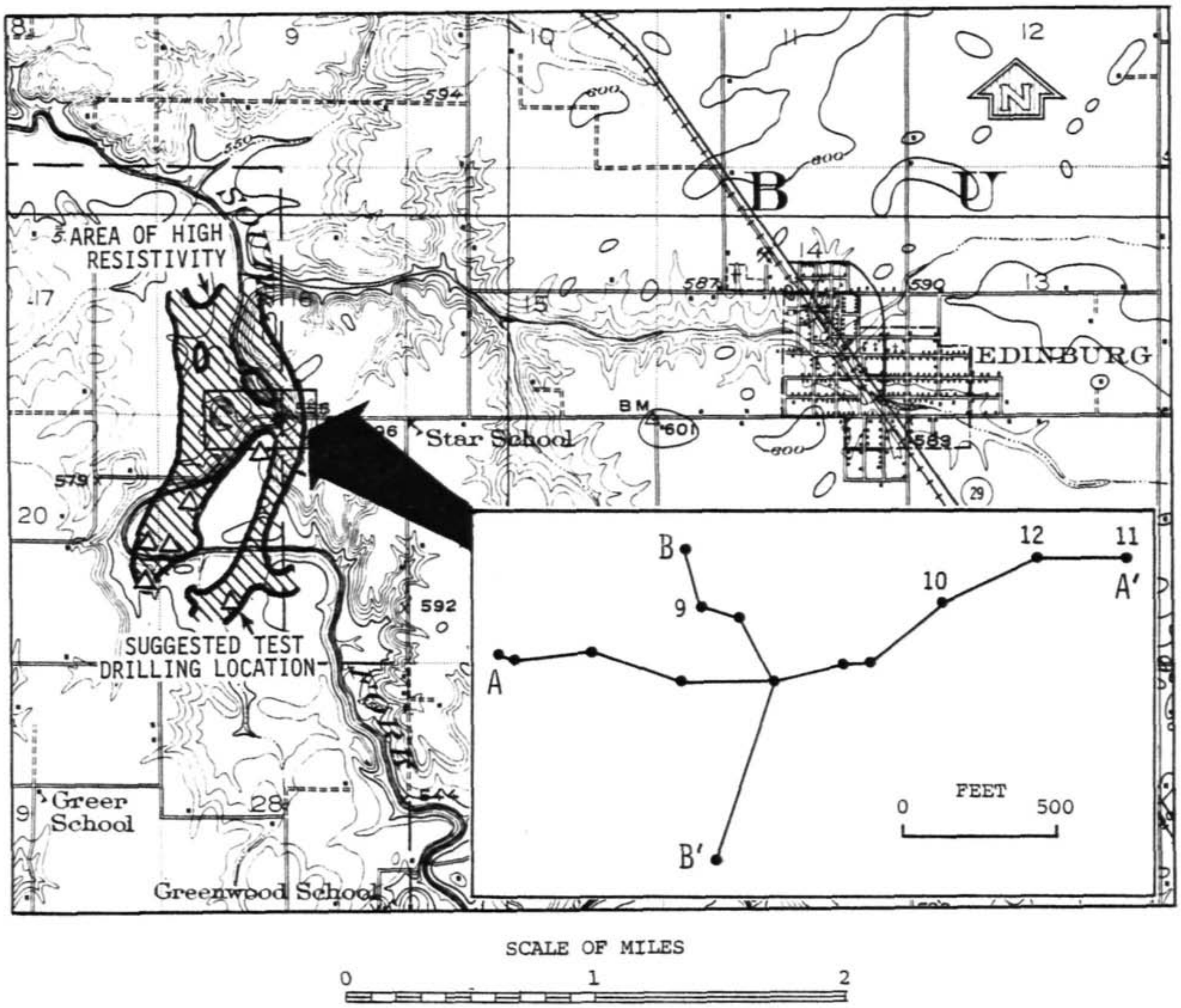


Figure 13. Edinburg study area

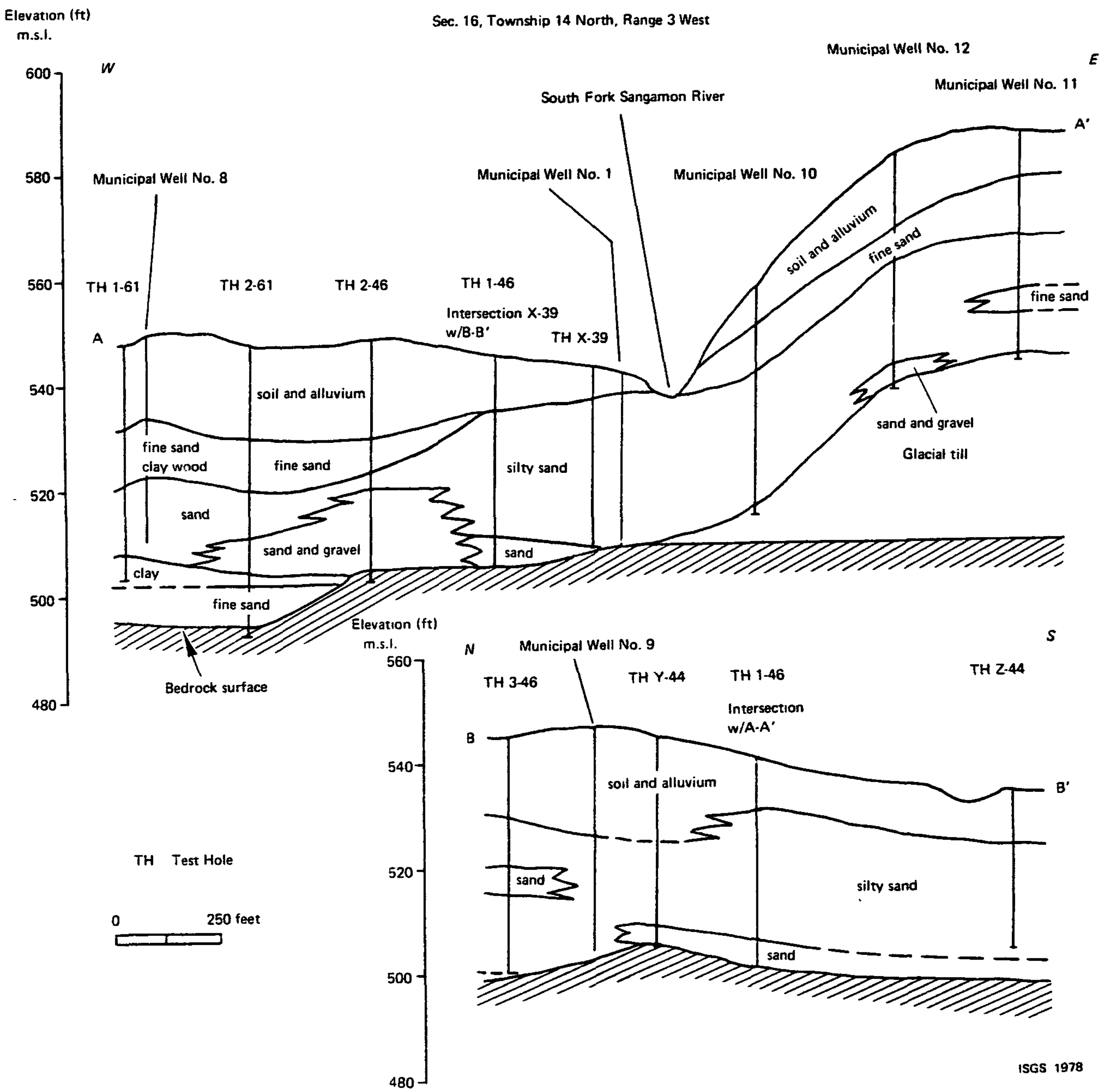


Figure 14. Cross sections A-A' and B-B', showing surface topography, glacial deposits, and bedrock surface in the Edinburg municipal well field. By Robert W. Ringler

center of the South Fork floodplain eastward below the bluff Figure 14). It is unlikely the sand extends very much farther eastward, but there is a good chance it extends farther westward in the valley bottom, giving it a total width of approximately 3000 feet.

A public water supply was installed in 1939 by the village of Edinburg, when wells were drilled along the west bank of South Fork, Sangamon River, about 2 1/2 miles west of town. By 1977 a total of 12 wells had been drilled, four of which are still in use. The following summary describes the locations and well construction features of these four wells (Nos. 9, 10, 11, and 12).

Well No. 9: Drilled in May 1961 to a depth of 43 feet, 250 feet N and 1850 feet E of the SW corner of Section 16, T14N, R3W. Cased with eight-inch pipe to a depth of 33 feet and with No. 30 slot screen from 33 to 43 feet. The annulus between the screen and the 34-inch borehole was filled with gravel. Reportedly operates at a rate of 35 gpm.

Well No. 10: Drilled in April 1974 to a depth of 44 feet, 260 feet N of the SE corner of the SW 1/4 of Section 16. Twenty-eight-inch outer casing was placed to a depth of 10 feet, and eight-inch inner casing was placed to 29 feet, followed by No. 6 slot shutter screen from 29 to 44 feet. The annulus between the screen and the 22-inch borehole was filled with gravel. Reportedly operates in combination with Well No. 11 at a combined rate of 60 gpm.

Well No. 11: Drilled in September 1974 to a depth of 44 feet, 400 feet N and 600 feet E of the SW corner of the SE 1/4 of Section 16. Cased with 24-inch outer casing to 10 feet and with 10-inch inner casing to 29 feet, followed by 15 feet of No. 6 slot shutter screen. Gravel was placed in the annulus between the screen and the 26-inch borehole. Reportedly operates simultaneously with Well No. 10 for a combined rate of 60 gpm.

Well No. 12: Drilled in April 1977 to a depth of 42.5 feet, 400 feet N and 300 feet E of the SW corner of the SE 1/4 of Section 16. Cased with 12-inch pipe to 32.5 feet and with 10 feet of No. 6 slot shutter screen. The annulus between the screen and the 30-inch borehole was gravel packed. Reportedly alternates with Wells 10 and 11 (combined) at a rate of 60 gpm.

Average groundwater withdrawals at Edinburg have grown from 24,000 gpd in 1948 to the current 97,500 gpd.

Aquifer properties at Edinburg have been estimated from analysis of data from nine production tests. Values of transmissivity were found to be consistently low, ranging between 1250 and 6000 gpd/ft and averaging only 3580 gpd/ft. None of the tests had observation well data from which coefficients of storage could be determined; however, pumping water levels were generally all under water-table conditions. The extent of the aquifer was indeterminable from test data; however, from the configuration of the stream valley and geologic reports a reasonable estimate of between 1000 and 2000 feet was made for the aquifer width. A long-term coefficient of storage of 0.2 appears reasonable for such deposits under water-table conditions.

In order to estimate long-term boundary effects an idealized aquifer model was utilized. Transmissivity and storage coefficients of 3580 gpd/ft and 0.2, respectively, were assumed for the model aquifer. The effects of image wells associated with boundaries from a 1000- and 2000-foot strip aquifer were calculated and added to theoretical drawdowns caused by aquifer losses, dewatering, and mutual interference between wells. Total drawdowns were limited such that dewatering was 50% or less of the saturated thickness of the aquifer at each well. The results indicated that a 1000-foot strip was too conservative when compared with the operational experience at Edinburg. The aquifer was idealized, therefore, as a 2000-foot strip for image-well computations.

The model aquifer analysis indicated that the optimum development of the aquifer could be made by utilizing a three-well scheme of pumpage rather than all four present wells. The three-well system would not include Well No. 12, since its mutual interference effects with Wells 10 and 11 are significant. This is in agreement with actual reported operating conditions. Based on available information, therefore, the long-term sustained yield of a three-well system would be approximately 75 gpm, or 110,000 gpd.

The State Division of Water Resources has estimated the average water demand at Edinburg in the year 2000 to be nearly 105,000 gpd. Should additional water supplies be needed at that time a program of groundwater exploration will be required. The following excerpt from the State Geolgical Survey summarizes the recommendations of that agency for such an exploration program.

Twelve test holes drilled with the village in 1938 demonstrated a lack of water-bearing deposits in the drift and shallow bedrock. Resistivity surveys were conducted in 1935, 1938, 1944, 1960 and 1976. The South Fork valley bottom in Sections 16, 17, 20 and 21, T14N, R3W and the uplands around Edinburg have been thoroughly explored. Areas of higher resistivity have been delineated and sites recommended for test drilling in Sections 20 and 21. Another site for ground-water exploration is the southeast corner of Section 21, between the river and the bluffs where accumulations of water-bearing sand and gravel may be large enough to provide a supplemental groundwater supply. Due to rapid changes in texture both laterally and vertically in the sediments, a resistivity survey is recommended for the area to locate a site for test drilling.

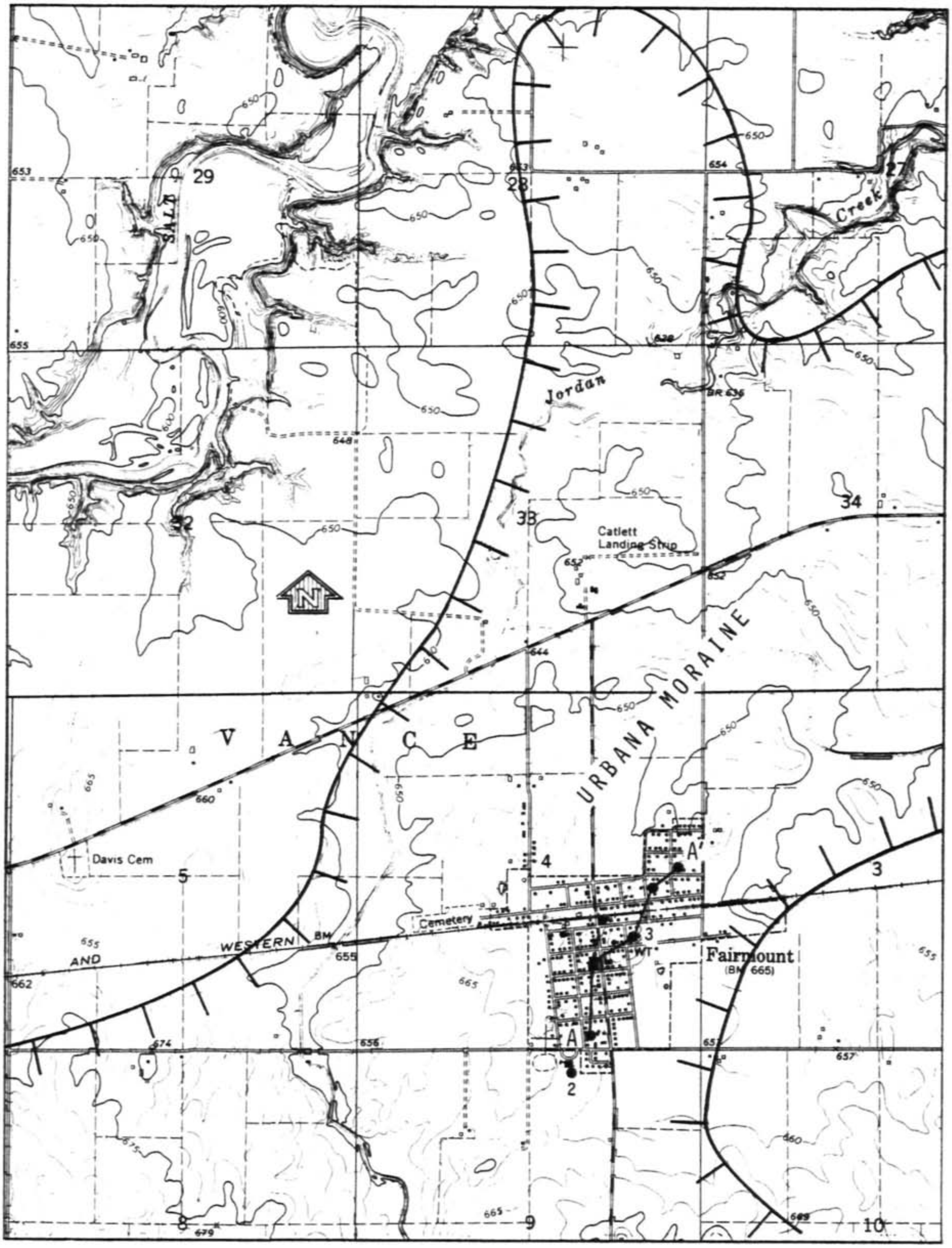
FAIRMOUNT

The village of Fairmount is in east-central Illinois in the southwestern portion of Vermilion County, approximately 10 miles southwest of Danville and 20 miles east-southeast of Urbana in Sections 3, 4, and 9, T18N, R13W. The area is served by two-lane state and county highways and the Norfolk and Western Railroad. The study area includes the southern portion of T19N, R13W, and the northern portion of T18N, R13W, and is shown on Figure 15, taken from the topographic map of the Oakwood 7 1/2-minute quadrangle.

Fairmount is situated on a lobe of the Urbana Moraine extending north from the main body which passes in an east-west direction through the southern portion of the study area (Figure 15). Topographic expression on the moraine is very subdued, with about 50 to 60 feet of total relief. Surface drainage on the Urbana Moraine is northward through Jordan Creek and smaller tributaries into the easterly flowing Salt Fork of the Vermilion River. Maximum topographic relief is approximately 160 feet.

The unconsolidated glacial deposits in the study area consist of Wisconsinan drift deposited on older materials which had been partially removed from the bedrock surface by advancing Wisconsinan glaciers. The drift deposits have a thickness of 25 to 58 feet with the maximum observed thickness in the center of Fairmount. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash and windblown silt (loess). Fairmount obtains part of its municipal water supply from Municipal Well No. 3 (Figure 16) developed in a sand and gravel deposit (outwash) at a depth of 44 to 48.3 feet in the drift. A test hole (TH 5-50), drilled within 20 feet of the present well, indicated 9 feet of water-bearing gravel present from 42 to 51 feet. Available data suggests the deposit trends to the northwest, thins to the south and terminates rather abruptly to the north and east. An anomalous thickness of sand and gravel reported in TH 5-64 is suspect, because it occurs at a higher elevation than the rest of the deposit and is located within 500 feet of Test Hole 2-50, which has no sand and gravel present (Figure 16). Thickness of the main body ranges from 1 to 9 feet, with an average of about 5 feet. Its width may be as great as 1000 to 1200 feet in the center of town, but where the deposit trends northwest, it narrows down to approximately 600 feet between Test Holes 3-50 and 1-64. Its length is at least one-half mile and possibly a mile or more.

The shallow bedrock in the Fairmount area contains sandstone, shale, limestone and siltstone of the Pennsylvanian Bond Formation. Driller's records indicate several wells in the south part of the village are finished in the shallow bedrock, receiving water from a sandstone bed at a depth of 45 to 50 feet. The sandstone bed thickens from 4 to 9 feet in Municipal Well No. 1-50 and Test Hole 7-50 in the SE 1/4, Section 4 to 26 feet in Municipal Well 2-50 in the NE 1/4, Section 9, T18N, R13W. Although the municipal wells have a moderate capacity, the sandstone body was only recognized in one other well and seems to be limited in extent. The shallow Pennsylvanian bedrock normally yields only very small groundwater supplies in this area.



SCALE OF MILES
0 1 2

Figure 15. Fairmount study area

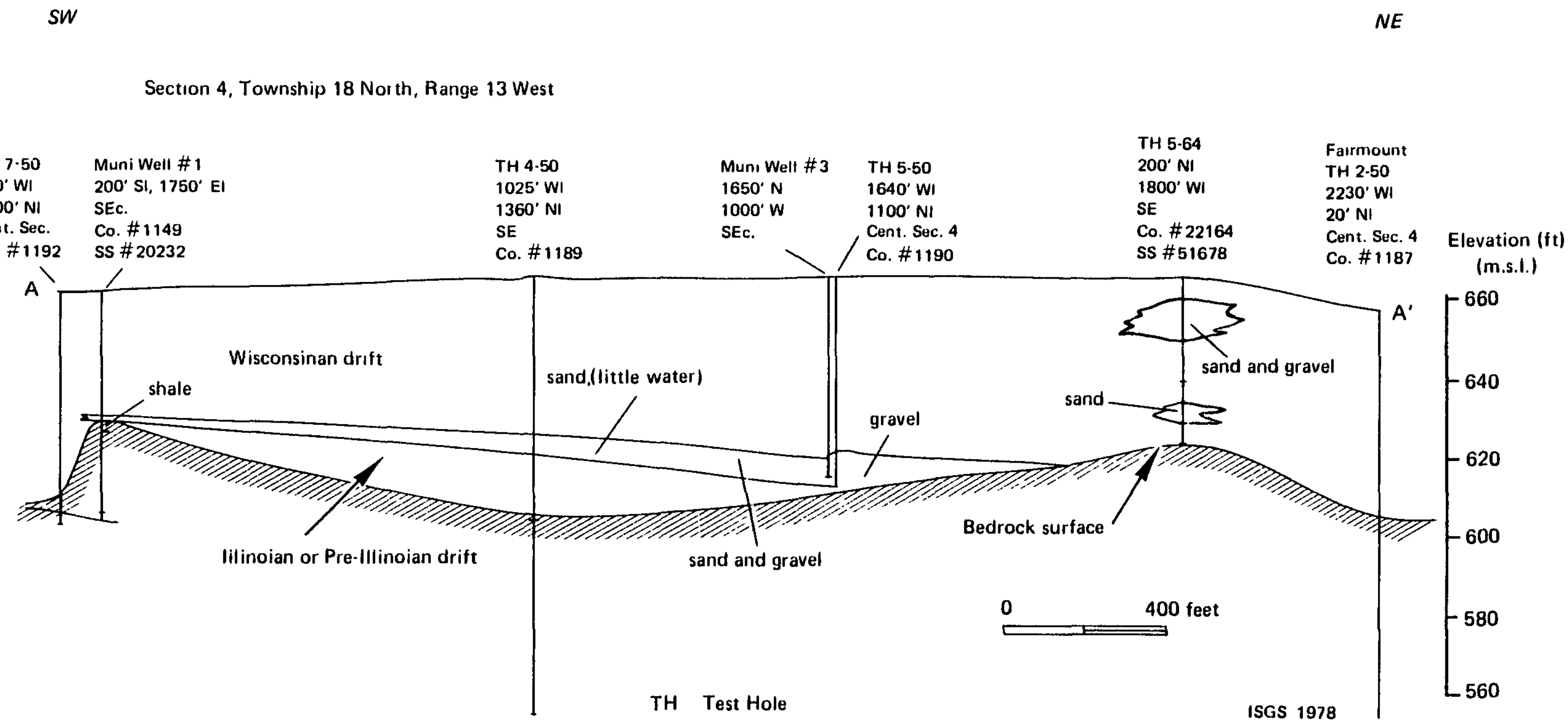


Figure 16. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Fairmount, Illinois. By Robert W. Ringler.

A public water supply for the Village of Fairmount was installed in 1950, when two shallow wells were drilled into bedrock. By 1964, a third well - this time tapping the drift - had been drilled. The following summary describes the locations and construction features of Wells 2 and 3, which are still in use. Well No. 1 has been abandoned.

Well No. 2: Drilled in June 1950 to a depth of 72 feet, about 1/8 mile south of Well No. 1, or approximately 340 feet S and 1890 feet W of the NE corner of Section 9, T18N, R13W. The well was cased through the drift with 46 feet of 10-inch pipe and left open below that depth. Reportedly operates at 40 gpm.

Well No. 3: Drilled in August 1964 to a depth of 48 feet, 1650 feet N and 1000 feet W of the SE corner of Section 4. Constructed with 10-inch casing to a depth of 44 feet and with No. 30 slot screen from 44 feet to the bottom. Reportedly operates at 45 gpm.

Water consumption grew quickly from 18,000 gpd in 1952 to 60,000 gpd in 1960. Between 1960 and 1972 average withdrawals fluctuated considerably, from a high of 75,000 gpd in 1963 to a low of 43,000 gpd in 1966. Since 1972, however, daily pumpage has remained about 60,000 gpd.

A well production test was conducted on Well No. 3 on August 17-18, 1964. Data from the test indicated a coefficient of transmissivity of 2460 gpd/ft and a water-table storage coefficient. The effects of geohydrologic boundaries were not observed during the test.

Bedrock production tests were conducted May 12-13 and June 12, 1950, on Wells 1 and 2, respectively. Values of transmissivity obtained from analysis of the data were 900 gpd/ft and 1015 gpd/ft, respectively, and water level data indicated a conversion from artesian to water-table conditions.

Data from the 1964 well test and other available information for Well No. 3 indicate that the shallow sand and gravel aquifer tapped by this well is thin and of limited areal extent. Nevertheless, sufficient drawdown is available to permit development of a modest water supply. Analysis of data collected during the 1964 well test suggests that about 50 gpm (72,000 gpd) can be developed on a long-term, sustained basis.

Analysis of time-drawdown data from the production test of Well No. 2 indicated an aquifer system which converts from artesian to water table conditions under long-term sustained pumpage. Based on this information the long-term yield was estimated, with the constraint that the aquifer must not be dewatered more than one-half of its saturated thickness. No additional drawdown, such as from interference from additional wells, was taken into account. Therefore, the sustained yield of the bedrock aquifer within a reasonable distance of town is essentially equal to the practical sustained yield of Well No. 2, which was calculated to be about 25 gpm or 36,000 gpd.

The total practical sustained yield of aquifers currently being pumped by Wells 2 and 3 is about 75 gpm or 108,000 gpd. It is doubtful whether additional wells into these aquifers within reasonable proximity to Wells 2 and 3 would significantly increase this total.

Projected groundwater demands made by the Division of Water Resources indicate that the village will need 65,000 gpd by the year 2000. The following summary, excerpted from the State Geological Survey Report, indicates areas recommended by that agency for exploration to develop additional groundwater supplies.

The village of Fairmount obtains part of its municipal groundwater supply from a well developed in a sand and gravel deposit in the drift. The deposit ranges from 1 to 9 feet in thickness, averaging about 5 feet at a depth of 20 to 44 feet, is 600 to 1200 feet wide, one-half to one mile or more long and trends to the northwest from the center of town. It thins to the south and pinches out rather abruptly to the north and east. Possibilities for future development of the aquifer appear good on the northwest corner of town in the NW 1/4, Section 4, T18N, R13W. Additional resistivity surveying is recommended to locate an optimum site for test drilling. A second area of possible outwash development is a small rise northeast of town. A drilling site is recommended for that location. A third potential area for goundwater exploration is adjacent to the Salt Fork in the NW 1/4, SE 1/4, Section 29, T19N, R13W. A municipal well is developed in the shallow bedrock, receiving water from a sandstone bed that appears to thicken to the south. Further development of this aquifer is possible but not recommended, until the potential of the drift aquifers to provide adequate supplies is fully evaluated.

FILLMORE

The village of Fillmore is in southeastern Montgomery County (Sections 23 and 26, T8N, R2W) in south-central Illinois. It is approximately 15 miles northwest of Vandalia and 12 miles east-southeast of Hillsboro. Two-lane state and county roads and the Norfolk and Western Railway serve the study area which includes the portions of T7N, and T8N, R1W and R2W, shown on Figure 17, an excerpt from the topographic maps of the Hillsboro and Ramsey 15-minute quadrangles.

Fillmore lies on a gently rolling glacial drift plain which has been partially dissected by a number of southerly-flowing streams. In many places, ridges and kames of drift materials are elevated 50 to 100 feet above the surrounding till plain, and the maximum topographic relief is 190 feet.

The unconsolidated glacial deposits in the study area consist of drift of pre-Illinoian, Illinoian and Wisconsinan age with a range in thickness from 40 to as much as 200 feet. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel, outwash, and wind-blown silt (loess). The Illinoian drift consists of two lower till units (Smithboro and Vandalia), which in places are separated by a discontinuous layer of silt, and an upper unit called the Hagarstown Member. The Vandalia Till Member locally contains small, thin lenses of sand and gravel which may be water-bearing. The Hagarstown Member is the main water-yielding unit in the study area, grading from gravelly till and poorly sorted gravel on the plains to sand and well-sorted gravel along the trends of ridges. It lies stratigraphically above the Vandalia Till and occurs both on the surface of the till and in erosional channels incised in it. Surface expressions are in the form of kames and elongate ridges.

The shallow bedrock in the study area consists of shales, limestones, sandstones and coals of the Pennsylvanian Bond and Mattoon Formations. The Mattoon Formation overlies the Bond, and both dip easterly toward the center of the Illinois Basin.

The village of Fillmore obtains its municipal water supply from sand and gravel deposits in the Hagarstown Member approximately one-half mile east of the village limits (Figure 17). The location of the deposits in relation to topographic features and other sand and gravel deposits is shown in Figure 18. Municipal Well No. 1 receives water from a thick sequence of sand, gravel, and cemented sand, having a maximum thickness of 53 feet observed in Test Hole 5-62, 400 feet north of the municipal well. What was thought to be sandstone in the bottom of the municipal well is apparently a layer of cemented sand that correlates with a similar layer in Test Hole 5-62. Data from Test Holes 4-62 and 5-62 indicate there is probably more water-bearing sand below the bottom of the municipal well. The deposit from which Municipal Well No. 1 receives water has a total width of approximately 2000 feet, although its effective width is nearer 1000 feet, since much of the deposit has a lower elevation than the base of the long

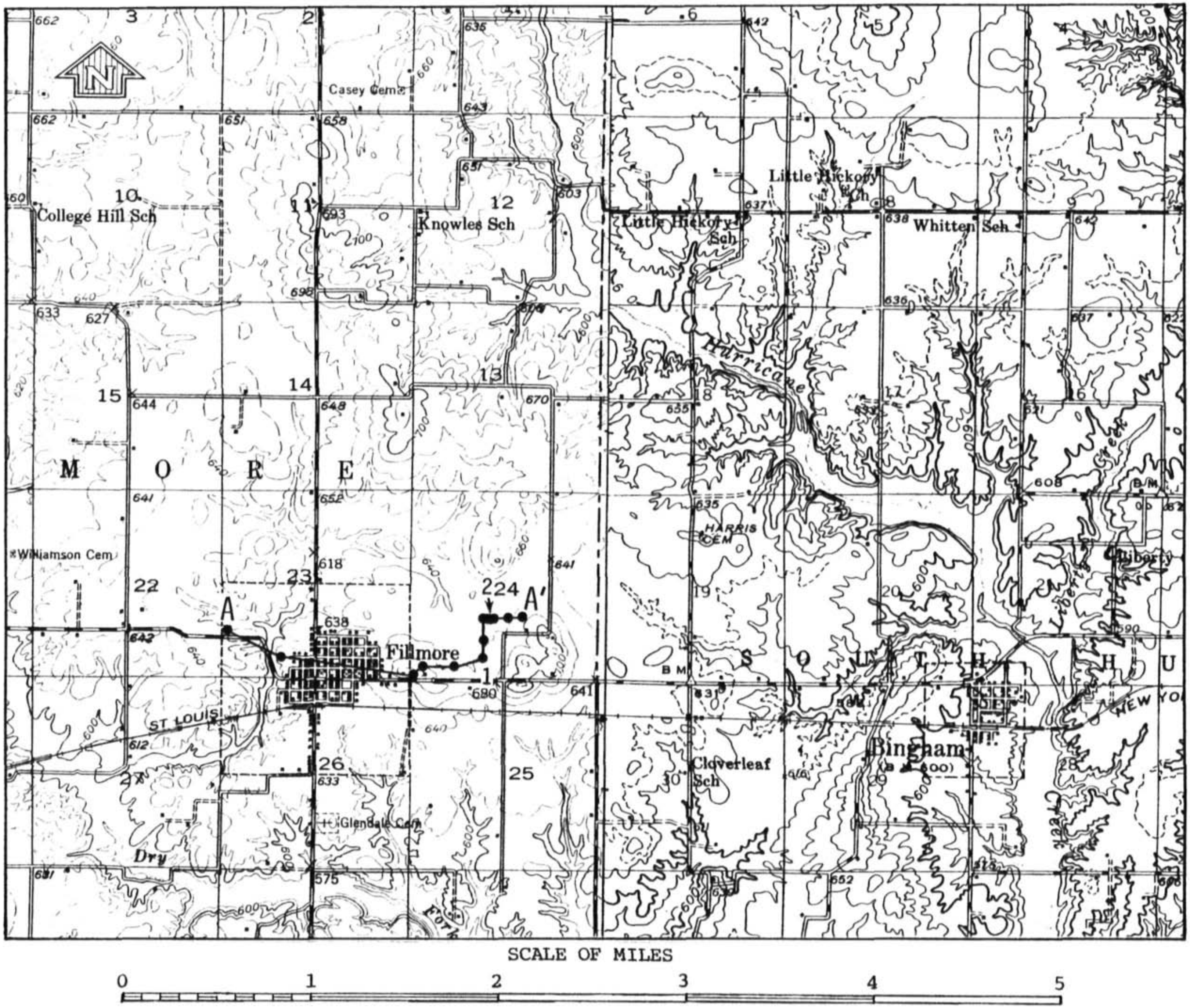


Figure 17. Fillmore study area

axis of the deposit between the municipal well and Test Hole 4-62. The deposit may be one-half mile or more long, trending northwest, with the well located near the head of the sand and gravel deposit at the crest of the hill. The texture probably becomes finer and better sorted away from the hill.

The deposit at Well No. 2 has a maximum observed thickness of 26 feet and is approximately 400 feet wide. It appears to have been deposited in a branch of the same stream which deposited the sand and gravel found in Municipal Well No. 1. Its long dimension cannot be accurately determined from available data, but is probably less than one-half mile and trends to the northeast. The size and shape of these deposits agree with previous interpretations of well and geophysical data which indicate that thick, widespread deposits are generally not present in the study area and that sand and gravel deposits are commonly found associated with kames and ridges on the drift surface.

A public water supply for the village of Fillmore was placed into operation in the summer of 1963. Two wells have been constructed and are both in use at the present time. Construction features and locations of these wells are summarized below.

Well No. 1: Drilled in December 1962 to a depth of 40 feet, one-half mile east of town, or approximately 520 feet N and 2000 feet E of the SW corner of Section 24, T8N, E2W. Eight-inch casing was set to a depth of 30 feet, followed by No. 6 slot shutter screen to the bottom. The annulus between the screen and the 22-inch borehole was gravel packed. Reportedly operates at 16 gpm.

Well No. 2: Drilled in July 1977 to a depth of 63 feet, 2000 feet N and 2465 feet E of the SW corner of Section 24. Six-inch casing was installed to 53 feet, followed by No. 25 slot screen to the bottom. Reportedly operates at 10 gpm.

After an initially slow start in 1963, when daily withdrawals averaged only 6400 gallons, pumpage rose to 17,000 gpd and has remained essentially the same, at 15,000 gpd, until the present time. It is to be noted, however, that in a 1977 Public Water Supply Report it was felt that the average pumpage would be between 22,000 and 25,000 gpd were it not for the Village's continuous requests for water conservation necessitated by drought conditions during 1976.

The effects of drought were still evident in 1977 at Fillmore, as nonpumping water levels in Well No. 1 declined from an original depth of 3.5 feet to 32 feet below land surface, or two feet below the top of the screen. Geohydrologic boundaries associated with the limited nature of the aquifer cause interference effects in water levels when pumping takes place. Drought conditions aggravate such effects, since all the water pumped by the well is withdrawn from storage and is not being replenished quickly by rainfall. Thus, under drought conditions, severe water level declines occur, necessitating a cutback in daily pumpage, as happened in 1977.

Hydraulic properties of the aquifer tapped by Well Nos. 1 and 2 have been estimated from data collected during well tests conducted shortly after drilling.

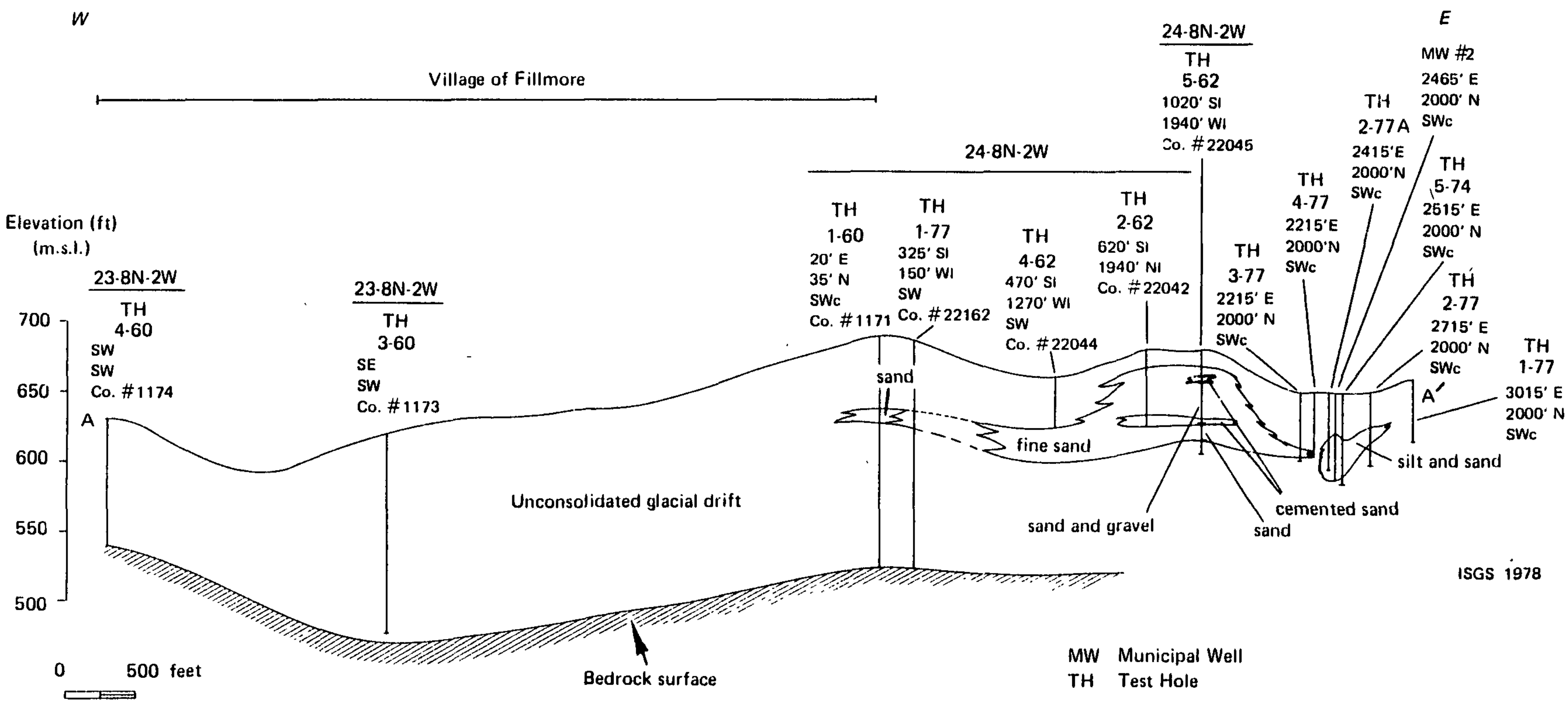


Figure 18. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Fillmore, Illinois. By Robert W. Ringler.

Early data from a production test on Well No. 1 indicated a coefficient of transmissivity of 11,200 gpd/ft. The later data were affected by geohydrologic boundaries. A test conducted July 26, 1977 on Well No. 2 also revealed the presence of boundaries, indicating an aquifer width of less than 400 feet. Transmissivity and storage coefficients were calculated to be 3620 gpd/ft and 2.6 x 10^{-4}, respectively.

The long-term sustained yield of Well No. 1 was estimated in 1962 to be about 26 gpm or 38,000 gpd. The well was generally pumped at rates of 35 to 40 gpm (according to a 1977 Public Water Supply Report) until the summer of 1976, when there occurred a severe reduction in its well capacity due to extended drought conditions. Between 1976 and the time when the report was written (August 1977) the well was able to sustain pumping rates not exceeding 16 gpm. A State Water Survey study at the time concluded that the long-term sustained yield of the well might be only 14 gpm or about 20,000 gpd. In 1977, when Well No. 2 was drilled and tested, an analysis of the test data, along with available information, concluded that - due to the limited extent of the aquifer - the sustained yield of Well No. 2 might be 10 gpm or less. Drought conditions in recent years have put a severe stress on the aquifer tapped by Well Nos. 1 and 2 and have in effect provided a measure of the capability of the aquifer under such stress. It is, therefore, concluded that the combined sustained yield of Well Nos. 1 and 2 is probably something just under 24 gpm or approximately 33,000 gpd.

The State Division of Water Resources has estimated the average groundwater demand at Fillmore in the year 2000 to be nearly 21,500 gpd. Should additional supplies be required, test drilling and exploration will be necessary. The following excerpt summarizes the recommendations of the State Geological Survey for groundwater exploration in the vicinity of Fillmore.

Test borings in 1976 revealed the possibility of developing several small supplementary wells west of a spring along Hurricane Creek in Section 20, T8N, R1W. Other possibilities of sand and gravel deposits that could be developed in the future are on the flanks of kames and ridges in Sections 11, 13, 14, and the N 1/2 Section 24, T8N, R2W. An electrical earth resistivity survey is recommended to locate sites for test drilling.

Coal test logs indicate the presence of sand and gravel at the base of the pre-Illinoian drift, but data are too sparse to define any trends in the deposit. Lenses of sand and gravel occurring within the Vandalia Till are generally local and too small to be developed as sources of water.

There are no records of wells developed in the bedrock in the study area. The shallow bedrock contains a high percentage of non-water-bearing shales, and below 200 feet the water is generally too highly mineralized for most uses.

GAYS

The Village of Gays is in the southeastern corner of Moultrie County in east-central Illinois, approximately 5 miles west-southwest of Mattoon. Gays is served by State Route 16 and CONRAIL. It is situated in Section 26, T12N, R6E. The study area includes the portions of Ts 11 and 12N, Rs 6 and 7E in Coles and Shelby Counties shown on Figure 19, a portion of the topographic maps of the Stewardson and Mattoon 15-minute quadrangles.

Gays lies near the southern limit of Wisconsinan Glaciation within a topographic feature known as the Shelbyville Morainic System. Gays sits near the crest of a low moraine elongated in an east-northeast—west-southwest direction. The moraine acts as a drainage divide; north of it drainage is northwest into the Kaskaskia River. To the south, surface waters flow into the Little Wabash River. Topography on the axis of the moraine is rather subdued, sloping uniformly to the southwest at approximately 6 to 8 feet per mile. The flanks of the ridge are much steeper and are dissected by a number of southerly- and northwesterly-flowing streams. Maximum topographic relief is over 150 feet.

The unconsolidated glacial deposits in the Gays area consist of drift of Wisconsinan, Illinoian and pre-Illinoian age with a total thickness range of 167 to 240 feet (Figure 20). The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash and wind-blown silt (loess). The sand and gravel deposits are permeable, and where present in sufficient thickness are capable of yielding small to moderately large quantities of groundwater. The Village of Gays has obtained water from two thin but wide-spread sand and gravel units. The upper unit, at the base of the Wisconsinan drift, is 1 to 10 feet in thickness and occurs throughout the study area. The lower unit occurs within the Illinoian drift, ranges from 5 to 15 feet thick and appears to pinch out approximately one mile north of Gays (Figure 20). The glacial till is relatively impermeable, although where the texture becomes coarser it can yield small water supplies for private use.

The bedrock surface in the Gays area contains shale, sandstone, limestone, and coal of the Pennsylvanian Mattoon Formation. There are no records of water wells developed in the bedrock in the area. Adequate supplies for farm and domestic use are generally found in the drift. The only subsurface bedrock data come from oil and gas tests. Small supplies may be available from thick sandstones or fractured limestones to depths of approximately 250 feet, below which the water becomes too highly mineralized for most uses. Moderate to large supplies are not available from the bedrock, and drilling into the bedrock for a municipal water supply is not recommended until the potential for sand and gravel deposits in the glacial drift to provide the desired supply of groundwater is fully evaluated.

The village made an attempt to install a public water supply in 1934. Three wells were drilled south of the New York Central Railroad tracks, but none were of sufficient yield for public water-supply use. A water supply finally was installed upon completion of two wells in 1961. A third well was added in 1964. As of 1976, these wells were still in use. Their locations and construction features are summarized below:

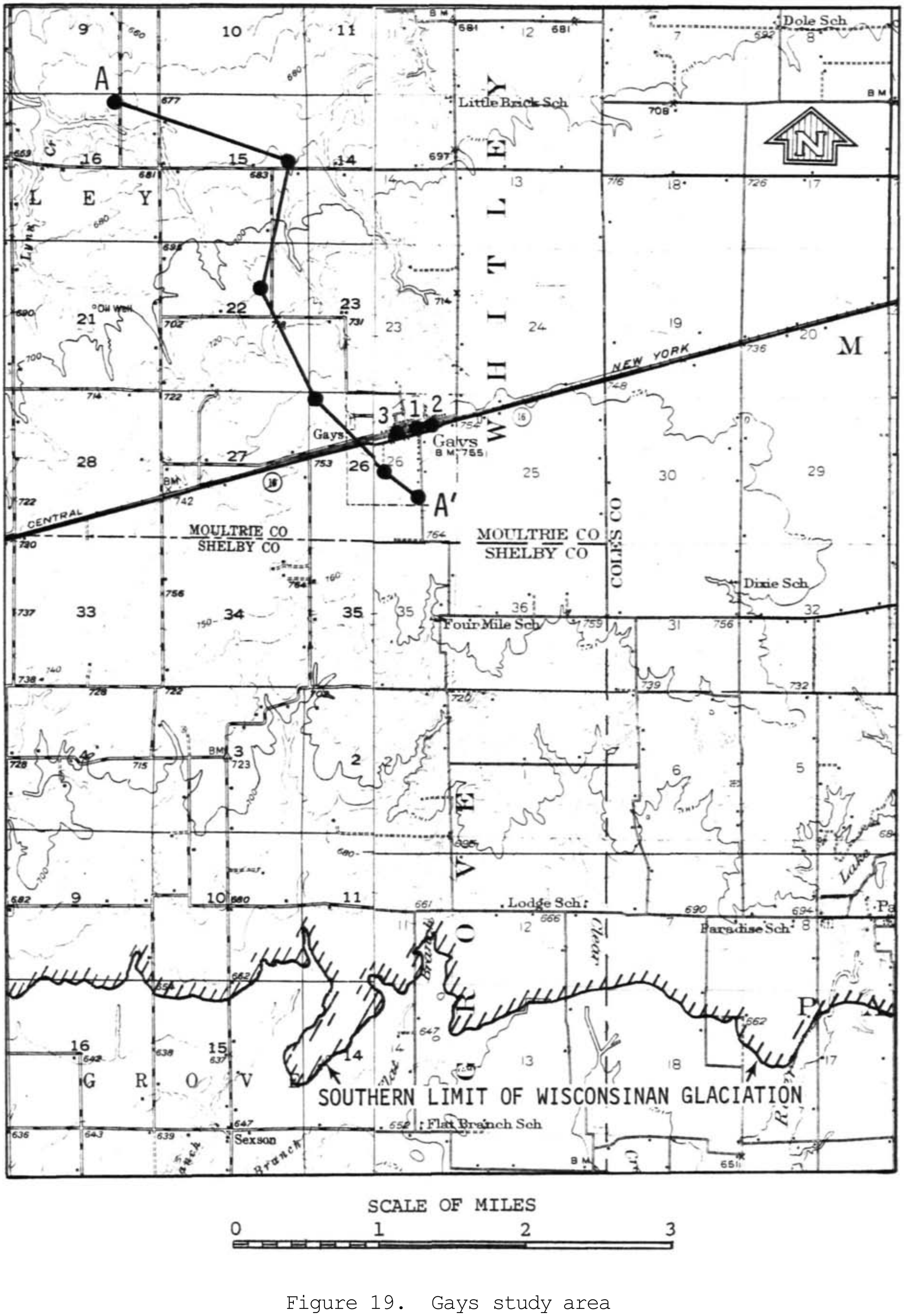


Figure 19. Gays study area

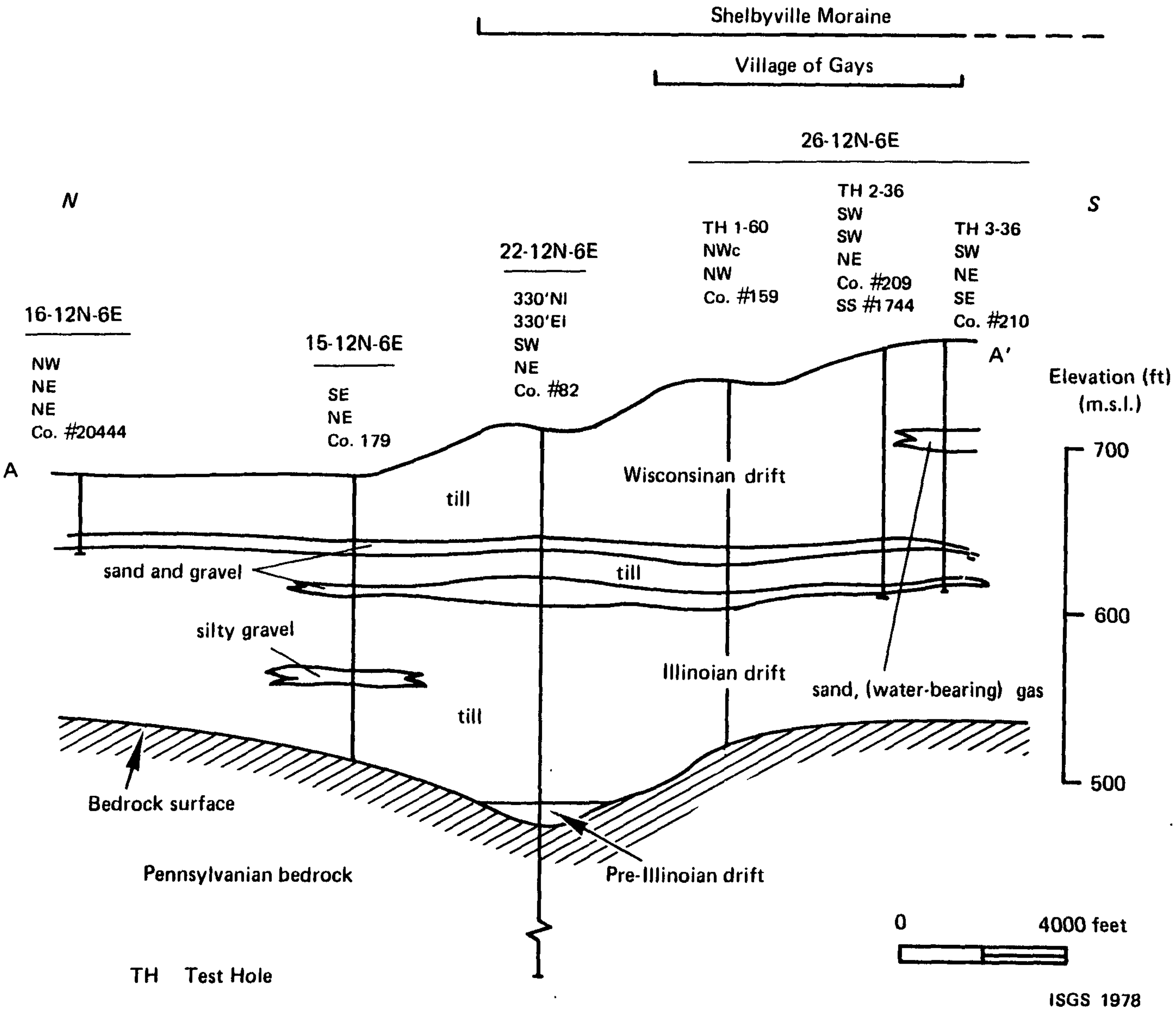


Figure 20. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Gays, Illinois. By Robert W. Ringler

Well No. 1: Drilled in 1961 to a depth of 114.5 feet, 1260 feet S and 1340 feet W of the NE corner of Section 26, T12N, R6E. Cased with six-inch pipe to 103 feet, followed by 6 1/2 feet of No. 30 slot screen and four feet of No. 15 slot screen. Reportedly operates at a rate of 3 gpm.

Well No. 2: Drilled in 1961 to a depth of 111 feet, 425 feet NE of Well No. 1, or approximately 110 feet S and 950 feet W of the NE corner of Section 26. Six-inch casing was set at a depth of 102 feet, followed by 9 feet of No. 30 slot screen. Reportedly operates at about 5 gpm.

Well No. 3: Drilled in November 1964 to a depth of 110 feet, 700 feet SW of Well No. 1, or approximately 1500 feet S and 2050 feet W of the NE corner of Section 26. Constructed with six-inch casing to a depth of 106 feet and with four feet of No. 50 slot screen. Reportedly operates at a rate of 20 gpm.

In 1962 pumpage was reported to be 5000 gpd, and by 1969 it had grown to 12,000 gpd. Since that time, withdrawals have fluctuated about an average of 13,000 gpd and were reported to 14,000 gpd in 1976.

Several aquifer tests were conducted at Gays between 1960 and 1964. Data from these tests were analyzed to determine coefficients of transmissivity and storage. Average values for these coefficients were determined to be 9450 gpd/ft and 0.001, respectively. Test data also revealed the presence of a geohydrologic boundary approximately 500 feet from the well field. It was concluded in test evaluation reports that, due to the combined effect of aquifer properties and limited areal extent, the wells at Gays might have a combined capacity in excess of the natural rate of recharge.

Based on available information, groundwater conditions were approximated by an idealized semi-infinite aquifer in the vicinity of the well field. A geohydrologic boundary was assumed to be 500 feet from the three wells, and aquifer transmissivity and storage coefficients of 9540 gpd/ft and 0.001, respectively, were assumed.

Recent information on operational conditions at Gays indicates that specific capacities of all three wells are low - probably less than 1.0 gpm/ft. Based on current well data, the idealized aquifer model, image-well theory, and theoretical distance-drawdown relationships, the long-term sustained yield of the well field at Gays was estimated to be between 25 and 30 gpm (36,000-42,000 gpd). This agrees with a 1961 State Water Survey report which estimated the sustained yield to be 25 gpm.

The State Division of Water Resources has projected a water demand for Gays of 11,700 gpd in the year 2000. Present wells appear capable of providing such a supply in years of normal precipitation. Should additional supplies be found desirable, however, exploration for other well sites would be necessary. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for future groundwater exploration.

A sand and gravel deposit at the base of the Wisconsinan drift at a depth of 102 to 115 feet, elevation 650 feet, has provided the municipal water supply for the Village of Gays. Although this deposit is relatively thin (1 to 10 feet) it appears to he fairly widespread over the area. Another sand and gravel deposit occurs approximately 20 feet deeper within the Illinoian drift and pinches out a mile north of town. If additional groundwater supplies are needed in the future, an electrical earth resistivity survey is recommended south of the village in an area of possible outwash development in Sections 34-36, T12N, R6E and 1-3 T11N, R6E. Test drilling into the bedrock for a municipal water supply is not recommended until the potential for sand and gravel deposits in the drift to provide an adequate supply of groundwater has been properly evaluated.

Upon completion of this report it was learned that the Village of Gays now purchases its water supply from the Moultrie County Water District, which procures water from Lake Shelbyville.

HAMEL

The Village of Hamel is in southwestern Illinois in north-central Madison County (Sections 11 and 14, T5N, R7W), approximately 7 miles northeast of Edwardsville and 14 miles east of Alton. Interstate 55, State Routes 140 and 157, and the Chicago and Northwestern, Norfolk and Western, Illinois Terminal and CONRAIL railways serve the study area, which is depicted on Figure 21, taken from the topographic maps of the Worden, Prairietown, Edwardsville, and Marina 7 1/2-minute quadrangles.

Hamel is on a gently rolling drift plain whose surface has been moderately dissected by several southward-flowing streams which are either tributaries or the main branch of Silver Creek to the east. In the western part of the study area, drainage is to the west into Cahokia Creek. Maximum topographic relief is over 90 feet.

The unconsolidated Pleistocene glacial drift in the study area consists of ice-laid till, water-laid silt, sand and gravel outwash and wind-blown silt (loess). The drift is pre-Illinoian, Illinoian, and Wisconsinan in age and ranges in thickness from 54 to 163 feet. Sand and gravel deposits generally occur in two intervals in the drift sequence. The upper deposits occur as discontinuous lenses and stringers in the middle and upper parts of the drift at depths ranging from 20 to 70 feet (Figure 22). The lower unit occurs at or near the base of the drift to the east and appears to be present beneath Silver Creek, pinching out to the west (Figures 21 and 22). This deposit is normally 5 to 10 feet thick and locally in a buried bedrock valley attains a thickness as great as 33 feet (Figure 22). This valley appears to underlie the Silver Creek floodplain and its larger tributaries and may consist of more than one channel (Figure 22).

In the central and western parts of the study area, the extensive sand and gravel deposit at the base of the drift appears to be absent. However, the Cahokia Creek bottom in the northwest may contain buried channel deposits of sand and gravel which will yield water.

The shallow bedrock in the study area contains mostly non-water-yielding shale and limestone of the Pennsylvanian Modesto Formation. There are no records of any wells obtaining water from the bedrock in the study area, although fractured limestones at the bedrock surface may be capable of supplying small quantities of water for private use.

Hamel obtains its municipal water supply from three wells constructed in a sand and gravel deposit beneath a tributary to Silver Creek in the SE 1/4 of the SE 1/4 of Section 7 and the NE 1/4 of the NE 1/4 of Section 18, T5N, R6W. The deposit attains a thickness of 26 to 33 feet at the well field and appears to be partially contained within a small, north-south trending bedrock valley. The main part of the valley containing the sand and gravel is approximately 4400 feet wide at the municipal wells, although the sand and gravel deposit appears to extend beyond the side of the valley to the east and pinches out to the west (Figures 21 and 22). Available evidence indicates the deposit extends at least 2 miles to the north and one mile to the south. The 26 to 33 foot thickness observed in the municipal

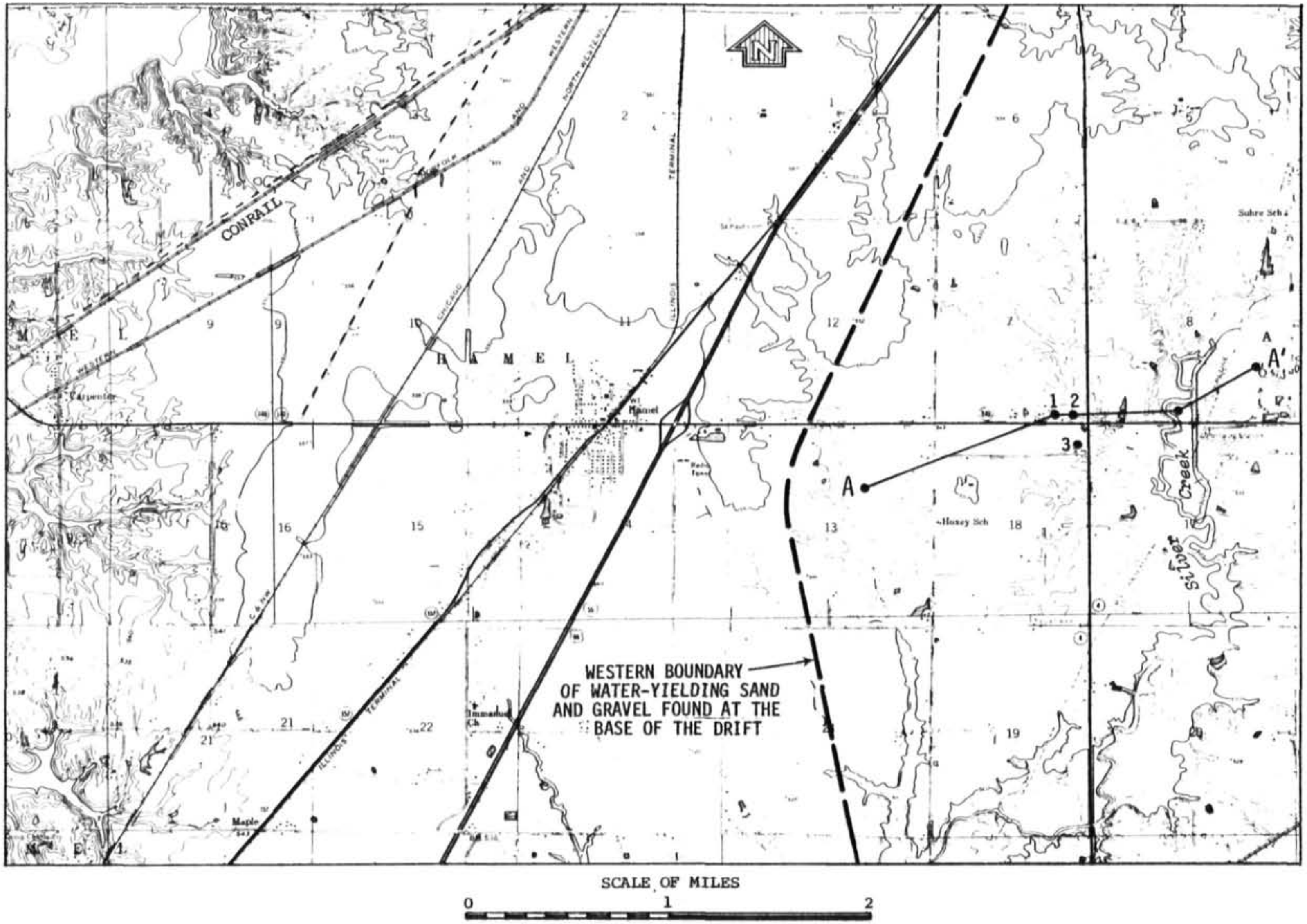


Figure 21. Hamel study area

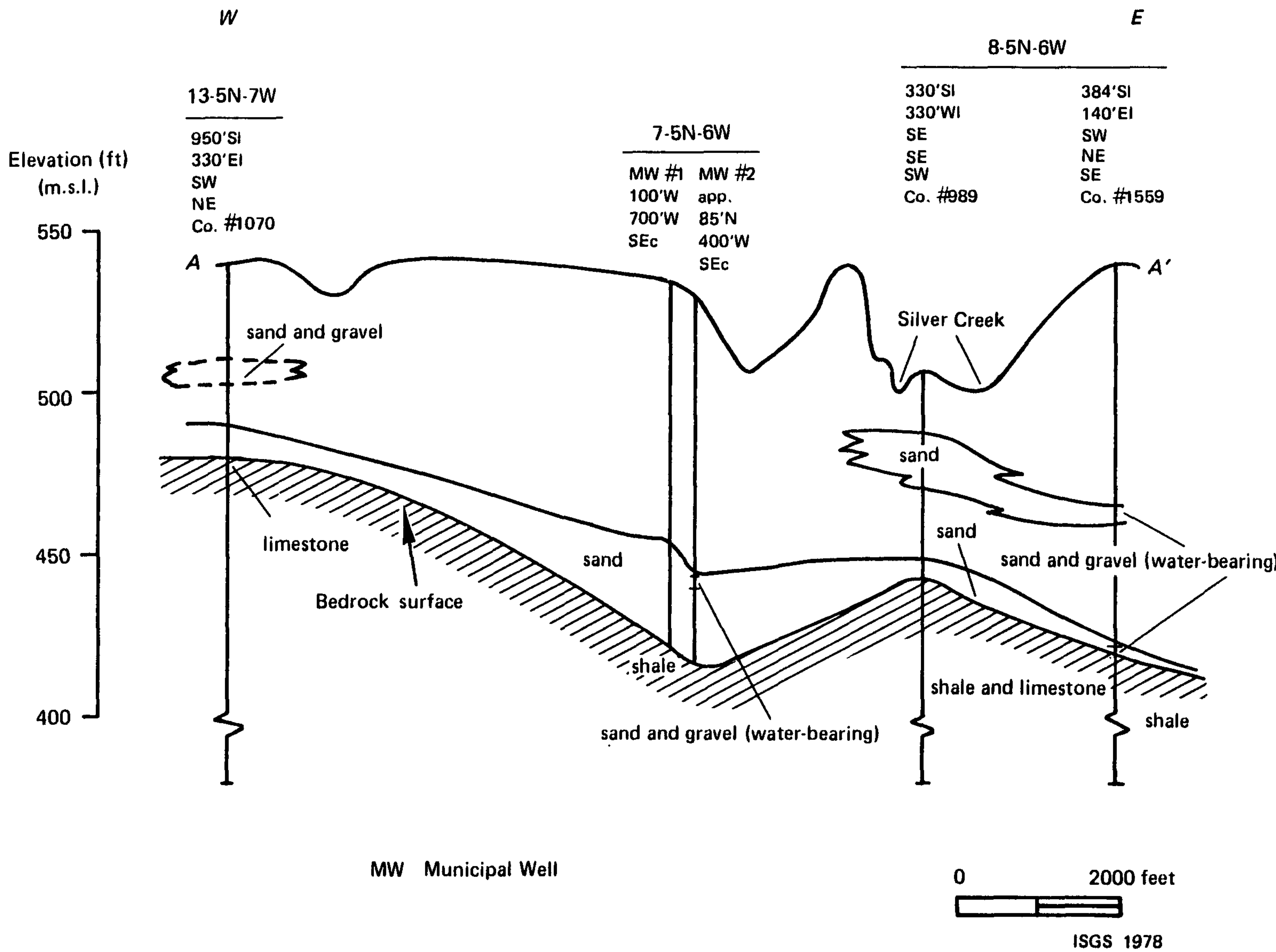


Figure 22. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface at Hamel, Illinois
By Robert W. Ringler

wells may indicate either the thickest portion of the deposit or the deepest part of the valley. This thickness probably extends farther to the north and south, although regional data suggest 5 to 10 feet is a more common thickness for this deposit.

A public water supply was installed for the village in 1957. Between 1954 and 1976 three wells were drilled, all of which are still in operation. The following summary describes locations and construction features of these wells.

Well No. 1: Drilled in December 1954 to a depth of 113 feet on the George Cassens property, approximately 100 feet N and 700 feet W of SE corner of Section 7, T5N, R6W. Cased with 8-inch pipe to the bottom. The casing was slotted between 103 and 111 feet. Donated to Hamel by Mr. Cassens. Reportedly operates at a rate of 35 to 40 gpm.

Well No. 2: Drilled in January 1955 to a depth of 113 feet on the George Cassens property, 335 feet east of Well No. 1, or approximately 60 feet N and 370 feet W of the SE corner of Section 7. Cased with eight-inch pipe to the bottom, and slotted in the lower 20 feet. In 1967 this well was added to the Hamel water system. Reportedly operates at a rate of 35 to 40 gpm.

Well No. 3: Drilled in 1957 to a depth of 110 feet, 469 feet S and 235.5 feet W of the NE corner of Section 18. Cased to the bottom with eight-inch pipe. Below 90 feet the casing was slotted. Added to the Hamel system in 1976. Reportedly operates between 35 and 45 gpm.

The growth of groundwater withdrawals has been rapid at Hamel. In 1958 and 1959 withdrawals averaged 10,000 gpd. By 1977 withdrawals had reached 75,000 gpd.

Data from two well production tests at Hamel are available. A test conducted February 2-3, 1955, on Well No. 2 indicated coefficients of transmissivity and storage of 25,000 gpd/ft and 3.3×10^{-4}, respectively, while data from a test conducted September 1, 1976, on Well No. 3 suggested a much higher transmissivity value--94,000 gpd/ft. Both tests also indicated the presence of geohydrologic boundaries at distances of 1500 to 1700 feet from the well field, an effective distance much smaller than would have been expected from the geologic reports.

In a 1967 report on the long-term yield of Wells 1 and 2, the State Water Survey determined the sustained yield of the two-well system to be about 60 gpm. A 1977 report determined the sustained yield of Well No. 3 to be about 50 gpm, but mutual interference effects would still limit the total yield of the three-well field to something between 50 and 60 gpm. Nonpumping water level data and pumpage information indicated that the well field was being pumped at the time (75,000 gpd) at or near its practical sustained yield. With normal precipitation the sustained yield might be as much as 60 gpm (86,000 gpd) while in drought periods the sustained yield would likely be only 50 gpm (72,000 gpd).

The State Division of Water Resources has projected an average water demand at Hamel of 55,500 gpd during the year 2000. Should additional supplies prove necessary, a groundwater exploration program will be needed. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for future groundwater development.

Further development of the aquifer appears possible at this time. Available data indicate expansion may be possible to the south and north and possibly east. Deposits of sand and gravel are known to occur in the Silver Creek bottom, although they do not appear to be related to the present Silver Creek Drainage system. Late and post-Pleistocene sediments deposited by Silver Creek tend to be silty and generally have low water-yielding capacities. An electrical earth resistivity survey is recommended to help locate an optimum site for test drilling.

A second possible source of water from the glacial drift in the vicinity of Hamel is from the Cahokia Creek bottom. Buried channel deposits of sand and gravel are utilized by the town of Worden to the north in Section 28, T6N, R7W and there are resistivity data suggesting the deposits may extend farther south down the Cahokia valley. An electrical earth resistivity survey will be helpful to locate optimum sites for test drilling.

HINDSBORO

Hindsboro is located in southeastern Douglas County in east-central Illinois, approximately nine miles east of Arcola and six miles northwest of Oakland. The area is served by State Route 133 and CONRAIL. The study area includes the portions of T14 and 15N, R9 and 10E shown on Figure 23, part of the topographic map of the Oakland 15-minute quadrangle.

Physiographically, Hindsboro is situated on the northern flank of an arcuate portion of the Wisconsinan Arcola Moraine. Approximately four miles east of town, the moraine is breached by the south-flowing Embarras River. The maximum topographic relief is about 110 feet, and the regional slope is to the northeast.

The unconsolidated Pleistocene glacial deposits in the study area consist of drift of pre-Illinoian, Illinoian, and Wisconsinan age with a total thickness of 65 to 167 feet (Figure 24). Lenses and stringers of sand and gravel occur throughout the drift in thicknesses ranging up to 22 feet, although normally the deposits are less than 10 feet thick. The thinner deposits are found at or near the interface of the Illinoian and Wisconsinan drift where a peat layer and/or soil horizon marks the boundary between the two drift sheets. The thicker deposits tend to occur in the Illinoian and older drift (Figure 24). The sand and gravel deposits are generally permeable and will yield small to moderate supplies of groundwater to wells. Their water-yielding capacities are restricted by their relative thinness, their limited lateral extent, and their grain-size sorting characteristics. Those containing a high proportion of fine-grained sediments will have a lower water-yielding capacity than those containing clean, well-sorted sand and gravel. Thin alluvium with minor amounts of sand and gravel may exist in the Embarras River Valley and in some of the larger tributaries to the north and east of Hindsboro.

The Village of Hindsboro currently obtains its municipal water supply from sand and gravel beds present at depth intervals of 75-100 feet and 135-150 feet in the glacial drift. The upper sand and gravel beds are 1 1/2 to 12 feet thick at an elevation of 535 to 575 feet, while the lower sand beds may be as much as 20 to 26 feet thick at elevations of approximately 500 to 520 feet. Data indicate the lower bed may extend north of town for some distance. It may prove fruitful to further explore this area with an electrical earth resistivity survey to help determine the presence of any water-bearing deposits and delineate their extent.

There are no records of wells which obtain water from the shallow bedrock in the Hindsboro area. However, oil tests indicate the presence of water-bearing sandstones and sandy limestones at depths of 110 to 430 feet (Figure 24). No indication is made of possible yields, although data from other wells outside the immediate study area indicate only small supplies can be expected from the shallow bedrock. Below depths of approximately 250 feet, the water becomes too highly mineralized for most uses. Test drilling into the bedrock is not recommended until the potential for sand and gravel in the glacial drift to provide adequate supplies of groundwater is properly evaluated.

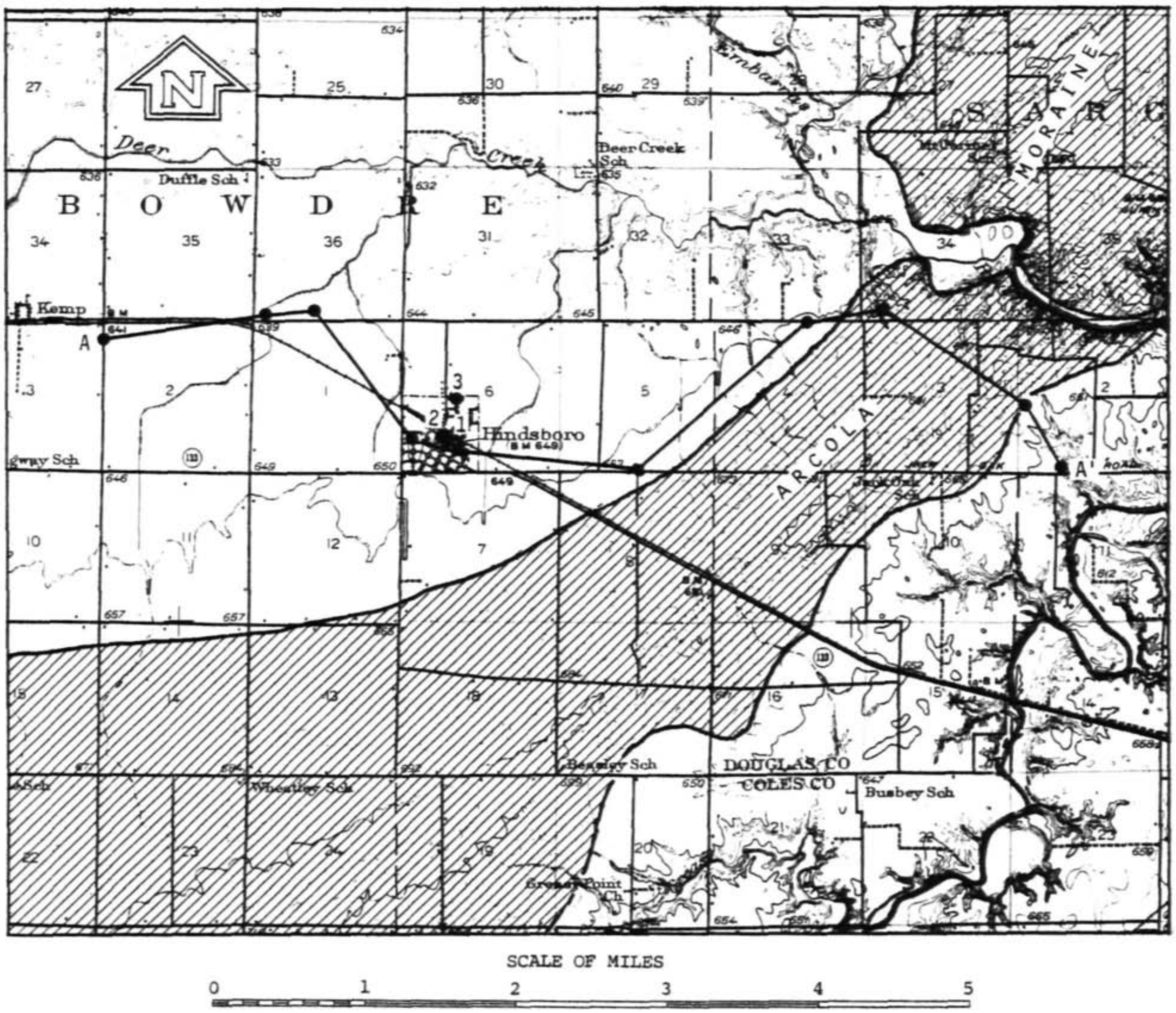


Figure 23. Hindsboro study area

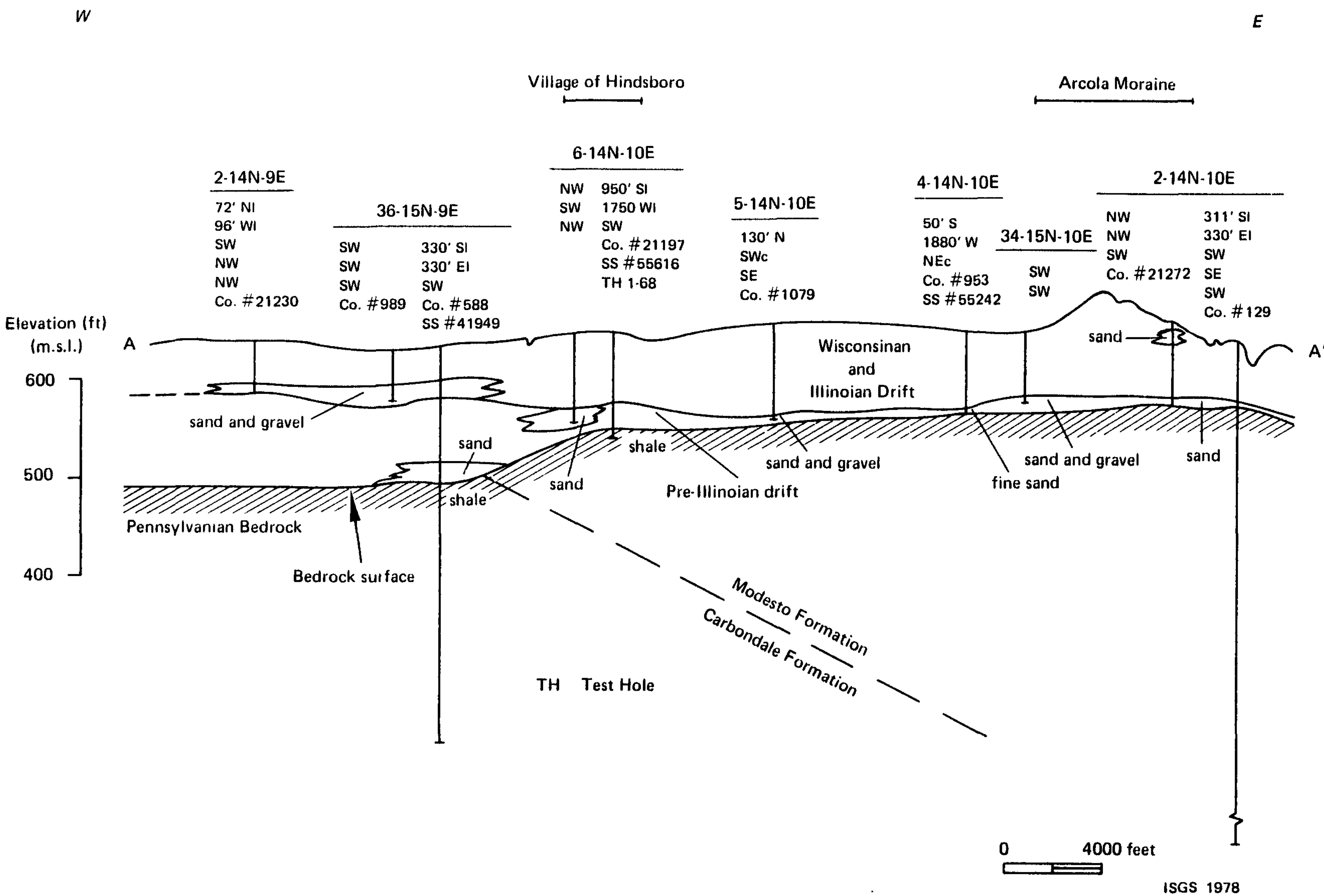


Figure 24. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Hindsboro, Illinois. By Robert W. Ringler.

A public water supply was installed for the Village of Hindsboro in 1956. Since that time three wells have been drilled, all of which are still in existence. The following summary describes the general construction features of Wells 1-3.

Well No. 1: Drilled in January 1956 to a depth of 83 feet, in the center of town, 1100 feet N and 1596 feet E of the SW corner of Section 6, T14N, R10E. Constructed with 20-inch casing to a depth of 40 feet, 8-inch inner casing to a depth of 74 1/2 feet, and with No. 20 slot screen from 74 1/2 feet to the bottom. Gravel was used to fill the annular space between the screen and the 20-inch borehole. Reportedly operates at 15 gpm.

Well No. 2: Drilled in May 1961 to a depth of 47 feet (plugged back to 28 feet), 65 feet northwest of Well No. 1. Eight-inch casing was placed from the surface to 23 feet, followed by five feet of No. 30 slot screen. The well reportedly operates at only 1 gpm and has been on standby use for several years.

Well No. 3: Drilled in September 1971 to a depth of 140 feet, 2575 feet S and 2020 feet E of the NW corner of Section 6. Constructed with six-inch casing to 129 feet and three sections of screen: No. 20 slot, 129-132; No. 15 slot, 132-136 feet; and No. 10 slot, 136-140 feet. Reportedly operates at 15 gpm.

In 1957, one year after the water supply was installed, the daily average pumpage at Hindsboro was 8,000 gallons. By 1964 this had increased to 20,000 gpd. In 1965 a coin-operated water dispenser was installed at the plant for water hauling operators. This, perhaps, might account for the decrease in pumpage that year to 15,000 gpd. Since 1970, when withdrawals averaged 23,000 gpd, pumpage has been relatively unchanged, fluctuating between 22,000 and 25,000 gpd.

The character of the deposits tapped by Wells 1, 2, and 3 are known from six well tests that were conducted between 1955 and 1971. Tests on Wells 1 and 2 in the shallow aquifer revealed average transmissivity and storage coefficients of 2160 gpd/ft and 0.01, respectively, while test data from Well No. 3 indicated a remarkably similar transmissivity value for the deeper deposits--2090 gpd/ft. Water levels remained under artesian conditions throughout the test.

Well test analyses along with operational experience have shown the practical sustained yields of Wells 1 and 3 to be 15 gpm and 25 gpm, respectively (the capacity of Well No. 2 has declined to only 1 gpm due to extremely low water levels in recent years). It was determined that available drawdown at Well No. 3 suggested a production capability of 40 gpm, however, an analysis based on screen size limited the recommended use to 15 gpm. Therefore, the practical sustained yield of the well system currently is of the order of 57,000 gpd (40 gpm). A well in the vicinity of Well No. 3 with sufficient screen, however, could reasonably be expected to operate at 40 gpm as an alternative to Well No. 3 and therefore increase the potential sustained capacity at Hindsboro to about 79,000 gpd (55 gpm).

Estimates of groundwater demand made by the State Division of Water Resources indicate that by the year 2000 the average water demand at Hindsboro will be 26,000 gpd. Should additional supplies be required in excess of the estimated yield capacity, however, it is doubtful whether they could be procured in the vicinity of the present wells. The following excerpt from the State Geological Survey report summarizes the areas recommended by that agency as being suitable for groundwater exploration.

Sand and gravel stringers of limited thickness and areal extent within the glacial drift currently provide the municipal water supply for the village of Hindsboro. These occur at depths of 72 to 140 feet, elevation 575 to 500 feet, with thicknesses of 2 to 12 feet or more. Electrical earth resistivity surveys had indicated favorable sites to drill. Three wells were drilled in 1968, one in a recommended location on the northeast corner of town and two others in the center and southeast portion of town. A fourth location, recommended in both surveys, lies approximately 1000 feet east of the southwest corner of Section 6, T14N, R10E, on the south edge of town. Test drilling into the bedrock is not recommended until the potential for drift aquifers to provide an adequate water supply has been properly evaluated.

HOMER

The Village of Homer is in east-central Illinois in the southeastern part of Champaign County (Sections 8 and 9, T18N, R14W) , approximately 15 miles southwest of Champaign-Urbana. The Norfolk and Western Railroad, Illinois Route 49 and other two-lane state and county roads serve the study area which includes parts of Ts 18 and 19N, Rs 14W and HE shown on Figure 25, a portion of the topographic map of the Homer 7 1/2-minute quadrangle.

Homer lies on a nearly flat to gently rolling glacial drift plain which has been partially dissected by northerly and northeasterly flowing tributaries of the Salt Fork River to the north. Surface topography is more irregular along the Salt Fork, with relief along the bluffs as great as 40 feet. Maximum topographic relief is 65 feet.

The unconsolidated Pleistocene glacial drift in the study area consists of ice-laid till, water-laid silt, sand and gravel outwash, and windblown silt (loess). The drift is pre-Illinoian, Illinoian, and Wisconsinan in age and ranges in thickness from 72 to 147 feet. Sand and gravel deposits tend to occur in two depth intervals in the drift. The upper occurs at depths between 30 to 70 feet, elevation 600 to 645 feet, and is the thickest and most widespread water-yielding unit in the area (Figure 26). The lower unit generally occurs at or near the base of the drift, below 75 feet, elevation 605 feet, and tends to be much thinner and more restricted in areal extent.

The shallow bedrock in the Homer area consists of sandstone, shale, limestone, and coal of the Pennsylvanian Carbondale and Modesto Formations. The contact between the younger Modesto and older Carbondale Formations runs north-south along the eastern edge of town and both formations dip gently to the east. There are no records of wells developed in the shallow bedrock, and the high proportion of nonwater-bearing shales in the shallow bedrock precludes the development of any moderate to large groundwater supplies there. Below a depth of about 300 feet, water is generally too highly mineralized for most uses, and drilling into the bedrock for a municipal supply is not recommended.

Homer obtains its municipal water supply from a sand and gravel deposit in the glacial drift. The deposit reaches a maximum thickness of 38 feet northeast of the well field; however, logs of test holes there indicate it is cemented. In the field, it ranges from 20 to 30 feet thick and exhibits texture from silty sand to sand and gravel. The depost is narrow and elongate, trending northeast-southwest, with the thickest portion northeast of Municipal Well #1 (Figure 26). The deposit is also roughly V-shaped, with one limb extending northeast into Homer and the other limb extending northwest a mile west of town.

The limb extending into Homer which supplies the municipal groundwater is roughly 2 miles long and 2500 feet wide, although the thicker portion of the deposit in which the village wells are constructed is about 500 to 1000 feet wide.

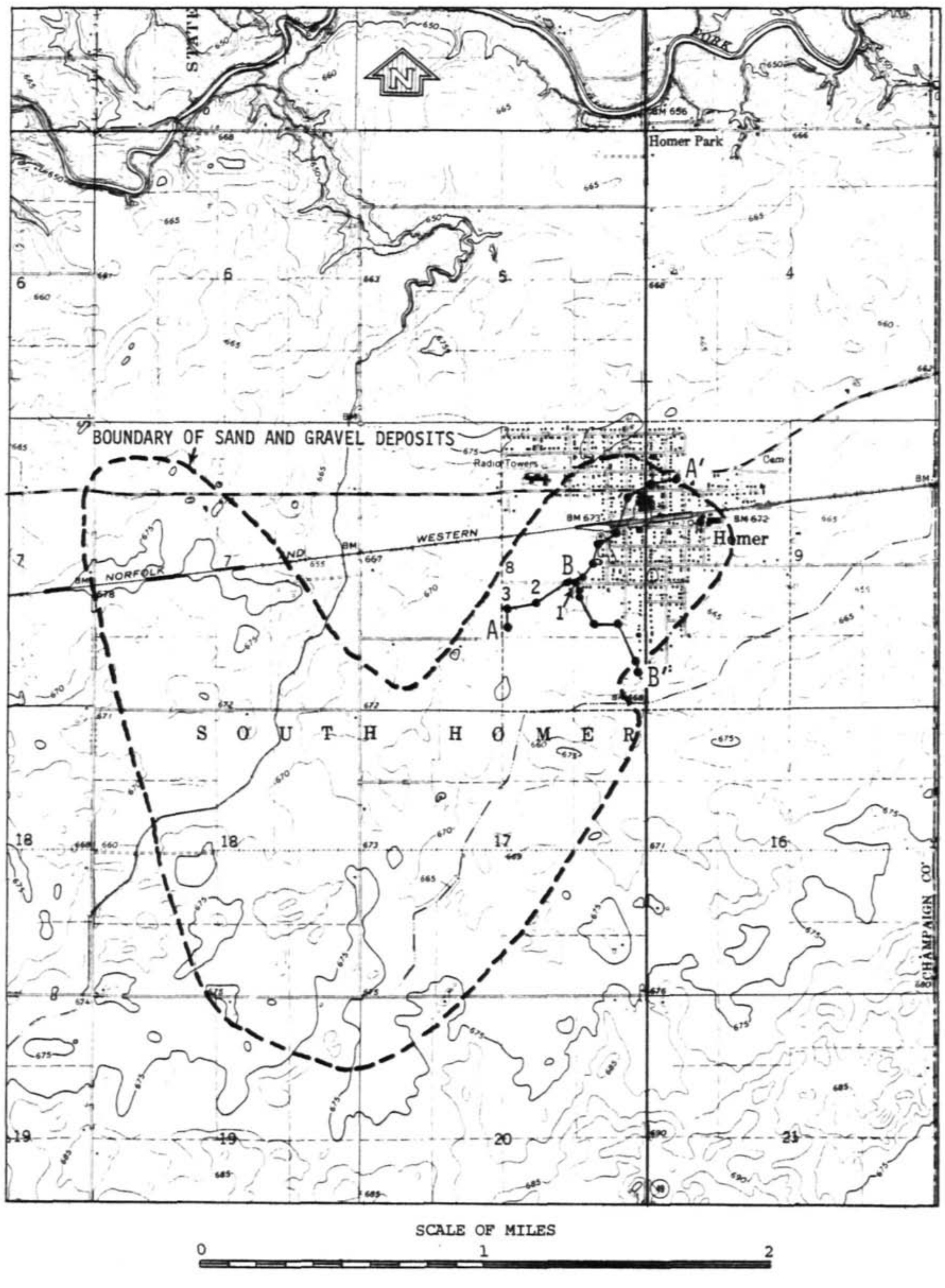


Figure 25. Homer study area

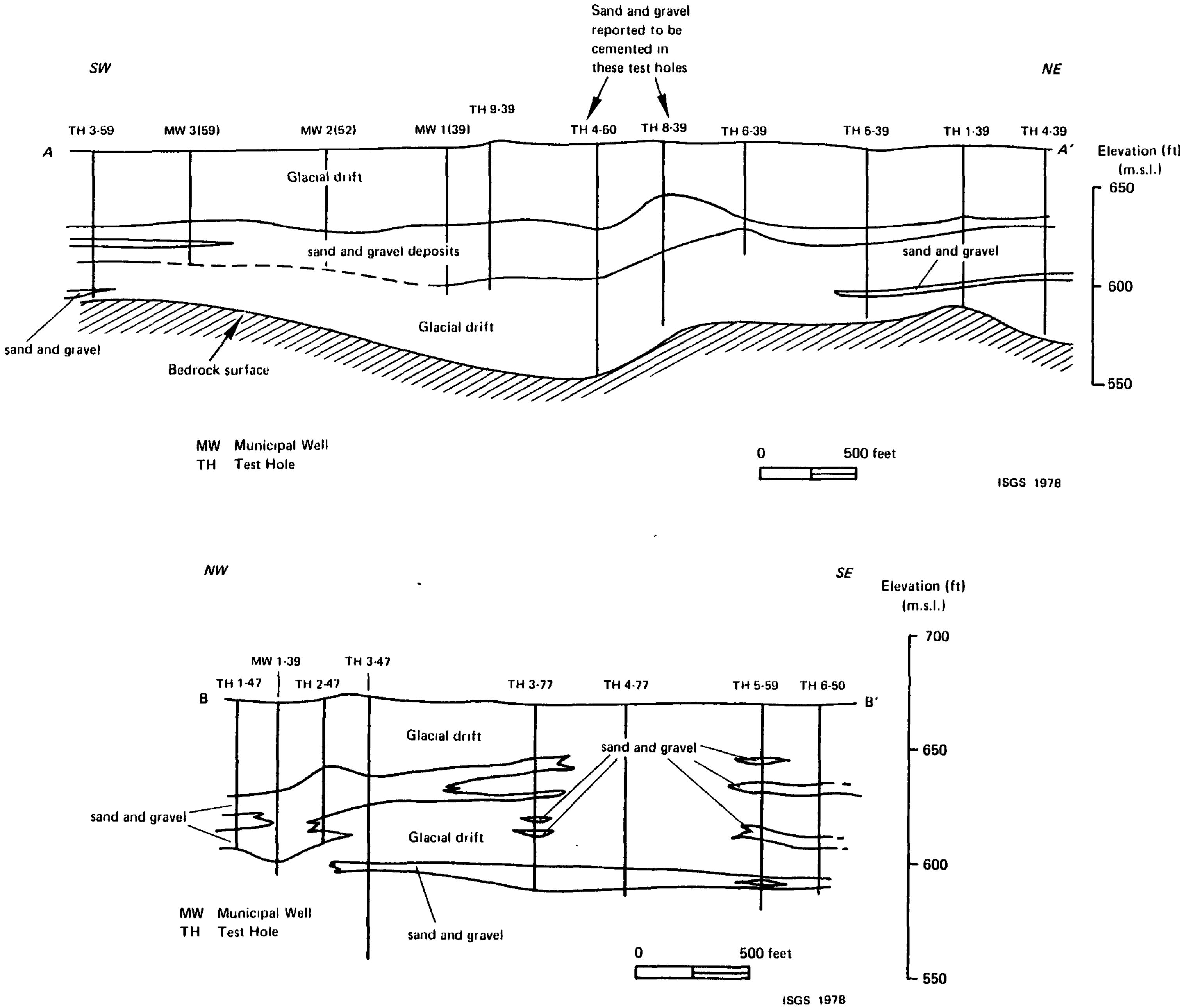


Figure 26. Cross sections A-A' and B-B', showing surface topography, sand and gravel deposits in the glacial drift, and bedrock surface at Homer, Illinois. By Robert W. Ringler

A public water supply was installed by the village in 1939. By 1959 a total of three wells had been drilled, all of which are still in use. The following summary describes- the locations and construction features of these wells.

Well No. 1: Drilled in 1939 to a depth of 72 feet at the southwest corporate limits, or approximately 2300 feet N and 1500 feet W of the SE corner of Section 8, T18N, R14W. Constructed with 16-inch outer casing to a depth of 40 feet and with an eight-inch inner casing to a depth of 49 feet, 7 inches, below which was an eight-inch screen. The upper 10 feet and lower 5 feet of screen had slot openings while the intermediate 7 1/2 feet was blank, pipe. Gravel was placed in the annular space between the casings and outside the screen. Reportedly operates at a rate of about 30 gpm.

Well No. 2: Drilled in June 1952 to a depth of 60.5 feet, 660 feet SW of Well No. 1, or 1860 feet N and 1953 feet W of the SE corner of Section 8. Twenty-six-inch outer casing was set at a depth of 40 feet, and 12-inch inner casing was set to 50 1/2 feet, followed by 10 feet of shutter screen. Reportedly operates at 100 gpm.

Well No. 3: Drilled in November 1959 to a depth of 59 feet, approximately 870 feet W of Well No. 2, or 820 feet S and 10 feet E of the NE corner of the SW 1/4 of Section 8. Cased with 36-inch outer casing to a depth of 9 feet and with 12-inch inner casing to 49 feet, followed by 60-slot screen from 49 to 59 feet. Gravel was placed outside the casing and screen. Reportedly operates at 100 gpm.

Water consumption at Homer in 1948 was 30,000 gpd. By 1964 the average pumpage had grown to 131,200 gpd. Following the installation of meters in 1967 consumption dropped to 90,500 gpd and in 1968 to 85,000 gpd. Pumpage began to increase again, reaching 118,000 gpd in 1977. After two major leaks were located and repaired consumption again declined and is currently averaging 100,000 gpd.

Aquifer properties at Homer have been estimated from analysis of data from three production tests in 1948 (Well No. 1), 1952 (Well No. 2), and 1959 (Well No. 3). Storage coefficients could not be calculated from these data due to lack of observation wells; however, water levels remained artesian throughout the 1948 and 1952 tests and converted to water table conditions during the 1959 test. The coefficients of transmissivity calculated for the three tests were 8400, 20,000, and 5700 gpd/ft, respectively. Transmissivity was estimated for the second test from specific capacity data.

Reports issued by the State Water Survey in 1964 and 1977 estimated the practical sustained yield of the aquifer at Homer. The 1964 report studied water level and pumpage data and concluded that the aquifer could be developed to a maximum rate of about 164,000 gpd. A revised report in 1977, utilizing additional information, concluded that the safe yield of the aquifer was between 100,000 gpd and 125,000 gpd.

Based on an analysis of water levels, pumpages, and precipitation data it appears reasonable to conclude that during years of normal or above precipitation the aquifer could safely be pumped at rates of as much as 160,000 gpd, while during drought periods the safe rate of withdrawal would decline to between 100,000 and 125,000 gpd.

The State Division of Water Resources has estimated that by the year 2000 water consumption at Homer will be nearly 118,000 gpd. Should additional water supplies be needed, a groundwater exploration program will be necessary. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for groundwater exploration.

The present well field appears to be fully developed. If additional groundwater supplies are needed in the future, an area south and west of town in the northern halves of Section 17 and 18, T18N, R14W is recommended for exploration. There, sand and gravel deposits 5 to 10 feet thick are expected to occur at depths of 45 to 50 feet. An electrical earth resistivity survey is recommended to locate optimum sites for test drilling.

INDIANOLA

The village of Indianola is in south-central Vermilion County (Sections 17 and 20, T17N, R12W) in east-central Illinois. It is approximately 15 miles southwest of Danville and 30 miles southeast of Champaign-Urbana. Two-lane state and county highways and the Missouri-Pacific Railroad serve the study area which is made up of the portion of T17N, R12W shown on Figure 27 from the topographic map of the Georgetown 7 1/2-minute quadrangle.

Indianola lies approximately two miles north of the main body of the Wisconsinan-age Ridge Farm Moraine, a lobe of which extends to within a quarter-mile of the southwestern corner of town. The topography is nearly flat to gently rolling, except where dissected by surface drainage features, and has a regional slope to the east. Swank Creek, which passes through Indianola, and other smaller tributaries flow southward and empty into the northeasterly flowing Little Vermilion River. The maximum topographic relief is 70 feet.

The unconsolidated glacial deposits in the study area consist of Illinoian and Wisconsinan drift with a total thickness of 40 to 100 feet. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash and wind-blown silt (loess). The till is relatively impermeable, although where the texture is sufficiently coarse, it can yield small supplies of groundwater to wells. A shallow deposit of sand and gravel outwash is fairly widespread in the study area at depths of 6 to 15 feet. It ranges in thickness from 2 to 45 feet and varies in texture from fine sand to coarse gravel and boulders. The shallow outwash is noted in numerous wells north of the Little Vermilion River, although it tends to be somewhat discontinuous and was not present in all wells studied. A lack of well data south of the river prevents its recognition there. The deposit thickens from 6 to 40 feet in the village well field (Figure 28) and appears to maintain this thickness downstream along the creek. A well developed 1 1/2 miles downstream of the well field in the SE 1/4 Section 16, T17N, R12W showed 33 feet of sand present.

Other sand and gravel beds have been noted to occur at depths of 40 to 65 feet and 115 feet in the drift. These appear to be localized deposits and are only noted in a small number of wells.

The shallow bedrock in the study area consists of sandstones, limestones, shales, claystones and coals of the Pennsylvanian Modesto Formation, which attains a thickness of approximately 125 feet in this area. It dips under the overlying Bond Formation, also of Pennsylvanian age, a mile to the west.

The village of Indianola obtains its municipal water supply from the sand and gravel aquifer in the Swank Creek Valley described above. The well field is located within the village limits, where the deposit thickens from 6 to 10 feet, at Municipal Wells #1 and #2, to as much as 48 feet in Test Holes 3-66, 3-76 and Municipal Well #3 (Figure 28). The width of the deposit is on the order of 600 to 1000 feet, although its lateral extent is much greater, as the deposit appears to be extensive but discontinuous

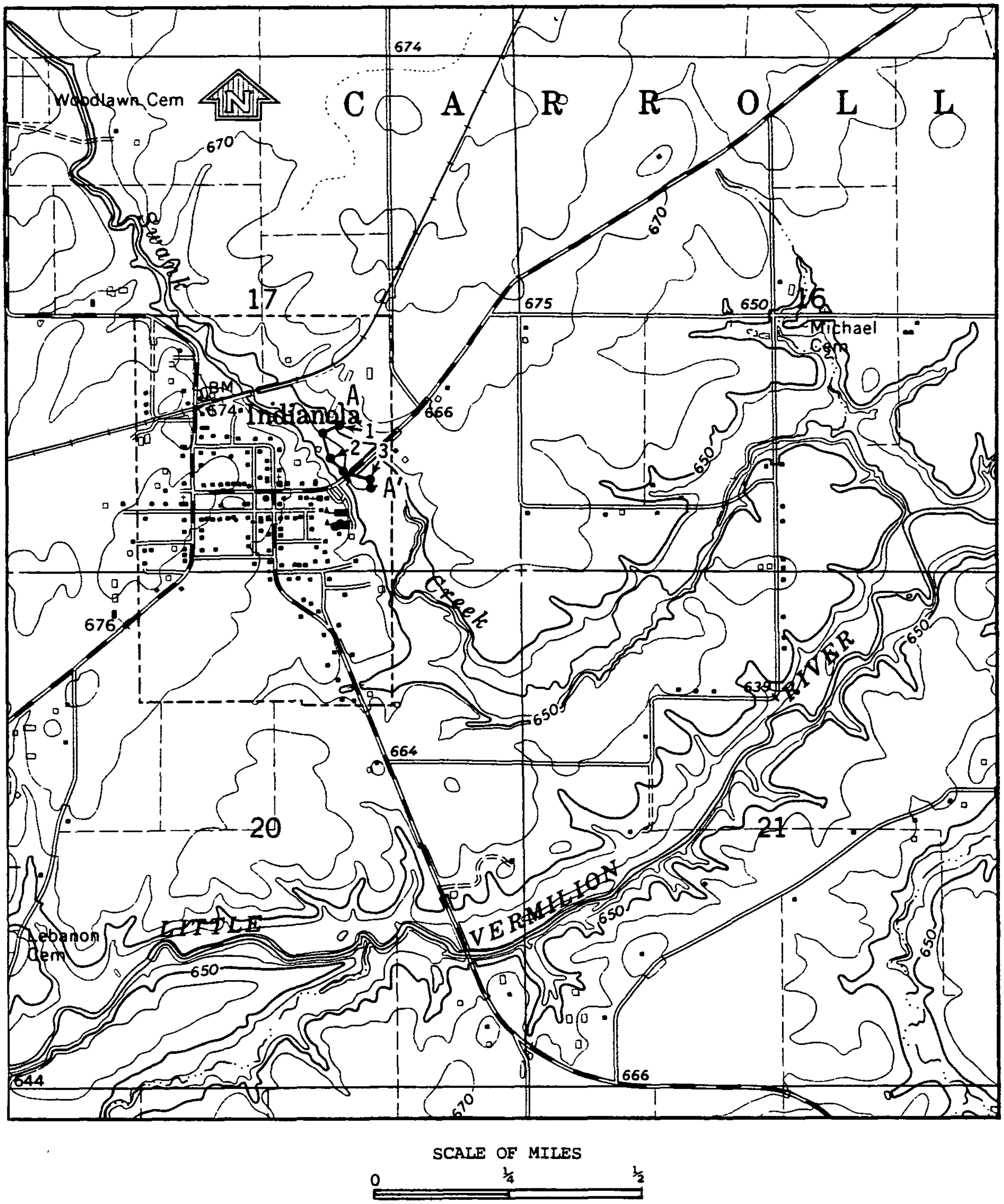


Figure 27. Indianola study area

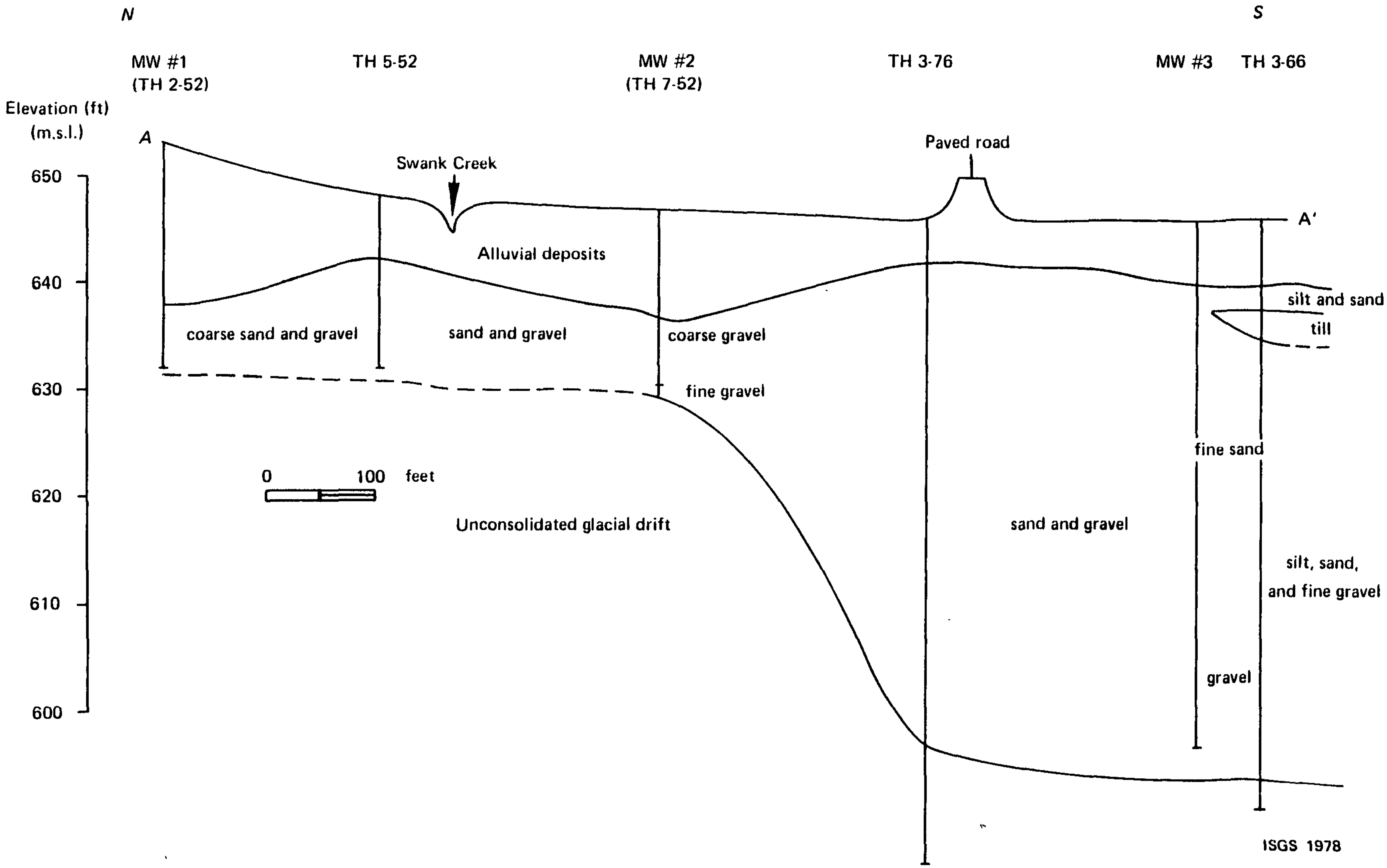


Figure 28. Cross section A-A', showing surface topography and location of sand and gravel deposits in the glacial drift near Indianola, Illinois. By Robert W. Ringler.

throughout the study area north of the Little Vermilion River. Well and resistivity data indicate the deposit is present along the lower reaches of Swank Creek, at least from where it enters the village limits on the northwest corner to its confluence with the Little Vermilion River.

There are no records of wells developed in the bedrock in the study area. Due to the widespread occurrence of non-water-yielding shale in the shallow bedrock, prospects for developing a municipal water supply in the shale are poor. Records of oil well tests near Sidell, to the west, indicate the presence of salt water in sandstones and sandy limestones in the deeper bedrock below 500 feet; however, water from bedrock below 200 feet is generally too highly mineralized for most uses. Testing of the bedrock is not recommended because of the low permeability of the shallow formations and the salinity of water encountered in the deeper formations.

A public water supply was installed for the Village of Indianola in 1954, when two wells - originally drilled as test holes in 1952 - were completed as production wells. They remained the sole source of water for 22 years until 1976, when Well No. 3 was added. The following summary decribes the locations and construction features of Wells 1, 2, and 3, all of which are still in operation.

Well No. 1: Drilled in August 1952 to a depth of 21 feet, approximately 2000 feet N and 2000 feet W of the SE corner of Section 17, T17N, R12W. Ten-inch casing was set to a depth of 15 feet, followed by six feet of No. 80 slot screen. Reportedly operates at a rate of 14 gpm.

Well No. 2: Drilled in August 1952 to a depth of 17.5 feet on the south bank of Swank Creek, oppdsite Well No. 1, or approximately 1800 feet N and 1800 feet W of the SE corner of Section 17. Constructed with six-inch casing to a depth of 14.5 feet, followed by No. 80 slot screen from 14.5 to 17.5 feet. Reportedly operates at 7 gpm.

Well No. 3: Drilled in October 1976 to a depth of 49 feet, 900 feet N and 1600 feet W of the SE corner of Section 17. Constructed with eight-inch casing to a depth of 39 feet, followed by No. 40 slot screen to the bottom. Reportedly operates at 40 gpm.

Groundwater withdrawals between 1955 and 1965 were more or less constant, averaging 15,000 gpd. Between 1965 and 1975 pumpage information was not available because of meter malfunctions, but it was reported that between 1971 and 1975 Wells 1 and 2 operated 24 hours per day. The current average withdrawal is reported to be 30,600 gpd.

Aquifer properties were estimated from data collected during production tests conducted in July and August 1952 and in November 1976. On July 3, 1952, a production test was run on Well No. 1. Analysis of the time-drawdown data indicated the coefficients of transmissivity and storage to be 2920 gpd/ft and 0.002, respectively. The data also revealed the presence of nearby geohydrologic boundaries. A 24-hour production test was conducted on August 11 and 12, 1952, in which Wells 1 and 2 were pumped simultaneously and nearby test holes were used as observation wells. Observation well data indicated a transmissivity of 7700 gpd/ft. Analysis of these data also indicated that the aquifer was rather narrow in extent

— approximately 300 feet wide. Upon completion of Well No. 3 a production test was conducted November 19, 1976. Water levels remained artesian during the test, but - as in earlier tests - the data were affected by the presence of geohydrologic boundaries. A value of 29,300 gpd/ft was determined for the transmissivity, reflecting the much greater aquifer thickness in the vicinity of Well No. 3.

In 1963, an evaluation was made by the State Water Survey as to the long-term sustained yield of the well field (Wells 1 and 2) as it existed at the time. The study was prompted by numerous requests by Village officials who were concerned over critically low water levels and water short-* ages. It was determined that the nature of the aquifer tapped by Wells 1 and 2 was such (shallow and thin) as to be highly sensitive to drought conditions. The study concluded that the combined sustained yield of Wells 1 and 2 was probably limited to about 15 gpm. A 1966 study by a consulting firm corroborated the above conclusion concerning the combined well yield and noted that the operating efficiency of both wells had declined to only 30 to 40% of original conditions. The consultant recommended a third well, which was subsequently added to the system.

Upon analysis of the test data from Well No. 3 in November 1976, it was concluded that the long-term sustained yield of the well was 40 gpm. Since the areal extent of the aquifer in the vicinity of the well was in question, however (due to the observed effect of boundaries), this figure was qualified in the State Water Survey report with the suggestion that water levels be monitored at the site periodically. Thus, the total practical sustained yield of the well field at Indianola may be of the order of 50 to 55 gpm (about 75,000 gpd).

The State Division of Water Resources has projected a groundwater demand of 21,000 gpd by the year 2000 for the Village. Should demands prove to be in excess of the estimated aquifer yield, exploration for additional supplies will be required. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for future exploration.

Indianola obtains its municipal water supply from a sand and gravel outwash deposit which occurs in the Swank Creek Valley. The deposit thickens from 4 to 10 feet in the northern part of the well field to over 40 feet farther south. The valley below Swank Creek in which the deposit occurs is approximately 600 to 1000 feet wide, although the lateral persistence of the deposit is much greater. Resistivity and well data indicate the deposit is at least 2 1/2 miles long. Resistivity surveying for future development of the aquifer is recommended downstream from the present well field along the Swank Creek in Sections 20 and 21, T17N, R12W.

There are no records of wells developed in the bedrock, so that testing of the bedrock is not recommended.

LONGVIEW

The Village of Longview is in east-central Illinois in the southeastern part of Champaign County (Sections 33 and 34, T17N, R10E). It is approximately 5 miles east-northeast of Villa Grove and 18 miles southeast of Champaign-Urbana. The Missouri-Pacific Railroad and other two-lane county roads serve the study area, which includes portions of T16N and T17N, R10E. Figure 29, taken from the topographic map of the Villa Grove 15-minute quadrangle, is a map of the area.

The presence of several galcial moraines in the area gives the topography a flat to gently rolling appearance. Longview is situated just off the edge of the Hildreth Moraine, a narrow, elongate ridge to the east (Figure 29). A remnant of the Hildreth Moraine also forms a subdued rise in the northwest corner of the area. Drainage is westward through Jordan Slough and Long Point Slough which join the south-flowing Embarras River at Villa Grove. Maximum topographic relief is about 80 feet.

The unconsolidated Pleistocene glacial drift in the study area consists of ice-laid till, water-laid silt, sand and gravel outwash, and wind-blown silt (loess). The drift is pre-Illinoian, Illinoian, and Wisconsinan in age and ranges in thickness from 75 to 255 feet. Sand and gravel deposits generally occur in three depth intervals in the drift: 30 to 70 feet, 80 to 130 feet and near the base of the drift below about 170 feet. The upper sand and gravel deposit generally occurs between elevations 610 and 650 feet and marks the base of the Wisconsinan drift (Figure 30). The middle deposits are within the Illinoian drift, generally at or near its base. The lower deposits are part of the pre-Illinoian drift in the buried Pesotum bedrock valley. These deposits which are not as thick or extensive as are normally found in buried valleys of this type have been found at depths below 200 feet.

Logs of oil wells, which are generally of questionable accuracy in describing glacial drift, sometimes indicate thick sand and gravel at depths of 100 to 175 feet in Sections 28-30, T17N, R10E. There has been no confirmation of these reports of sand and gravel.

The shallow bedrock in the Longview area consists of shale, sandstone, limestone, and coal of the Pennsylvanian Carbondale Formation. Where present, the sandstone and rarely the limestone yield only small, domestic supplies of water and cannot be considered a likely source of moderate to large supplies of groundwater. Below a depth of about 300 feet water is generally too highly mineralized for most uses, and drilling into the bedrock for a municipal supply is not recommended until the potential for water-bearing drift deposits to provide the desired supply is fully evaluated.

The Village of Longview obtains its municipal water supply from a well constructed in a shallow sand and gravel deposit in the NW corner of Section 4, T16N, R10E. The deposit attains its maximum observed thickness of 20 feet at the well and thins to 3 to 5 feet to the east and west. Although the deposit is widespread through the study area, it is discontinuous, and' data are insufficient to accurately define its boundaries. Its presence at the base of the Wisconsinan drift at depths of 25 to 65 feet has been noted in

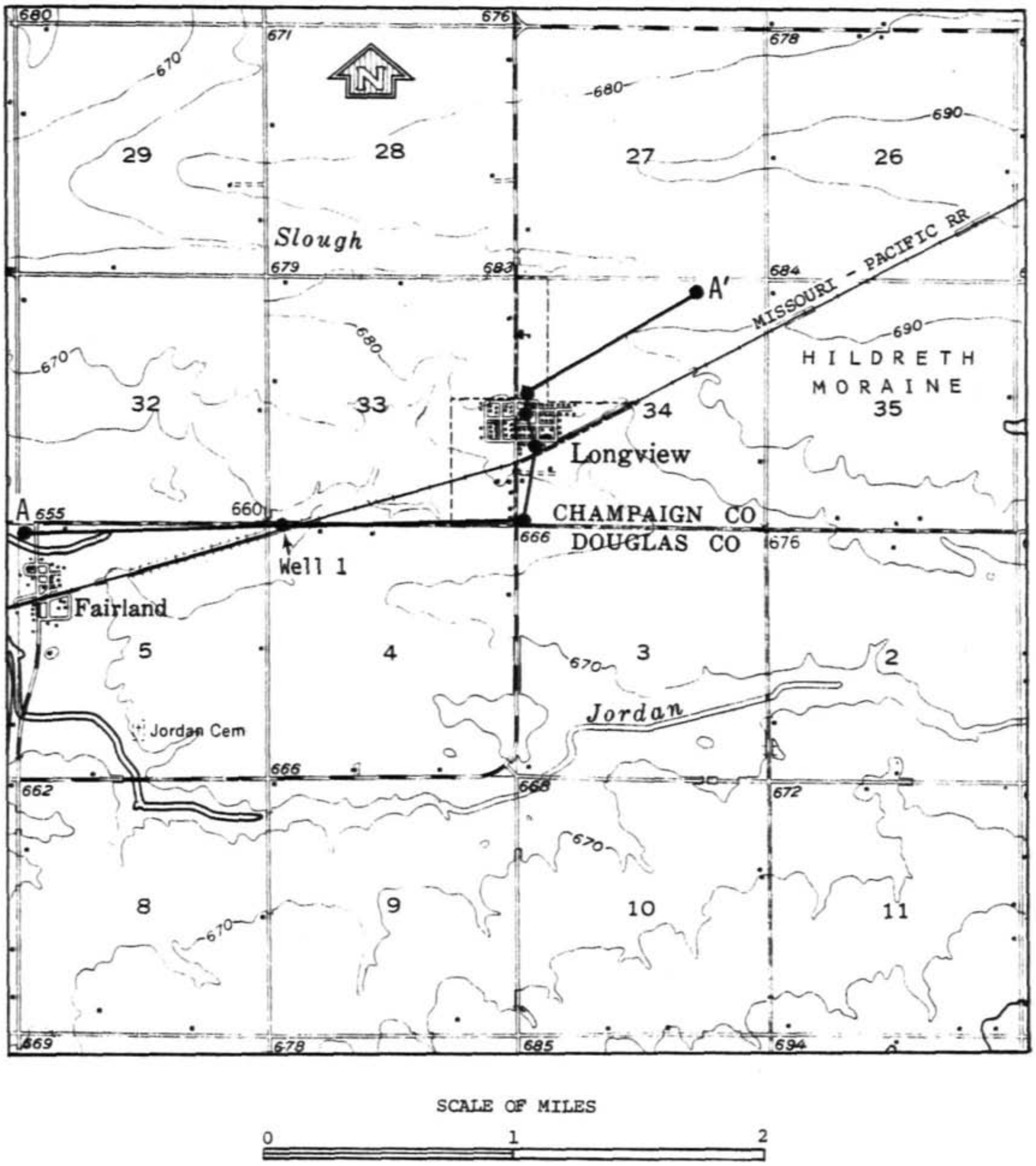


Figure 29. Longview study area

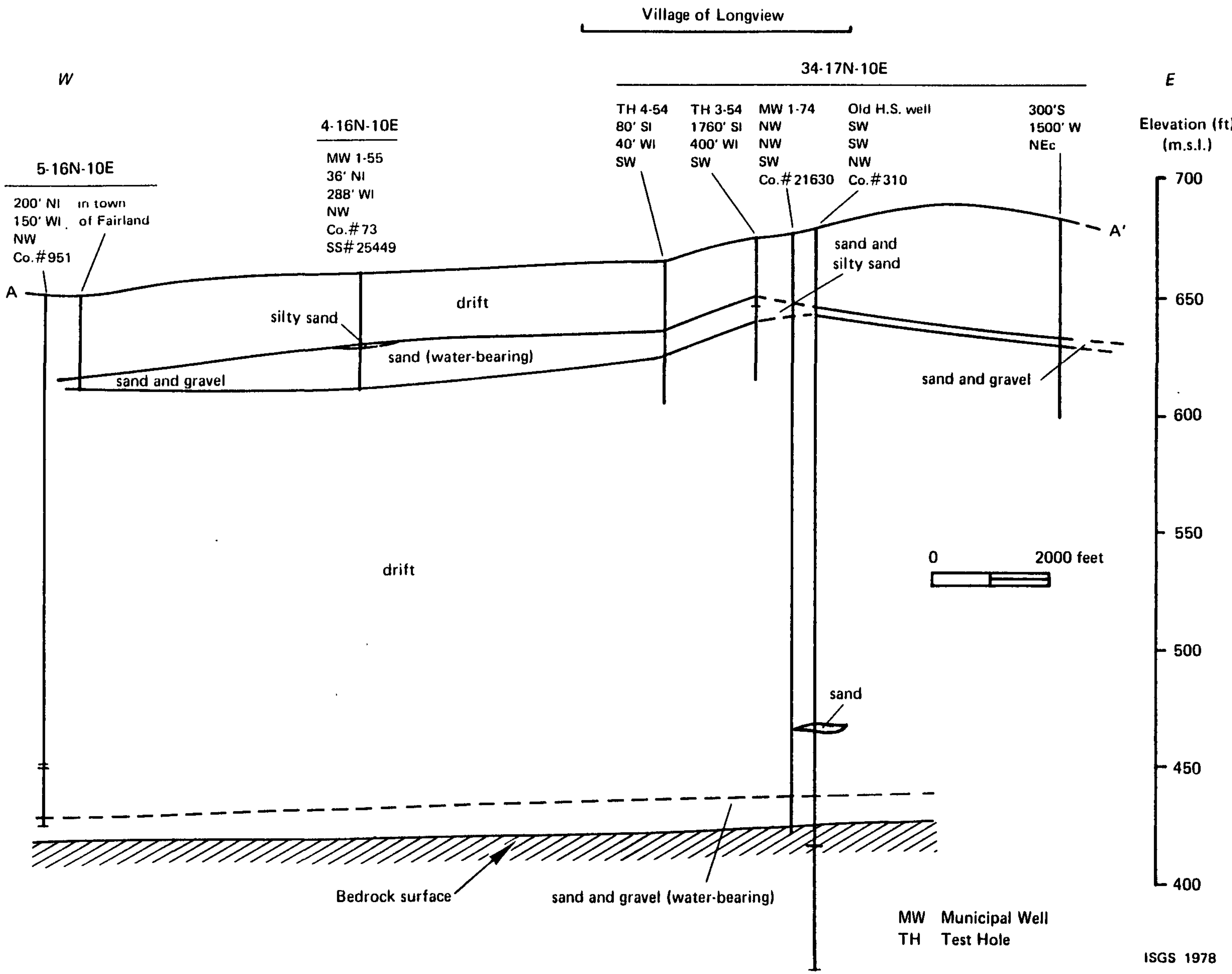


Figure 30. Cross section A-A , showing surface topography, glacial deposits, and bedrock surface at Longview, Illinois. By Robert W. Ringler.

a number of water wells in the study area. The 20 foot thickness at the municipal well is unlikely to be exceeded in the area, and large variations within the 0-20 foot thickness range can be expected to occur within short distances.

A public water supply was installed for the village in 1955. Well No. 1 was completed in May of that year to a depth of 50 feet, about one mile southwest of town, or approximately 36 feet S and 288 feet E of the NW corner of Section 4, T16N, R10E. The well was cased with 10-inch pipe to a depth of 40 feet and with No. 25 slot screen from 40 feet to 50 feet. This well remains the only source of water for the village and reportedly operates at 60 gpm.

Pumpage at Longview was only 4300 gpd in 1956 and grew slowly for the following 9 years, reaching 7300 gpd in 1965. During the period, 1966 to 1976, withdrawals averaged 12,000 gpd and currently average 21,000 gpd.

A well production test was conducted May 20-21, 1955, on Well No. 1. Observation well data indicated the presence of geohydrologic boundaries 200 feet and 600 feet from Well No. 1. Graphical analysis of the test data indicated coefficients of transmissivity and storage of 8400 gpd/ft and 0.0013, respectively.

For the purpose of estimating the practical sustained yield of Well No. 1 an idealized mathematical model aquifer was assumed, consisting of an aquifer 20 feet thick and 800 feet in width, with coefficients of transmissivity and storage of 8400 gpd/ft and 0.0013, respectively. Image-well theory was used to estimate the influence of the geohydrologic boundaries.

The practical sustained yield of Well No. 1 was estimated by using the idealized aquifer model to calculate long-term pumping levels at various pumping rates. Available drawdown was limited to the difference between the top of the aquifer and nonpumping levels that were projected to include seasonal recession. For years of normal to below-normal precipitation it was estimated that the sustained yield would be about 20,000 gpd.

The average groundwater demand at Longview for the year 2000 has been estimated by the State Division of Water Resources to be only 9350 gpd. If additional groundwater supplies should, nevertheless, be needed the State Geological Survey has made the following recommendations for groundwater exploration.

The deposit from which the municipal supply is currently being obtained may be large enough for additional wells to be constructed in it. More resistivity and test drilling data are needed to determine its extent and locate an optimum site to construct a new well.

A sand and gravel deposit at the base of the pre-Illinoian drift in the Pesotum bedrock valley may also be capable of providing a supplementary supply. A deep well drilled in 1910 revealed the presence of sand and gravel at depths of 240 to 253 feet. A third area to explore is the NW 1/4 of Section 28, T17N, R10E, where logs of oil wells indicate deposits of sand and gravel with a cumulative thickness of 90 to 112 feet.

MAZON

The Village of Mazon is in south-central Grundy County in northeastern Illinois, approximately 10 miles north of Dwight and 8 miles south of Morris. The area is served by two-lane state and county highways and by the Atchison, Topeka and Santa Fe Railroad. The study area is the portion of T32N, Rs 7 and 8E, shown on Figure 31, an excerpt from the topographic maps of the Dwight and Morris 15-minute quadrangles.

Mazon lies on a nearly flat till plain, veneered with lacustrine deposits, with a gentle regional slope of about 10 feet per mile to the northeast. Several small streams, Johnny Run, Murray Slough, and the West Fork of the Mazon River, meander across the study area. Topographic relief is subdued, reaching a maximum of approximately 70 feet.

The unconsolidated glacial deposits in the study area consist of drift of Wisconsinan age with a range in thickness from 7 to 95 feet. The glacial deposits are a complex of ice-laid till, water-laid outwash, alluvium and lacustrine (lake) deposits and wind-blown silt (loess). West of the coarse lacustrine deposits (Figure 31), thin beds of sand and gravel are found within or at the base of the drift. They are generally restricted in extent with a correspondingly small water-producing capability.

The shallow bedrock in the study area consists of shale, sandstone, coal, and underclay of the Pennsylvanian Carbondale Formation. Wells in the shallow bedrock generally have a low water-yielding capacity and yield water of highly variable quality. Logs for several wells describe the water as murky or having an oil show. Water-yielding rocks in the deeper bedrock are not encountered until the Ordovician St. Peter Sandstone at a depth of approximately 590 feet, or at sea level, below Mazon. Water from the St. Peter can be expected to be moderately mineralized.

The village of Maxon presently obtains its municipal groundwater supply from buried sand and gravel fround 1 1/4 miles east of town by an electrical earth resistivy survey in 1938. The deposit developed as a delta or alluvial fan on the shore of the former glacial Lake Wauponsee. In the vicinity of the well field, the deposit varies from 17 to 27 feet in thickness, with a maximum south of the well field of 28 1/2 feet. The deposit is stratified; textures range from silty sand to gravel with occasional lenses of clay and silt (Figure 32). Its width near the well field is approximately 1000 feet and it appears to widen to the south to about 1 mile (Figure 31). It is nearly 2 miles long.

West and south of town in Sections 19, 20, 21, and 29, several private wells obtain water from streaks of gravel at the base of the drift. These deposits are generally only 1 to 3 feet thick, although a log from a well in the SW 1/4 of Section 29 described 16 feet of gravel.

The public water supply for the village of Mazon was put into service in 1942. Between 1942 and 1975, a total of six wells were drilled within a 105 x 110-foot fenced-in area one mile east of town. In 1975, a well-numbering change was made, so that former Well Nos. 2, 4, 5, and 6 are now known, respectively, as Nbs. 2, 3, 1, and 4. The following summary describes their locations and construction features; all other wells have been abandoned.

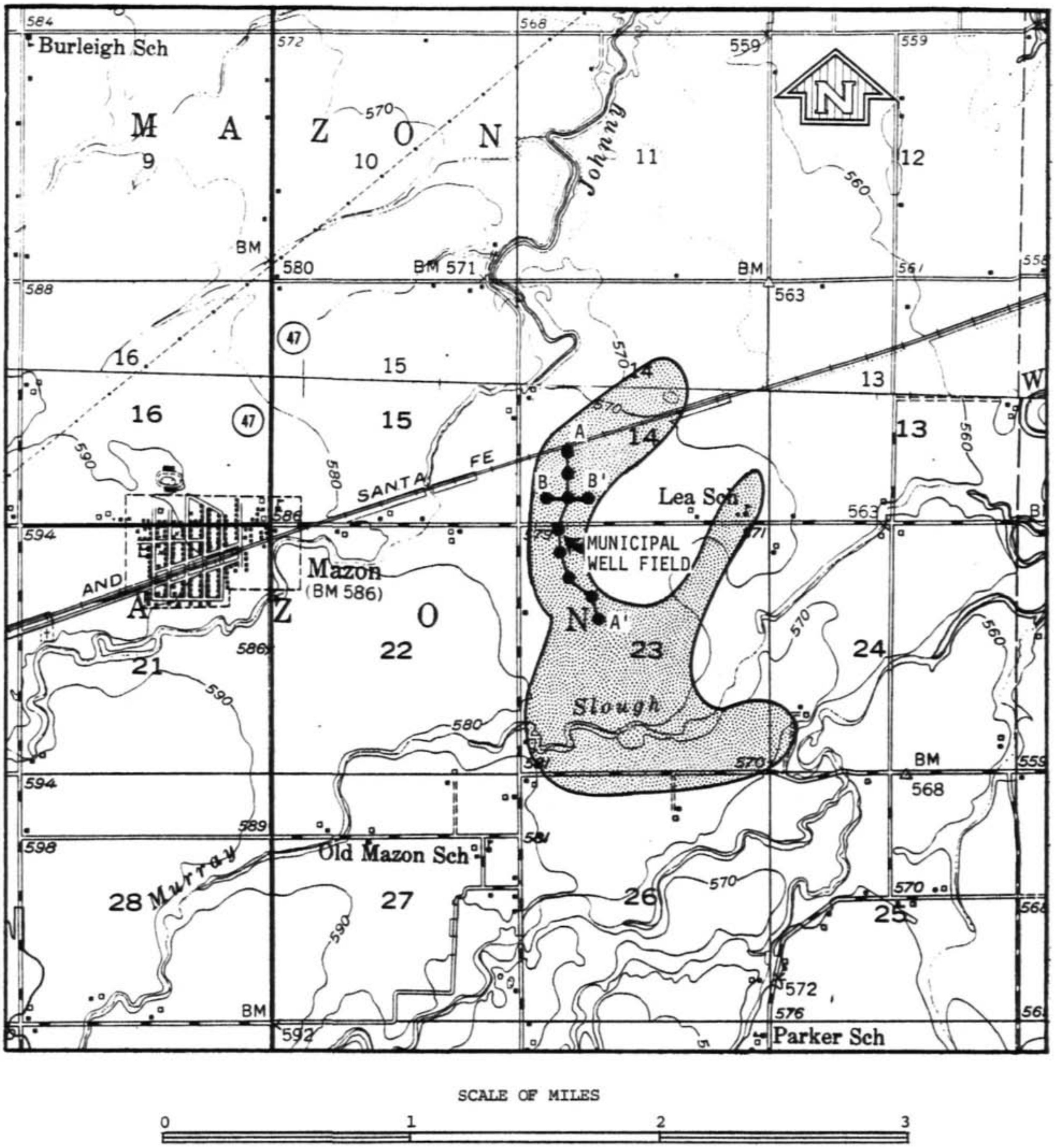


Figure 31. Mazon study area

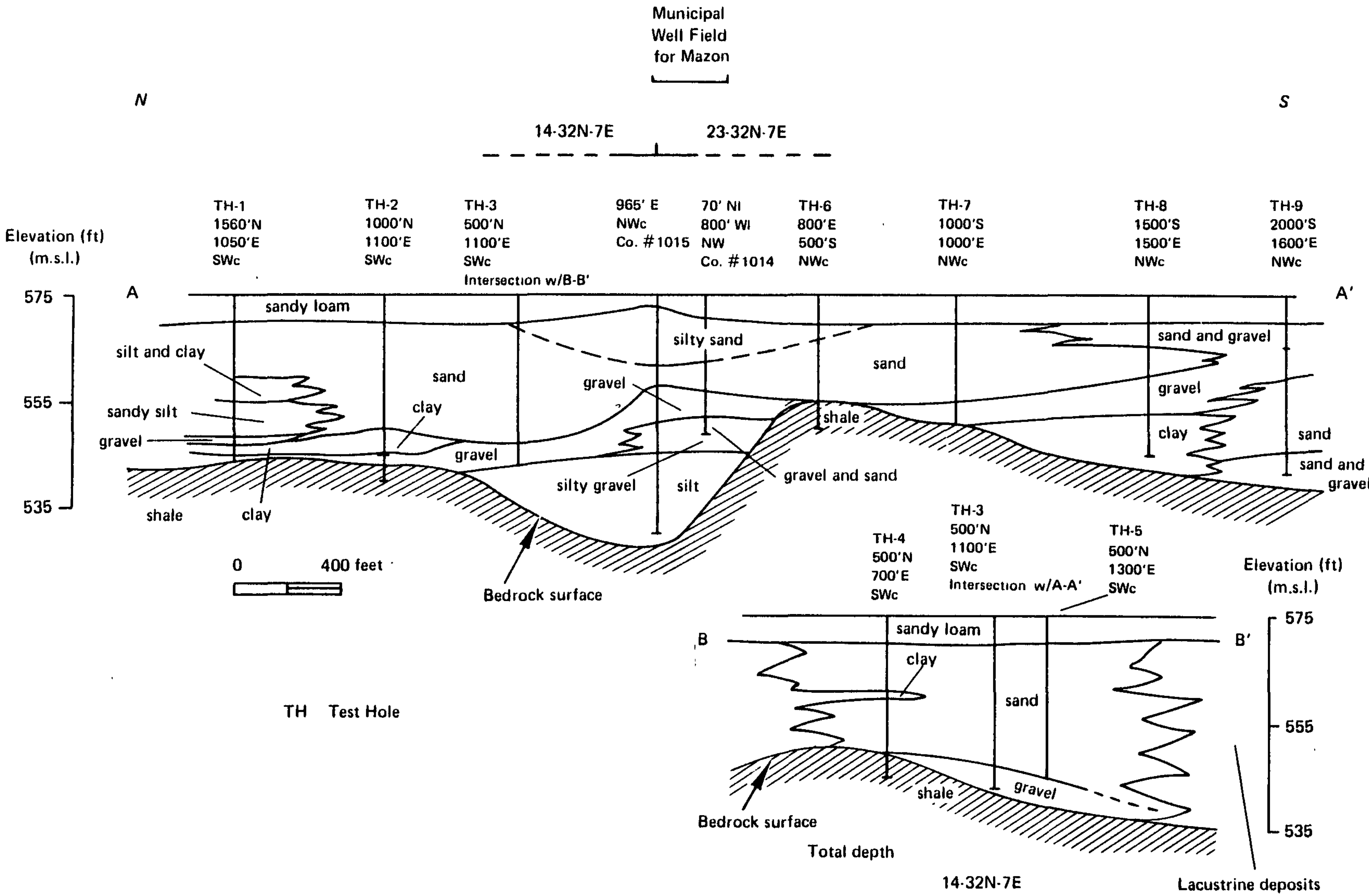


Figure 32. Cross section A-A* and B-B', showing surface topography, glacial deposits, and bedrock surface east of Mazon, Illinois. By Robert W. Ringler.

ISGS 1978

Well No. 1: *(formerly No. 5)* Drilled in 1963 to a depth of 25 feet, 50 feet SE of original Well No. 1 (whose location was given as 70 feet S and 800 feet E of the NW corner of Section 23, T32N, R7E). Six-inch casing extended to a depth of 16 feet, followed by eight feet of screen. Reportedly operates at 45 gpm.

Well No. 2: Drilled in 1948 to a depth of 26 feet, approximately 40 feet SW of original Well No. 1. Cased with 10-inch pipe to a depth of 20 feet. Screen information is unavailable. Reportedly operates at 25 gpm.

Well No. 3: *(formerly No. 4)* Drilled in 1962 to a depth of 26 feet, 55 feet NW of original Well No. 1. Cased with 34-inch outer casing to 16 feet, 8-inch inner casing to 17 feet, and No. 8 slot screen from 17 to 26 feet. Reportedly operates at 40 gpm.

Well No. 4: *(formerly No. 6)* Drilled in 1975. Legal location and construction features unknown but reportedly similar to other wells in well field. Operates at 6 gpm.

Pumpage at Mazon grew from 15,000 gpd in 1947 to 70,000 gpd in 1969 and 1970. After a major leak was found and repaired, consumption declined to 57,000 gpd in 1973. Currently, pumpage averages 75,000 gpd.

Little is known of the aquifer properties at Mazon, since production test data are not available. Specific capacity information from two tests (April 23, 1941, for original Well No. 1 and April 2, 1958, for original Well No. 3) suggested the aquifer transmissivity was of the order of 5000 gpd/ft. However, pumping histories of the wells indicated a transmissivity greater in magnitude. Based on drillers logs, average aquifer thickness, and reasonable values of permeability for fine-to-medium sand, a transmissivity of 9000 gpd/ft was assumed, along with a water table storage coefficient of 0.2. Geologic reports indicate that the aquifer has a narrow, linear configuration, trending north-to-south, approximately 1000 feet in width in the vicinity of the well field.

In order to estimate the long-term practical sustained yield of the well field at Mazon, an idealized aquifer model was utilized, consisting of a 1000-foot strip aquifer whose transmissivity and storage coefficient average 9000 gpd/ft and 0.2, respectively. Total drawdown at each pumped well was calculated as the sum of aquifer losses, mutual interference, and image effects associated with geohydrologic boundaries. The sums of these increments were then corrected for additional drawdown due to dewatering. Available drawdown in each well was taken to be the difference between the original nonpumping water level and the pumping level which would result in dewatering half of the aquifer.

Based on available information, the long-term practical sustained yield of the well field is estimated to be about 60 gpm or 86,000 gpd. Because the aquifer is shallow and, therefore, sensitive to drought conditions, the practical sustained yield could be reduced by 50% during periods of prolonged drought.

Estimates of future groundwater demands made by the State Division of Water Resources indicate that the average demand at Mazon in the year 2000 will be 85,000 gpd. If additional supplies of water are needed, an exploration program will be necessary. The following excerpt from the State Geological Survey indicates the recommendations of that agency for groundwater exploration.

It appears the sand and gravel deposit from which Mazon currently obtains its groundwater supply could be further developed to the northeast and southeast. The portions of Sections 14 and 23 lying within the inferred boundary of the deposit on Figure 31 are the suggested areas to explore. Additional resistivity surveying is recommended to locate optimal sites for test drilling.

Exploration for a municipal supply in the shallow bedrock is not recommended because of the low capacity and the variable water quality of wells already developed there. The St. Peter Sandstone in the deeper bedrock is not a good possibility at this time, because the water is expected to be moderately mineralized.

NOBLE

The Village of Noble is in southeastern Illinois on the west side of Richland County (Section 8, 9, 16, and 17, T3N, R8E), 8 miles west-southwest of Olney. State Route 250, U.S. Route 50, and the Baltimore and Ohio Railroad serve the study area comprising the portion of T3N, R8E and R9E shown on Figure 33, from the topographic maps of the Clay City and Noble 7 1/2-minute Quadrangles.

Noble is situated on a broad, subdued rise, extending southward from a hill lying several miles north of the village. Drainage is to the east, south and west from Noble. On the west the ground surface slopes gently to a break in slope about the 460 foot elevation contour, then more steeply toward the valley in which the Big Muddy Creek and Little Wabash River flow. Maximum topographic relief is over 120 feet.

The unconsolidated glacial deposits in the study area consist of drift of Illinoian and possibly pre-Illinoian age, with a thin surficial cover of Wisconsinan wind-blown silt (loess). The unconsolidated deposits range in thickness from 15 feet in the uplands to over 100 feet approaching the river valley on the west. The drift in the uplands consists mainly of glacial till with a few, thin scattered lenses of sand and gravel. In the river valley to the west, the deposits are mainly fine-grained alluvium, with sand and gravel occurring at a depth of 50 to 60 feet.

The shallow bedrock in the study area consists of rocks of the Pennsylvanian Mattoon Formation which contains a high proportion of sandstone in addition to shale and limestone (Figure 34). The sandstones yield fresh water from depths just beneath the surface to 250 feet. The groundwater gradually becomes more mineralized with depth, and electrical logs from nearby oil wells indicate the groundwater becomes too highly mineralized for most uses below a depth of about 300 feet. Non-water-bearing rocks occur throughout the Pennsylvanian sequence, and in places are persistent enough to split the sandstone into distinct layers (Figure 34). Textures in the sandstones range from clean, coarse sand to siltstones and silty sandstones. The sandstone is generally white, but brown and gray beds have been reported.

In the deeper bedrock between depths of approximately 2200 and 3200 feet, rocks of Mississippian age have yielded large quantities of oil, gas and salt water. Much of the salt water has been reinjected into rocks associated with the oil bearing zone, but some of it has leaked from brine-pits or been spilled in oil field operations.

The Village of Noble obtains its municipal water supply from wells developed in Pennsylvanian sandstones in the shallow bedrock. The sandstones are generally 30 to 60 feet thick and appear to be continuous throughout the area (Figure 34). The sandstones commonly interfinger with finer-grained shales, limestones, shaley sands and sandy shales which reduces permeability. As a result, water-yielding beds of sandstone can be found almost anywhere in the area, but beds with high porosity and permeability, the best aquifers, may be restricted in size and difficult to find.

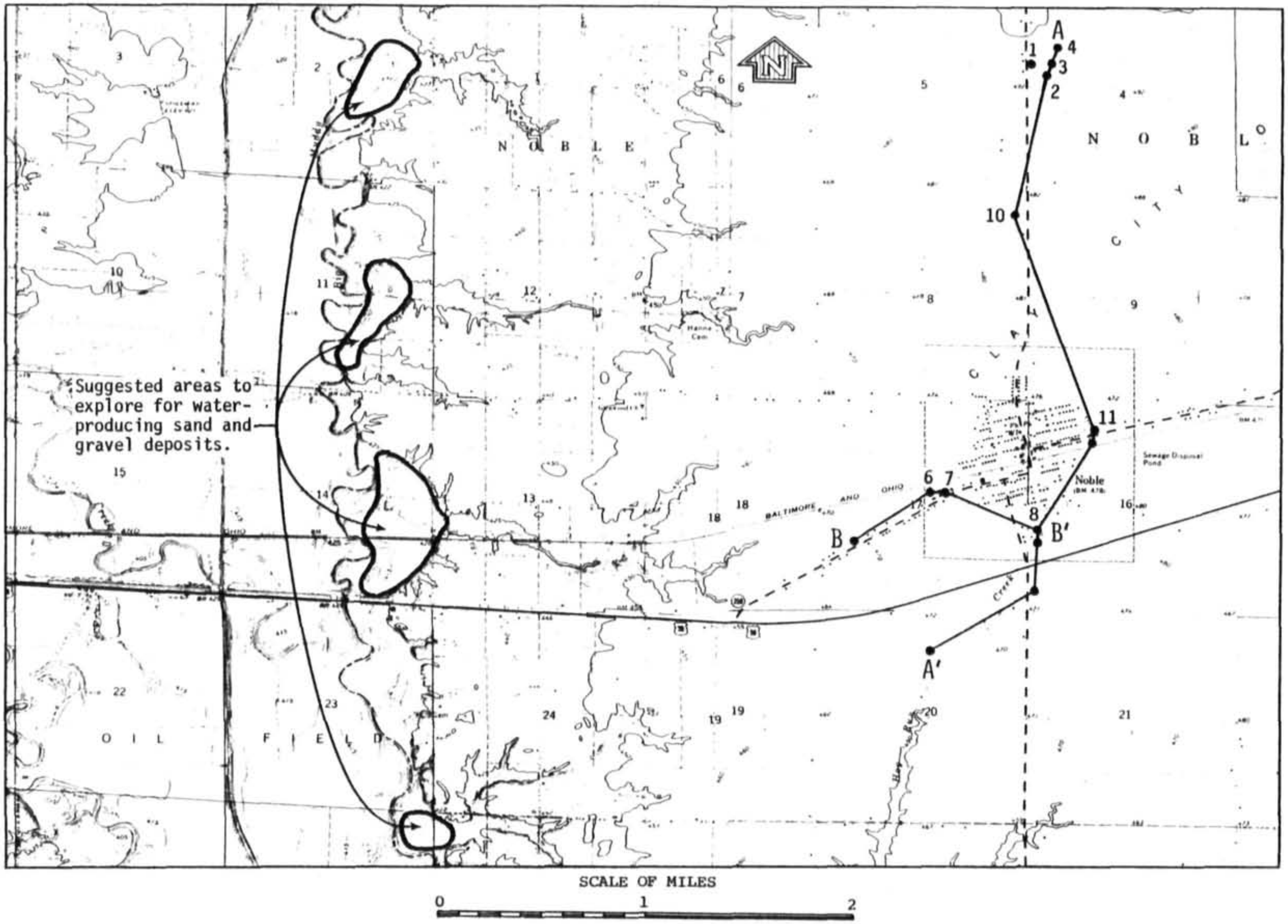
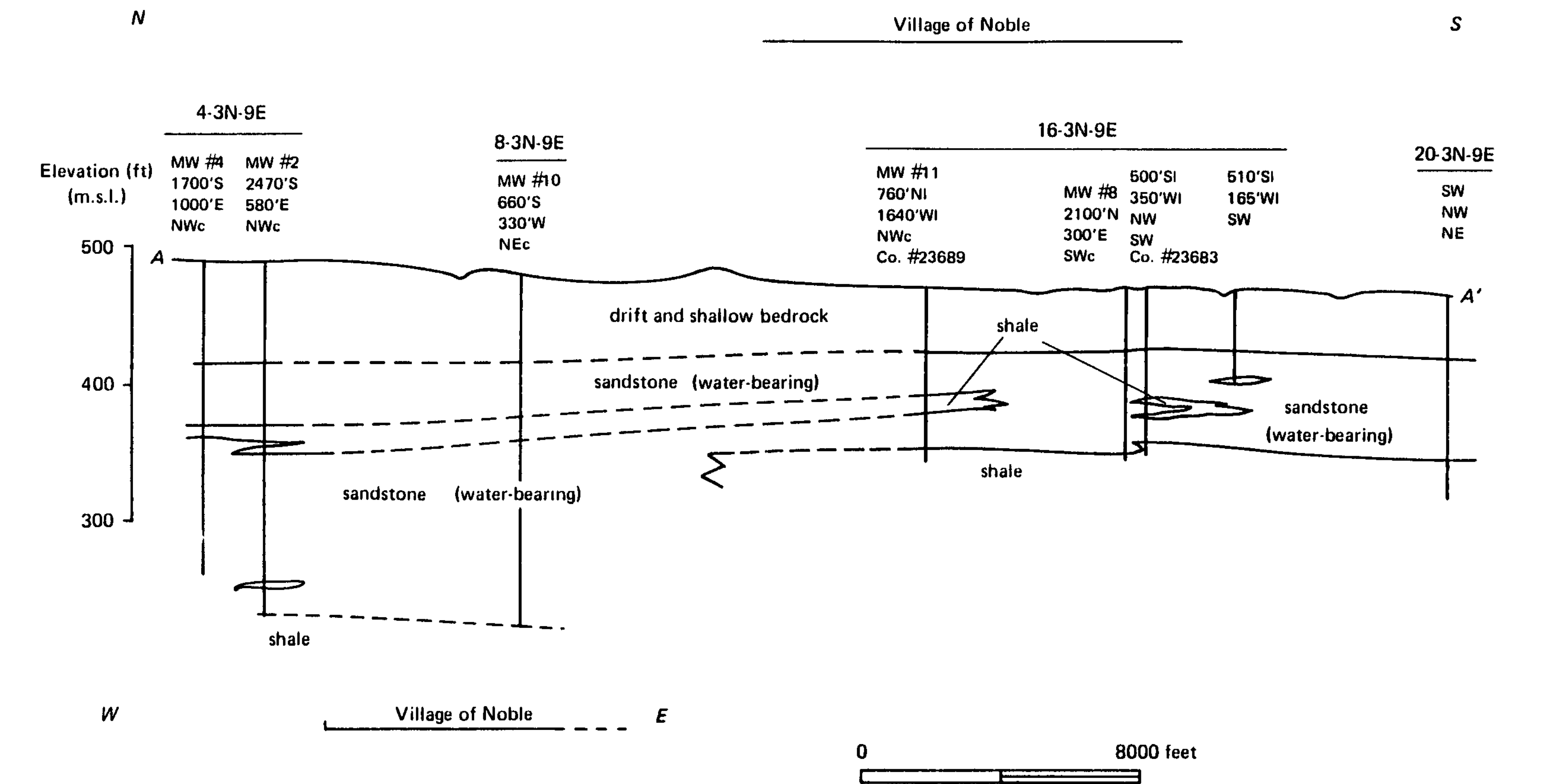


Figure 33. Noble study area



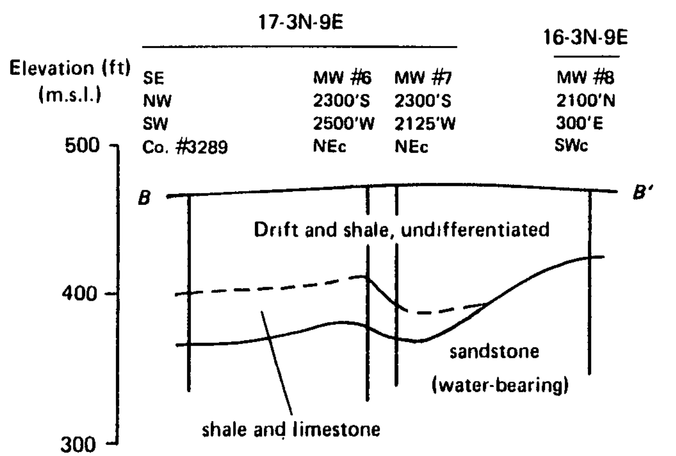


Figure 34. Cross-sections A-A' and B-B', showing surface and bedrock topography, glacial drift, and water-bearing sandstones in the bedrock topography near Noble, Illinois. By Robert W. Ringler.

The Village completed the installation of a public water supply in 1948 after having drilled a well in 1946. Subsequently, at least eight additional wells were drilled. At the present time seven wells remain in use. The following summary describes the locations and well construction features of the existing wells.

Well No. 1: Drilled in 1946 to a depth of 210 feet, about two miles north of town, or approximately 2110 feet S and 100 feet E of the NW corner of Section 4, T3N, R9E. Constructed with 6 1/4-inch casing to a depth of 81 feet, followed by six-inch open borehole to the bottom. Deepened in 1962 to a depth of 247 feet. Reportedly operates at a rate of 5 gpm.

Well No. 3: Drilled in 1948 to a depth of 210 feet, approximately 600 feet E of Well No. 1. Deepened in 1960 to 238 feet. Cased with 8 1/4-inch pipe to a depth of 133 feet. One-foot long slots were cut into the casing at depths of 90, 100, and 110 feet. Reportedly operates at about 2 gpm.

Wells No. 4: Drilled in September 1960 to a depth of 230 feet, about 1000 feet NE of Well No. 1, or 1700 feet S and 1000 feet E of the NW corner of Section 4. Cased with eight-inch pipe to 76 feet, followed by a 7 7/8-inch open hole to the bottom. Reportedly operates at about 6 gpm.

Well No. 6: Drilled in April 1964 to a depth of 148 feet in the southwest part of town, or approximately 2300 feet S and 2500 feet W of the NE corner of Section 17. Seven-inch casing was set to a depth of 98 feet, followed by seven-inch open hole. Reportedly operates at a rate of about 5 gpm.

Well No. 7: Drilled in April 1964 to a depth of 137 feet, 375 feet E of Well No. 6, or approximately 2300 feet S and 2125 feet W of the NE corner of Section 17. Cased with seven-inch pipe to 105 feet, followed by seven-inch open hole. Reportedly operates at about 6 gpm.

Well No. 9: Reported in a 1964 Public Water Supply report to have been drilled to a depth of 215 feet. Construction information unknown, but it is believed to be located in the vicinity of the old well field north of town in Section 4. Reportedly operates at about 10 gpm.

Well No. 10: Purchased in 1977 from Gulf Oil Company. Drilled to a depth of 257 feet, 660 feet S and 330 feet W of the NE corner of Section 8. Cased with five-inch pipe to a depth of three feet and with seven-inch pipe from three feet to 140 feet. A seven-inch open hole extended to the bottom. Reportedly operates at about 3 gpm.

Average withdrawals have apparently doubled since the system was installed, growing from 27,000 gpd during the first year to the current 60,000 gpd. It is reported that the wells must operate round-the-clock to meet present demand.

Eight well production tests are on file at the State Water Survey for Noble. Specific capacities are typical of Pennsylvanian sandstones in this part of the state, averaging 0.17 gpm/ft. Transmissivities are extremely low, ranging from 11 to 490 gpd/ft and averaging 200 gpd/ft. Only one storage coefficient could be determined from the tests; an artesian value of 6.5×10^{-4} was calculated.

An idealized model aquifer was hypothesized to aid in computing mutual interference between pumping wells. It was assumed that the aquifer extended beyond the limits of the cone of depression and had values of 200 gpd/ft and 1.0×10^{-4} for the coefficients of transmissivity and storage, respectively.

The long-term sustained yield of the well field was estimated by taking into consideration specific-capacity data, mutual interference, and available drawdowns (taken as the depth from original nonpumping levels to the top of the aquifer at each well). Based on available information the long-term sustained yield of the aquifer in the general area of the existing wells is estimated to be about 67,000 gpd.

The State Division of Water Resources has projected a water demand at Noble of 53,000 gpd in the year 2000. This is of the same order of magnitude as current demands. Should additional supplies be desired at that time a groundwater exploration program would be necessary. The following excerpt from the State Geological Survey summarized the recommendations by that agency for such exploration.

There are two options for future development of groundwater resources in this area. The first is to drill more wells into the shallow bedrock south of town. Several wells properly spaced and pumped at moderate rates would minimize induced recharge and lateral movement of brines from oil field operations and provide a future supply of groundwater of acceptable quality. The suggested areas to explore are the south halves of Sections 16 and 17 and the north halves of Sections 20 and 31, T3N, R9E.

The second option is to explore the river valley to the west where small streams empty into the bottom in Sections 2, 11, and 14 and 23, T3N, R8E. As much as 33 feet of sand and gravel are known to exist in Section 3, and the geologic setting with the small streams entering a large, unconfined area make it likely water-bearing sand and gravel deposits were developed at their mouths. An electrical earth resistivity survey would be useful to locate sites for test drilling and to identify areas in which the drift and shallow bedrock have been contaminated by oil field brines.

NOKOMIS

The Village of Nokomis is in northeastern Montgomery County in south-central Illinois. It is approximately 18 miles south of Taylorville and 12 miles southwest of Pana in Sections 14, 15, 22 and 23, T10N, R2W. The area is served by two-lane state and county highways and CONRAIL. The study area includes the portion of Ts 9 and 10N, Rs 1 and 2W, shown on Figure 35, an excerpt from the topographic maps of the Nokomis and Pana 15-minute Quadrangles.

Nokomis lies on the northwest flank of an elongate, hummocky ridge extending northeast-southwest through the study area. A large number of intermittent streams flow off the flanks of the ridge. On the north side they feed into the northerly flowing South Fork of the Sangamon River and the southwesterly-flowing East and Middle Forks of Shoal Creek. South of the ridge they empty into the southerly-flowing Ramsey and Elliott Creeks. Topographic relief is pronounced along the crest of the ridge and on its flanks. North of it the ground surface slopes gently to the northwest. Maximum topographic relief is 130 feet.

The unconsolidated glacial deposits in the study area consist of drift of pre-Illinoian, Illinoian and Wisconsinan age, which range in thickness from 32 to 120 feet. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash and alluvium and wind-blown silt (loess). Pre-Illinoian drift is exposed in the banks of Ramsey Creek southeast of the study area and generally occurs beneath Illinoian drift in buried bedrock valleys. The Illinoian drift consists of a basal member called the Vandalia Till and an upper member of sandy and gravelly beds collectively called the Hagarstown. The Vandalia Till locally contains lenses of sand and gravel which may be water bearing. However, due to the thinness and small areal extent of these lenses, their water-producing capabilities are generally very limited. Deposits of the Hagarstown are less compact and more permeable than the underlying Vandalia Till, and the different types grade into one another, varying with degree of water sorting. Textures range from gravelly till and poorly sorted gravel between the ridges to well sorted sand and gravel along the trend of the ridges.

The shallow bedrock in the study area consists of shale, limestone, sandstone and coal of the Pennsylvanian Bond and Mattoon Formations. The Mattoon Formation overlies the Bond and both dip easterly toward the center of the Illinois Basin.

The Village of Nokomis obtains its municipal water supply from sand and gravel deposited as alluvial fans at the base of the ridge south of town. The village wells are located within and just west of the city limits. In most places, the deposits comprise two units; an upper one consisting of fine sand, about 5 feet thick, and a lower one of predominantly coarse sand and gravel, 9 to 21 feet thick, which supplies water to the municipal wells. The lower unit has a maximum observed thickness of nearly 22 feet within the city limits but appears to pinch out near the break in slope at the base of the ridge. The areal extent of the alluvial fans is variable, ranging from a few hundred feet to a mile or two in diameter. The lateral continuity

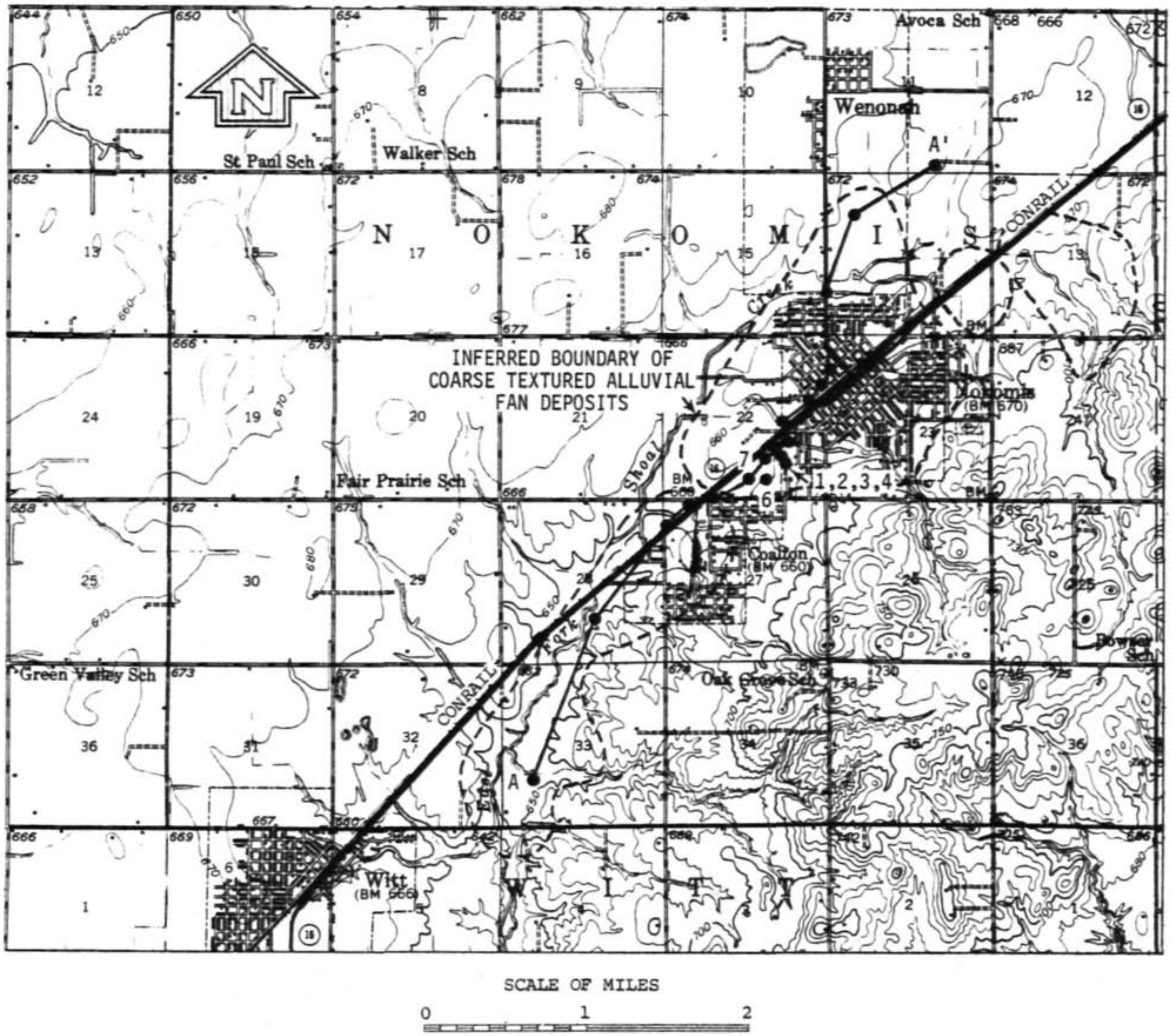


Figure 35. Nokomis study area

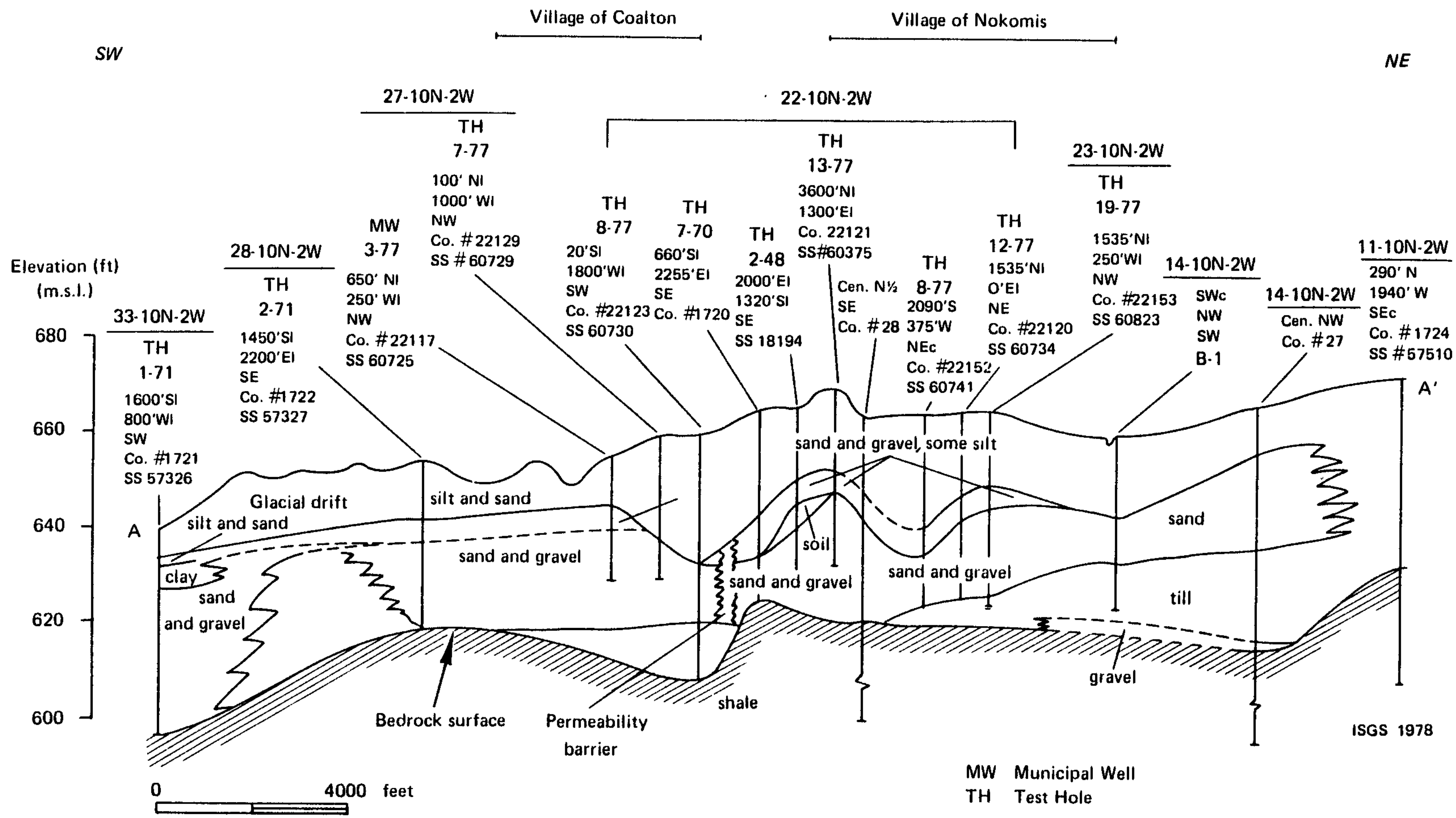


Figure 36. Cross section A-A', showing surface topography, sand and gravel deposits in the glacial drift, and bedrock surface near Nokomis, Illinois. By Robert W. Ringler.

between these deposits is suggested by Figure 36, although there are likely to be permeability barriers on the edges of the individual fans, inhibiting the free flow of groundwater between them.

A public water supply was installed by the City of Nokomis in 1895. Water was first obtained from six drift wells located in the southwest part of town along the south side of the railroad right-of-way. Shortly after 1923, these wells were all abandoned. The present numbering system of wells begins with four wells drilled in 1923. Since that time eight were drilled, one of which has been abandoned. The following summary indicates known locations and construction features of wells presently in use.

Wells 1-4: Drilled in March and April 1923 in a north-south line, 350 feet west of the city limits. The south well (Well No. 1) is approximately 1700 feet N and 1800 feet W of the SE corner of Section 22, T10N, R2W. The wells were drilled to a depth of 40 feet and were cased with 10-inch pipe and 14 feet of screen. A common suction pump reportedly pumps 65 gpm from Wells 1, 2, and 3, while Well No. 4 operates at a rate of 60 gpm.

Well No. 6: Drilled in August 1951 to a depth of 41 feet, 840 feet N and 2040 feet W of the SE corner of Section 22. Constructed with 12-inch casing to a depth of 29 feet, followed by four feet of No. 14 slot screen and with eight feet of No. 40 slot screen. Reportedly operates at a rate of 90 gpm.

Well No. 7: Drilled in December 1970 to a depth of 38.5 feet, 666 feet N and 2255 feet W of the SE corner of Section 22. Twelve-inch casing was installed to a depth of 28.5 feet, followed by 10 feet of No. 80 slot shutter screen. The annulus between the screen and the 32-inch borehole was filled with gravel. Reportedly operates at a rate of 35 gpm.

Well No. 8: Drilled in March 1977 to a depth of 40 feet, 1480 feet S of the NE corner of Section 22. Constructed with eight-inch casing to 32 feet and with No. 20 slot screen from 32 to 40 feet. Believed to operate at approximately 50 gpm.

Pumpage figures indicate that in 1913 Nokomis had an average withdrawal rate of 67,000 gpd. A local coal mine purchased water in the 1940's, and pumpage reached 133,000 gpd by 1944. Currently, Nokomis pumps an average of 180,000 gpd and furnishes approximately 15,000 gpd to nearby Coalton.

The hydraulic properties of the aquifer tapped by the Nokomis well field are known from analysis of data from well tests conducted on December 10, 1970, and March 23, 1977.

A well production test was conducted December 10, 1970, on Nokomis Well No. 7. Transmissivity and storage coefficient values determined from the analysis of the data were 45,000 gpd/ft and 3.7×10^{-5}, respectively. It is suspected that the low value of storage coefficient may be attributable to partial-penetration effects. A three-hour production test was conducted March 21, 1977, on Well No. 8. Analysis of the data resulted in average values of the coefficients of transmissivity and storage of 37,300 gpd/ft and 2.1×10^{-3}. It is believed that long-term pumping levels in the aquifer will be under water-table conditions, if existing pumping schemes prevail.

For purposes of computing long-term effects of groundwater pumpage schemes, an idealized aquifer model was used, consisting of a wide, semi-infinite strip aquifer, 10,000 feet in width and extending to infinity in a southwesterly direction from the well field. The aquifer effectively ends 6000 feet to the northeast of the well field. Average aquifer properties were 41,000 gpd/ft and .001 for transmissivity and storage coefficient, respectively. Available drawdowns were limited to the top of the aquifer, and nonpumping levels were assumed to be those extant during the original development of the well field. The effects of boundaries were computed from image-well theory.

In an October 1963 study by the State Water Survey it was estimated that the practical sustained yield of the well field (Wells 1-6 at that time) was about 175,000 gpd and that another well field a mile to the northeast might develop another 80,000 gpd. Since that time, Well No. 5 has been abandoned and replaced by Well No. 7, and an eighth well has been drilled approximately 1/2 mile to the northeast. The State Water Survey, in analyzing test data from Well No. 8, estimated that 50-55 gpm (72,000-79,200 gpd) could probably be developed from the well.

With the idealized aquifer model described above, it was estimated that the seven existing wells could sustain a long-term development of about 150 gpm or 216,000 gpd under normal conditions of precipitation. As was evidenced last summer, however, when dry conditions prevailed and water level declines forced round-the-clock pumpage, below normal precipitation could reduce the sustained yield by 12 to 13%.

Projections by the State Division of Water Resources indicate that by year 2000, groundwater demand at Nokomis will be 198,000 gpd. Additional demands would require development of new well fields. The following summary, excerpted from the State Geological Survey, indicates the recommendation of that agency for future exploration and well development.

Excellent possibilities for development of a large groundwater supply exist to the southwest of the Village of Nokomis in Sections 28 and 33. Test drilling there in 1971 revealed deposits of sand and gravel over 30 feet thick (Figure 36). If additional supplies of groundwater are needed in the future, it is recommended that a well be constructed in the vicinity of Test Hole 1-71 or 2-71. Sections 34 and 35, south of Nokomis are also likely to contain extensive sand and gravel deposits which could be developed into a moderate to large supply. Further electrical resistivity work is recommended to locate optimal sites for test drilling. Test drilling in Sections 28 and 33 should proceed to bedrock which lies at approximately 35 to 45 feet in that area. Test drilling in Sections 34 and 35 should proceed to 120 feet or bedrock, whichever comes first, as the drift is a little thicker there. Generally, below about 200 feet, water in the bedrock becomes too highly mineralized for most uses, and testing of the bedrock is not recommended until the capacity of the drift aquifers to provide an adequate supply of groundwater has been fully evaluated.

OREANA

The Village of Oreana is in central Illinois in the north-central portion of Macon County (Sections 9 and 16, T17N, R3E), approximately 5 miles northeast of Decatur. The Illinois Central-Gulf Railroad, Interstate 72 and State Highways 47 and 48 serve the study area which includes all of T17N, R3E, as shown on Figure 37, a portion of the topographic maps of the Forsyth and Argenta 7 1/2-minute quadrangle.

Oreana is on a nearly flat upland surface, north of the Sangamon River floodplain, with a gentle regional slope to the south. Several small streams flow southward into the Sangamon River. The topography is more pronounced along the river valley and along streams feeding into it, with 70-foot bluffs adjacent to the floodplain. The maximum topographic relief is 77 feet.

The unconsolidated glacial deposits in the Oreana area consist of drift of pre-Illinoian, Illinoian, and Wisconsinan age with a range in thickness from 145-170 feet, thickening to the north. The glacial materials are a complex of ice-laid till, water-laid clay, silt, sand and gravel outwash and alluvium, and wind-blown silt (loess).

Water-yielding sand and gravel deposits under the uplands are generally thin (less than 15 feet) and discontinuous, although locally, thicker accumulations are found (Figure 38). The most extensive sand and gravel unit occurs between elevations 550 and 570 feet and appears to be widespread over the area, thinning and pinching out to the north and west and possibly extending south and east as far as the Sangamon River Valley. The Sangamon River Valley bottom contains two types of deposits. The upper 8 to 12 feet is dominantly fine-grained alluvium. Below the alluvium is a coarser textured unit consisting of well-to poorly-sorted sand, with some lenses of gravelly sand. Its presence has not been well documented in the study area.

The shallow bedrock in the study area consists predominantly of non-water-bearing shale and limestone, with lesser amounts of sandstone, siltstone, and coal of the Pennsylvanian Bond Formation. Groundwater in the deeper bedrock is highly mineralized.

The Village of Oreana obtains its municipal groundwater supply from a sand and gravel deposit near the base of the glacial drift, between elevations of 550 and 580 feet and depths of 100 and 130 feet, in Section 9, T17N, R3E. The lens-shaped deposit attains its maximum observed thickness of 26 feet at Municipal Well No. 2 and thins rapidly to 6 feet, approximately 800 feet to the north. It is split by a wedge of till, pinching out to the west and thinning to 16 feet, 1700 feet to the northeast (Figure 38). It is at least 4000 feet wide (N-S) by 6000 feet long (E-W) and may extend much farther to the east or southeast. A heavy dashed line on Figure 37 marks the boundary of the deposit, which consists mainly of sand and gravel, becoming silty to the west. To the north and east, a layer of interbedded silt and sand or fine packed sand, 3 to 5 feet thick, overlies the coarser material.

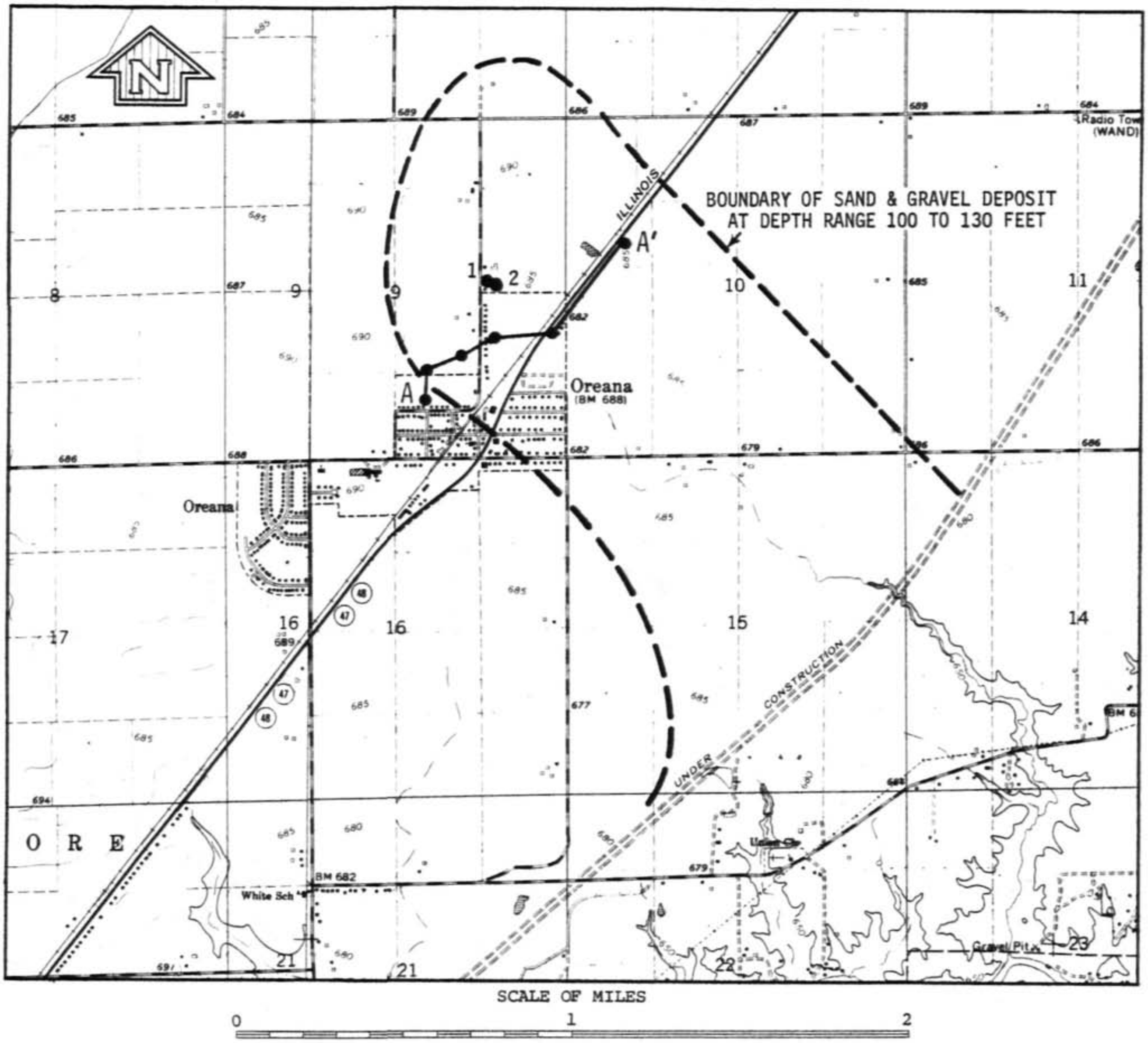


Figure 37. Oreana study area

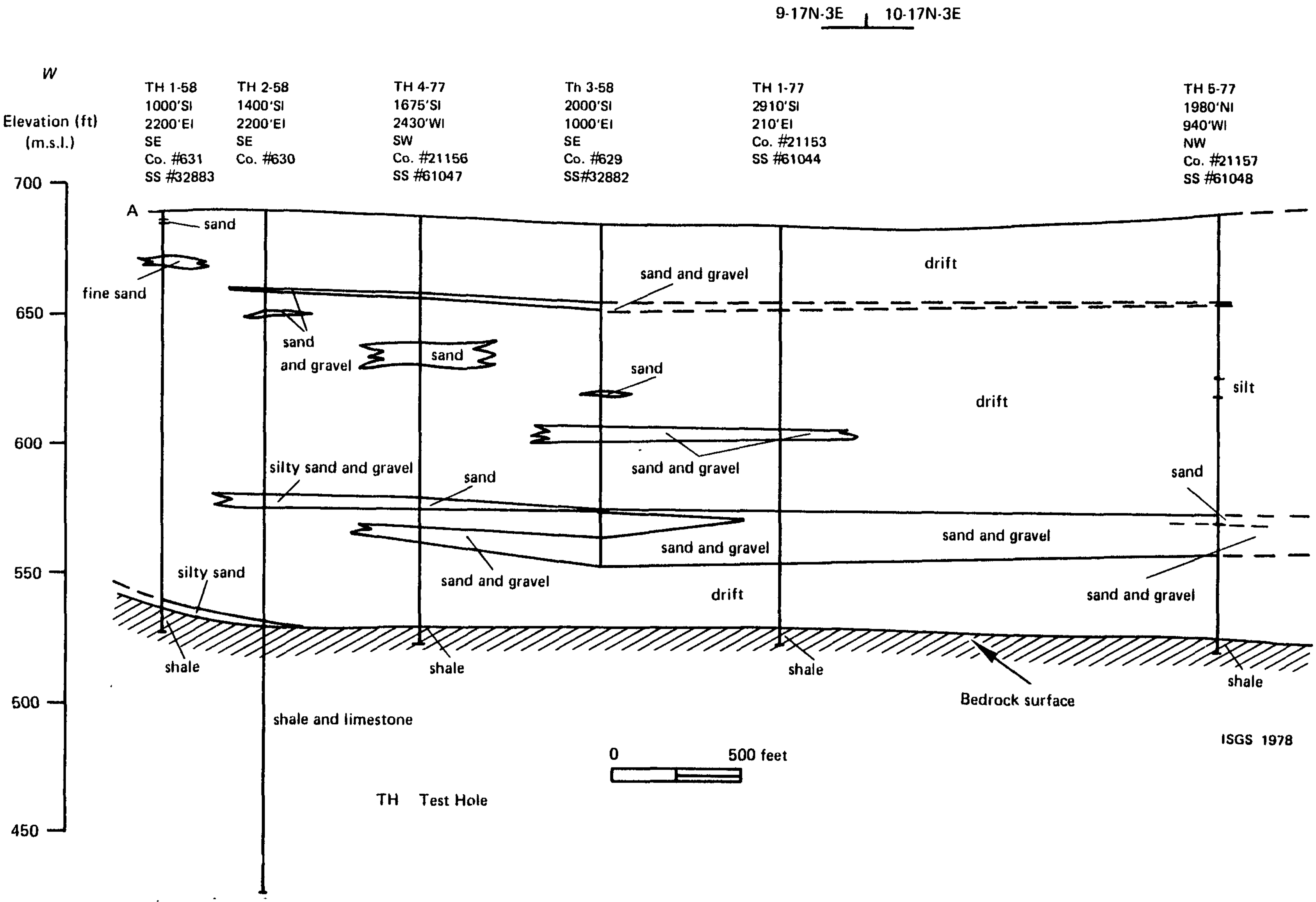


Figure 38. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Oreana, Illinois. By Robert W. Ringler.

A public water supply was installed for the Village of Oreana in 1958, when Well No. 1 was drilled to a depth of 131.5 feet, on the north edge of town, 2950 feet N and 1250 feet W of the SE corner of Section 9, T17N, R3E. Six-inch casing was set to a depth of 117 feet, followed by No.80 slot screen to the bottom. This well is on standby and operates at a rate of 60 gpm only weekly for maintenance purposes.

Well No. 2 was drilled in January 1965 to a depth of 132 feet, 63 feet SE of Well No. 1. The well was constructed with eight-inch casing to 117 feet, followed by 15 feet of No. 80 slot screen. No. 3 Muscatine gravel was placed in the annulus between the screen and the 19-inch borehole. This well is the primary water supply and operates at 110 gpm.

Records show a steady growth of water consumption at Oreana from 15,000 gpd in 1960 to 62,000 gpd in 1977.

A well production test conducted January 1965 on Well No. 2 indicated the coefficients of transmissivity and storage to be 28,000 gpd/ft and 1.0×10^{-4}, respectively. Test data also revealed the presence of multiple boundaries. In May 1977, another test on Well No. 2 resulted in similar values of these coefficients: 26,000 gpd/ft and 1.2×10^{-4}, respectively. A test conducted on Test Hole 9 in the NW 1/4 of Section 10 indicated values for these coefficients to be 21,000 gpd/ft and 8×10^{-5}, respectively. In none of the above tests were data sufficient to allow direct computation of boundary distances.

Because of the limited nature of the aquifer underlying Oreana, it is felt the practical sustained yield of that aquifer has been nearly reached already. Any greater withdrawals of water in the future will likely cause dewatering of the upper portions of the aquifer. New wells will only compete with each other and not appreciably increase the total aquifer yield.

During years of normal precipitation, the practical sustained yield of the aquifer is estimated to be 75,000 to 85,000 gpd. During periods of drought, however, this figure could drop to as little as 45,000 gpd.

The State Division of Water Resources has estimated that the average water demand at Oreana in the year 2000 will be 151,700 gpd. Additional supplies will have to be found to supplement the present well field. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for groundwater exploration.

Possibilities for further development of the present aquifer appear fair. Suggested areas for testing are the E 1/2 of the SE 1/4 of Section 9, the SW 1/4 of Section 10, and the N 1/2 of Section 15, T17N, R3E. If sufficient supplies are not found in these areas, it is suggested the area of exploration be expanded southward in Sections 14-16 and 21-23 to and including the Sangamon River floodplain. A supplementary resistivity survey is recommended to help locate optimum areas for test drilling. There are no records of wells developed in the shallow bedrock in the Oreana area. The paucity of bedrock wells is due mainly to the predominance of non-water-bearing shales in the shallow bedrock. Generally below a depth of about 200 feet, water from the bedrock is too highly mineralized for most purposes, and all groundwater below the lower part of the Pennsylvanian rocks is highly mineralized.

RED BUD

Red Bud is in the northwestern corner of Randolph County in southwestern Illinois (Figure 39), approximately 22 miles south of Belleville and 35 miles southeast of East St. Louis. The Illinois Central-Gulf Railroad passes through the northern part of town in an east-west direction. State Routes 3, 154, and 159 serve the study area, which includes all of T4S, R8W, the part of T4S, R7W west of the Kaskaskia River channel, and the southern part of T3S, R8W.

The topography around Red Bud is a gently rolling drift surface with a regional slope to the east. Approximately 1 1/2 miles east of town a shallow depression in Horse Prairie extends to the north and south and connects with the Kaskaskia River drainage system. Between Horse Prairie and the Kaskaskia River is a large elongate moraine trending north-south. The maximum topographic relief is 155 feet, ranging from about 370 feet in the Kaskaskia bottomlands to 525 feet in the western part of the area.

The main drainage feature is the Kaskaskia River, flowing from north to south along the eastern margin of the study area. The river channel originally had a meandering configuration that has been straightened for navigation. Near Red Bud intermittent streams flow to the east and south into the northward-flowing Richland Creek and the southward-flowing Horse Creek which in turn empty into the Kaskaskia River.

The unconsolidated Pleistocene glacial deposits in the Red Bud area consist of ice-laid till, water-laid silt, sand and gravel outwash and windblown silt (loess). Thicknesses range from a thin veneer of 10 to 20 feet on the upland surfaces to 60 to 90 feet in the river and stream channels and hillier areas (Figure 40). The sand and gravel outwash is permeable and, when present in sufficient thickness, is capable of yielding moderate to large quantities of water to wells. The glacial till generally has very low permeability, although when the texture is sandy, it can yield small supplies for private use. Loess on the uplands has been deposited as a blanket 5 to 10 feet thick on the tills and outwash deposits.

Well logs and topographic interpretation suggest the presence of a partially buried bedrock valley east of Red Bud running north to south, parallel to the Kaskaskia River. Although well data are sparse, it appears that deposits of sand and gravel, 3 to 16 feet thick, occur throughout the drift and partially fill the buried valley.

A large north-south moraine lies between the buried valley and the Kaskaskia River. Well data suggest the presence of extensive outwash deposits extending west and south of the moraine. Sand and gravel lenses in the outwash commonly reach thicknesses of 2 to 8 feet at depths of 10 to 50 feet. Development of these deposits for private supplies is common, but development for a municipal water supply has apparently not been attempted.

Possibilities for developing a large groundwater supply from the drift are excellent in the water-laid sand and gravel of the Kaskaskia River bottomland. Baldwin obtains its water supply from wells in Section 16, T4S, R7W, and Red Bud has four test holes on the west side of the bottomland near

Figure 39. Red Bud study area

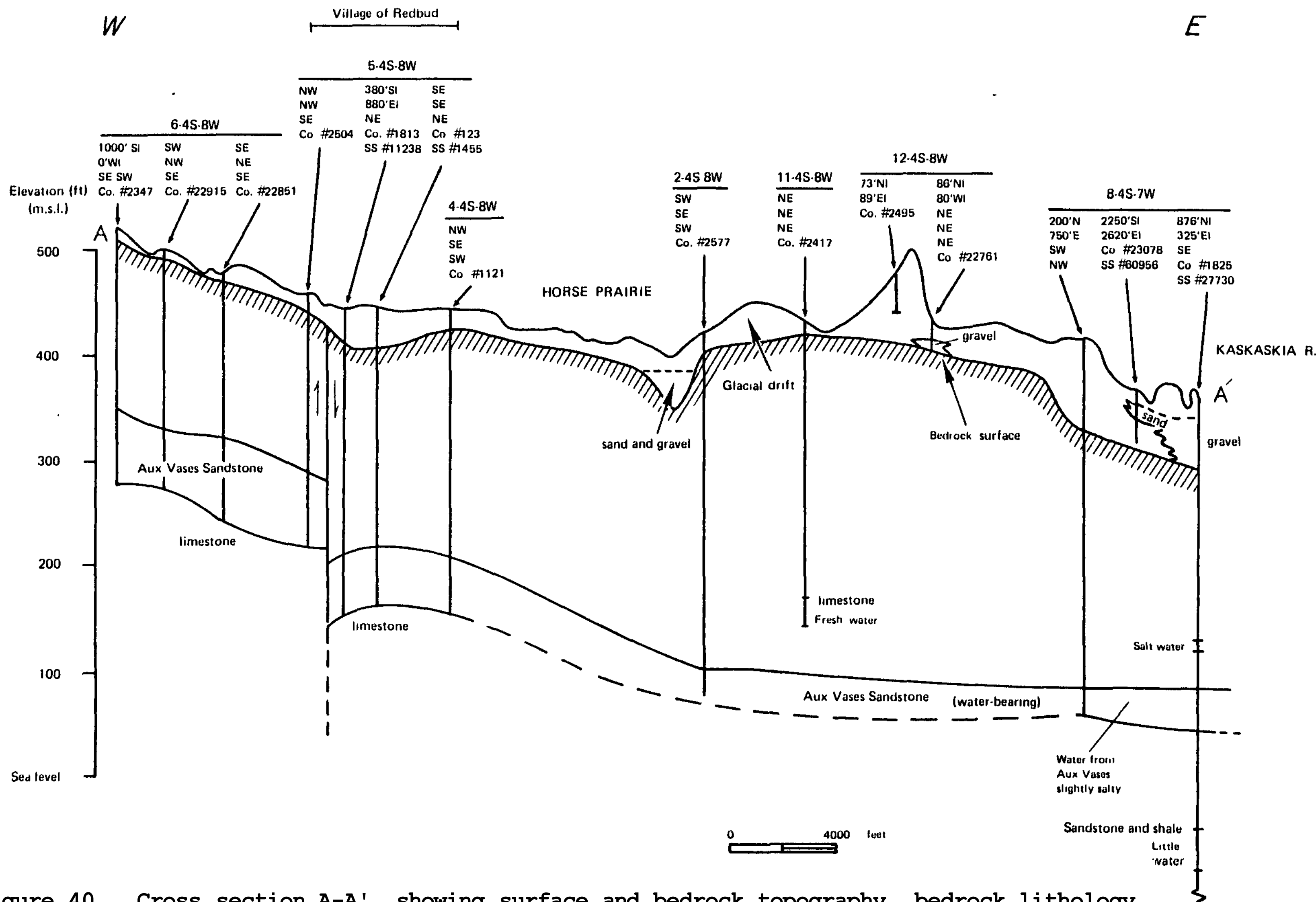


Figure 40. Cross section A-A', showing surface and bedrock topography, bedrock lithology, and location of fault and water-bearing zones in the shallow bedrock at Red Bud, Illinois., By Robert W. Ringler.

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the bluffs in Sections 5 and 8, T4S, R7W. Although extensive sand and gravel deposits are present throughout the bottomland, further test drilling will be necessary to define the most favorable location for a well field.

The bedrock surface in the Red Bud area consists of sandstones, siltstones, shales, and limestones of the Chesterian Series and the upper part of the Valmeyeran Series of Mississippian age. The Aux Vases Sandstone in the Upper Valmeyeran has the largest water-bearing capacity of the sandstone bodies found in the shallow bedrock. It is white, calcareous, grades from coarse to fine upwards, and contains minor beds of siltstone, shale, dolomite, and limestone. It commonly has a relatively thin (4 feet), soft sandstone bed above the main body of sandstone, and varies considerably in hardness, induration and water-bearing capacity, both laterally and vertically, with the degree of cementation. The upper part of the Aux Vases is usually fine-grained and well cemented, while the lower part may be friable to completely incoherent.

A map showing the elevation of the top of the Aux Vases Sandstone shows that the Red Bud area is on the nose of a broad anticline which plunges gently to the east. The Aux Vases Sandstone is approximately 50 to 60 feet thick in the Red Bud area, thinning slightly to the east, and generally thickening to the south, southeast, and north. The observed thickness is at a maximum of 94 feet in Section 23, T4S, R8W, and at a minimum of 12 feet in Section 11, T4S, R8W.

Water level measurements have not been taken in the Red Bud area with great regularity, but definite trends of water level decline are evident. Since 1914, when Red Bud constructed its first public water supply system, nonpumping water levels have receded over 100 feet in some wells.

In 1888, a well drilled to a depth of 580 feet, penetrating the St. Genevieve and St. Louis formations, produced water which rose to a height of 8 feet above the ground's surface (corresponding to approximately 438 feet MSL). Chemical analyses of the water from this deep well have shown a water of very similar quality as that in the overlying Aux Vases Sandstone, supporting the belief that the two limestone formations communicate water directly to and from the Aux Vases. Water levels in the limestone, then, should be indicative of levels in the sandstone. At such an early date, this water level is a good indication of the "predeveloped" water level of the aquifer, the level attained prior to any significant pumpage in the area.

Historical records also show water level measurements taken in some of the city's early industrial wells. The Ziebold Mill, the Becker Mill, the creamery, and the packing house all had wells of their own in which water level measurements had been made at some time or another. Adjustment of each measurement for topographic variation of the ground surface clearly indicates a water level recession in the Red Bud area, as groundwater withdrawals increased. Red Bud's public water supply went into operation in early 1915, but no real estimate was made on water use until 1918. At that time the consumption was estimated to be about 150,000 gallons per month or about 5000 gpd. By 1934, pumpage had exceeded 40,000 gpd and water levels had dropped to below 400 feet MSL. Water levels dropped at a fairly uniform rate of about 0.78 feet/year between 1890 and 1950.

During the 1950's and 1960's, groundwater withdrawals increased rapidly from about 76,000 gpd (1950) to 225,000 gpd (1970). Water levels receded, correspondingly, from 382 feet to 308 feet MSL, which translates to a recession of 5.4 feet/year.

Comparison of the water level decline and average daily pumpage shows that, in general, water level declines have been proportional to increases in pumpage. The data are somewhat scattered, owing to variations in measurement procedures and pumpage schemes, but there is an apparent consistent relationship between decline and pumpage. Approximately 2100 gpd were pumped with each foot of decline. This consistent relationship between decline and pumpage and the fact that water levels stabilize after each increase in pumpage indicates that in the past recharge has balanced withdrawal.

Currently an average of 310,000 gpd is developed from 9 wells which operate at rates of between 30 and 95 gpm.

The water-yielding capability of the Aux Vases Sandstone in the Red Bud area is affected by two primary factors:

1. the permeability or hydraulic conductivity of the formation, and
2. the recharge rate to the formation.

Over the past several years, aquifer tests have been conducted on many wells in and around Red Bud. The information gathered during these tests is very useful for determination of the hydraulic characteristics of the sandstone and its overlying or confining layers.

Values for transmissivity calculated from several aquifer tests ranged from about 200 to 450 gallons per day per foot (gpd/ft). These values reflect the very low water-transmitting capability of the Aux Vases Sandstone. This fact is also clearly reflected in specific capacity data where yields for 17 wells investigated are all below 2.0 gpm/ft of drawdown.

Recharge to the Aux Vases is equally low. From water level data the radius of influence created by Red Bud's wells was found to be roughly 10,000 feet. If, as previous investigation indicated, recharge balances withdrawal, then the recharge rate (Q/A) can be estimated as 27,000 gpd/sq mi for a pumping rate of 300,000 gpd.

The formations overlying the sandstone consist of till, fine limestones, and shale, reaching thicknesses over 100 feet. Walton (ISWS Report of Investigation 48, 1965) expressed values for the vertical permeability (P') of similar material in other parts of Illinois ranging from 1.0×10^{-2} gpd/sq ft (for drift and clay with some sand and gravel) to 5.0×10^{-5} gpd/sq ft (for dolomitic shale). From water level and geologic data, P' was computed to be 1.4×10^{-3} gpd/ft^2, comparing favorably with Walton's values.

The water-yielding capability of the Aux Vases Sandstone is greatly limited, then, by the aquifer's ability to, first, receive recharge from rainfall and runoff and, secondly, to transmit that water which is received to a well or wells. The transmissivity averages less than 500 gpd/ft for all 17 wells investigated, and specific capacities are all less than 2.0 gpm/ft of drawdown. The vertical permeability of the overlying material was a very low 1.4 x 10^{-3} gpd/sq ft, and recharge to the Aux Vases is only 27,000 gpd/sq mi.

The information gathered in this investigation was used in a digital computer model developed by Prickett and Lonnquist (ISWS Bulletin 55, 1971) to help determine the practical sustained yield of the Aus Vases Sandstone near Red Bud.

In the area surrounding Red Bud the Aux Vases is essentially "infinite" in areal extent and fairly uniform in thickness. An "infinite" aquifer means that barrier boundary effects caused by the edge or discontinuation of the aquifer will not be seen during pumpage over extremely long periods of time. For modeling purposes an infinite aquifer need only be large enough to make those boundary effects negligible. An aquifer approximately 15 miles by 15 miles was sufficient for this case.

For the model, values of 200 to 500 gpd/ft and 1.0 x 1.0^{-4} were used for the aquifer transmissivity and storage coefficient, respectively. The confining bed, consisting of clay, limestone, and shale averaged 230 feet thick with a vertical permeability of 0.0014 gpd/sq ft. Prior to development, the saturated thickness of the confining bed was assumed to be 220 feet, while for present day modeling, it was assumed to be only 60 to 120 feet.

In order to model the long-term decline of the nonpumping water levels experienced in Red Bud, an averaged pumping rate for each well was used. The nonpumping levels could be thought of as following a trend caused by continuous pumpage (24 hours/day) at averaged rates much lower than actual pumping rates, while the pumping levels themselves can be reproduced using actual rates taken from water works records. By using various schemes for possible locations and pumping rates of future wells and trying to maintain water levels above the top of the Aux Vases, an estimate for the potential yield of the aquifer was made.

During periods of normal wetness, the Aux Vases could supply in excess of 700,000 gpd. However, this figure is based on pumping 20 wells spaced at 1/2-mile intervals (to avoid mutual interference effects as much as possible) and, therefore, would require facilities far in excess of what exists at Red Bud now. A more practical figure would be 500,000 gpd being pumped from 10-12 wells at 1/2-mile spacing.

This figure drastically changes during drought periods. During a long dry spell, perhaps lasting up to one year, the practical sustained yield could drop to as low as 250,000 gpd. This discrepancy between normal and dry periods is due to the fact that under drought conditions the source bed overlying the aquifer confining bed is depleted, and pumpage is derived directly from aquifer storage.

Projections of water demand show that by the year 2000, the average daily water demand will be over 312,000 gpd. Maximum daily withdrawals currently run over 380,000 gpd. The Aux Vases Sandstone, the major bedrock aquifer supplying Red Bud's water, may be nearing its practical sustained yield. With proper placement and maintenance of new wells the Aux Vases can be expected to yield 500,000 gpd under normal wetness conditions. Data indicate, however, that during dry periods this amount could drop to as low as 250,000 gpd.

Further development of the bedrock for a large water supply must be carefully weighed against other alternatives. The Aux Vases Sandstone is already fairly heavily developed although additional drilling could be carried out if necessary to the north, northeast, or southeast of town. Development of additional wells will require proper spacing to minimize interference from adjacent existing wells. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for groundwater exploration.

Currently, the glacial drift offers the best possibility of a moderate to large groundwater supply. A buried bedrock valley lying between Red Bud and the Kaskaskia River is attractive, due to its proximity to town, although extensive geophysical testing and test drilling will be necessary to accurately determine its groundwater producing potential.

The Kaskaskia River Bottomlands offer the best chance for a moderate to large groundwater supply at present. Water-bearing sand and gravel deposits are known to be present and have already been tapped by the City of Baldwin as its water supply source.

SIDELL

The Village of Sidell is in east-central Illinois in the southwestern portion of Vermilion County. It is approximately 18 miles southwest of Danville and 24 miles southeast of Urbana in Sections 21, 22,27, and 28, T17N, R13W (Figure 41). The area is served by two-lane state and county highways and the Missouri-Pacific Railroad. The study area is the portions of T16 and T17N, R12 and R13W, shown on Figure 41, which is taken from the topographic map of the Newman 15-minute quadrangle.

Sidell is situated on the north, or backside of the Ridge Farm Moraine with a small outlier to the north. South of the Ridge Farm Moraine and also trending east-west are the Hildreth and the West Ridge Moraines. The regional slope is to the east, as evidenced by the drainage pattern of the Little Vermilion River. Maximum topographic relief is 100 feet.

The unconsolidated Pleistocene glacial deposits in the study area consist of drift of pre-Illionian, Illinoian, and Wisconsinan age with a total thickness of 46 to 235 feet. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash, and windblown silt (loess). Pre-Illinoian drift occurs as fill in the pre-glacial Mahomet Bedrock Valley, which extends into the study area from the west, sending branches north and south of Sidell (Figure 42). Illinoian drift normally attains a thickness of 50 to 70 feet and is overlain by 15 to 90 feet of Wisconsinan drift, which is capped by a loess blanket 2 to 4 feet thick.

The sand and gravel deposits in the drift are generally permeable and are capable of yielding small to moderate supplies of groundwater to wells. In the vicinity of Sidell, a deposit at the surface of the Ulinoian drift appears widespread, ranging from 1 to 48 feet in thickness (Figure 42). Other deposits occur at the bases of the Ulinoian and pre-Illinoian and within the Wisconsinan drift in the Hildreth and West Ridge Moraines south of town.

The Village of Sidell obtains its water supply from a thick sand and gravel deposit in the SW 1/4 of Section 26, T17N, R13W, which was located by a resistivity survey in 1947. The deposit has a maximum observed thickness of 48 feet, but is narrow--1000 feet or less. Resistivity data indicate the deposit trends westward from the well field and then northwestward into the west-central part of Section 27, T17N, R13W. Data indicate the deposit west of the well field is a channel with a thickness that may exceed 15 feet along the thalweg but which thins to 3 to 10 feet along the sides.

The shallow bedrock in the study area contains sandstone, siltstone, shale, limestone, and coal of the Pennsylvanian Modesto and Bond Formations. The Village of Sidell is located at the contact where the Modesto Formation dips easterly under the younger Bond Formation. Three to four miles to the north near Jamaica (Figure 42), several wells obtain water from sandstone, but there are no records of wells obtaining water from the bedrock near Sidell. Salt water has been reported in several deep oil test wells at depths below 300 feet (Figure 42); however, water from bedrock below 200 feet is generally too highly mineralized for most uses. Testing of the bedrock is

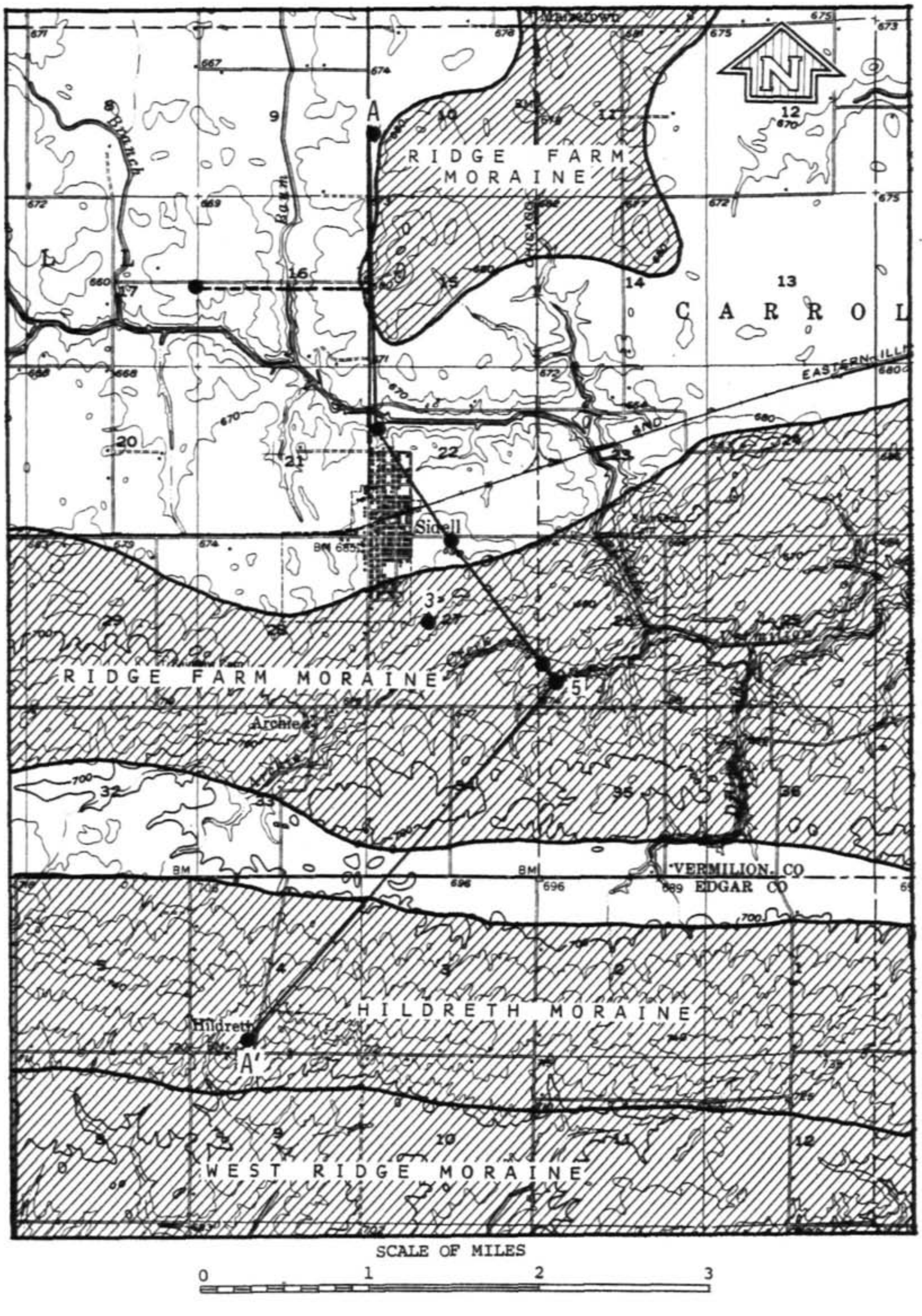

Figure 41. Sidell study area

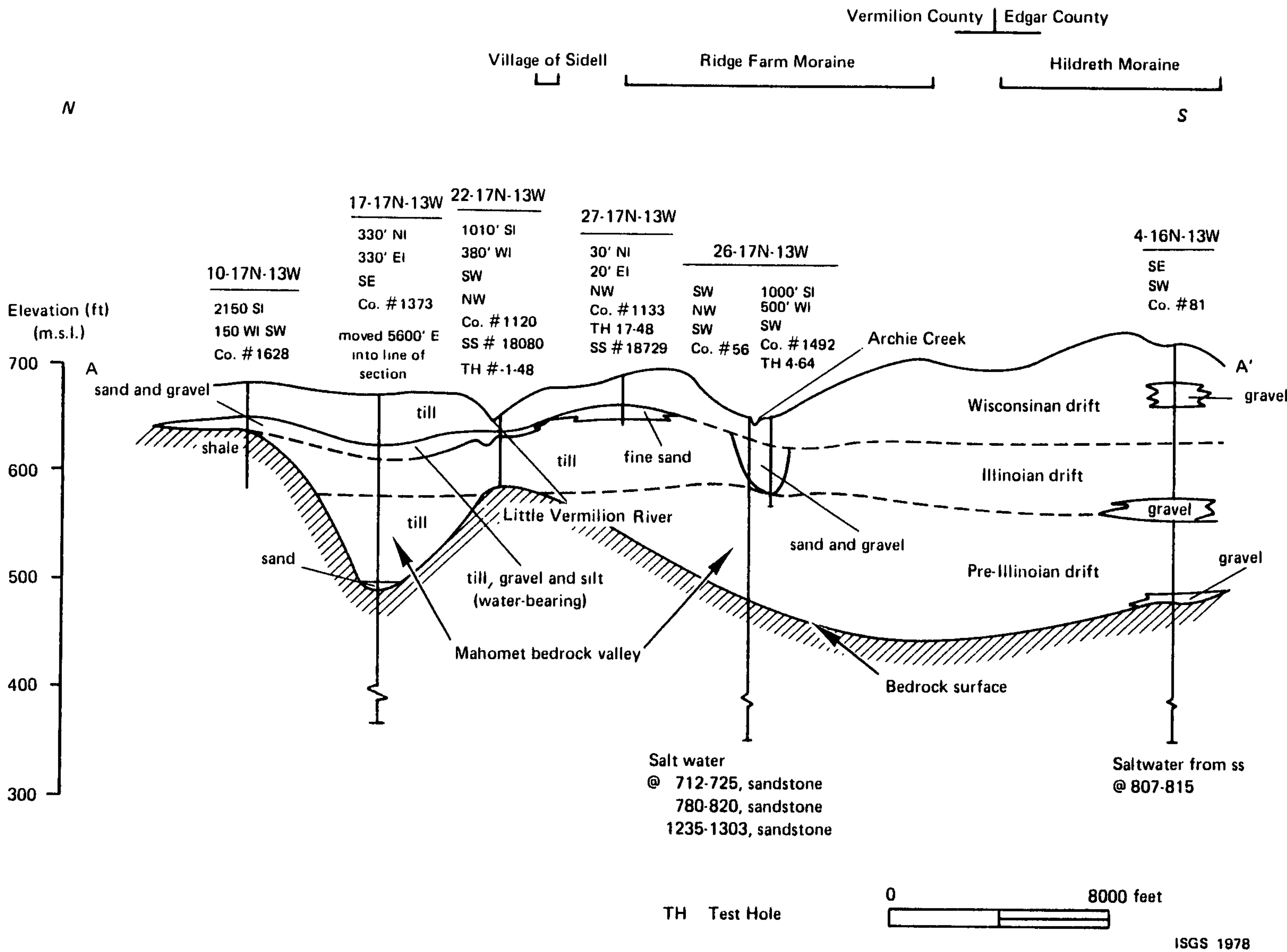

Figure 42. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface at Sidell, Illinois. By Robert W. Ringler.

not recommended because of the large amount of impermeable shale in the shallow bedrock and the high salinity of water in the deeper bedrock.

A public water supply was installed by Sidell in 1928. Water was originally obtained from two wells which were about 30 years old at the time. The primary source of supply was a four-foot-diameter dug well near the center of town. Between 1949 and 1964 three additional wells were added to the system. At the present time, only Wells 3 and 5 are in use and are described below; all other wells have been abandoned.

Well No. 3: Drilled in March 1949 to a depth of 28 1/2 feet and located southeast of town, 2632 feet S and 1970 feet E of the NW corner of Section 27. Constructed with 16-inch casing to a depth of 22 feet and with No. 50 slot screen from 22 feet to the bottom. Reportedly operates at 30 gpm.

Well No. 5: Drilled in December 1964 to a depth of 66 feet, 1 1/4 miles southeast of town, approximately 1000 feet N and 500 feet E of the SW corner of Section 26. Constructed with 12-inch pipe to a depth of 56 feet and with No. 80 slot screen from 56 feet to the bottom. No. 3 Muscatine gravel was placed in the annulus between the screen and the 30-inch borehole. Reportedly operates at 60 gpm.

Pumpage records at Sidell were not kept for many years after the water system was installed. The first reported figure was for 1952, when the average consumption was 17,000 gpd. The average withdrawals grew steadily and in 1976 were reportedly 43,000 gpd.

Well production tests conducted in March 1949 and in November 1964 furnish the only available data from which aquifer properties at Sidell may be derived.

Data from an eight-hour test on Well No. 3 in 1949 indicated a water table condition and a transmissivity of 7900 gpd/ft. Time-drawdown data from a six-hour test at the site of Well No. 5 in 1964 revealed transmissivity and storage coefficients of 23,000 gpd/ft and 5.2×10^{-4}, respectively. The test data also indicated the presence of geohydrolgic boundaries. The aquifer is believed to be less than 1000 feet in width in the vicinity of Well No. 5.

Analyses of data collected during the well production tests of 1949 and 1964 and geologic information described earlier indicated that the aquifer in the vicinity of Wells 3 and 5 is limited in areal extent. For purposes of computing estimated long-term drawdowns at those wells the aquifer was assumed to be about 1000 feet in width at Well No. 3 and only 600 feet wide near Well No. 5. The effects of image wells associated with geohydrologic boundaries were estimated by assuming aquifer properties as described above, except that storage coefficients were adjusted to allow for long-term water levels converting from artesian to water-table conditions. Drawdowns were limited to the top of the aquifer at both wells. Based on available information, therefore, the long-term sustained yield at Wells 3 and 5 was estimated to be about 20,000 gpd and 50,000 gpd, respectively, or a total of 70,000 gpd.

Projections of population and water consumption made by the State Division of Water Resources indicate that groundwater demands at Sidell will be nearly 43,000 gpd, or quite close to current demands. Should future additional supplies be needed in excess of the estimated aquifer sustained yield, exploration will be required. The following summary indicates the recommendations of the State Geological Survey for future groundwater exploration in the Sidell area.

The length of the deposit containing thick sand and gravel accumulations is probably less than a half mile, although the entire system including thinner deposits is several miles long. Possibilities for further development of the aquifer may exist to the west, in the S 1/2 of Section 27, and to the southeast, in the N 1/2 of the NW 1/4 of Section 35. Other areas lie along the Little Vermilion River, northwest of town, and along the crest of the Ridge Farm Moraine to the junction of the Little Vermilion River and Archie Creek, in Sections 23 through 26. Exploratory test drilling is needed to determine the presence, thickness, and extent of sand and gravel deposits in all the above areas.

There are no records of wells which obtain potable water from the bedrock in the immediate vicinity of Sidell, and testing of the bedrock is not recommended.

TOLEDO

The Village of Toledo is in southeastern Illinois in central Cumberland County (Sections 25 and 36, T10N, R8E and Sections 30 and 31, T10N, R9E). It is approximately 24 miles northeast of Effingham and 17 miles southeast of Mattoon. The Illinois Central Gulf Railroad, Illinois Route 121 and other two-lane state and county roads serve the study area, which is composed of the parts of Township 10N, Ranges 8 and 9E, shown on Figure 43, a portion of the topographic map of the Toledo 15-minute quadrangle.

Toledo lies on a gently rolling drift plain which has been moderately dissected by southward-flowing streams and rivers. In the study area, Cottonwood Creek and the Embarras River are the main drainage features. Maximum topographic relief in the area is over 82 feet.

The study area is approximately 4 miles south of the southern limit of Wisconsinan glaciation in Illinois. Meltwater from Wisconsinan glaciers carved out the larger drainage features in the study area, and sediment deposited by the runoff partially filled the valleys. The unconsolidated glacial deposits in the study area are a complex of ice-laid till of Illinoian and pre-Illinoian age, water-laid outwash of Wisconsinan age with lesser amounts of older outwash within the Illinoian and pre-Illinoian drift, and a surface blanket of Wisconsinan loess. The drift ranges in thickness from less than 20 to 80 feet, but is normally about 40 to 50 feet thick. Thin stringers of sand and gravel are commonly found at depths of 20 to 30 feet in the drift in the uplands, but these appear to have a limited areal extent and water-yielding capacity.

Toledo obtains its municipal groundwater supply from a sand and gravel deposit in the Cottonwood Creek bottom east of town (see Figure 44). Materials of this type are present all along the creek bottom, although rapid lateral and vertical variations in texture and sorting indicate they are not part of a single, continuous deposit, but a series of coalescing deposits. The sides of the valley roughly mark the lateral extent of the deposit, which in the vicinity of the well field is approximately 1200 to 1400 feet wide. At the well field, the deposit is 10 to 12 feet thick. About 3000 feet to the north, materials of similar thickness and texture are present. It is likely the sand and gravel deposits become thicker and cleaner farther downstream.

The shallow bedrock in the study area consists mainly of non-water-bearing shales and limestones of the Pennsylvanian Mattoon Formation. There are no records of wells developed in the shallow bedrock in the study area, and generally below a depth of about 200 to 300 feet the water becomes too highly mineralized for most uses.

The Village of Toledo installed a public water supply system in 1926. A water supply project was started in 1899, but the impounding reservoir for water supply purposes was used solely as a boiler water supply for Toledo's municipal light plant. Three wells are presently in use with a fourth under construction.

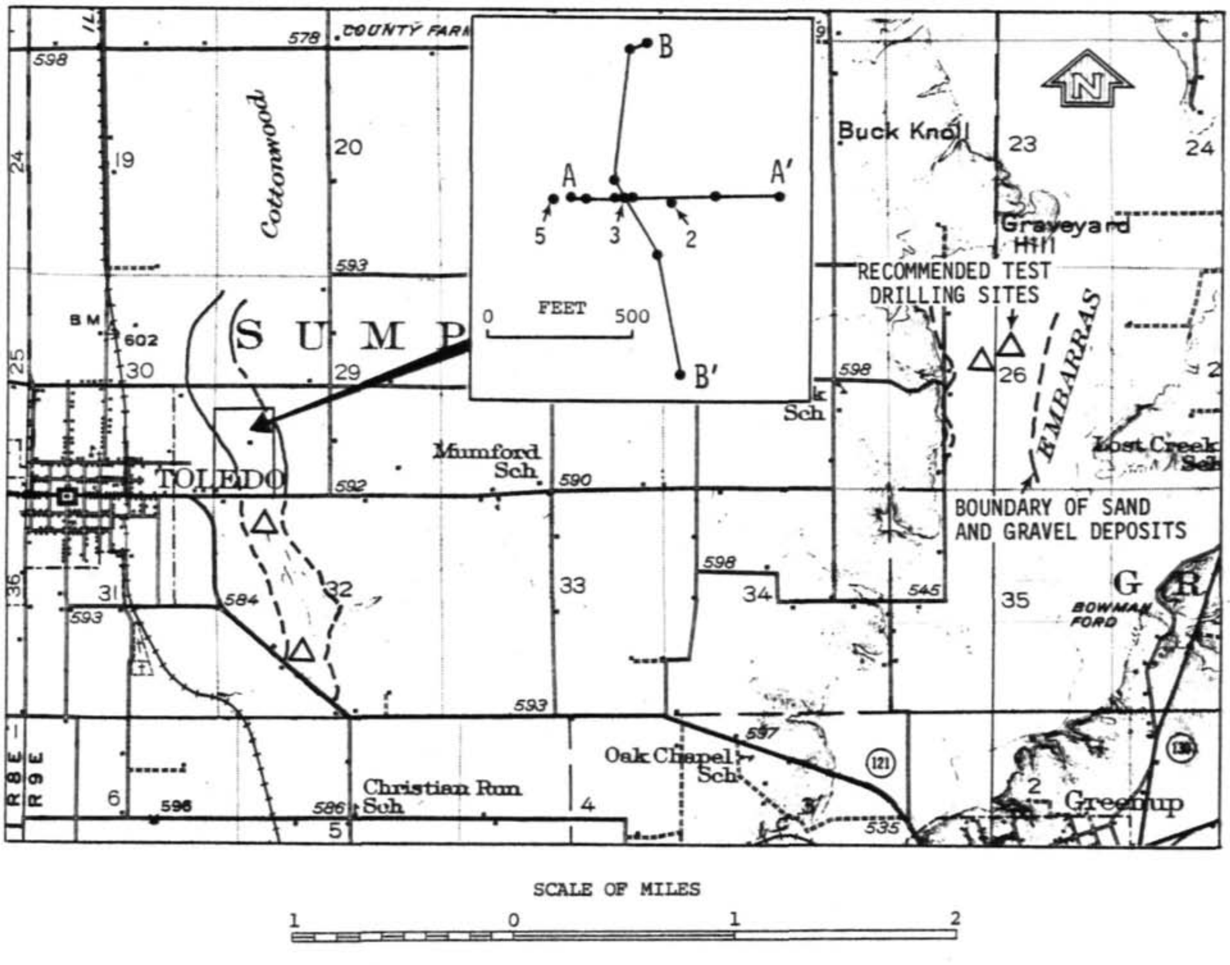

Figure 43. Toledo study area

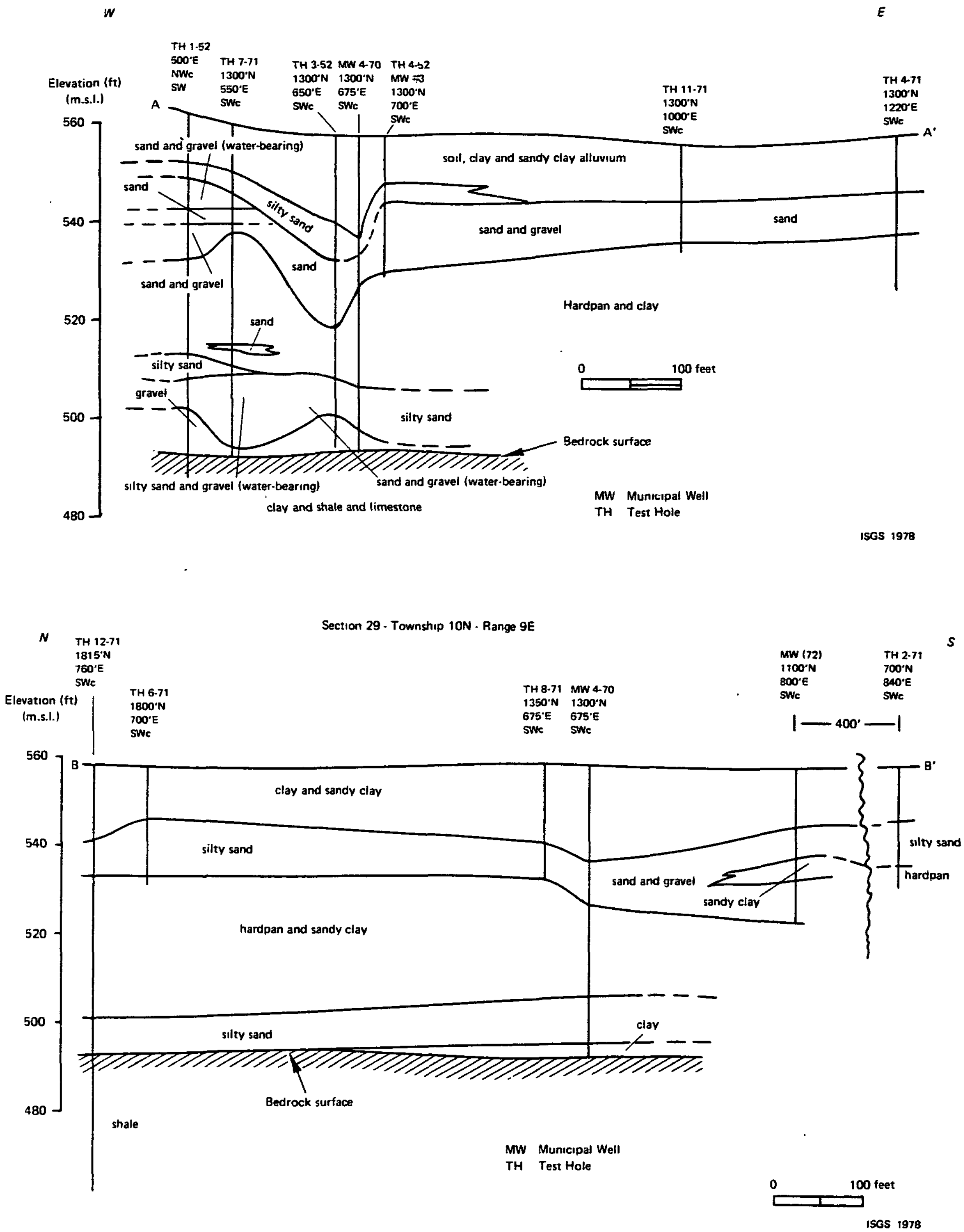

Figure 44. Cross sections A-A' and B-B' showing surface topography, glacial deposits and approximate bedrock, surface along Cottonwood Creek east of Toledo, Illinois. By Robert W. Ringler.

Well No. 2: Drilled in 1933 to a depth of 20 feet, approximately 1300 feet N and 800 feet E of the SW corner of Section 29, T10N, R9E. The lower 10 feet of this 12-foot diameter well was cased with an eight-inch brick wall laid dry, and the upper 10 feet with bricks laid in mortar and waterproofed with asphalt. The original capacity was 125 gpm and served as the sole water source for Toledo until 1952. The capacity dropped off to 35 gpm by 1967; well points were driven through the bottom of the well in 1973 to improve capacity to 75 gpm. Present yield is down to 20 gpm.

Well No. 3: Drilled in July 1952, 1300 feet N and 700 feet E of the SW corner of Section 29 (98 feet W of Well No. 2). The well is 29 feet deep and was tested at 65 gpm. Present capacity is 20 gpm.

Well No. 5: Drilled in 1974, 30 feet deep, 36 inches in diameter and located 250 feet W of Well No. 3. Present capacity is 90 gpm.

Well No. 6: Drilled in 1977, 150 feet W of Well No. 5. Capacity is reportedly similar to Well No. 5. Due to electrical problems, is not on line yet at the time of this writing.

Toledo's average daily pumpage was estimated to be around 10,000 gpd when its water supply first began operating in 1925. Consumption was up to 32,000 gpd by 1952 and averaged 50,000 gpd in 1960. Daily consumption wavered between 55,000 gpd and 65,000 gpd through 1965 and grew to 70,000 gpd in 1970. The present average withdrawal is approximately 80,000 to 90,000 gpd.

Aquifer tests were conducted on Well No. 2 in 1948 and on Well No. 3 in 1952. Data from these tests show the aquifer transmissivity to range from 5400 to 14,500 gpd/ft. Calculations made from observation well data gave a storage coefficient of 0.10, which is in the water-table range. Data taken in 1952 suggested the presence of a geohydrologic boundary, but the location of that boundary could not be determined with any confidence from the data collected.

The aquifer was mathematically modelled by an idealized infinite strip aquifer, using a transmissivity of 6000 gpd/ft, a storage coefficient of 0.1, and an aquifer width of 1400 feet (assumed from the geologic reports).

The idealized model aquifer was used to estimate the practical sustained yield of the aquifer by using steady-state leaky artesian equations and image well theory, and by limiting long-term pumping levels to the tops of the screens in the pumping wells. The long-term yield was determined to be 129,000 gpd from three wells pumping 30 gpm apiece. Should dry weather conditions prevail for an extended period of time, the yield could drop to 86,000 gpd.

Estimates of groundwater demand in the year 2000 made by the State Division of Water Resources indicate that 92,000 gpd will be needed at Toledo by that date. This compares favorably with present withdrawals being developed from Toledo's aquifer.

Areas of future groundwater development possibilities lie along sections of Cottonwood Creek south of the present well field near the center of the NW 1/4 of Section 32 (T10N, R9E) and just north of Route 121 where the creek crosses the highway. Another possibility for exploration is along the Embarras River in the center of Section 26, T10N, R9E. Test drilling into the bedrock is not recommended.

WINCHESTER

The Village of Winchester is in central Scott County in western Illinois (Sections 29 and 32, T14N, R12W), approximately 14 miles southwest of Jacksonville and 7 miles east of the Illinois River Valley. U.S. Route 36, State Route 106 and the Burlington-Northern Railroad serve the study area, which includes portions of T13N, and T14N, R12W in Figure 45, a portion of the topographic map of the Winchester 15-minute quadrangle.

Winchester lies on an upland drift plain which has been strongly dissected by westerly flowing streams. One of these, Big Sandy Creek, has developed its own floodplain south and east of town. The present course of Big Sandy Creek is controlled by a preglacial bedrock valley, which has been filled with glacial sediments. Sixty- to 100-foot bluffs exist along most of the major waterways in the area. Maximum topographic relief is over 125 feet.

The unconsolidated glacial deposits in the study area are a complex of ice-laid till, water-laid clay, silt, sand and gravel outwash and alluvium, and wind-blown silt (loess). The deposits are pre-Illinoian, Illinoian, and Wisconsinan in age and range in thickness from 43 to over 100 feet.

The buried bedrock valley over which the Big Sandy Creek flows is filled with coarse-grained valley train deposits and fine-grained silt and alluvium. The upper 10 to 20 feet of fill consist of silty, clayey alluvium with some sandy lenses. Below the alluvium is a discontinuous layer of silt, probably Wisconsinan loess, which has been partially eroded and reworked (Figure 46). The lowermost unit is a coarser-textured valley train or outwash deposit which ranges from boulders to silty sand in texture.

The shallow bedrock in the study area contains limestone, shale and sandstone of middle Mississippian age (100 feet) overlying the thick shales of the Devonian-Mississippian New Albany Group. The upper surface of the bedrock is commonly fractured and weathered, and may contain fresh water. The fractured and weathered zone extends 10 to 30 feet below the bedrock surface.

The St. Peter Sandstone, found at depths below 900 feet, is a possible aquifer, although wells finished in it in nearby towns had small capacities (10-17 gpm) and high chloride content (2440 ppm).

The Village of Winchester obtains its municipal water supply from a sand and gravel deposit along Big Sandy Creek in Section 5, T13N, R12W, and Section 33, T14N, R12W, about 1 1/2 miles south of town (Figure 45). The deposit occurs in a buried bedrock valley and is overlain by up to 26 feet of fine-grained silt and alluvium (Figure 46). In the vicinity of the well field the deposit is 19 to 31 feet thick and ranges in texture from silty sand to gravel and boulders. Test drilling data indicate the deposit extends all the way across the floodplain between Big and Little Sandy Creeks, and analysis of topographic and drainage features indicate it probably extends upstream, along both creeks, for at least several thousand feet and downstream for several miles (Figure 45). Upstream, along Big Sandy Creek,

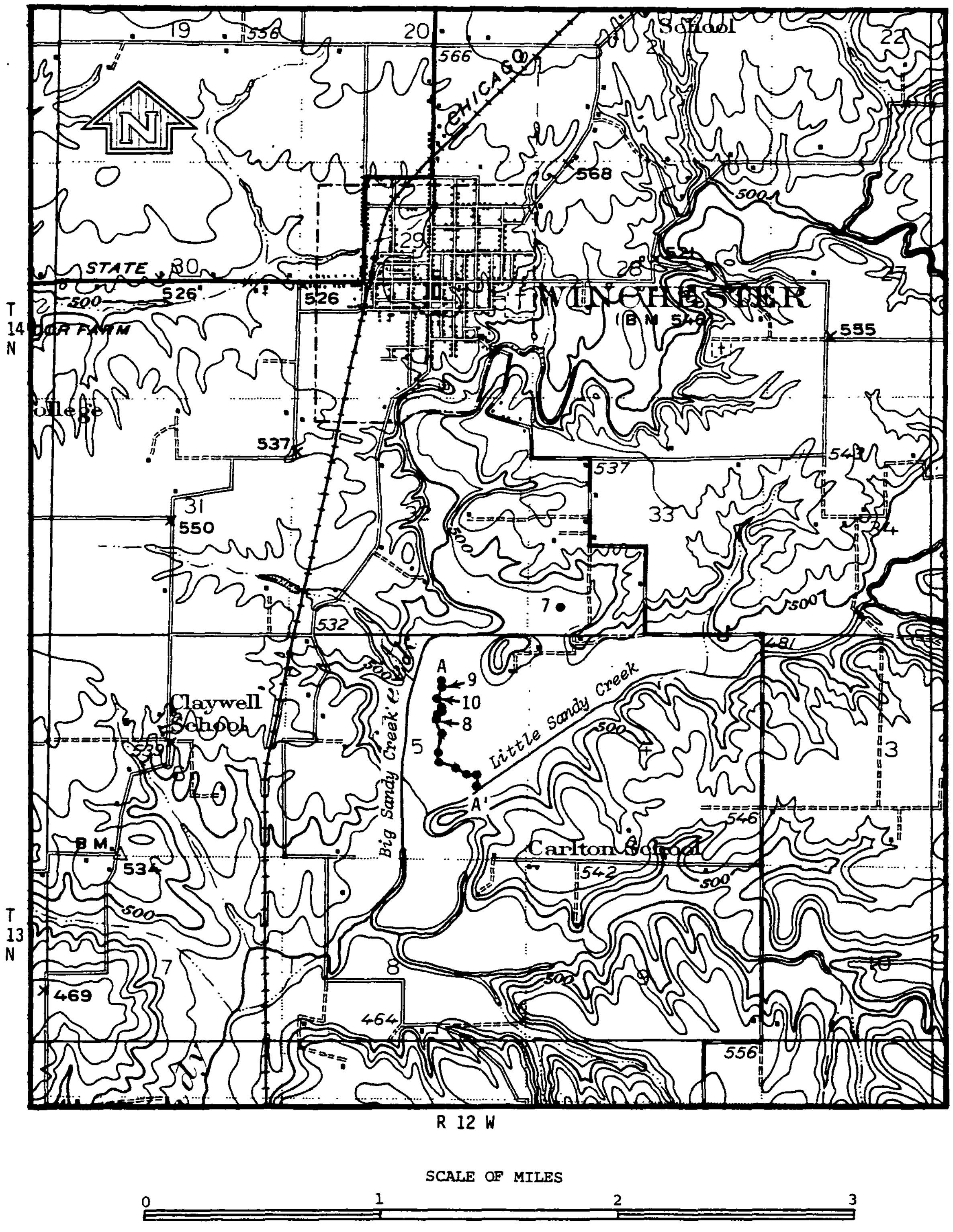

Figure 45. Winchester study area

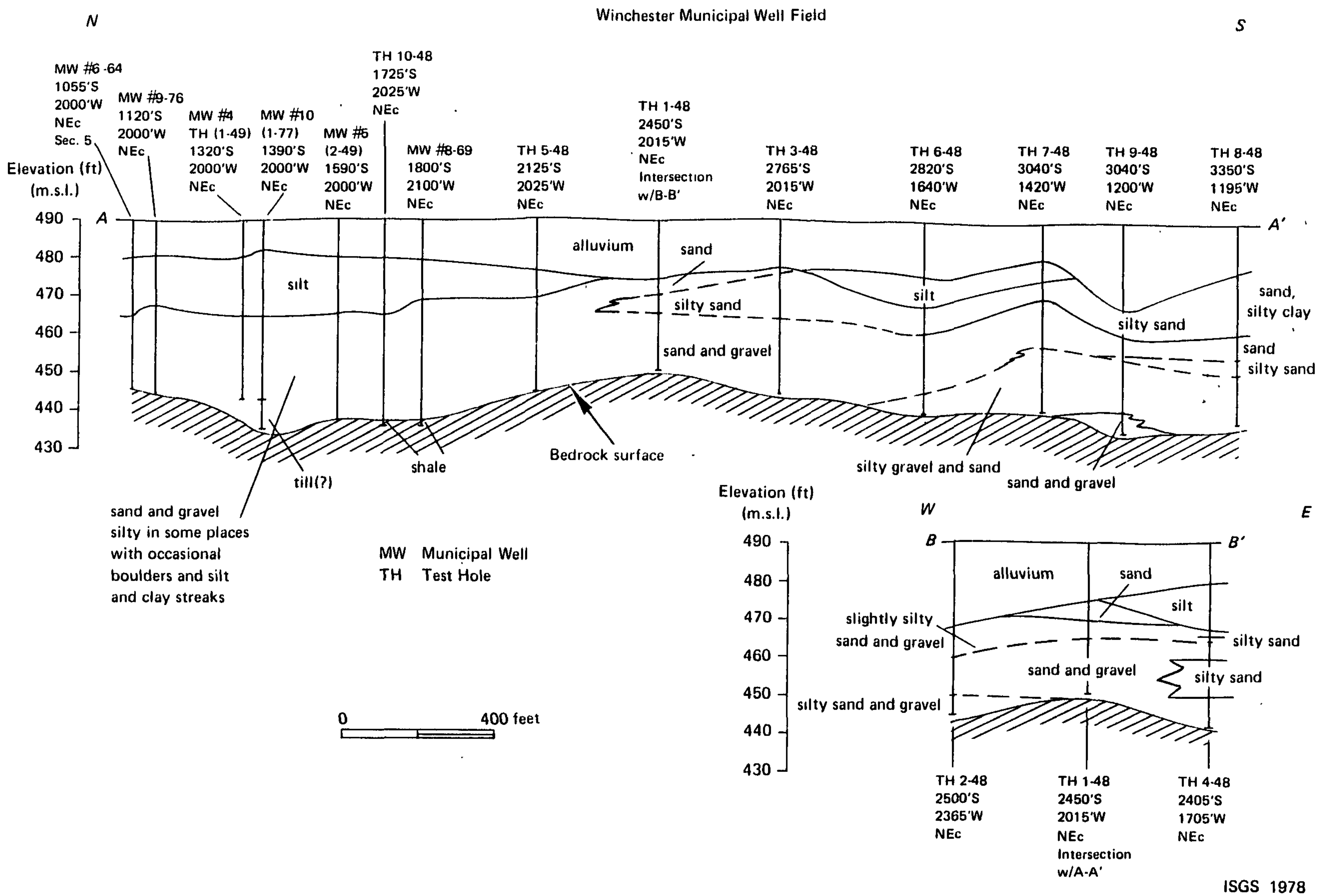

Figure 46. Cross sections A-A' and B-B', showing surface topography, glacial and alluvial deposits, and bedrock surface at Winchester, Illinois. By Robert W. Ringler.

the buried channel appears to split, one branch following the narrow passageway along the present course of the creek and the other swinging eastward around a small hill and rejoining the first. The extent of the buried valley along Little Sandy Creek is unknown but probably extends as far as the northeast corner of Section 4, T13N, R12W. From available information, it appears that the deposit has a maximum width of about 3000 feet and length greater than a mile, becoming narrower and thinner upstream.

The City of Winchester installed a public water supply in 1914. In 1913, a test well had been drilled on a farm about 1 mile south of town in Section 33, T14N, R12W. Since that time 10 wells have been drilled in the area. The following summary describes locations and construction features of the only wells in current use--Nos. 7, 8, 9, and 10. All other wells have been abandoned.

Well No. 7: Drilled in January 1965 to a depth of 63 feet, 550 feet N and 587 feet E of the SW corner of Section 33. Twelve-inch casing was set to 53 feet, followed by No. 6 slot shutter screen to the bottom. The annulus between the screen and the 30-inch borehole was gravel filled. Reportedly operates at 100 gpm.

Well No. 8: Drilled in May 1969 to a depth of 52 feet, 1800 feet S and 2100 feet W of the NE corner of Section 5, T13N, R12W. Constructed with twelve-inch casing to 42 feet and with No. 6 slot shutter screen from 42 to 52 feet. Gravel was placed between the screen and the 24-inch borehole. Reportedly operates at 100 gpm.

Well No. 9: Drilled in March 1976 to a depth of 46 feet, 1120 feet S and 2000 feet W of the NE corner of Section 5. Constructed with 24-inch outer casing to 12 feet, twelve-inch casing to 36 feet, and No. 5 slot shutter screen from 36 to 40 feet. Gravel was placed between the screen and the 24-inch borehole. Reportedly operates at 85 gpm.

Well No. 10: Drilled in March 1977 to a depth of 48 feet, 1390 feet S and 2000 feet W of the NE corner of Section 5. Constructed with 24-inch outer casing to 10 feet, twelve-inch inner casing to 38 feet, and No. 80 slot screen from 38 to 48 feet. Reportedly operates at 85 gpm.

In 1916, two years after the water supply was installed, groundwater withdrawals averaged 27,000 gpd. Growth was relatively slow until the early 1950's, when pumpage increased rapidly. By 1970 or so, pumpage had reached 200,000 gpd, and in 1975 a high of 255,000 gpd was reported. Currently, pumpage averages 200,000 gpd, the decline apparently due to repairs of leaks found in the system.

The hydraulic properties of the sand and gravel aquifer at Winchester have been estimated from analysis of data from seven well production tests conducted between 1949 and 1977. Transmissivities were determined from time-drawdown graphical analysis of six of the tests and from specific capacity data from one test. Observation wells were utilized in all tests but two. Transmissivities were quite low, ranging from 3435 to 14,960 gpd/ft. Storage coefficients appeared to be in the transition range between artesian and water-table conditions, ranging from 0.0004 to 0.016.

An idealized aquifer model was utilized for the purpose of computing long-term drawdowns in existing wells. A 1968 State Water Survey report indicated that the aquifer in the vicinity of the well field may have an effective width of 1500 feet. The model aquifer was thus assumed to be of this order of magnitude in width and assigned average transmissivity and storage coefficient values of 8000 gpd/ft and 0.05 (this storage coefficient is higher than the average value from well test analysis and takes into account long-term conversion of water levels from artesian to water table conditions).

Using the model aquifer above, image-well theory, theoretical distance-drawdown curves, specific capacity data, and available drawdown information (estimated from original well test data for early wells), long-term drawdowns were computed for each well until a reasonable, optimum scheme of pumpage was determined. Based on available information it is estimated that the long-term sustained yield of the well field at Winchester is of the order of 255,000 gpd. During years of severe drought this figure may possibly be reduced by about 25%.

The State Division of Water Resources has estimated that the average water demand at Windhester in the year 2000 will be 195,000 gpd, or close to the current consumption. Should additional supplies be needed, a groundwater exploration program will be necessary. The following excerpt from the State Geological Survey summarizes the recommendations by that agency for groundwater exploration.

Although new wells are continually being drilled to augment the present supply, it appears the deposit is adequate to supply the foreseeable needs for Winchester. More data are needed to determine the boundaries of the buried bedrock valley which contains the water-bearing sand and gravel. A seismic refraction survey is recommended to more accurately delineate the boundary of the bedrock valley. All of the floodplain of Big and Little Sandy Creeks lying in Section 4 and 5, T13N, R12W, can be regarded as a potential source of groundwater (Figure 45). Further test drilling will be needed to characterize the texture and thickness of the deposits found there.

If it is determined that the area of the present well field is inadequate to meet future needs, exploration should proceed farther downstream on the Big Sandy Creek floodplain using the following: electrical earth resistivity to locate optimum sites for test drilling, seismic refraction surveying to determine the thickness of the unconsolidated sediments above bedrock, and test drilling to discern the texture, thickness and water-yeilding potential of the sediments.

WINDSOR

Windsor is in eastern Shelby County in east-central Illinois, Section 36, T12N, R5E (Figure 47), approximately 11 miles west-southwest of Mattoon and 10 miles east-northeast of Shelbyville. State Routes 16 and 32 and CONRAIL serve the study area, which includes the portions of Ts 11 and 12N, Rs 5 and 6E shown in Figure 47, from the topographic map of the Stewardson 15-minute quadrangle.

Windsor lies near the southern limit of Wisconsinan glaciation on the northern flank of the Shelbyville Morainic System. The ridge acts as a drainage divide. On the north, water drains northwestward into Sand Creek and other tributaries of the Kaskaskia River. To the south, surface waters flow southward into Richland and Brush Creeks and tributaries of the Little Wabash River. The maximum topographic relief is over 160 feet.

The unconsolidated glacial deposits in the study area consist of pre-Illinoian, Illinoian, and Wisconsinan drift that is less than 50 to 132 feet thick. The glacial deposits are a complex of ice-laid till, water-laid silt, sand and gravel outwash, and wind-blown silt (loess). Pre-Illinoian drift may occur at the base of the drift in small bedrock valleys. Surficial loess thickness ranges from two to four feet.

Lenses and stringers of sand and gravel, 2 to 15 feet thick, occur throughout the drift sequence (Figure 47) but usually at the contact of the Wisconsinan and Illinoian drift, at depths of 70 to 100 feet (Figure 48). The deposits of permeable sand and gravel at this contact make the interval the best water-yielding zone, although wells developed here contain methane gas. The outwash stringer from which Windsor draws most of its water supply is linear along the crest of the moraine and exhibits sorting; textures range from sand and gravel to very fine silty sand. The deposit appears to slope to the northeast. Further extensions of this deposit and other stringers may be determined by electrical earth resistivity surveys and further test drilling. The water-yielding potential for these deposits is restricted somewhat by their thinness and limited areal extent.

The shallow bedrock in the Windsor area contains limestones, coals, shales, and sandstones of the Pennsylvanian Mattoon Formation. This formation attains a thickness of 200 to 250 feet in the study area and is underlain by the Pennsylvanian Bond Formation. Water yields from bedrock wells are low; tested capacities range from 2 1/2 to 6 gpm. Moderate to large supplies are not available from the shallow bedrock, and below depths of approximately 250 feet the water becomes too highly mineralized for most uses. Test drilling into the bedrock is not recommended until the potential for sand and gravel deposits in the glacial drift to provide adequate supplies of groundwater has been fully evaluated.

A public groundwater supply was installed for Windsor in 1935. During the previous year, Well No. 1 was drilled at a site one mile south of town. Subsequently, seven additional wells were drilled, Well No. 8 being added to the system in 1974. The following summary describes wells which remain in use. All others have been abandoned.

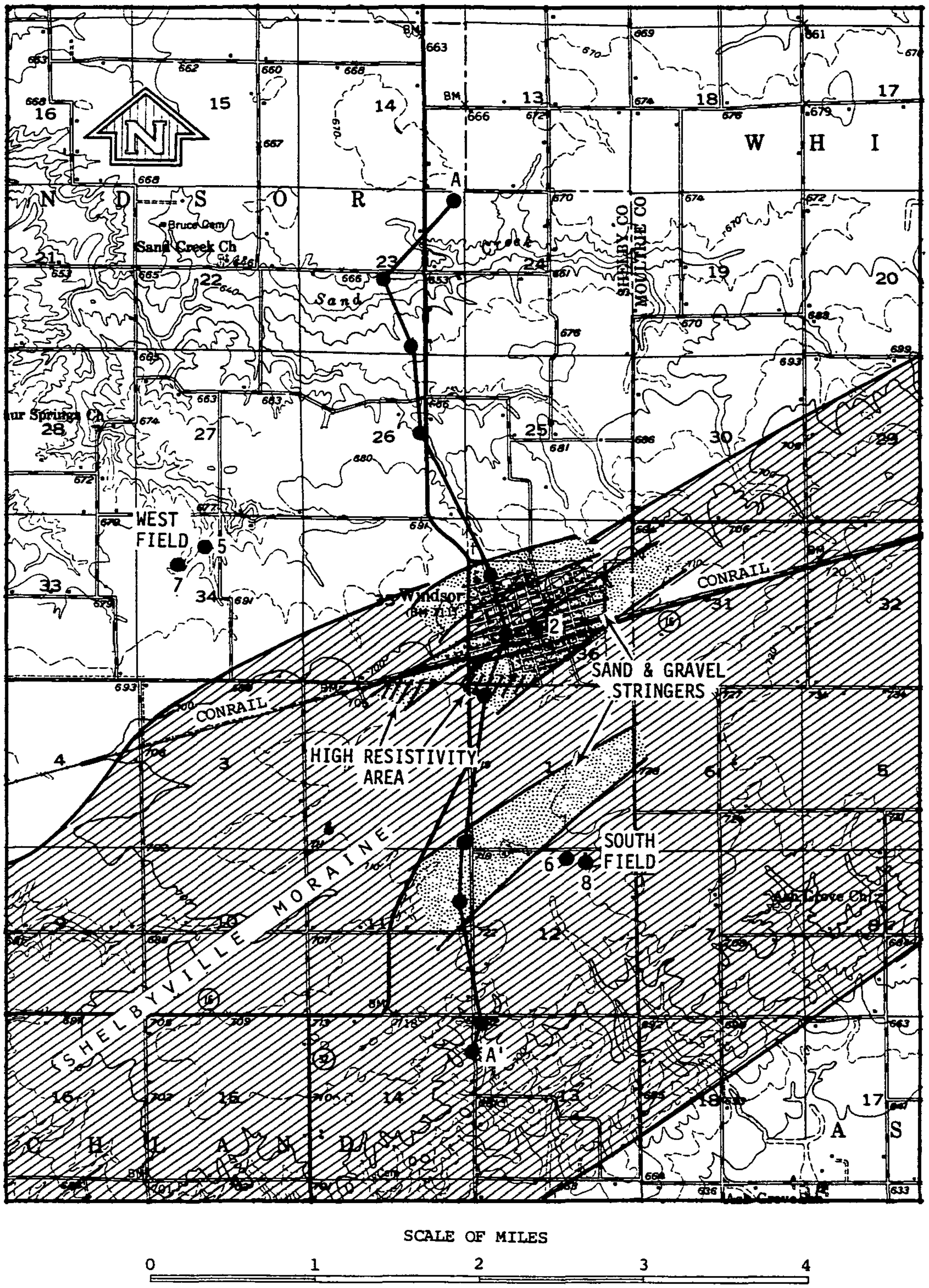

Figure 47. Windsor study area

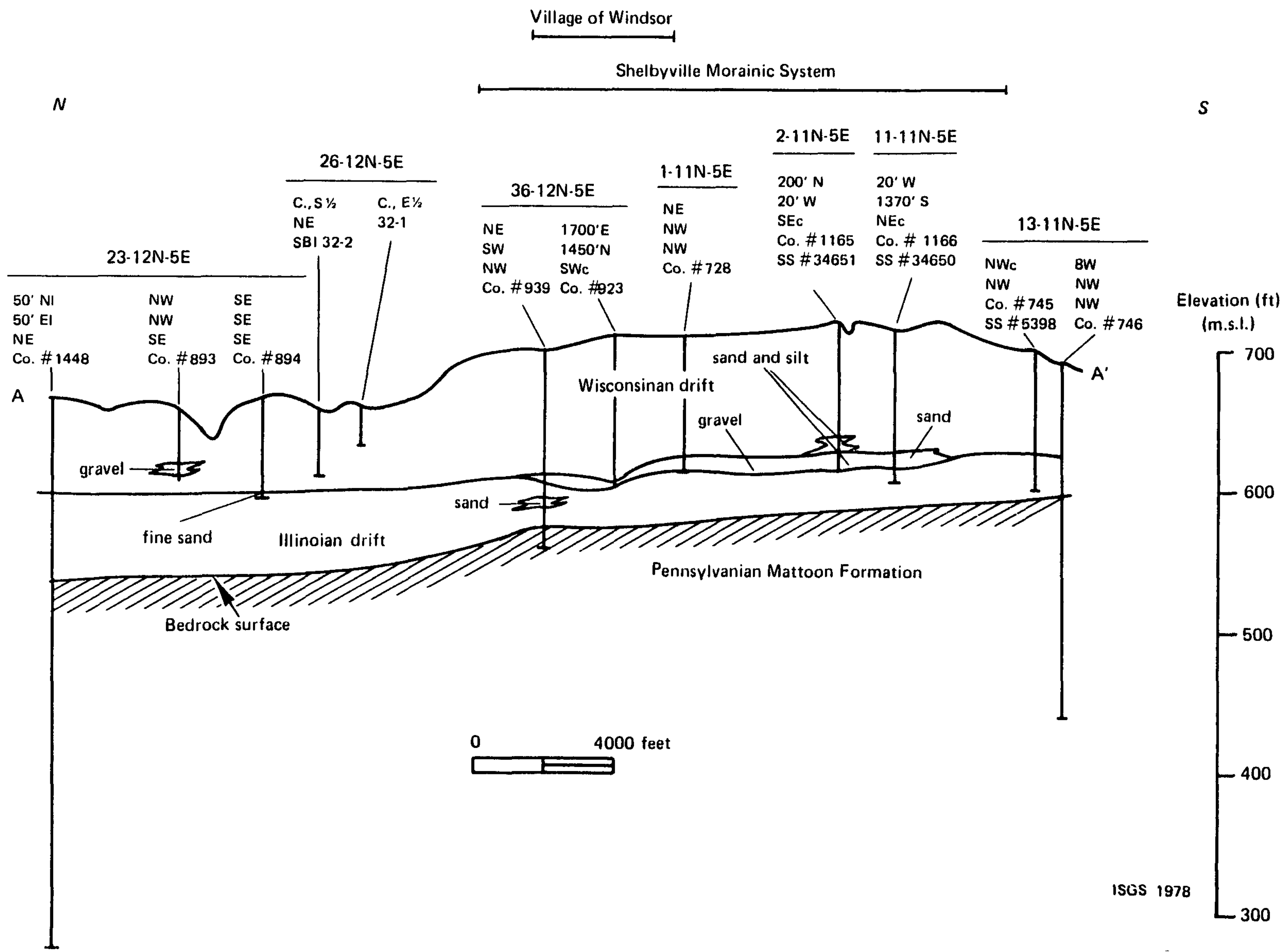

Figure 48. Cross section A-A', showing surface topography, glacial deposits, and bedrock surface near Windsor, Illinois. By Robert W. Ringler.

Well No. 2: Drilled in February 1949 to a depth of 131 feet, 5 inches, in Windsor, approximately 1550'N and 2325'E of the SW corner of Section 36, T12N, R5E. Construction features include 12-inch casing to 119 feet, 9 1/2-inches, and 11 feet of No. 25 slot screen. Reportedly operates at 24 gpm.

Well No. 5: Drilled in September 1971 to a depth of 63 feet, 1070'S and 500'W of the NE corner of the NW 1/4 of Section 34, T12N, R5E. Construction features include a six-inch casing to 55 feet, 8 feet of No. 35 slot screen and a one-inch gravel pack from 45 feet to the bottom. Reportedly operates at 20 gpm.

Well No. 6: Drilled in June 1973 to a depth of 100 feet in the NE 1/4 of Section 12, T11N, R5E. Constructed with six-inch casing to 96 feet and with four feet of No. 25 slot screen. Operated at 27 gpm.

Well No. 7: Drilled in February 1974 to a depth of 64.5 feet, 1691'S and 1370'E of the NW corner of Section 34, T12N, R5E. Constructed with six-inch casing to 60 feet, No. 20 slot screen from 60 to 64.5 feet and with a three mm. gravel pack. Operated at 20 gpm.

Well No. 8: Drilled in November 1974 to a depth of 100 feet in the NE 1/4 of Section 12, T11N, R5E. Constructed with 96 feet of six-inch casing, followed by four feet of No. 35 slot screen. Operated at 27 gpm.

Groundwater withdrawals at Windsor have grown from only 6000 gpd in 1935, when the supply was installed, to a reported 107,500 gpd in 1977. A 1977 Public Water Supply report of the State EPA described water levels as having dropped to critical levels and pumps breaking suction as a result. Pumps were lowered and valved back to reduce the risk of breaking suction. The combined well capacity of the four main wells (No. 5, 6, 7, and 8) fell from 110 gpm in 1975 to 100 gpm in 1976 and to 94 gpm in 1977.

Aquifer tests conducted at seven sites in the Windsor area between 1935 and 1974 revealed an average aquifer transmissivity in the "South Field" (Wells 6 and 8) of 10,000 gpd/ft and in the "West Field" (Wells 5 and 7) of 16,000 gpd/ft. Storage coefficients could not accurately be evaluated but were in the artesian range. Data from the tests also revealed the presence of geohydrologic boundaries. Hydrologic conditions at the South and West Fields were simulated by assuming infinite strip aquifers 900 feet and 2500 feet wide, respectively.

Based upon available geohydrologic information and on operational experience at the West and South Fields and on Well No. 2 in town it is estimated that the total sustained capability of the wells at Windsor is of the order of 140,000 gpd.

The State Division of Water Resources has estimated the water demand for Windsor in the year 2000 to be approximately 77,300 gpd. Should the present water supplies prove to be less adequate than predicted, or if additional supplies are needed, exploratory test drilling would be required. The following excerpt from the State Geological Survey describes exploration for groundwater recommended by that agency.

A sand and gravel stringer at the base of the Wisconsinan drift currently provides most of the municipal water supply for the village of Windsor. This deposit, which occurs at depths of 81 to 102 feet and at an elevation of 619 to 631 feet, is 6 to 10 feet thick, approximately 1000 to 2000 feet wide, and of variable sorting, which influences its water-yielding capacity. Within the village limits, water resources in the drift are already fully developed, although there is evidence of eastward and westward extensions that may be explored to increase local supplies. If additional water supplies are needed in the future, an additional electrical earth resistivity survey should be conducted to the east or west of the present aquifers to locate optimal areas for test drilling. Test drilling into the bedrock is not recommended until the potential for drift aquifers or other outside sources to provide an adequate supply of water has been evaluated.

WORDEN

Worden is in northeastern Madison County (Sections 26 and 35, T6N, R7W), in southwestern Illinois. The area is served by State Routes 4 and 140, Interstate Route 55, and the Norfolk and Western, Chicago and Northwestern, Illinois Terminal Railroads and CONRAIL. The study area includes portions of T5N, R7W, and T6N, R7W shown on (Figure 49), from the topographic maps of the Worden and Prairietown 7 1/2-minute quadrangles.

Worden is situated on the west flank of a broad, low rise on an Illinoian ground moraine. The regional slope is 5 to 10 feet per mile to the south-southwest. Two miles to the west a drainage feature known as the . Cahokia Creek Bottom is occupied by the southerly flowing Cahokia Creek, and surface waters from Worden flow westerly along small tributaries toward Cahokia Creek. The maximum relief in the area is 160 feet.

The unconsolidated glacial deposits in the study area consist of drift of Illinoian and Wisconsinan age. During the Illinoian glaciation, glacial drift was deposited on the bedrock surface, and a large channel, 2000 to 3000 feet wide and 50 to 60 feet deep, was cut in the drift and bedrock. Several periods of aggradation and erosion followed in which the channel was partially filled with fine-grained material. Subsequently, smaller channels (about 250 feet wide) were cut into these deposits and later filled with coarser textured outwash (Figure 50). Periods of loess deposition during late stages of Illinoian and Wisconsinan glaciations left a blanket of loess 4 to 8 feet thick. Contemporaneous with the loess deposition were periods aggradation in which loess-derived alluvium was built to a depth of 15 to 20 feet, burying the outwash-filled channels.

The possibility of other buried channels or similar features being present in the valley bottom has been discussed in previous reports. The geomorphological setting is favorable for the existence of other sand and gravel deposits similar to the known deposit. A moderate to high stream discharge and very high sediment loading during a period of glacial melting could have created a braided channel situation with several channels alternately being occupied and then filled with outwash. The 2000- to 3000-foot width of Cahokia Bottom is certainly enough to contain more than the single, 250-foot wide channel from which Worden presently obtains its municipal water supply. Additional electrical earth resistivity surveying could be used to investigate the presence of other water-bearing deposits within the Cahokia Creek Bottom.

The shallow bedrock in the Worden area contains red and gray shales, red claystones, sandstones and limestones of the Pennsylvanian Modesto Formation. Several wells in the area obtain small supplies of water from fractures in shale and limestone near the bedrock surface. Water-bearing sandstones, limestone and dolomites also occur lower in the bedrock section. Oil tests indicated the presence of sandstones in the depth interval of 150 to 180 feet in Sections 20 and 26, T6N, R7W, and 415 to 420 feet and 470 to 515 feet in Section 28, T6N, R7W. Another water-bearing sandstone and limestone unit in the interval 550 to 650 feet contains some oil, and the

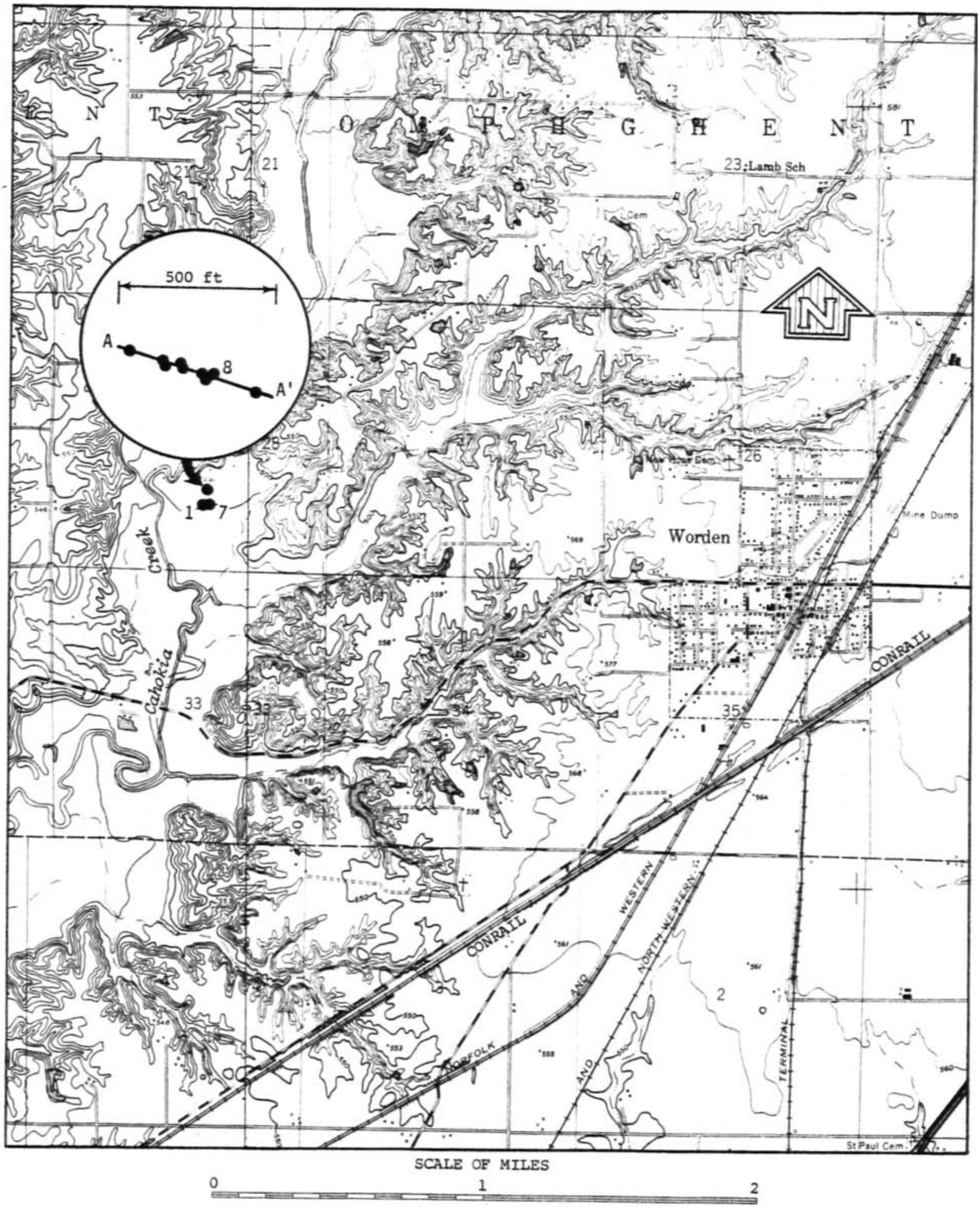

Figure 49. Worden study area

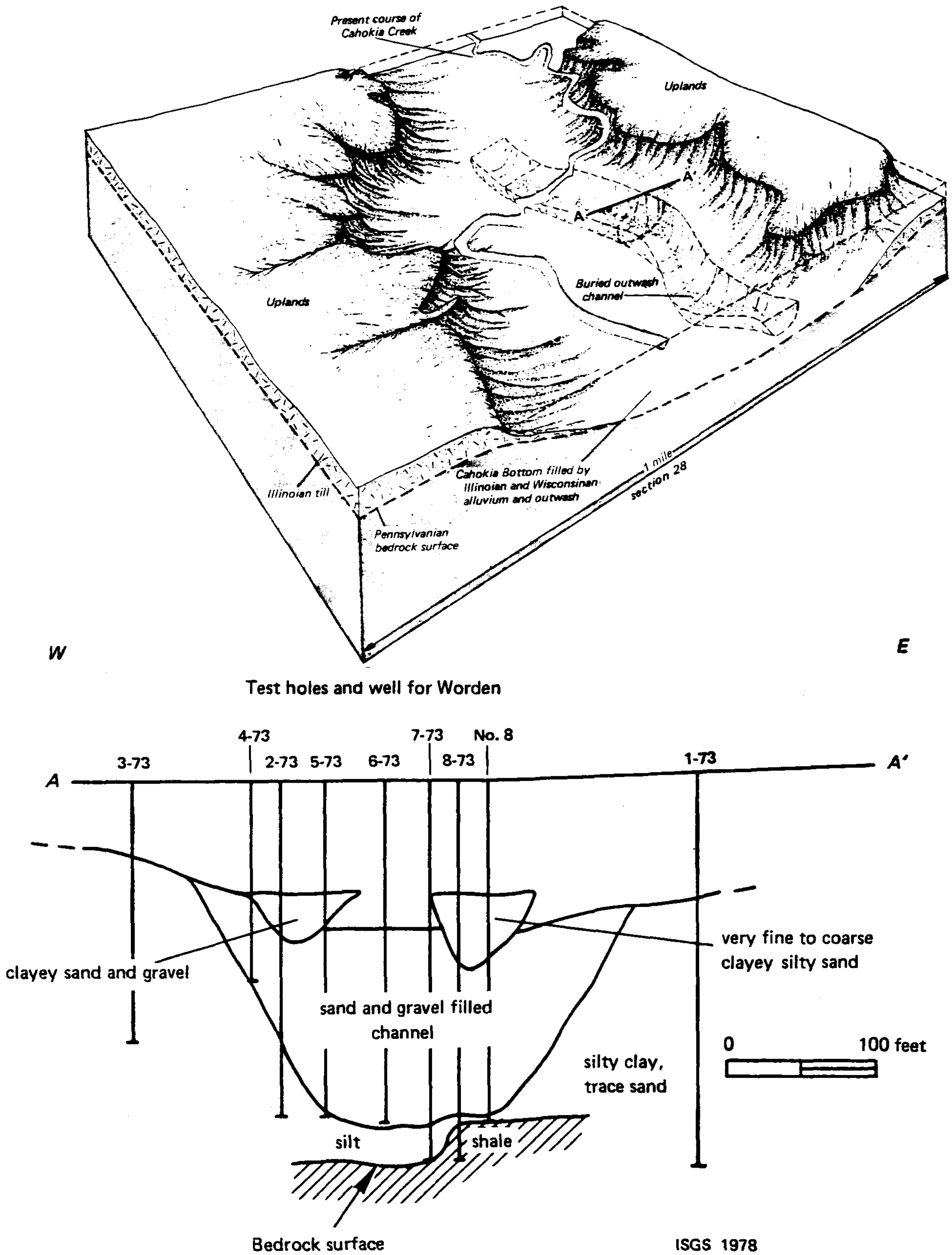

Figure 50. Three-dimensional representation of Cahokia Creek Bottom, showing the buried sand-and gravel-filled outwash channel beneath the present-day Cahokia Creek, and cross section A-A', depicting the stratigraphic relationship between the channel and the enclosing alluvium.
By Robert W. Ringler

associated water tends to be salty. Moderate to large supplies are not available from the shallow bedrock, and generally below 250 feet the water becomes too highly mineralized for most uses. Test drilling into the bedrock for additional water supplies is not recommended until the potential for drift aquifers to provide an adequate supply of water has been fully evaluated.

The Village of Worden partially completed its water supply system in 1947. Between 1947, when the first well was drilled, and 1975, eight wells were drilled, three of which remain in operation and are described below. All other wells have been abandoned.

Well No. 1: Drilled in 1947 to a depth of 54 feet and located in the Cahokia Creek Bottoms, two miles west of Worden, in the SE 1/4 of Section 28, T6N, R7W. Cased with 8-inch pipe to a depth of 46 feet and with No. 40 slot screen from 46 feet to the bottom. Reportedly operates at a rate of 20 gpm.

Well No. 7: Drilled in May 1969 to a depth of 43 feet and located 60 feet NE of Well No. 1, or approximately 1100 feet N and 2300 feet W of the SE corner of Section 28. Cased with 8-inch pipe to a depth of 35 feet, followed by No. 40 slot screen from 35 feet to the bottom. Reportedly operates at 20 gpm.

Well No. 8: Drilled in April 1975 to a depth of 46 feet, 1450 feet N and 2300 feet W of the SE corner of Section 28. Twenty-inch outer casing and 8-inch inner casing were both set to a depth of 40 feet, and 8-inch, No. 60 slot screen was set from 40 to 46 feet. The annulus between the screen and the 20-inch borehole was gravel packed. Present pumping rate believed to be 35 gpm.

Early water consumption records show an average pumpage in 1956 of 14,800 gpd. By 1959 this had grown to 45,000 gpd, but for the next 15 years, pumpage growth slowed. In 1975, consumption had reached 80,000 gpd. Currently, withdrawals average 75,000 gpd.

Several production tests have been conducted on the municipal wells at Worden. In April 1955, a test of Well No. 1 determined the transmissivity to be 4000 gpd/ft. A test conducted on Well No. 6 in October 1968 showed a transmissivity of 5000 gpd/ft at the pumped well and 6200 gpd/ft at Well No. 1, which was used as an observation well. A storage coefficient of 2.3×10^{-4} was also calculated from the observation well data. Data from a June 1969 test of Well No. 7 showed an average transmissivity of 5800 gpd/ft, while those from a May 1975 test of Well No. 8 indicated a transmissivity of 6200 gpd/ft.

The aquifer, therefore, was assumed to have average transmissivity and storage coefficients of 5000 gpd/ft and 2.3×10^{-4}, respectively, based on the above test results.

The practical sustained yield of the aquifer tapped by the municipal wells at Worden is influenced by the following factors: mutual interference between wells, aquifer boundaries, well screen clogging caused by high iron content (30 mg/1) in the water, and reduced recharge caused by the combined effect of limited aquifer areal extent and low flow periods in Cahokia Creek.

Analysis of the aquifer sustained yield was based on the above considerations as well as the use of an idealized aquifer model. The model aquifer was assumed to be an infinite strip, 250 feet wide, with transmissivity and storage coefficients of 5000 gpd/ft and 2.3×10^{-4}, respectively. For extended pumping periods the water levels were assumed to convert to water table conditions, and, therefore, an effective storage coefficient of 0.01 was used in drawdown computations.

Using the above assumptions and considerations the practical sustained yield of the present well field under normal conditions was found to be in excess of 80,000 gpd. During drought periods, however, the sustained yield would be expected to decrease to only about 36,000 gpd. It is possible, however, that another 14,000 gpd might be developed from the aquifer if a suitable well site could be found at least 400 feet from the nearest well.

The State Division of Water Resources estimates of future groundwater demand indicate that the average demand at Worden in the year 2000 will be about 67,000 gpd. Should the aquifer prove to be inadequate, additional supplies would need to be developed and a groundwater exploration program initiated. The following excerpt from the State Geological Survey summarizes the recommendations of that agency for such exploration.

A buried sand-and-gravel-filled channel, 12 to 27 feet thick and approximately 250 feet wide, in the Cahokia Creek Bottom currently provides the municipal water supply for Worden. Electrical earth resistivity surveying and other wells indicate the buried channel extends in a north-south direction from the well field. Direct recharge into the aquifer from Cahokia Creek, where it passes over the aquifer to the north, seems unlikely, because the thickness of fine-grained alluvium over the channel is probably greater than the depth of Cahokia Creek. Coarser beds in the overlying alluvium may provide indirect recharge. Additional wells may be drilled to the south into the aquifer if larger supplies of groundwater are required or the present wells become unserviceable. Drilling into the bedrock for additional groundwater is not recommended, until the potential for the buried outwash channel and other drift aquifers to provide an adequate supply of water has been fully evaluated.

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APPENDIX

PUBLIC GROUNDWATER SUPPLY ASSESSMENT

1. Adams County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Adams Co. Water District #1		608 (Est. 1975)	18,000	1975	Misslsslppian Syst- (Keokuk-Burlington Limestone)	1	90	40	6/1/72 SWS	Adequate. The supply servos four villages. Fowler, Paloma, Coatsburg, and Columbus.
						2	80	18		
Camp Point	1,143		76,000	1975	Pleistocene Series (sand and gravel) Misslsslppian Syst. (Keokuk-Burlington Limestone)	3	24	16	7/29/70	Deficient. As of 1975, all pumps operating 24 hrs/day.
						4	40	7	7/29/70	
						5	56	3	7/29/70	
						6	415	3	8/18/70	
						7	1036	1	3/11/76 SWS	
						8	410	3	8/18/70	
						9	385	3	8/18/70	
						10	415	4	8/18/70	
						11	420	2	8/18/70	
						12		8		
Golden	571		30,000	1976	Pennsylvanlan Syst. (sandstone) Misslsslppian Syst. (Keokuk-Burlington Limestone)	1	80	Standby		Marginal
						2	83	6.5	6/28/49	
						6	75	9.5		
						7	380	7.5		
						8	420	11.5	5/19/70	
Liberty	369		26,600	1976	Misslsslppian Syst. (St. Louis-Fern Glen Limestone)	2	295	8	11/5/63 SWS	Adequate
						3	308	18	10/17/68	
						4	355	8	2/2/72 SWS	
						5	284	9	7/18/73 SWS	
						6	340	10-20	11/11/75 SWS	
Loraine	372		20,000	1976	Misslsslppian Syst. (Keokuk-Burlington Limestone)	1	300	12	5/15/56 5/15/72	Marginal
						2	300	10-15	5/23/56 SWS 2/15/72 SWS	
						3	340	15	9/5/74 SWS	
Mendon	883		71,000	1976	Misslsslppian Syst. (Warsaw limestone)	8	176	100	10/9/62 SWS	Adequate
						9	180	90		
Mill Creek Water District		2135 (Est. 1978)	140,000	1978	Mississippi River Valley alluvium	1	80	275	8/24/72 SWS	Adequate
Payson	589		70,000	1976	Misslsslppian System (Burlington Limestone)	1	330	75	8/7/40 SWS	Adequate
						2	304	100	9/14/67 SWS	

Plainville	289	26,000	1976	Mi-ssissippian System (limestone)	1	141	25	8/10/62 SWS	Adequate
					2	188	9	9/12/62 SWS	
					3	230	5	11/12/76 SWS	
					4	220	15	9/29/77 SWS	
					5	167	40	10/12/77 SWS	
Ursa	423	26,000	1976	Mlssissippian System (limestone)	1	200	80	6/21/66 SWS	Adequate

2. Alexander County

Central Alexander County Public Water District	unknown	unknown		Sand and gravel	1	98	500	2/16/72 SWS	Insufficient data for aquifer assessment
McClure East Cape Girardeau Public Water District	752 (Est.)	50,000	1974	Sand and gravel	1	108	125	10/9/67 SWS	Adequate
Tamms	645	27,000	1974	Sand and gravel	1	171	100	5/19/71 SWS	Adequate
Thebes	442	25,000	1974	Ordovician System (Kimmswick gray lime)	1	300	80	9/9/64 SWS	Adequate

3. Bond County

Greenville	4,631	522,900	1975	Pleistocene Series (sand and gravel) Pennsylvanian System (limestone)	2	70	250	3/4/59 SWS	Adequate. Surface water is the main source for public water supply. Ground water is used for emergency.
					5	74	250		
Mulberry Grove	697	49,600	1975	Sand and gravel	1	40	36	4/7/41 SWS	Adequate. Treated water is obtained from Greenville
					3	37	30		
					4	33	20	12/31/62 SWS	
Pocahontas	764	50,000	1976	Sand and gravel	1	46.8	25	5/4/54 SWS	Adequate
					2	36	25	8/22/72 SWS	
					4	31	25	9/19/67 SWS	
					5	35	20	5/19/72 SWS	
Smithboro	203								Adequate. Treated water is obtained from Greenville

4. Boone County

Facility	Population 1970 census	spec. census	(gallons)	(yr)	Aquifer description	Well no.	Deptli (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Belvidere	14,061		3,600,000	1977	Pleistocene Series	2	1861	500		Adequate
					(buried Troy Bedrock	3	1803	500		
					Valley, sand and	4	1800	1000	9/14-15/42 SWS	
					gravel)	5	610	600	10/15-16/45 SWS	
					Ordovlclan System	6	868	1000	6/15/55 SWS	
					(St. Peter Sandstone)	7	969	1000	11/15-16/62 SWS	
					Cambrian System	8	1393	1500	7/20-21/64 SWS	
					(Ironton-Galesville	9	122	1250	6/5/69 SWS	
					Sandstone, Mt. Simon					
					Sandstone)					
Capron	654		65,000	1976	Ordovician System (Maquoketa limestone, St. Peter sandstone)	1	880	150	11/29/77	Adequate
Poplar Grove	607		45,000	1976	Sand and gravel	2	184	185		Adequate

5. Brown County

Facility	Population 1970 census	spec. census	(gallons)	(yr)	Aquifer description	Well no.	Deptli (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Mound Station	203		12.000	1976	Mississippian System (Keokuk-Burlington Limestone)	1	483	30	12/29/64 SWS	Adequate
Versailles	429		38,000	1976	Sand and gravel	1	45	24	7/13-14/53 SWS	Marginal
						2	36	24	7/13-14/53 SWS	

6. Bureau Cctunty

Facility	Population 1970 census	spec. census	(gallons)	(yr)	Aquifer description	Well no.	Deptli (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Arlington	250		25,300	1976	Sand and gravel	2	94	18		Adequate.
						3	100	20	1/20/55 SWS	
Buda	675		96,000	1976	Ordovician System	2	1630	200		
					(Galena-Platteville	4	135	100		
					Dolomite, St. Peter	5	1601	175	3/18/68 SWS	Adequate
					Sandstone) Silurian System (Niagaran-Alexandrlan dolomite)					
Bureau Junction	466		21,300	1976	Silurian System	2	305	flowing		Adequate
					(Nlagaran dolomite)	4	334	flowing		
Cherry	551		35,000	1976	Sand and gravel	1	33	60	11/22/40 SWS	Adequate
						2	34	100		
Dalzeli	579		35,000	1976	Sand and gravel	2	155	70	2/2-5/62 SWS	Adequate
						3	81.5	75		

DePue	1,919	176,800	1976	Silurian System	2	1487	120		Adequate
				(Niagaran-Alexandrian	3	1490	250		
				dolomite)					
				Ordovlclan System					
				(Galena-Platteville					
				Dolomite, St. Peter					
				Sandstone)					
Dover	176	8,100	1976	Sand and gravel	1	294	110		Adequate
Ladd	1,328	175,000	1977	Ordovlclan System .	1	1860	300	1/9/40 SWS	Adequate
				(Galena-Platteville	2	163	450	12/22-23/48	
				limestone, St. Peter					
				Sandstone) Pleistocene					
				(sand and gravel)					
LaMoille	669	61,000	1976	Sand and gravel	2	331	180	8/8/36	Adequate
					3	341	240		
Maiden	262	17,000	1976	Sand and gravel	1	270	140	9/9-10/70 SWS	Adequate
Manllus	402	53,000	1977	Sand and gravel	2	268	100	11/7/67 SWS	Adequate
					3	285	120		
Mineral	286	25,000	1976	Silurian System	1	375	30	8/12/54	Adequate
				(limestone and	2	447	30	5/21/64 SWS	
				dolomite)					
Neponset	507	29,000	1976	Pennsylvanlan System	2	250	Standby	3/14/55 SWS	Adequate
				(shale, limestone,	3	1640	163	2/29/56	
				sandstone)	4	200	Standby		
				Ordovlclan System					
				(Galena-Platteville					
				dolomite)					
Ohio	506	44,000	1976	Sand and gravel	2	385	65		
					4	404	200		
					5	434	250	6/29/67 SWS	Adequate
Princeton	6,959	1,286,000	1977	Sand and gravel	3	260	1000		Marginal
					5	270	800		
Sheffield	1,038	93,000	1976	Sand and gravel	4	71	200	10/23/61 SWS	Adequate
					5	73	170	9/26/69 SWS	
Spring Valley	5,605	1,102,000	1977	Pleistocene Series	8	46	Standby		Adequate
				(sand and gravel)	9	50	Standby		
				Ordovician-Cambrian	10	2696	1300	6/8-14/67 SWS	
				Systems (sandstone)	11	2723	1500	11/4/76	
Tiskilwa	973	103,000	1977	Sand and gravel	1	92	100		Adequate
					2	140	150		

Facility	Population 1970 census	Population spec. census	Average daily pumpage (Gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Van Orin	100 (Est. 1976)		5,000	1976	Sand and gravel	1	258	40		Adequate
Walnut	1,295		201,000	1977	Sand and gravel	4 5 6	247 272 267	190 190 350		Adequate
Wyanet	1,005		97,500	1976	Sand and gravel	1 2	218 225	130 130		Adequate
7. Calhoun County										
Batchtown	217		13,500	1976	Mississippi River Valley alluvium	1 2	86.5 86	30 28	4/4/bb SWS	Adequate
Brussels	191		35,000	1976	Alluvial sand and gravel	1	78	105	12/10/63 SWS	Adequate
Hardin	1,035		215,000	1975	Sand and gravel	1 2	70 64	250 100	4/21/72 SW 1/13/54 SWS	Adequate
Kampsville	439		38,000	1975	Alluvial sand and gravel	1 2	60 52	80 71	7/11/56 SWS	Adequate
8. Carroll County										
Chadwick	605		54,100	1977	Cambrian-Ordovician Systems (Galena-Platteville Dolomite, St. Peter Sandstone, Galesville Sandstone)	2 3	1215 1210	Standby 400	 8/24/67 SWS	Adequate
Lanark	1,495		227,000	1977	Cambrian-Ordovician Systems (St. Peter Sandstone, Ironton Sandstone)	3 4	1100 1082	400 250	2/20/57 SWS 7/13/71	Adequate
Milledgeville	1,130		117,000	1977	Cambrian-Ordovician Systems (Shakopee, Oneota limestone, Galesville Sandstone)	3 4	675 1146	Standby 350		Adequate
Mt. Carroll	2,143		215,000	1977	Ordovician System (St. Peter Sandstone) Cambrian System (Eau Claire sandstone)	2 3	1457 1453	700 400	 12/20/55 SWS	Adequate

Savanna	4,942	782,000	1977	Ordovlclan System (Galena-Plattevllle Dolomite, Clenwood Sandstone) Cambrian System (Eau Claire sandstone, Mt. Simon Sandstone)	3 4 5 6	1780 1308 1804 1300	Standby 550 585 1200	9/15/27 SWS 12/10/52 SWS 3/15/65	Adequate
Shannon	848	115,000	1977	Ordovlclan System (Galena-Plattevllle Dolomite, St. Peter Sandstone)	1 2	250 698	100 185	3/13/57 SWS	Adequate
Thomson	617	58,000	1977	Sand and gravel	2 3 4	60 81 65	70 185 400	 9/13/54 SWS 9/5/75	Adequate
				9. Cass County					
Arenzville	403	30,000	1976	Sand and gravel	1 2	60 60	100 100	3/20/47 6/13/69 SWS	Adequate. Alternates in use with W/1 on daily basis
Ashland	1,128	85,000	1975	Indian Creek bottom-land sand and gravel	1 2 3 4	21 21 21 27	42 42 42 150	10/17/35	Adequate. Main public water supply is from Little Indian Creek surface water. All groundwater (W#1, W#2, W#3, W#4) is maintained for emergency use during extended drought period.
Beardstown	6,222	1,100,000	1977	Illinois River Valley alluvium	5 7 8 11 12 13 14 15 16	78 86 89 92 92 86 83 80 81	Standby 600 700 700 700	11/17/70 SWS 6/30/75 7/9/75 7/24/75	Adequate
Chandlerville	762	75,000	1977	Sangamon River Valley alluvium	1 2	34 37	Standby 150	7/9-10/36 SWS 5/13/69 SWS	Adequate
Virginia	1,814	155,000	1976	Sangamon River Valley alluvium	1 2	29 30	40 40	12/10/76 SWS	Adequate. Public water supply is obtained from impoundment reservoir. Groundwater is maintained only for emergency source during extended drought.

10. Champaign County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Broadlands	315		21,000	1977	Sand and gravel	1	71.5	35	3/14/55 SWS	Marginal. Limited
						2	78	10	10/3/77 SWS	aquifer.
Champaign-	56,837	59,152	15,000,000	1978	Mahomet Bedrock	35	208	500		Adequate. Wells are located
		(1972)			Valley, sand and	40	212	275	4/10/78	in two well fields:
Urbana	33,976	34,502			gravel, Illinoian	41	224	600		1) West field (West of Mattis
		(1972)			glacial drift	42	217.5	700	10/20/44	Ave. in Champaign); Well
						43	224.5	700		#48,53,54,55,56,57,58,59,60,61.
						45	197	375		2) North Well field (Corner
						46	207.2	350		of N. Goodwin & Bradley Ave.
						47	217.2	385		in Urbana); Well # 35,40,41,42,
						48	232	700	5/12/47	43,45,46,47.
						53	289	2100	12/26/56	
						54	330.5	3000	11/26,28,29/56	
						55	300	1000		
						56	318	2100		
						57	297	2100		
						58	326.5	2800		
						59	338.4	2100		
						60	340	2400	4/7-9/71	
						61	296.5	2100	7/9,10,11/74	
Dewey Public		220	9,000	1976	Mahomet Bedrock	1	273	48	6/17/69 SWS	Adequate.
Water District		(Est.			Valley sand and					
		1976)			gravel					
Fisher	1,525		100,000	1976	Mahomet Bedrock Valley	1	236	125		Adequate
					sand and gravel	3	270	200		
Gifford	814		56,000	1973	Mahomet Bedrock Valley	1	157	127	9/5/61 SWS	Adequate
					sand and gravel	2	165	100	3/1/66 SWS	
Homer	1,354		100,000	1978	Sand and gravel	1	72	30	5/4/66 SWS	Marginal
						2	60.5	100	6/8/52 SWS	
						3	59	100	11/24/59 SWS	
									1/9/65	
Ivesdale	357		24,700	1975	Sand and gravel	1	85	50	9/24/65 SWS	Adequate
Longview	275		21,000	1978	Sand and gravel	1	50	60	5/20/55 SWS	Adequate
Ludlow	531		50,000	1976	Mahomet Bedrock Valley	1	122	90	10/15/48 SWS	Adequate
					sand and gravel	2	122.5	110		
Mahomet	1,296	1,520	170,000	1973	Mahomet Bedrock Valley	2	97	90		Adequate
		(1974)			sand and gravel	3	251.6	190		

Ogden	703		61,000	1977	Sand and gravel	1	65	150	9/23/52 SWS	Adequate
						2	70	108		
Penfield Public Water District		240 (Est. 1973)	15,000	1976	Sand and gravel	1	195	50	2/10/66 SWS	Adequate
						2	200	50	10/13/77 SWS	
Pesotum	536		45,000	1976	Sand and gravel	1	190	105	2/2/56 SWS	Adequate
									6/29/67 SWS	
						2	190	105	10/24/67 SWS	
Philo	1,022		90,000	1975	Sand and gravel	2	44	23	5/31/45 SWS	Marginal
						3	28.5	60	3/27/54	
						4	26	32	10/11/62	
Rantoul	25,562		1,800,000	1977	Mahomet Bedrock Valley sand and gravel	3	137	650	12/5/39 SWS	Adequate
						5	291	800		
						6	142	200		
						7	279	1,050		
Royal	197		15,000	1976	Sand and gravel	1	106.5	50	1/9/68 SWS	Adequate
Sadorus	454		21,000	1975	Sand and gravel	1	114	27	6/21/63 SWS	Adequate
						2	112	30	9/6/63 SWS	
Sangamon Valley Public Water District		2,000 (Est. 1973)	187,000	1974	Sand and gravel	1	283.1	300	10/2/67 SWS	Adequate
						2	289	220		
Savoy	592	1,496 (1975)								Village receives water from Northern Illinois Water Corporation in Champaign-Urbana.
Sidney	915		60,000	1976	Sand and gravel	1	56	Standby		Adequate
						2	58.5	125	11/16/54 SWS	
						3	53	50	9/1/77 SWS	
St. Joseph	1,554	1,869 (1975)	174,000	1975	Wisconsinan drift, sand and gravel	1	76	Standby	5/28/58 SWS	Adequate
									2/7/64 SWS	
						2	72.5	50		
						3	72	160	7/15/71 SWS	
						4	82.5	125	12/27/76 SWS	
Thomasboro	806		80,000	1976	Mahomet Bedrock Valley sand and gravel	1	230	100	4/18/60 SWS	Adequate
						2	238	100	3/1/66 SWS	
Tolono	2,027		150,000	1974	Illinoian glacial drift, sand and gravel	9	179	150		Adequate
						11	181	150	2/16/66 SWS	
						12	182.5	150	12/20/72 SWS	

U. Christian County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Assumption	1,487		140,000	1974	Sand and gravel in	1	23	18		Adequate
					the valley of Lake	2	24	18		
					Fork	5	26	13	6/6-7/61 SWS	
						6	26	13	6/7/61 SWS	
						7	30	13	6/11/61 SWS	
						8	31	18		
						9	35	35		
						10	90	No Record	5/16/78 SWS	
						11	105	No Record		
Edinburg	1,153		97,500	1978	South Fork, Sangamon	9	43	35	5/10/61	Marginal
					River Valley alluvium	10	44	*	4/26/74 SWS	*W#10 and W//11 operated
						11	44	*	9/30/74 SWS	simultaneously for 60
						12	42.5	60	4/8/77	gpm total; alternated in use with W//12
Morrisonville	1,178		85,000	1975	Sand and gravel	4	44	120	6/5/44 SWS	Adequate
						5	41	120	9/17/52 SWS	
Mt. Auburn	520		35,000	1977	Sand and gravel	1	70	50	4/29/41	Adequate. W//1 alternated
						2	65	50		in use with W//2 on a weekly basis.
Palmer	244		10,000	1976	Sand and gravel	1	76	78	5/1/67	Adequate
Stonington	1,096		90,000	1976	Sand and gravel	9	65	Standby		Adequate. Well //10 is
						10	124.5	150	2/26/69 SWS	alternated in use with
						11	104	150	1/24/74 SWS	Well #11 on a weekly basis
Taylorville	10,644		1,000,000	1978	Sand and gravel	11	88	800		Adequate. Additional 1 to
						12	90	800		1.6 mgd is obtained from
						13	96	800		an impoundment reservoir. City supplies water to Langeyville PWD and Owaneco. SWS Report of Investigation 41, published in 1961, rates the long-term yield of Taylorville's aquifer at 1.4 MGD when operated individually.

12. Clark County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Casey	2,994		408,000	1977	Sand and gravel	6	79.5	125		Adequate
						8	132	100	1/20/66 SWS	
						9	132	100		
						10	71	100	7/2/68 SWS	

Dunlap Group Water Company		75 (Est. 1976)	3,800	1976	Sand and gravel	1	42.5	30	11/4/71 SWS	Adequate
Marshall	3,468		700,000	1975	Big Creek Valley alluvium	1	65	650		Adequate
						2	64	850		
						3	69.5	700	6/2/72 SWS	
Martinsville	1,374		118,600	1977	Sand and gravel	5	58	60	12/28/49 SWS	Adequate
						6	56	60	1/26/50 SWS	
						7	68	60	4/25/66	
						8	76	120	8/21/70 SWS	
Union-York Water District		670 (Est. 1976)	36,000	1976	Sand and gravel	1	115.5	55	11/4/64 SWS	Adequate
Westfield	678		35,000	1974	Sand and gravel	5	50	33	9/14/73 SWS	Adequate
						6	53	40	12/4/75 SWS	
					13. Clinton County					
Albers	656		23,400	1975	Pleistocene Series	2	184	27	11/16/56 SWS	Adequate
					(sand and gravel)	3	54	60	2/27/57 SWS	
					Pennsylvanlan System	4	59	70	12/2/75	
					(sandstone)	5	61.6	70	3/17/78 SWS	
Aviston	828		51,000	1976	Sand and gravel	1	74	98		Adequate
						2	67	125	8/4/64 SWS	
Bartelso	439		26.900	1975	Sand and gravel	1	53	50	6/28/63	Adequate
Damiansvllle Public Water District		385 (Est. 1975)	8,500	1975	Sand and gravel	3	63	25	8/24/73	Adequate. Aquifer test Indicates 10 gpm of long term yield on Well #3.
Germantown	1,108		56,200	1975	Sand and gravel	1	28.5	21	1/18/56	Marginal
						2	26	34	1/25/56	
					14. Coles County					
Ashmore	428		65,000	1977	Sand and gravel	1	42	80	9/14/72 SWS	Adequate
						2	43.5	91	11/25/74 SWS	
Lerna	288		18,600	1975	Pleistocene Series	1	34	3	9/24/58 SWS	Deficient
					(sand and gravel)	3	138	6.5		
					Pennsylvanlan System	4	151	3	9/30/55 SWS	
					(Sandstone)	5	130	3		
						6	142	5	8/6/76 SWS	

15. Crawford County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Flat Rock	504		28,000	1976	Sand and gravel	1	52	90	9/27/56 SWS	Adequate
						2	63	75	12/5/61 SWS	
Hutsonville	544		27,000	1974	Sand and gravel	2	36.5	250		Adequate
						3	32	300	7/28/58 SWS	
Eaton Public Water District		700 (Est. 1972)	17,400	1972						Adequate. See Robinson
Hebron Public Water District		350 (Est. 1976)	16,000	1976						Adequate. See Robinson
Oblong	1,860		146,000	1972						Adequate. See Robinson
Stoy	199									Adequate. See Robinson
Palestine	1,640		85,000	1974						Adequate. See Robinson
Robinson	7,178		1,340,000	1973	Wabash River Valley alluvium	5	70	250		Adequate. Water is supplied to Eaton PWD, Oblong, Hebron PWD, Palestine, and Stoy.
						7	81	600		
						9	85	600		
						10	84	800		

16. Cumberland County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Greenup	1,618		145,000	1975	Embarrass River Valley alluvium	3	43	140		Adequate
						4	40	40	11/13/50 SWS	
						5	41	80	9/20/63 SWS	
						6	44	250	10/20/77 SWS	
Jewett	211		10,000	1975	Sand and gravel	1	133.5	38	11/15/63 SWS	Adequate
						2	136	45	1/16/64 SWS	
Toledo	1,068		85,000	1978	Cottonwood Creek Valley alluvium	2	20	20		Marginal
						3	29	20	7/28/52 SWS	
						5	30	90	2/18/75 SWS	

17. DeKalb County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
DeKalb	32,949		3,918,000	1976	Ordovician-Cambrian Systems (Glenwood - St. Peter Sandstone, Ironton-Galesville Sandstone)	1	133	700		Adequate
						4	1,325	495	8/23/38 SWS	
						6	1,291	1,000	1/25/52 SWS	
						7	1,328	925	1/27/55 SWS	
						8	949	620		
						9	1,330	525		
						10	1,310	1,100	7/21/66 SWS	
						11	1,312	1,200	1/2/68 SWS	
						12	1,200	1,175	8/14/72	

Genoa	3,003	3,210	428,500	1977	Ordovlcian System	2	730	500			Adequate
		(1975)			(Glenwood-St. Peter	3	732	700	10/15/56	SWS	
					Sandstone)	4	770	1,000	12/21/70		
Hinckley	1,053		115,400	1977	Ordovlcian System	2	708	300			Adequate
					(Galena-Platteville	3	605	300	12/28/63		
					Dolomite, St. Peter						
					Sandstone)						
Kingston	481		58,600	1977	Ordovlcian System	2	755	100			Adequate
					(Galena-Plattevllle	3	717	300	12/18/58	SWS	
					limestone, St. Peter						
					Sandstone)						
Kirkland	1,138		109,400	1976	Ordovlcian System	1	636	320	10/11/50	SWS	Adequate
					(Galena-Plattevllle						
					limestone, Glenwood-						
					St. Peter Sandstone)						
Malta	961		65,000	1977	Ordovician-Cambrian	1	853	100			
					Systems (Glenwood-St.	2	1,254	300	10/21/52	SWS	Adequate
					Peter Sandstone,						
					Ironton Sandstone)						
Sandwich	5,056		910,000	1975	Ordovician-Cambrian	1	650	800			Adequate
					Systems (St. Peter	2	600	750			
					Sandstone, Galesville	3	600	750			
					Sandstone)						
Shabbona	730		172,000	1977	Sand and gravel	1	150	100			Adequate
						3	149	200	5/26/59		
						4	163	200	4/24/72		
Somonauk	1,112		100,000	1977	Ordovlcian System	1	190	300			Adequate
					(St. Peter Sandstone)	2	502	250			
					Ordovician-Cambrian						
					Systems (Oneota,						
					Eminence-Potasi Fms.)						
Sycamore	7,834		1,796,000	1977	Ordovlcian System	1	902	950			Adequate
					(Galena-Plattevllle	3	1,002	600			
					Dolomite, St. Peter	5	1,270	1,000	7/9/62		
					Sandstone) Cambrian	6	1,214	1,000	7/13/70		
					System (Ironton-Gales-						
					ville Sandstone)						
Waterman	990		104,100	1976	Pleistocene Series	2	72	150			Adequate
					(sand and gravel)	3	400	180	10/21/63		
					Ordovlcian System						
					(Galena-Plattevllle						
					Limestone)						

18. Dewitt County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Clinton	7,570		1,100,000	1974	Mahomet Bedrock Valley sand and gravel	1	327	250		Adequate
						3	357	350		
						4	240	220		
						6	345	500	3/29/60 SWS	
						7	345	800	3/29/60 SWS	
						8		800		
						9		300		
Farmer City	2,217		213,000	1975	Wisconsinan and Illinoian age glacial sand and gravel	2	167	51	10/1/45 SWS	Adequate
									5/2/74 SWS	
						4	167	50	12/9/54 SWS	
									7/13/55 SWS	
									5/6/74 SWS	
						6	172	200	5/7/74 SWS	
						7	180	90	9/11/67 SWS	
									5/23/74 SWS	
						8	152	20	7/20/72 SWS	
									5/3/74 SWS	
Kenney	367		28,000	1974	Sand and gravel	1	248	190	10/26/56 SWS	Adequate
Wapella	572		50,000	1976	Wisconsinan glacial sand and gravel	2	79	60		Adequate
Waynesville	522		42,000	1974	Wisconsinan age Shelbyville moraine sand and gravel	6	217	200		Adequate
						7	162	standby		
Weldon	533		30,000	1974	Illinoian sand and gravel, Mahomet Bedrock Valley sand and gravel	3	167	70	8/13/63 SWS	Adequate
									6/13/68 SWS	
						4	163	50	10/11/72 SWS	
						5	293	150	4/3/78 SWS	

19. Douglas County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Arcola	2,276		146,000	1973	Wisconsinan glacial Band and gravel	2-A	128	56		Adequate. SWS Report of investigation 41, published in 1961, rates the long-term yield of Arcola's aquifer at 200,000 gpd.
						5	106	68	8/11/55 SWS	
						6	118	37	12/30/55 SWS	
Arthur	2,214		200,000	1977	Wisconsinan and Illinoian glacial sand and gravel	1	78	150		Adequate
						2	92	40	3/19/45 SWS	
						3	92	103		
						4	90	35	6/20/45 SWS	
						5	81	45	10/5/64 SWS	
						6	82	65	8/3/71 SWS	

Atwood	1,264		122,000	1976	Wisconsinan and Illinoian glacial sand and gravel	1	97	100	7/19/35	SWS	Adequate
						2	96	standby	8/3/60	SWS	
Camargo	241		15,000	1976	Pleistocene Series (Glacial sand and gravel), Pennsylvanian System (shale)	1	165	20	4/13/56	SWS	Adequate
						2	80.5	12	3/15/61	SWS	
						3	72	34	10/13/71	SWS	
Hindsboro	418		25,000	1976	Sand and gravel	1	83	15	10/29/68	SWS	Marginal
						2	28	1	6/13/68 10/29/68	SWS	
						3	140	15	9/8/71	SWS	
Newman	1,018		117,000	1976	Pleistocene Series (Embarrass River alluvium sand and gravel	3	30	standby	11/21-22-49	SWS	Adequate
						4	58.3	190	6/22/53	SWS	
Tuscola	3,917	5,000 (Est. 1977)	160,000	1978	Devonian and Silurian Systems (limestone)	6	460	95	7/10/64		Adequate. Tuscola purchases an additional 321,000 gpd of treated water from U.S. Industrial Chemical Co. This water is withdrawn from the Kaskaskla River.
						7	557	45			
						9	696	82			
Villa Grove	2,605		207,000	1976	Devonian System (Cedar Valley Sandstone)	1	645	250			Adequate
						2	627	250	3/11/54	SWS	

20. Edgar County

Brocton	349		25,000	1976	Sand and gravel	1	38	60	5/16/62	SWS	Adequate
Chrisman	1,285		147,000	1976	Sand and gravel	4	96	200	11/12/53	SWS	Adequate
						5	92	250	3/30/71	SWS	
Hume	496		35,000	1977	Sand and gravel	1	55	75	10/26/54	SWS	Adequate
						2	57	100	11/7/75	SWS	
Kansas	779		63,000	1977	Sand and gravel	4	85	100			Adequate
						5	81	110			
Metcalf	269		12,000	1977	Sand and gravel	1	75	100	2/2/55	SWS	Adequate
Redmon	251		8,500	1976	Sand and gravel	1	67	50	1/30/67	SWS	Adequate
Vermilion	333		4,500	1975	Sand and gravel	1	54	26	8/16/56	SWS	Adequate
						2	55	27	8/22/56	SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
21. Edwards County										
Albion	1,791		400,000	1975	Wabash River Valley alluvium	1	81.4	200	11/6/62	Adequate
						2	42.8	200	1/30/63 SWS	
						3	54.5	400	5/2/63 SWS	
									7/8/64 SWS	
Bone Cap	308		28,000	1972	Sand and gravel	1	47	25	2/14/64 SWS	Adequate
						2	91.6	30	3/29/68 SWS	
Grayville	2,035		405,000	1974	Wabash River Valley alluvium	1	72.5	450	12/21/44 SWS	Adequate
						2	71.8	300	12/13/44 SWS	
						3	73	450		
22. Effingham County										
Beecher City	466		22,000	1975	Kaskaskia River Valley alluvium	7	33	45	4/21/67 SWS	Adequate
						12	37.5	45	6/30/70 SWS	
Dieterich	550		40,000	1975	Dieterich Creek Valley alluvium	3	33	25		Marginal. Limited aquifer sensitive to drought conditions
						4	27	40		
						5	24	40		
						6	30	10		
						7	34.5	7		
Edgewood	495		57,500	1976	Pleistocene Series (unconsolidated glacial drift, sand and gravel) Pennsylvanian System (sandstone)	1	16.5	32	2/7/61 SWS	Adequate
						2	23	15		
						4	160	25	11/2/76 SWS	
Montrose	312		12,000	1971	Sand and gravel	1	36	40	7/26/71 SWS	Adequate
						2	44	25	11/3/71 SWS	
Teutopolis	1,249		97,400	1974	Sand and gravel	1	74	30	2/6/41 SWS	Adequate
						2	32	50	3/14/55 SWS	
						3	39	45	3/22/72 SWS	
Watson	276		10,000	1975	Sand and gravel	1	28	15	11/30/60 SWS	Marginal
						2	34	10	11/30/60 SWS	
23. Fayette County										
Brownstown	689		55,000	1975	Sand and gravel	1	38	2*		*Adequate. Estimated discharge Combined discharge reportedly 33 gpm.
						2	33	4*		
						3	27	5*		
						4	110	5*		
						5	26	3*		

				7	35	5*		
				9	45	15*		
				11	52	3*		
				12	50	5*		
				13	50	no record		
				14	25	3*		
				15	17	no record		
				21		no record		
Farina	634	35,000 1972	Pennsylvanian System (sandstone)	1	170	20		Adequate
				2	135	3.8		
				3	125	2.5		
				4	210	4.2		
				5	133	6.0	6/5/58 SWS	
				6	146	9.0	6/11/59 SWS	
				7	115	6.0	10/4/71 SWS	
				8	110	4.0	5/30/75	
				9	140	6.0	5/22/75	
				10	116	12.0	6/3/75	
Ramsey	830	106,000 1976	Sand and gravel	5	40	200	11/29/71 SWS	Adequate

24. Ford County

Cabery	287	40,000 1976	Silurian System (Silurian dolomite, limestone)	2	233	30	3/9/42 SWS	Adequate
				3	357	100	11/26/56 SWS	
Elliott	365	25,000 1977	Sand and gravel	2	126	60	5/22/50 SWS	Adequate
Gibson City	3,454	548,400 1975	Sand and gravel	1	58	300	11/19/41 SWS	Adequate
				2	56	320	6/16/59 SWS	
				3	58	425	9/20/49 SWS	
Kempton	263	15,200 1976	Sand and gravel	2	238	60		Adequate
				4	238	85	10/16/62 SWS	
Melvin	492	60,000 1975	Sand and gravel	3	258	60		Adequate
				4	265	140	6/9/54 SWS	
Paxton	4,373	500,000 1973	Mahomet Bedrock Valley sand and gravel	5	149	100	10/10/45 SWS	Adequate
				6	153	200	7/27/50 SWS	
				7	340	800	11/7-8/56 SWS	
				8	339	800	8/20-21/59 SWS	
Piper City	817	147,000 1975	Sand and gravel	6	90	90	5/29/44 SWS	Adequate
				7	130	160	10/1/53 SWS	
Roberts	506	23,000 1977	Sand and gravel	5	226	95	9/22/50 SWS	Adequate
				6	228	120	11/17/60 SWS	
Sibley	381	12,000 (Est. 1950)	Sand and gravel	1	117	58		Adequate

25. Fulton County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well No.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Bryant	326		14,800	1977	Devonian-Silurian Systems (dolomite and limestone) Ordovlclan System (Galena-Platteville dolomite, limestone).	1	1,282	50	2/24/72 SWS	Adequate
Cuba	1,581		100,000	1976	Silurian System (Nlagaran-Maquoketa limestone) Ordovlclan System (Galena-Platteville dolomite, limestone)	4	1,380	200	4/16/52 SWS	Adequate
Fairvlew	601		30,000	1976	Devonian-Silurian Systems (limestone and dolomite) Ordovlclan System (Glenwood-St. Peter Sandstone)	3	1,605	140	1/3/52 SWS	Adequate
Farmington	2,959		265,000	1977	Ordovlclan System (Galena-Platteville Dolomite, St. Peter Sandstone)	1	1,710	250		Adequate
						2	1,743	250		
Ipava	608		55,000	1975	Ordovlclan System (Maquoketa limestone, Galena-Platteville limestone)	1	1,324	250		Adequate
Lewistown	2,706		300,000	1977	Sand and gravel	7	35	90	3/23/56 SWS	Adequate
						8	35	85		
						9	46	125		
						10	46	225	6/11/71 SWS	
						11	44.5	200	5/3/74	
London Mills	610		65,000	1976	Sand and gravel	1	22.8	75	10/14/41 SWS	Adequate
						2	45	75	6/13/61 SWS	
Norrls	359		23,700	1976	Ordovlclan System (St. Peter Sandstone)	1	1,702	100	6/13/66 SWS	Adequate
St. David	773		68,600	1976	Sand and gravel	1	48	25	12/1/61	Marginal. Now part of Dunfermline-St. David Water Comm.
						2	43	25	12/1/61	
						3	44	10	11/8/63	
Smithfield	318		11,000	1977	Sand and gravel	1	205	50	1/26-27/67 SWS	Adequate
Table Grove	469		18,000	1975	Ordovlclan System (Galena-Platteville Dolomite, St. Peter Sandstone)	1	1,635	75	10/29/52 SWS	Adequate

26. Gallatin County

Equality	732	84,000	1976	Ohio River Valley alluvium	1 2	91 98	60 100		Adequate
New Haven	606	69,000	1973	Wabash River Valley alluvium	1 2	60 56.7	100 Unknown	8/13/65 SWS 6/29/73	Adequate
Old Shawneetown	342	10,000	1973	Ohio River Valley alluvium	1	84	50	6/17/64 SWS	Adequate
Ridgway	1,160	65,000	1975	Wabash and Ohio River Valley alluvium	1 2	85 85	200 50	11/10/38 SWS	Adequate
Shawneetown	1,742	190,000	1974	Ohio River Valley alluvium	3 4	101 96	250 250	6/25/70 SWS 8/3/72 SWS	Adequate

27. Greene County

Carrollton	2,866	180,000	1969	Mississippian System (Keokuk-Burlington Limestone)	Spring		500		Adequate. Discharge from spring varies seasonally..
Eldred	292	21,000	1975	Sand and gravel	1 2	52 56	87 45	6/16/59 SWS	Adequate
Hillview	322	17,000	1975	Apple Creek Valley alluvium	1	69.5	50	7/10/68	Adequate
Kane	432	35,000	1975	Sand and gravel	1	59	100	8/17/64	Adequate
Rockbridge	256	8,600	1973						Adequate. Water is obtained from Medora, Macoupin County
Roodhouse	2,357	300,000	1975	Mississippian System (Keokuk-Burlington Limestone)	1 (No.Well) 2 (So.Well)	150 150	Standby 550	6/20/72 SWS 6/20/72 SWS	Adequate
Wilmington	141								Adequate. Water is obtained from Roodhouse.

28. Grundy County

Braceville	668	30,000	1976	Ordovlclan System (St. Peter Sandstone) Pleistocene Series (sand and gravel)	1 2 3	868 79 105	33 12 No record	10/16/63 SWS 3/1/77 SWS	Adequate
Carbon Hill	317	25,000	1976	Ordovlclan System (St. Peter Sandstone)	2 3	650 800	20 100	5/6/66	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (Et)	Discharge (gpm)	Aquifer test	Aquifer assessment
Coal City	3,040		421,000	1977	Ordoviclan System,	3	360	390		Adequate
					(Galena limestone)	4	793	250	7/29-30/69	
					St. Peter Sandstone)				1/23/78	
						5		No record	6/14-16/78	
Diamond	452		64,300	1977	Ordoviclan System	1	723	103	9/26/59	Adequate
					(St. Peter Sandstone)					
Eileen	371		38,000	1976	Ordoviclan System	1	700	70		Adequate
					(St. Peter Sandstone)					
Gardner	1,212		93,700	1977	Ordoviclan System	1	173	50		Adequate
					(St. Peter Sandstone)	2	161	112	10/6-7/44	
					Pennsylvanian System	3	972	45	7/5/39 SWS	
					(limestone)				9/11-12/39 SWS	
					Pleistocene Series				3/17/51 SWS	
					(sand and gravel)	4	1,933	600	10/7/68	
Kinsman	153		15,000	1976	Ordoviclan System	1	700	Standby		Adequate
					(St. Peter Sandstone)	2	785	50		
Mazon	727		75,000	1978	Sand and gravel	1	25	45		Adequate. Construction
						2	26	25		features of W#4 are
						3	26	40		unknown.
						4		6		
Minooka	768	934	150,000	1977	Ordoviclan System	3	1,508	300	5/19-20/65	Adequate
		(1972)			(St. Peter Sandstone)	4	725	140	8/14/73	
					Cambrian System					
					(Galesville Sandstone)					
Morris	8,194	8,435	1,250,000	1977	Cambrian System	3	720	900		Adequate
		(1972)			(Galesville Sandstone)	4	1,501	800		
					Ordoviclan System	5	1,000	1,462	5/11-13/54 SWS	
					(St. Peter Sandstone)					
Ridgecrest Utility Co. Inc. (Sub-division)		567 (Est. 1974)	23,000	1972	Ordoviclan System (dolomite and limestone)	1	650	150	12/10/65	Adequate
South Wilmington	725		45,000	1976	Ordoviclan System	3	993.5	40	5/31/50	Adequate
					(St. Peter Sandstone)	4	970	70	10/7/66	

29. Hancock. County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (Et)	Discharge (gpm)	Aquifer test	Aquifer assessment
Bowen	489		42,000	1974	Mississippian Bedrock	2	345	15	7/7/48	Adequate
									5/5-6/52	
					Sand and gravel	3	72	25		
						4	68	25		
						5	70	25		

Carthage	3,350		300,000	1975	Buried valley sand and gravel	1 2	204 189	175 100			Adequate. Surface reservoir is the main source of water supply. Groundwater is used only for supplemental or emergency purposes.
LaHarpe	1,240		90,000	1972	Buried valley sand and gravel	1	89.5	135	9/6/77		Adequate. Ground water will be used only to supplement surface water supply.
Plymouth	740		65,000	1976	Sand and gravel	1 2	67 68	100 100	2/13/64	SWS	Adequate
					30. Hardin County						
Cave-in-Rock	503		27,500	1974	Mississippian System (St. Louis Limestone)	1	220	130	3/16/61	SWS	Adequate. Aquifer is hydraulically connected with Ohio River. Well capacity depends on the Ohio River pool level.
Elizabethtown	707					1	396	12			Village considered P.W.S. in 1977, drilled Well #1. No detailed record yet.
Hardin County Water District		615 (Est.)	12,000	1972	Ohio River Valley alluvium	1	84.5	50	8/14/70	SWS	Adequate
					31. Henderson County						
Biggsville	391		60,000 (Est.)	1971	Mlssissippian System (Keokuk-Burlington Limestone) Ordovician System (Maquoketa Shale)	1 2	891 950	Standby 250			Adequate. There is no record of actual consumption, as there is no master meter in the distribution. However, Geological Survey's description of aquifer shows supply should be adequate.
Media	180		12,000	1976	Mlssissippian System (Keokuk-Burlington Limestone)	1	70	80			Adequate
Oquawka	1,352		160,000	1977	Mississippi River Valley alluvium	1 2	50 140	300 500			Adequate
Raritan	206		8,000	1976	Devonian System (limestone) Ordovician System (Maquoketa Shale, Galena-Platteville Dolomite)	1	964	50	12/15/64	SWS	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Stronghurst	836		73,000	1976	Mississipplan System (Keokuk-Burlington Limestone) Ordovician System (Glenwood-St. Peter Sandstone)	1 3 4	1,009 69 70	112 120 90		Adequate

32. Henry County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Alpha	771		76,000	1976	Devonian and Silurian Systems (limestone) Ordovician System (Galena-Platteville limestone, St. Peter Sandstone)	1 2	1,364 1,209	120 100	 1/16/50 SWS	Adequate
Andover	420		45,000	1976	Silurian System (dolomite)	1	677	110	6/25/54 SWS	. Adequate
Annawan	787		110,000	1977	Silurian System (dolomite)	1 2	603 603	150 150	6/2/47 SWS 6/18/70 SWS	Adequate
Atkinson	1,053		126,000	1977	Devonian System (limestone)	1 2	1,123 604	200 175		Adequate
Bishop Hill	191		30,000	1976	Silurian System (limestone)	1	675	50	8/6/62 SWS	Marginal
Cambridge	2,095		206,000	1977	Devonian-Silurian Systems (limestone) Ordovician System (Maquoketa limestone, Galena limestone)	2 3	1,377 1,410	225 350		Adequate
Colona	1,293		176,000	1977	Silurian System (dolomite)	1 2	492 445	100 250	4/5/56 SWS	Marginal
East Portal Water System		315 (Est. 1976)	17,000	1976	Silurian System (limestone)	1	470	100		Adequate
Galva	3,061		494,000	1976	Silurian System (dolomite) Ordovician System (Galena-Platteville Dolomite, Shakopee dolomite)	3 4	1,524 1,687	500 500		Adequate
Geneseo	5,840		588,000	1976	Green River Valley alluvium	E-1 E-3 F-1 25 26	20 65'4" 18 65 60	100 300 100 600 500	 7/15/47 SWS 4/1/66	Adequate

Green Rock	2,744		153,000 1976						Water is obtained from Colona PWS.
Kewanee	15,762		1,300,000 1977	Silurian System (Nlagaran-Alexandrian dolomite) Oirdovlclan System (Galena-Platteville Dolomite) Cambrian System (Franconla sandstone and dolomite)	1 2 3 4	2,497 2,430 2,484 2,501	800 700 500 1,050	 8/30-31/39 SWS 9/13-14/65 SWS	Adequate
Lynn Center Water Association		115 (Est. 1974)	11,000 1974	Silurian System (limestone)	1	686	35		Adequate
Ophiem		115 (Est. 1976)	12,000 1976	Devonian-Silurian Systems (limestone)	1	370	70		Adequate
Orion	1,801	1,192 (1975)	180,000 1976	Devonian-Silurian Systems (limestone, dolomite)	1 2	615 521	120 150		Adequate
Osco		112 (Est. 1974)	10,000 1974	Silurian System (dolomite)	1	400	18		Marginal
Woodhull	898		100,000 1976	Ordovlcian System (Maquoketa Shale, St. Peter Sandstone)	1 2	1,390 1,369	180 120		Adequate
				33. Iroquois County					
Aslikum	590	694 (1974)	50,000 1974	Silurian System Nlagaran limestone)	1 2 3	196 147 215	84 60 100	5/28-29/47 SWS 6/23/77 SWS	Adequate
Beaverville	442		20,000 1975	Silurian System (limestone)	1 2	200 203	130 110	8/8/49 SWS 9/28/65 SWS	Adequate
Buckley	680		68,900 1977	Sand and gravel	3 4	152 152	110 110	4/20/48 11/13/58	Adequate
Chebanse	1.185		200,000 1974	Pleistocene Series (sand and gravel) Silurian System (dolomite)	1 2	152 150	206 300	2/23/49 SWS 4/9/57 SWS	Adequate
Cissna Park	773		75,000 1977	Wisconsinan glacial deposits	5 6	176 176	400 100	10/13/66 12/17/74	Adequate
Clifton	1,339		134,000* (Est)	Silurian System (dolomite)	1 2	137 143	250 250	8/29/41 SWS 9/24/56	Adequate. *No record of actual consumption, based on daily per capita consumption of 100 gal.

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Crescent City	579		25,000	1975	Sand and gravel	2	132	200		Adequate
						3	145	150		
Danforth	404		35,000	1974	Sand and gravel	6	210	30	1/24/56 SWS	Adequate
						8	100	110	1/21/71 SWS	
						9	100	106	5/14/71 SWS	
Donovan	343		24,000 *(Est)	1972	Sand and gravel	1	130	100	10/22/70	Adequate. *No master meter to measure actual consumption.
						2	170	44		
Gilman	1,786		185,000	1977	Sand and gravel	1	195	400	8/20/52 SWS	Adequate
						2	197	350	9/9/60 SWS	
Loda	525		35,000	1974	Sand and gravel	1	156	145	9/5/40 SWS	Adequate
						2	158	150	6/13/51 SWS	
Martinton	278		28,000 *(Est)	1970	Devonian-Silurian Systems (dolomite and limestone)	1	265	280		Adequate. *No master meter Based on 100 gallons per day per capita consumption
Milford	1,656		214,000	1974	Sand and gravel	6	70	125		Adequate
						7	79	225		
						8	80	800	11/20/63 SWS	
Onarga	1,436		135,000	1977	Sand and gravel	1	156	55		Adequate
						3	165	240	5/25/73 SWS	
Sheldon	1,455		146,000 *(Est.)	1970	Sand and gravel	4	116	350		Adequate. *No master meter Based on 100 gallons per day per capita consumption
						5	112	125		
Thawville	271		23,000	1977	Sand and gravel	1	120	75	8/9/50 SWS	Adequate
Watseka	5,294		530,000 *(Est.)	1973	Sand and gravel	3	168	350		Adequate. *No master meter. Based on 100 gallons per day per capita consumption
						4	160	200		
						5	175	350	6/10/52 SWS	
						6	160	400	6/5/61 SWS	
						7	133	400	8/13/74	
Wellington	410		22,000	1977	Sand and gravel	1	123	50	9/5/68 SWS	Adequate
Woodland	350		350,000 *(Est.)	1970	Sand and gravel	2	107	Standby		Adequate. *No master meter. Based on 100 gallons per day per capita consumption.
						4	122	55		
						5	124	100		
34. Jackson County										
Corham	361		27,500	1975	Mississippi River Valley alluvium	1	89	80	7/7/60 SWS	Adequate

Grand Tower	664	786	65,000	1975	Mississippi River	1	156	75	8/3/51 SWS	Adequate
		(1971)			Valley alluvium	2	155	150	8/31/71 SWS	
					35. Jasper County					
Newton	3,024		324,000	1975	Illinoian glacial	1	57.3	125		Adequate. Water obtained
					drift, sand and gravel	2	53	125	4/2/64 SWS	from the Embarras River
						3	52	125	4/8/64 SWS	and/or from three wells.
St. Marie	335		18,000	1975	Embarrass River Valley	1	54	70	8/19/65 SWS	Adequate
					alluvium	2	53.5	35	10/24/68 SWS	
Willow Hill	296		8,000	1975	Pennsylvanian System	1	295	5	12/11/63 SWS	Adequate
					(sandstone)	2	275	5	1/21/64 SWS	
						3	269	20	11/11/64 SWS	
					36. Jersey County					
Grafton	1,018		80,000	1976	Mississippi River Valley	2	56	166	3/17/69 SWS	Adequate
					alluvium					
Jerseyville	7,446		550,000	1975	Illinois River Valley	1	96	900	2/12/64 SWS	Adequate. Jerseyville
					alluvium	2	99	900	2/13/64 SWS	supplies water also to
										Fieldon and Nutwood Water
										District.
					37. Jo Daviess County					
Apple River	482		88,000	1977	Ordovlclan System	1	380	155	9/19/41 SWS	Adequate
					(Galena-Platteville					
					dolomite and limestone,					
					St. Peter Sandstone)					
East Dubuque	2,408		280,000	1976	Mississippi River Valley	2	1,502	Standby		Adequate
					alluvium. Cambrian System	3	104	600		
					(Eau Claire sandstone					
					and dolomite)					
Elizabeth	707		81,000	1977	Ordovlclan System	1	600	Standby		Adequate
					(Galena-Plattevllle	2	317	170		
					limestone, St. Peter					
					Sandstone)					
Galena	3,930		1,400,000	1976	Ordovlclan System	3	1,575	Standby		Adequate
					(St. Peter Sandstone)	4	1,515	840		
					Cambrian System	5	1,100	1,600	3/19/63 SWS	
					(Eau Claire sandstone,					
					Mt. Simon Sandstone)					
Hanover	1,243		146,000	1976	Cambrian-Ordovlcian	1	1,090	Standby		Adequate
					Systems (St. Peter	2	1,132	500		
					Sandstone, Galesville					
					Sandstone)					

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Scales Mound	382		28,000	1976	Ordovlclan System	2	374	150		Adequate
					(Galena-Plattevllle	3	451	160		
					Dolomite, St. Peter					
					Sandstone)					
Stockton	1,930		476,000	1977	Ordovlclan System	4	1,277	380		Adequate
					(Galena-Plattevllle Dol-	5	922	270		
					omite, St. Peter Sand-	6	1,088	570	7/21/53 SWS	
					stone) Cambrian System				3/24/53 SWS	
					(Galesvllle Sandstone,					
					Eau Claire sandstone)					
Warren	1,523		160,000	1977	Cambrlan-Ordovlclan Sys-	2	963	285		Adequate
					tems (Shakopee dolomite	3	1,000	270		
					and sandstone, Franconla					
					sandstone, Ironton					
					Sandstone)					
					38. Kankakee County					
Aroma Park	896		117,000	1977	Silurian System	2	299	Standby		Adequate
					(Jollet limestone)	3	432	115	12/11-13-62 SWS	
Buckingham	198		21,100	1977	Silurian System	3	240	52	1/25/49 SWS	Adequate
					(Nlagaran-Alexandrlan				4/18/49	
					limestone)					
Grant Park	914		138,000	1977	Silurian System	3	330	240	1/20/49 SWS	Adequate
					(Raclne-Waukashau-	4	504	290		
					Jollet Dolomite)					
Herscher	988	1,127	121,000	1977	Silurian System	5	789	160		Adequate
		(1974)			(Nlagaran-Alexandrlan	6	773	160		
					dolomite)	7	163	220	2/21/75 SWS	
Manteno	2,864		263,000	1977	Silurian System	1	97	250		Adequate
					(Nlagaran-Alexandrlan	2	310	325		
					limestone)	3	279	210	5/31/64 SWS	
Momence	2,836		426,000	1977	Silurian System	1	125	450		Adequate
					(Nlagaran dolomite)	2	125	650		
						3	175	500	9/11/57	
						4	175	500	10/2/57	
Reddlck	247		13,600	1977	Ordovlclan System	1	1,188	54	6/22/54 SWS	Adequate
					(St. Peter Sandstone)					
St. Anne	1,271		163,000	1977	Silurian System	2	265	350		Adequate
					(Nlagaran-Alexandrlan	3	240	500		
					limestone)					

39. Kendall County

Marina Village Subdivision		1,750 (Est. 1976)	90,000	1976	Silurian System (Silurian dolomite) Ordovician System (St. Peter Sandstone)	1 2	187 700	110 160	4/9/63		Adequate
Newark	590		60,000	1974	Ordovlcian System (Glenwood-St. Peter Sandstone)	2 3	287 336	100 Unknown	8/3/64 6/27/73	SWS	Adequate
Oswego	1,862		235,000	1978	Cambrian System (Galesville Sandstone)	3 4	1,378 1,396	950 700	10/26/57 5/19/64		Adequate
Piano	4,664		1,000,000	1974	(Fox River Valley alluvium)	2 3 4 5	42 39.5 36.5 40.8	300 400 500 900	7/22/46 5/11/60 6/23/66 7/1/66	SWS	Adequate
Yorkville	2,049	2,453 (1974)	260,000	1974	Pleistocene Series (sand and gravel) Cambrian System (Galesville Sandstone)	2 3	42 1,335	180 890	5/22-24/54 6/30/60	SWS	Adequate

40. Knox County

Abingdon	3,936		425,000	1975	Ordovlcian System (St. Peter Sandstone) Cambrian System (Galesville Sandstone)	2 3	2,583 2,586	350 800	 3/17/59	 SWS	Adequate
Altona	542		45,000	1977	Silurian System (Niagaran-Alexandrian dolomite and limestone)	1	808	125	4/27/51	SWS	Adequate
Galesburg	36,290		6,500,000	1977	Mississippi River Valley alluvium	Ranney Well: Pump 1 Pump 2 Pump 3 Potts Dam: 1 2 Florence Ave: 1-74 2-74 3-74	 97 97 97 2,414 2,408 2,473 101 97 102	 2,000 5,000 5,000 Standby Standby Standby 1,780 1,780 1,780			Adequate. City also provides water to East Galesburg.
Henderson	210		26,500	1977	Devonian System (limestone)	1	705	100	8/5/66	SWS	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Knoxville	2,930		328,000	1977	Ordovician System (St. Peter Sandstone) Cambrian System (Franconia Sandstone)	1 2 3	1,375 2,495 2,525	240 300 450	 3/29/60	Adequate
Maquon	374		20,000	1977	Misslssippian System (Keokuk-Burlington limestone) Devonian-Silurian Systems (limestones and dolomite)	1	638	60	10/10-13/52 SWS	Adequate
Oak Run Development		300 (Est. 1977)	40,000	1977	Devonian-Silurian Systems (limestones and dolomite)	1	802	125		Adequate
Oneida	728		72,800 *(Est.)	1970	Silurian System (dolomite) Ordovician System (Galena-Platteville Dolomite)	1 2	840 1,202	100 150	 4/8/70 SWS	Adequate. *No master meter. Based on 100 gallons per day per capita consumption.
Rio	186		24,000	1977	Devonian System (Cedar Valley-Wapsipinicon Limestone) Silurian System (dolomite)	1	675	90	12/8/58 SWS	Adequate
St. Augustine	204		12,000	1976	Pennsylvania System (limestone)	1 2	160 871	20 20	4/29/60 SWS	Adequate
Victoria	441		27,000	1977	Devonian System (Cedar Valley-Wapsipinicon Limestone) Silurian System (Niagaran-Alexandrian dolomite)	1	860	63	4/24/50	Adequate
Wataga	570		60,000	1977	Devonian System (Wapsipinicon Limestone) Silurian System (Niagaran dolomite)	1	840	125	12/13/54 SWS	Adequate
Willlamsfield	552		40,000	1977	Devonian System (Wapsipinicon Limestone) Silurian System (Niagaran-Alexandrian dolomite)	2 3	887 880	125 125	 3/6/70	Adequate
Yates City	840		80,000	1977	Pleistocene Series (glacial drift, sand and gravel) Ordovician System (St. Peter Sandstone)	1 3	100 1,580	Standby 200		Adequate

41. La Salle County

Cedar Point	304		45,800	1977	Ordovician System (Galena-Platteville Dolomite)	1	1,750	100			Adequate
Earlville	1,410		123,000	1976	Cambrian-Ordovician Systems (St. Peter Sandstone, Eminence-Potosi, Franconia Fms.)	2 3	150 625	Standby 450			Adequate
Grand Ridge	698		116,300	1976	Sand and gravel	1 3	162 190	120 250	 1/31/62	 SWS	Adequate
Harding		140 (Est) 1976	7,500	1976	Ordovician System (St. Peter Sandstone)	1	180	20	10/10/73	SWS	Adequate. Aquifer analysis indicates capacity of 150 gpm for this well.
Jonesville		434 (Est.) 1977	27,000	1977							Adequate. Water is obtained from Oglesby public water supply.
Kangley	290		15,000	1977	Ordovician System (St. Peter Sandstone)	1	542	100	9/25/58	SWS	Adequate
Lake Holiday Subdivision		1,348 (Est.) 1976	58,100	1976	Cambrian System (Franconia dolomite Galesville Sandstone)	1 2	663 708	250 Standby	7/19/65 9/9/65	SWS SWS	Adequate
LaSalle	10,620		3,150,000	1976	Unconsolidated glacial drift	3 4 5 6 7	39 58 60 56 49	850 1,600 1,600 1,800 1,500	 11/16-17/66 12/28-29/66		Adequate. All are dug wells.
Leland	743		65,000	1976	Mississippian System (Keokuk-Burlington Limestone)	1 2	230 220	100 100			Adequate
Lenore	196		17,900	1976	Sand and gravel	1 2	40 92	300 18			Adequate
Lostant	465		42,300	1977	Ordovician System (Galena-Platteville limestone, Glenwood-St. Peter Sandstone)	4	1,881	80	9/10-11/53	SWS	Adequate
Marseilles	4,320		600,000	1976	Ordovician System (Oneota Dolomite) Cambrian System (Eminence-Potosi Dolomite)	2 3 4	670 850 1,466	Standby 200 600			Adequate
Mendota	6,902		1,183,000	1976	Ordovician System (St. Peter Sandstone)	3 4 5	534 1,360 Standby	800 1,280 600	8/22-23/45 5/3-4/57	SWS SWS	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer teat	Aquifer assessment
Naplate	686		39,000	1976	Ordoviclan System	1	420	140	5/19/69 SWS	Adequate
					(Shakopee Dolomite,					
					New Richmond Sandstone)					
Oglesby	4,175		493,000	1977	Ordoviclan System	3	2,821	1,000	4/2/49 SWS	Adequate
					(Galena-Plattevllle	4	2,795	1,000	4/1-2/59 SWS	
					Dolomite, Oneota Dolo-					
					mite) Cambrian System					
					(Ironton-Galesville					
					Sandstone)					
Ottawa	18,716		1,870,000	1976	Ordoviclan System	8	1,180	1,360	11/10/70	Adequate
					(Oneota Dolomite)	10	1,220	905	10/1/71	
					Cambrian System	11	1,203	1,500	6/28/73 SWS	
					(Franconia dolomite,					
					Galesville Sandstone)					
Peru	11,772		1,827,000	1976	Ordoviclan System	5	2,601	1,000		Adequate
					(Galena-Platteville	6	2,665	1,200	2/22/52 SWS	
					Dolomite) Cambrian	7	2,591	1,000	11/20-21/63 SWS	
					System (Galesvllle					
					Sandstone)					
Ransom	440		41,500	1977	Ordoviclan System	1	325	Standby		Adequate
					(St. Peter Sandstone)	2	831	10		
						3	280	Standby		
						4	812	40.5	8/30/71 SWS	
Rutland	437		50,000	1977	Sand and gravel	3	No data	40		Adequate
						4	55	50		
Seneca	1,781		189,000	1976	Ordoviclan System	1	700	250		Adequate
					(Glenwood-St. Peter	2	704	300	9/24/43	
					Sandstone, Oneota					
					Dolomite)					
Tonlca	821		35,000	1976	Sand and gravel	2	193	25		Adequate
						3	193	Standby	8/25/53	
						4	205	175		
North Utica	974		153,900	1976	Ordoviclan System	1	618	300		Adequate
					(Oneota Dolomite)	2	1,078	500	8/11/75 SWS	
					Cambrian System					
					(Galesvllle Sandstone)					
42. Lawrence County										
Birds-Pinkstaff Water District		800 (Est. 1972)	64,800	1978	Sand and gravel	1	82	50	1/17/69 SWS	Marginal. 24-hour opera-ation.

Bridgeport	2,262	240,000 1974						Adequate. Water is obtained from the Lawrencevllle PWS.
Lawrencevllle	5,863	1,000,000 1974	Wabash River Valley alluvium	6	78	500		Adequate
				8		800		
				9	81	850		
				10	80	500		
Petrolla Water District	752 (Est. 1973)	31,800 1973						Adequate. Water is obtained from the Lawrenceville PWS.
St. Francisville	997	70,000 1976	Wabash River Valley alluvium	1	134	Standby		Adequate
				3	136	Standby	9/28/51 SWS	
				4	160	Standby	9/31/61 SWS	
				7	42	200	10/31/75 SWS	
Sumner	1,201	100,000 1974						Adequate. Water is obtained from the Lawrencevllle PWS.

43. Lee County

Amboy	2,184	248,000 1976	Ordovician System (St. Peter Sandstone) Cambrian System (Galesville Sandstone)	2	1,100	350	12/5/38 SWS	Adequate
				3	1,105	680	1/24/58 SWS	
Ashton	1,112	189,000 1977	Cambrian System (Eminence-Potosi Dolomite)	1	545	250	11/27/41 SWS	Adequate
				2	249	325		
Compton	399	60,000 1977	Sand and gravel	2	335	57		Adequate
				3	332	90		
Dixon	18,147	2,200,000 1977	Ordovlcian System (St. Peter Sandstone)	3	1,865	900		Adequate
				5	1,700	1,300		
			Cambrian System (Mt. Simon and Fond du Lac Sandstones)	6	1,720	600	8/7/57 SWS	
							9/11/57 SWS	
				7	1,870	1,200	1/3/61 SWS	
				8	1,872	1,300	8/11-12/70 SWS	
Franklin Grove	968	70,000 1977	Ordovlcian System (New Richmond Sandstone)	1	298	85		Adequate
				2	150	Standby		
			Cambrian System (Galesville Sandstone)	3	769	140		
Harmon	205	20,300 1977	Ordovlcian System (Glenwood-St. Peter Sandstones)	9	950	250		Adequate
Lee	252	75,000 1977	Sand and gravel	1	325	85		Adequate
				2	338	150	12/30/64 SWS	

Facility	Population 1970 census	spec. census	Average daily purpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer Assessment
Paw Paw	846		160,900	1977	Cambrian System	1	1,018	180		Adequate
					(Calesville Sandstone)	2	1,053	400	9/20/71	
Steward	308		26,600	1977	Ordovician System	1	100	40		Adequate
					(St. Peter Sandstone)	2	400	200	11/7/72 SWS	
Sublette	361		35,500	1977	Ordovician System	1	752	25		Adequate
					(St. Peter Sandstone)	2	771	350	11/1/61 SWS	
West Brooklyn	225		10,000	1977	Ordovician System (St. Peter Sandstone)	4	675	100		Adequate
					44. Livingston County					
Campus	215		20,000	1975	Sand and gravel	2	174	100		Adequate
Chatsworth	1,255		128,000	1977	Sand and gravel	2	67	100	5/17/49	Adequate
						3	99.5	100	6/6/58 SWS	
						4	232	200	6/21/60 SWS	
						5	223	200	9/19/60 SWS	
Cornell	532		26,000	1974	Sand and gravel	1	99	95	7/7/53 SWS	Adequate
Cullom	572		65,000	1976	Sand and gravel	2	152.5	125	8/29/47 SWS	Adequate
						3	145	130	9/14/61 SWS	
Dwight	3,841		425,000	1978	Sand and gravel	1	140	267		Adequate
						4	140	367		
						5	142	371		
						6	132	490	4/28/71 SWS	
Emmington	101		5,000	1975	Pennsylvanian System (limestone)	1	550	50	7/9/71 SWS	Adequate
Fairbury	3,359		530,000	1977	Sand and gravel	1	39	240	7/9/62 SWS	Adequate
						2	40	160		
						3	57	220	6/7/60 SWS	
						4	52	350	12/7/76 SWS	
Flanagan	976		68,000	1974	Sand and gravel	2	168	100		Adequate
						3	164	60	7/13/72 SWS	
						4	173.5	50	6/30/77 SWS	
Forrest	1,219		115,000	1975	Sand and gravel	1	114	370	4/8/35 SWS	Adequate
						2	102.3	370		
						3	104.5	202		
Odell	1,076		90,000	1974	Cambrian System (Eminence-Potosi Dolomite)	3	1,940	300	5/1-2/51 SWS	Adequate

Saunemin	415		27,000	1976	Sand and gravel	4	39.3	Standby	10/22/63 SWS	Adequate
						5	183	30	10/10/69 SWS	
						6	184	115	7/26/77 SWS	
Strawn	144		10,000	1975	Sand and gravel	1	60	34		Adequate

45. Logan County

Atlanta	1,640		140,000	1976	Sand and gravel	1	191	110		Adequate
						2	147	90		
						3	157	40	6/21/62 SWS	
						4	150	95	11/4/65 SWS	
Beason-Chestnut		500 (Est. 1978)	27,500	1978	Sand and gravel	1	50	110	8/11/72 SWS	Adequate
Broadwell	159		12,000	1975	Sand and gravel	1	47	45		Adequate
						2	53	45		
Elkhart	435		55,000	1976	Sand and gravel	1	75	Standby		Adequate
						2	77	60	9/19/68 SWS	
Emden	552		35,000	1977	Sand and gravel	1	124	150	10/2/40	Adequate
Hartsburg	363		25,000	1976	Sand and gravel	1	97	28	5/5/48 SWS	Adequate
						3	103	45	7/2/71 SWS	
Latham	361		48,000	1977	Sand and gravel	2	72.5	20	8/13/53 SWS	Adequate
						3	72	15	2/7/63 SWS	
						4	66	30	7/24/68 SWS	
						5	70	30	6/15/72 SWS	
						6	74.5	100	11/12/75 SWS	
Lincoln	17,582		3, 000,000	1977	Sand and gravel	5	45	300		Adequate. Dug well
						6	54	750		Dug well
						7	45	750		Dug well
						8	33	300		Used only during summer
						9	50	500		
						10	49	200		
						11	50	600		
						12	60	1,000		
Middletown	626		39,000	1975	Sand and gravel	1	155	150	4/14/41 SWS	Adequate
						2	145.5	200	6/8/73 SWS	
Mt. Pulaski	1,677		175,000	Feb. 1978	Sand and gravel	1	80	Standby	9/17/59	Adequate
						3	104	Standby	3/10/54	
						4	34	85	8/3-5/60	
						5	32	125	7/10/63 SWS	
						6	38.5	150	1/29/76 SWS	
New Holland	321		30,000	Feb. 1978	Sand and gravel	1	72	50		Adequate, Well #1 alternates with W #2.
						2	74	50		

46. Macon County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Argenta	1,034		75,000	1977	Sand and gravel	1	230.5	85	3/10/54 SWS	Adequate
						2	251	100	8/21/61 SWS	
Blue Mound	1,181		98,000	1974	Sand and gravel	1	55	50	1/6/69 SWS	Adequate
						2	58	45	2/28/69 SWS	
						3	88	300	6/10/70 SWS	
Forsyth	585		45,200	1977	Sand and gravel	1	104	135	4/1/66	Adequate
						2	110.5	70	8/3/71	
Harristown		1,165 (1969)	*		Wisconsinan sand and gravel	1	31	200	4/28/75 SWS 9/21/77	*No record of system operation yet
Long Creek Water District		3,000 (Est. 1977)	139,000	1977	Sand and gravel	1	105.5	300	1/20/76 SWS	Adequate
Macon	1,249		81,,000	1973	Wisconsinan sand and gravel	2	128	111		Adequate
						3	128	111	7/13/60 SWS	
						4	62.5	154	8/29/62 SWS	
						5	88	200	10/4/77 SWS	
Maroa	1,467		120,000	1976	Sand and gravel	1	86	45		Adequate
						2	292	110	12/2/76 SWS	
						3	290	110	12/6/76	
Niantic	705		77,,000	1977	Sand and gravel	1	48	20	7/24/50	Adequate
						3	48	74		
						4	51		11/15/74 SWS	
Oreana	1,092		62,,000	1977	Sand and gravel	1	131.5	60	7/31/58 SWS	Marginal
						2	132	110	1/21/65 SWS	
Warrensburg	811	1,165 (1974)	85,000	1974	Sand and gravel	1	118	125	3/12/75 SWS	Adequate
						2	132	152	1/3/56 SWS	

47. Macoupin County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Chesterfield	262		15,000	1976	Sand and gravel	1	50	35	2/29/68 SWS	Adequate
Medora	505		50,,000	1975	Sand and gravel	1	54	50	3/5/63 SWS	Adequate
						2	50	50	6/19/72 SWS	

48. Madison County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Alhambra	594		40,,700	1975	Silver Creek Valley alluvium	1	80	133	6/6/55 SWS	Adequate
						2	82	130	10/26/71 SWS	
						3	82	100	1/23/78 SWS	

Bethalto	7,074	8,001 (1974)	1,248,500	1976	Mississippi River Valley alluvium	1	93.5	190	3/11/42	SWS	Adequate
						2	92	240	3/24/42	SWS	
						3	96	400			
						6	95	500	4/21/64	SWS	
						7	90	460	2/20/70	SWS	
						8	91	650	7/28/71	SWS	
						9	92	700	7/28/71	SWS	
						10	98.4		3/7/78		Well 010 and Well #11
						11	91.5		3/2/78		are not in operation yet.
Collinsville	19,567		2,070,000	1975	Mississippi River Valley alluvium	7	102	1,050	8/8/50		Adequate
						8	99	900	1/11/57		
						9	102	900			
						10	103	900	8/12/58		
East: Alton	7,309	7,665 (1972)	568,600	1975	Mississippi River Valley alluvium	1	90	500	9/8/67	SWS	Adequate
						2	91.5	500	8/31/67	SWS	
						3	103	500	8/23/67	SWS	
Edwardsville	11,070		1,334,600	1975	Mississippi River Valley alluvium	3	114	950			Adequate
						4	116.5	650			
						5	115	1,050			
						7	117	1,500	7/28/72	SWS	
Forest Homes - Maple Park Public Water District		1,855 (Est. 1975)	75,000	1975	Mississippi River Valley alluvium	1	67	80	11/9/59		Adequate
						2	66	80	1/19/60		
Glen Carbon	1,897	3,082 (1975)	304,700	1975	Mississippi River Valley alluvium	4	106	430	4/19/63	SWS	Adequate
						5	99	450	11/28/66	SWS	
						6	105	500	9/30/77	SWS	
Hamel	454		75,000	1977	Sand and gravel	1	113	40			Marginal. 4/7/78 report says this 3-well aquifer has sustained yield of 50-60 gpm.
						2	113	40	8/18/67	SWS	
						3	110	45	9/1/76	SWS	
Hartford	2,243		393,800	1974	Mississippi River Valley alluvium	1	115	2 76			Adequate
						2	106	300			
						3	107	400	5/17/71	SWS	
						4	106	600	8/26/77	SWS	
Livingston	916		61,200	1975	Sand and gravel	6	140	80	2/24/65	SWS	Adequate
Marine	882		58,700	1975	Sand and gravel	1	90	43			Marginal
						2	85.5	80	11/8/63	SWS	
Maryville	1,067	1,290	200,000	1975	Mississippi River Valley alluvium	1	100	150	9/14/64	SWS	Adequate
						2	102	150	9/15/64	SWS	
Meadowbrook PWD		1,575 (Est. 1976)	72,400								Adequate. Water is obtained directly from Bethalto PWS.

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer	test	Aquifer assessment
Moro PWD		455 (Est. 1974)	16,000	1974							Adequate. Water is obtained directly from Bethalto PWS.
Roxanna	1,882		624,100	1975	Mississippi River Valley alluvium	1	126	Standby	3/25/37	SWS	Adequate
						5	126.5	Standby	5/10/66		
						6	120	500	4/9/69	SWS	
						7	120	500	4/4/69	SWS	
St. Jacob	659		37,000	1977	Pennsylvanian System (sandstone)	4	182	13	5/16/56	SWS	Adequate
						5	188	25	9/29/66	SWS	
South Roxana	2,241		152,800	1975							Adequate. Water is obtained from Roxana PWS.
Troy	2,144		623,200	1974	Mississippi River Valley alluvium	1	115	300	2/25/53		Adequate
						2	115	410			
Wood River	13,186		1,283,600	1975	Mississippi River Valley alluvium	1	78.7	1,000	1/24/64	SWS	Adequate
						2	78.6	1,000	1/29/64	SWS	
						3	86	850	1/8/64	SWS	
						4	85.6	950	2/3/64	SWS	
Worden	1,091		75,000	1978	Cahokia Creek Valley alluvium	1	46	20	2/14/55	SWS	Marginal
						7	43	20	6/4/69	SWS	
						8	46	35	5/5/75	SWS	
					49. Marion County						
luka	343		15,500	1973	Pennsylvanian System	1	77.7	15	8/25/61		Adequate
						2	79	34	6/20/62	SWS	
					50. Marshall County						
Camp Grove		100 (Est. 1976)	7,500	1976	Devonian-Silurian Systems (limestone and dolomite)	3	825	21	10/12/65	SWS	Adequate
Henry	2,610		384,000	1976	Sand and gravel	3	62	500			Adequate
						4	75	500			
Lacon	2,147		275,000	1976	Sand and gravel	1	49	400			Adequate
						2	50	230			
						3	50	235			
LaRose	165		10,000	1976	Sand and gravel	1	47	50	1/17/73	SWS	Adequate
						2	47	50	1/17/73		

Sparland	585	60,000	1976	Sand and gravel	2	30	100		Adequate
					3	34	100		
Toluca	1,319	118,900	1976	Ordovlclan System	2	1,870	160	11/5/51 SWS	Adequate
				(Galena-Plattevllle	3	1,842	230		
				Dolomite, St. Peter					
				Sandstone)					
Varna	417	80,000	1976	Silurian System	2	1,870	149	8/6/49	Adequate
				(Nlagaran dolomite)					
				Ordovlclan System					
				(Galena-Plattevllle					
				Dolomite, St. Peter					
				Sandstone)					
Wenona	1,080	85,000	1976	Silurian System	4	62	60		Adequate
				(Nlagaran dolomite)	5	1,837	150	3/29/57 SWS	
				Ordovlclan System					
				(Galena-Plattevllle					
				limestone, St. Peter					
				Sandstone)					
				51. Mason County					
Easton	386	24,000	1978	Sankoty sand	1	135	125	10/5/60 SWS	Adequate
					2	138	125	8/30/71 SWS	
Havana	4,376	810,000	1977	Illinois River Valley	2	84	650		Adequate
				alluvium, Sankoty sand	4	75	650		
					5	96	630	9/19/74 SWS	
Manito	1,334	105,000	1976	Sankoty sand	1	81	55	7/15/37 SWS	Adequate
					2	84	80		
					3	100	300	5/11/67 SWS	
Mason City	2,611	380,000	1978	Sankoty sand	3	197.5	240		Adequate
					4	222	140		
					5	208	500		
San Jose	681	60,000	1976	Sankoty sand	4	186	150		Adequate
				52. Massac County					
Brookport	1,046	129,000	1974	Ohio River Valley	East	207	120		Adequate
				alluvium	West	208	180		
Joppa	531	50,000	1972	Mlsslssippian System	1	448	250	12/9/52 SWS	Adequate
				(limestone)	2	240	100	10/30/62 SWS	
								4/10/63 SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Metropolis	6,940		3,850,000	1976	Mississippian System (St. Louis and Salem Limestones)	1	270	650		Adequate
						2	420	1,300		
						3	286	1,800		
						4	400	510		
						5	400	500	5/16/55 SWS	
Millstone Public Water District	4,000 Est.		216,000	1976	Burled Cache River Valley alluvium	ICRR 1	96	300		Adequate
						ICRR 3	99	300	1/6/76	
						1	116	700	8/14/72	

53. McDonough County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Bardolph	331		15,000	1976	Ordovlclan System (Galena-Platteville do lomite, and limestone	1	1,150	50	12/29/64 SWS	Adequate
Bushnell	3,703		343,500	1976	Ordovlclan System (Galena-Plattevllle Dolomite, St. Peter Sandstone)	1	1,509	500	3/2-3/44 SWS	Adequate
						2	1,355	500	3/24/45 SWS	
						3	1,510	500	2/20/45 SWS	
									8/23/46	
Colchester	1,747		100,000	1978	Troublesome Creek Bottomland sand and gravel	5	32	100	5/13/75 SWS	Marginal
						6	32	85	5/19/75 SWS	
						7	32	75	5/14/75 SWS	
						8	34	50		
Good Hope	477		34,000	1976	Sand and gravel	1	66	Standby	4/10/63	Adequate
						2	78	94		
Industry	558		46,200	1976	Mississlpplan System (Keokuk-Burlington dolomite)	1	450	120	5/9/51 SWS	Adequate
Prairie City	630		40,000	1976	Ordovlclan System (Galena-Platteville Dolomite)	1	1,375	100	5/24/54 SWS	Adequate

54. McLean County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Anchor	200		11,800	1975	Wisconsinan sand and gravel	1	83	20	1/20/66 SWS	Adequate
Arrowsmith	305		20,000	1975	Sand and gravel	1	228	120	10/6/52 SWS	Adequate
Bellflower	400		43,200	1975	Wisconsinan sand and gravel	1	70	60	2/9-10/51 SWS	Adequate
						2	120	80	9/1/60 SWS	

Carlock	373		38,000	1977	Sand and gravel	1	254	50	8/2-3/61	SWS	Adequate
						2	245	40	11/7/77	SWS	
Chenoa	1,860		218,000	1976	Deep Wells: Silurian and Ordovlclan Systems (Nlagaran-Alexandrian limestone, Galena-Platteville limestone, St. Peter Sandstone) Shallow Wells: Pleistocene Series (sand and gravel)	1	2,035	65			Marginal
						2	194	42			
						3	129	22	4/6/66		
						4	1,914	115	2/9/73		
Colfax	935		85,000	1977	Sand and gravel	2	102	150	7/25/45	SWS	Adequate
						3	105	150	5/20/77	SWS	
Cooksville	241		17,500	1975	Sand and gravel	1	135	60	4/19/62	SWS	Adequate
						2	133	15	1/4/78		
Danvers	854		74,300	1977	Danvers Bedrock Valley sand and gravel	3	428	90	10/16/39	SWS	Adequate
						4	438	90	9/30/61	SWS	
Downs	651		42,000	1976	Wisconsinan glacial sand and gravel	1	107	160	10/3-4/52	SWS	Adequate
						3	134	135	5/3/72	SWS	
Ellsworth	259		14,000	1975	Sand and gravel	1	109	50			Adequate
						2	109	150	10/14/60		
Gridley	1,007		183,000	1973	Wisconsinan and Illinoian glacial drifts	3	286	170	7/2/53	SWS	Adequate
						4	294	170	9/24/63	SWS	
Heyworth	1,441		145,000	1976	Sand and gravel	1	62	240	9/23/35	SWS	Adequate
									10/12/36	SWS	
						2	59	170	11/2/59	SWS	
Hudson	802		65,000	1976	Sand and gravel	1	160	90	8/4/55	SWS	Adequate. Well #1 is alternated with Well #2
						2	96	200	6/13/67	SWS	
LeRoy	2,435	2,631 (1974)	213,000	1978	Sand and gravel	4	78	160	5/15/68	SWS	Adequate
						5	80	45			
						6	102	300	2/3/67	SWS	
						7	76	75	3/1/78	SWS	
Lexington	1,615		150,000	1977	Burled Danvers Bedrock Valley tributary	3	113.5	150	3/28/47	SWS	Adequate
						4	130	150	8/27/73	SWS	
McLean	820		90,000	1974	Mahomet Bedrock Valley sand and gravel	1	353	75	10/8/34	SWS	Adequate
						2	335	55			
						3	340	125	9/25/72	SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Normal	26,396	31,343 (1972)	1,981,000	1972	Wisconsinan and Illinoian sand and gravel	3	210	150	5/21/45 SWS 9/13/62 SWS	Adequate
						4	217	180	9/15/43 SWS 9/13/62 SWS	
						5	35	100	8/1/47 SWS 9/14/62 SWS	
						6	85	300	8/30/50 SWS 9/13/62 SWS	
						7	92	330	10/8/51 SWS 9/13/62 SWS	
						8	38	135	2/5/54 SWS 9/13/62 SWS	
						9	65	170	6/33/59 SWS	
						10	57	220	3/29/67 SWS	
						11	80	360	2/22/67 SWS	
					Pre-Illinoian Sankoty sand	100	345	1,000	11/7-8/74 SWS	
						101	345	1,000	10/1-2/74 SWS	
						102	364	1,000	10/23/74 SWS	
Saybrook	814		75,000	1975	Wisconsinan sand and gravel	1	59	135	5/20/35 SWS	Adequate
						2	155	Standby	4/16/35 SWS	
Stanford	657		60,000	1977	Pre-Illinoian Sankoty sand	1	235	105		Adequate
						3	248	95	7/12/62 SWS	
					55. Menard County					
Athens	1,158		81,000 *(Est.)		Sangamon River Valley alluvium	3	57	300		Adequate. *No master meter installed. Based on 70 gallons per day per capita consumption.
						4	57	150	10/2/69 SWS	
Greenview	740		85,000	1975	Sand and gravel	3	159	200	4/12/50 SWS	Adequate
						4	162	200	8/8/68 SWS	
Oakford	272		19,000 *(Est)		Sand and gravel	1	90	Standby	8/16/56	Adequate. *Based on 70 gallons per day per capita consumption
						2	110	140		
Petersburg	2,632		400,000	1975	Sangamon River Valley alluvium	1	48	380		Adequate. City also supplies water to Old Salem Chautauqua Association.
						3	56	300		
						4	58	400	9/12/63 SWS	
						5	55	350	8/29/66 SWS	
						6	47	280	10/20/76 SWS	
						7	102	500	6/5/78 SWS	

Tallula	643	40,000	1975	Sand and gravel	Ranney	34	120		Marginal. 5.6-9.7 hrs. needed to meet average and maximum daily consumption in 1975. However, 9/26/77 SWS correspondence indicates that village is seeking 100 gpm from Petersburg water supply. SWS report of Investigation 41, published in 1961, rates the long-term yield of Tallula's aquifer at 25,000 gallons per day during years of normal precipitation.

56. Mercer County

Aledo	3,325	284,000	1976	Ordovician System (Galena-Platteville limestone, St. Peter Sandstone)	2 3	1,172 1,214	550 750	 3/28/56	Adequate
Joy	513	39,500	1977	Mississippian System (Klnderhook Series-shale) Devonian System (Cedar Valley formation-limestone) Silurian System (Nlagaran dolomite)	1 2	440 420	75 85	 2/4-5/48 SWS	Adequate
Keithsburg	836	65,000	1975	Mlssissippian River Valley alluvium	1 2	81 81.5	100 100	9/22-23/49 9/22-23/49	Adequate
Matherville	699	60,000	1976	Silurian System (Nlagaran and Alexandrian dolomite)	1	604	125	5/28/51	Adequate
New Boston	706	116,500	1976	Mississippi River Valley alluvium	1 2	76.5 80	100 100	1/16/76 SWS	Adequate
New Windsor	723	68,000	1976	Devonian System (Cedar Valley-Wapslpinicon dolomite and limestone) Silurian System (Nlagaran dolomite)	1 2	546 658	Standby 130	 6/8/53	Adequate
North Henderson	246	16,000	1977	Devonian System (Cedar Valley-Wapslpinicon dolomite and limestone) Silurian System (Silurian dolomite)	1	710	85	7/30-31/57	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons) (yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Seaton	251		38,800 1976	Devonian System (lime rock)	1 2	244 364	Standby 200	 6/16-17/52	Adequate
Sherrard	808		58,000 1976	Devonian System (Cedar Valley-Wapslplnlcon limestone) Silurian System (dolomite)	1 2	660 670	60 175	 9/19-20/63	Adequate
Swedona		150 (Est. 1976)	10,500 1976	Devonian System (Cedar Valley-Wapslplnlcon limestone) Silurian System (dolomite)	1	533.5	45		Adequate
Viola	946		80,000 1976	Devonian-Silurian Systems (limestone and shale) Ordovician System (Maquoketa Shale)	1 2	1,281 651	175 100		Adequate
57. Monroe County									
Hecker	380	480 (1974)	24,000 1975	Mlssissippian System (Cypress Sandstone and Aux Vases Sandstone of Chester Series)	1 2 3 4 5	314 304 305 305 300	5 4 7 9 19	3/29/55 SWS 8/31/55 SWS	Adequate
Maeystown	109		*	Sand and gravel	1	58.5	100	8/2/76 SWS	Adequate. *Not yet in operation.
Valmeyer	733		114,500 1975	Mississippi River Valley alluvium	2 3	57 83.7	135 166	 10/19/70 SWS	Adequate
58. Montgomery County									
Coalton	304		10,000 1973						Adequate. Water obtained from Nokomis Public Water Supply
Farmersville	495		55,000 1976	Sand and gravel	1 2 3 4	52 45 51 70	45 32 15 40	1/9/73 SWS 1/9/73 SWS 4/21/77 SWS 1/13/78 SWS	Marginal. No record of actual operation of Well #4 as of April 1978.
Fillmore	397		15,000 1977	Illinoian sand and gravel	1 2	40 63	16 10	12/3/62 SWS 7/26/77 SWS	Marginal
Harvel	275		40,000 1977	Sand and gravel	1	38	120	2/26/54 SWS	Adequate
Irving	599		25,000 1971						Adequate. Water is obtained from Witt Public Water Supply

Nokomis	2,532		180,000	1978	Illlnolan sand and gravel	1	40	*		Adequate. *Combined output of Wells #1,2, and 3 is 65 gpm.
						2	40	*		
						3	40	*		
						4	40	60		
						6	41	90	8/22/51 SWS	
						7	38.5	35	12/10/70 SWS	
						8	40	50	' 3/23/77 SWS	
Raymond	890		80,000	1977	Sand and gravel	1	30	75		Adequate
						2	39.5	75	12/11/53 SWS	
						3	36	75	12/20/54 SWS	
						4	52	60	12/5/77	
Waggoner	257		10,000	1975	Sand and gravel	1	52	40	2/12/65	Adequate
						2	53.5	15	6/10/68	
Witt	1,040		110,000	1977	Sand and gravel	1	39	70		Adequate
						2	39	70		
					59. Morgan County					
Chapin	552		35,000	1969	*					Adequate. *Water is obtained from the Jacksonville Public Water Supply.
Jacksonville	20,553		3,500,000	1977	Sand and gravel	Ranney Well	93	2,600 2,450 1,600	9/1-11/55	Adequate. Three pumps. Water la obtained from the Ranney Well and/or Morgan Lake.
Meredosia	1,178		120,000	1976	Sand and gravel	2	60	55	5/1/50 SWS 2/5/73 SWS	Adequate
						3	84	120		
						4	87.5	130		
South Jacksonville	2,950	3,231 (1974)	271,800	1976	Sand and gravel	1	79.6	325	9/1/67 SWS	Adequate
						2	63	325	12/21/66 SWS	
					60. Moultrie County					
Bethany	1.235		94,700	1978	Kaskaskla River Valley alluvium	1	76	90	2/15/54 SWS	Adequate
						4	74	65	6/22/54	
						5	75	30		
						6	67	108	4/30/63 SWS	
						7	63	125		
Dalton City	427		30,000	1976	Sand and gravel	1	108	4	9/5/56 SWS	Adequate
						2	78	100	5/8/67 SWS	
Cays	269		14,000	1976	Sand and gravel	1	114.5	3	12/15/60 SWS	Marginal. No longer a Public Water Supply. Gays purchases water from Sullivan.
						2	111	5	10/19/60 SWS	
						3	110	20	11/16/64 SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Lovlngton	1,303		85,000	1978	Sand and gravel	2	130	150		Adequate
						3	130	60		
						5	133	100		
						7	108	100	7/21/71 SWS	
Sullivan	A,112		500,000	1973	Sand and gravel	1	129	300		Adequate. City also supplies water to Moultrie County Water District.
						2	120	300		
						3	91	300	10/6/54 SWS	
					61. Ogle County					
Byron	1,749	1,852 (1976)	400,000	1977	Ordovlclan System (St. Peter Sandstone)	1	2,000	600		Adequate
						2	673	300		
					Cambrian System (Galesville Sandstone)	3	715	1,000	9/11-12/69 SWS	
Creston	595		65,400	1976	Ordovlclan System (Galena-Plattevllle limestone, St. Peter Sandstone)	1	585	Standby		Adequate
						2	732	250	12/30/55 SWS	
Forreston	1,227		145,000	1976	Cambrian-Ordovician Systems (St. Peter Sandstone, Ironton Sandstone)	1	400	200		Adequate
						2	1,000	400	11/3/52 SWS	
Hlllcrest	630		63,400	1977	Ordovlclan System (St. Peter Sandstone)	1	387	225	10/5/64 SWS	Adequate
Leaf River	633		72,700	1977	Ordovlclan System (Platteville Dolomite, St. Peter Sandstone)	2	325	250	12/21/45 SWS	Adequate
Mt. Morris	3,173		352,700	1977	Cambrian System (Galesville Sandstone, Eau Claire sandstone)	2	1,147	Standby		Adequate
						3	1,807	240		
					Cambrian and Pre-Cambrian Systems (Mt. Simon Sandstone)	4	1.452	430		
Oregon	3,539		445,500	1976	Cambrian System (Eau. Claire sandstone) Cambrian and Pre-Cambrian Systems (Mt. Simon Sandstone)	1	1,690	270		Adequate
						2	1,200	480		
						3	1,200	550		
Polo	2,542		284,000	1977	Cambrian System (Eau Claire sandstone) Cambrian and Pre-Cambrian Systems (Mt. Simon Sandstone)	2	1,200	260		Adequate
						3	1,260	500	4/22/48 SWS	

Rochelle	8,594	8,850 (1974)	4,000,000	1977	Cambrian System (Eau Claire sandstone) Cambrian and Pre-Cambrlan Systems (Mt. Simon Sandstone) Ordovlclan System (St. Peter Sandstone)	3	1,484	Standby		Adequate
						4	1,450	1,000		
						5	502	575	4/28/38 SWS	
						6	867	600		
						7	925	Standby	12/23-24/58 SWS	
						8	935	1,800	11/17-18/61 SWS	
						9	888	1,200	9/2-3/60 SWS	
						10	920	1,200	1/24-25/66 SWS	
Stlllman Valley	871	1,004 (1975)	85,000	1976	Ordovlclan System (St. Peter Sandstone)	1	300	Standby		Adequate
						2	460	280		
					62. Peoria County					
Brimfield	729		55,000	1977	Ordovlclan System (Galena-Plattevllle Dolomite, Glenwood-St. Peter Sandstone)	1	1,257	150		Adequate
Chllllcothe	6,052		750,000	1977	Pleistocene Series (glacial drift, sand and gravel)	1	80	300		Adequate
						2	127	350	11/2/49	
						3	123	350	2/17/56	
						6	111	Standby	4/8/42 SWS	
						7	100	250	8/27/51	
Dunlap	656		70,000	1975	Silurian System (dolomite). Ordovlclan System (Galena-Plattevllle Dolomite, Glenwood-St. Peter Sandstone)	1	1,690	150	6/29/64	Adequate
Edelstein Waterworks Co-op		115 (Est. 1977)	6,000	1977	Ordovlclan System (Galena-Plattevllle Dolomite, Glenwood-St. Peter Sandstone)	1	1,885	50	2/19/64 SWS	Adequate
Elmwood	2,014		160,000	1977	Silurian System (Nlagaran-Alexandrian dolomite) Ordovlclan System (Galena-Plattevllle Dolomite, St. Peter Sandstone)	1	1,498	250		Adequate
						3	1,572	300	3/15-16/51	
Glasford	1,066		80,000	1978	Mississippian System (Burlington-Keokuk Limestone) Ordovlclan System (Galena-Plattevllle limestone, St. Peter Sandstone)	1	1,669	160		Adequate
						2	1,618	240	10/22/71 SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
llanna City	1,282		125,000	1977	Misslssippian System (Kinderhook shale and dolomite) Ordovician System (Galena-Platteville Dolomite, St. Peter Sandstone)	1	1,848	70	2/27/52 1/23/57 3/13/69 SWS	Adequate
						2	1,864	100	7/12-13/57 3/13/69	
Kingston Mines	380		22,000	1978	Ordovician System (Maquoketa shale and dolomite, Galena-Platteville Dolomite)	1	1,560	100		Adequate
Mapleton	281		15,000	1978	Sand and gravel	1		100		Adequate
Peoria	126,963	172,127 (Est. 1977)	15,500,000 *	1978	Sankoty sand and gravel	Main and Reserve wells:				Adequate. *An additional 8.5 mgd comes from surface water source.
						Main	33	6 MGD		
						Reserve	63	5.5 MGD		
						Sankoty wellsE:				
						7	91.2	2 MGD		
						8	89.2	2.3 MGD		
						9	95	2.5 MGD		
						10	93.2	2.5 MGD		
						12	140	2.75 MGD		
						14	132	2.16 MGD		
						15	123.5	2.0 MGD		
						Dodgr Street wells:				
						1	118.5	2.5 MGD		
						2	113.7	2.5 MGD		
						3	124	2.5 MGD	4/21/48	
						4	122.2	2.5 MGD		
						Griswold Street wells:				
						1	166.7	2 MGD		
						2	162	2 MGD	12/30/53	
Peoria Heights	7,943	8,239 (1975)	3,500,000	1977	Pleistocene Series (Sankoty sand, glacial drift and alluvium)	5	135	650-800		Adequate. Wells //5 and //6 are alternated with wells 37 and #8.
						6	122	500	12/8/61 SWS	
						7	129	650		
						8	123	800-1000	8/11/72 SWS	
						9	103	650	8/7/73 SWS	
						10	131	650		
Pleasant Valley Public Water District		3,200 (Est. 1976)	226,000	1976	Sand and gravel	2	106	235		Adequate
						3	128	325	7/8/69 SWS	
Princeville	1,455		200,000 *	1976	Silurian System (Niagaran-Alexandrian dolomite) Ordovician System (St. Peter Sandstone)	1	1,600	325		Adequate. *600,000 gallons per day for canning season from June to October
						2	1,342	375	9/9/38 SWS	
						3	1,680	440	5/6/71 SWS	

Rome Water Works		270 (Est. 1977)	14,000	1977	Sand and gravel	1 2	85 54	55 90			Adequate
Trlvoli Public Water District		350 (Est. 1977)	14,000	1977	Silurian System (dolomite)	1	1,193	70	9/10/70		Adequate

63. Perry County

Cutler	508		35,000	1974	Pennsylvanian System (sandstone)	2 3	575 595	87 150	 4/11/78	 SWS	Adequate
Willisville	659		30,000	1972	PennsylvanianSystem (sandstone and limestone)	1 2	550 555	110 110	3/20/40 7/13/54	SWS SWS	Adequate. In 1974 Willisville started receiving water from Kincaid Reeds Creek Conservation District.

64. Piatt County

Bement	1,638		165,000	1976	Sand and gravel	1 2	139 163	300 300			Adequate
Cerro Gordo	1,368	1,466 (1975)	100,000	1974	Sand and gravel	3 6 7 8	29 25 31 156	Standby 70 70 250	5/11/49 10/16/68 7/8/71 5/22/75	SWS SWS SWS SWS	Adequate
Cisco	358		28,000	1977	Sand and gravel	2 3	113 215	60 75	10/17/50	SWS	Adequate
DeLand	418		30,000	1974	Sand and gravel	1 3 4 5	65 81 79.5 83	30 30 25 30	12/9/35 4/21/61 	SWS SWS 	Adequate
Hammond	502		32,000	Jan. 1978	Sand and gravel	1 2	87 87	200 130			Adequate
LaPlace		400 (Est. 1974)	17,000	1974	Sand and gravel	1	55	50	7/9/70	SWS	Adequate
Mansfield	870		80,200	1977	Sand and gravel	2 3	210 215	155 237	10/16/53		Adequate
Monticello	4,130	4,360 (1973)	500,000	1977	Sand and gravel	1 2 4 5	209 212 263 274	Standby Standby 850 800	 6/9/58 1/15/73	 SWS	Adequate
White Heath		300 (Est. 1974)	13,500	1974	Sand and gravel	1	233	75	8/19-20/69	SWS	Adequate

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65. Pike County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Barry	1,444		137,000	1978	Sand and gravel	1	71.5	135	7/2-3/56 SWS	Adequate. Wells #1 and #2 operate alternately. Combined output during simultaneous operation is 200 gpm.
						2	71.5	155	7/18-19/56 SWS	
Baylis	307		5,000	1977	Mlsslsslpplan System (Keokuk-Burlington Limestone)	1	429	2.5	8/20/57 SWS	Deficient. Currently limit on the water usage by village ordinance.
						2	450	5	12/30/58 SWS	
						3	500	3		
Grlggsvllle	1,245		150,000	1977	Sand and gravel	1	29.7	100	10/24/63	Adequate
						2	30.2	60	10/24/63	
						3	31	35	10/24/63	
						4	34	75	8/10/65 SWS	
						5	84	200	1/3/78 SWS	
						6	70.9	200	12/21/77 SWS	
Hull	585		70,000	1976	Sand and gravel	1	51	100	3/24/36 SWS	Adequate. Wells 01 and 02 are alternated on a monthly basis.
									6/17-18/36 SWS	
						2	45	146		
Kinderhook	281		27,000	1976	Sand and gravel	1	40	75	3/22/40	Adequate
						2	38.5	75	4/16/58	
Milton	337		18,000	1977	Mlsslsslpplan System (Burlington Limestone)	1	113	Standby	4/3/65	Adequate
						2	118	Standby	6/5/56	
						4	56	30	11/24/69 SWS	
Nebo	454		75,000	1977	Bay Creek alluvium	1	43	50	2/9/53	Marginal
						2	52	50	9/12/73	
New Canton	486		25,000	1976	Sand and gravel	1	54	90	5/27/52	Adequate
						2	55	Standby		
Pearl	323		50,000	1977	Limestone outcropping	Spring	--	50		Marginal
Perry	451		40,000	1977	Sand and gravel	1	52	70	4/3/56 SWS	Adequate
						2	74	85	5/24/56 SWS	
Pleasant Hill	1,064		110,000	1977	Sand and gravel	1	57	175	6/16-17/36 SWS	Adequate
						2	60	175	11/4/63 SWS	

66. Pulaski County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Karnak	641		49,100	1977	Sand and gravel	1	37	100	6/10/53	Adequate
Mounds	1,718		338,000	1976	Devonian System (Clear Creek Chert)	1 (NW)	596	300	11/11/63	Adequate
						2 (SW)	596	300	11/11/63	

Mound City	1,177	135,000	1975	Devonian System (Clear Creek Formation)	1	630	350		Adequate
Olmsted	453	40,000 (Est. 1971)		Mississippian System (Osage slltstone and Klnderhook sandstone) Devonian System (Clear Creek Chert)	1	1,000	98	8/1-2/40	Adequate
Pulaski	471	17,000	1974	Cretaceous System (sand and gravel)	1A	88	50	12/15/65 SWS	Adequate
Ullin	546	72,300	1973	Cretaceous System (sand and gravel)	1	150	200	7/30/59	Adequate
				67. Putnam County					
Granville-Mark	1,611	140,000	1977	Ordovician System (St. Peter Sandstone)	1	1,741.5	92		Adequate
					2	1,793	200	12/14/48 SWS	
Hennepin Public Water District	650 (Est. 1973)	152,000	1977	Illinois River Valley alluvium	3	100	430	11/28/55 SWS	Adequate
					4	107	430		
					5	135	650		
Magnolia	328	33,000	1976	Wisconsinan sand and gravel	1	320	Standby		Adequate
					4	138	100	11/13/73	
McNabb	246	23,700	1976	Wisconsinan sand and gravel	2	250	100		Adequate
Standard	282	20,000	1977	Ordovician System (St. Peter Sandstone)	2	1,802	200		Adequate
				68. Randolph County					
Baldwin	467	68,500	1975	Kaskaskia River Valley alluvium	1	65	75	5/6/64 SWS	Adequate
					2	60	40	10/30/70 SWS	
Percy	967	88,200	1977	Pennsylvanian System (sandstones of Potts-ville Formation)	1	427	110	1/15/35 SWS 8/11/53 SWS 8/8/55 SWS 10/9/57 SWS	Adequate
Prairie du Rocher PWD	700 (Est. 1974)	45,800	1974	Mississippi River Valley alluvium	1	86	100	5/8/40 SWS	Adequate
					2	72.6	105	5/6/60	
Red Bud	2,559	310,000	1978	Mlsslsslpplan System (Aux Vases Sandstone)	2	283	30	9/1/34 SWS	Marginal. Mutual interference effects do not permit all wells to operate simultaneously.
					3	293	95		
					4	289	38	1/17/51 SWS	
					5	281	50	7/12-13/61	
					6	285	65	9/1/67 SWS	
					7	281	54	7/16/70 SWS	
					8	306	85	3/28/73	
					9	272	32	8/21/75 SWS	
					10	230	35		

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Ruma	154	196 (1975)	12,000	1973	Mississippian System (sandstones of Chester Series)	1	315	65	8/20/62 SWS	Adequate
						2	314	30	3/15/69 SWS	
Steeleville	1,957	2,256	190,000	1975	Pennsylvanian System (sandstones of Pottsville Formation)	1	285	85	8/25/48 SWS	Adequate
									7/14/54 SWS	
						3	319	100	12/14/66 SWS	
						4	314	65	4/10/74 SWS	
						5	335	92	12/15/75 SWS	
					69. Richland County					
Calhoun	238		8,000	1972	Pennsylvanian System (sandstone)	1	310	12	5/29/62 SWS	Adequate
						2	330	15	8/2/62 SWS	
Claremont	269	325 (Est. 1973)	10,000	1973	Pennsylvanian System (sandstone)	1	350	15	11/29/54 SWS	Adequate
						2	340	18	9/1/65 SWS	
Noble	719		60,000	1978	Pennsylvanian System (sandstone)	1	247	5		Marginal
						3	238	2		
						4	230	6		
						6	148	5	4/10/64 SWS	
						7	137	6	4/10/64 SWS	
						9	215	10		
						10	257	3	5/12/77 SWS	
Farkersburg	262		6,300	1972	Pennsylvanian System (sandstone)	1	316	30	8/28/56 SWS	Adequate
						2	297	16	10/17/56 SWS	
West Liberty-Dundas Water District		548 (Est. 1975)	18,500	1975	Pennsylvanian System (sandstone)	1	174	10	7/19/68 SWS	Adequate
						2	168	3	1/15/69 SWS	
						3	170.5	6	4/4/69 SWS	
						4	200	3	2/3/77 SWS	
					70. Rock Island County					
Andalusia	950	1,094 (1974)	100,000	1976	Devonian System (limestone)	1	150	180	10/19/54	Adequate
						3	170	155		
Carbon Cliff	1,369		65,000	1974	Ordovician System (Galena Dolomite, St. Peter Sandstone)	1	1,105	300	8/9-10/51	Adequate
						2	300	130	10/29/69	
Coal Valley	3,088		323,000	1976	Devonian-Silurian System (limestone)	2	555	300	7/26-27/62 SWS	Deficient
Cordova	589		42,000	1973	Silurian System (Niagara-Kankakee dolomite)	1	340	250		Adequate

Edglngton Community		30 (1976)	2,000	1976	Devonian System (dolomite and limestone)	1	525	20		Adequate
Milan	4,873	6,036 (1975)	570,000	1976	Ordovician System (Galena-Platteville limestone)	1 2 3	1,157 320 453	80 140 330	 6/28/54 1/28/55	Adequate
Port Byron	1,222		101,000	1977	Silurian System (dolomite)	2 3	462 460	170 160	9/26/52	Adequate
Rapids City	656		65,100	1976	Silurian System (Niagaran-Alexandrian limestone)	1 2	533 540	112 250		Adequate
Reynolds	610		65,000	1976	Silurian System (Niagaran limestone)	1	650	150	4/7-8/52	Adequate
Silvia	5,907		563,000	1976	Silurian System (dolomite) Ordovician System (Glenwood-St. Peter Sandstone)	3 4 5	1,680 480 450	600 230 500	5/1/56 5/3/69 6/24-25/70	Adequate
Silvis Heights Subdivision		3,000 (Est. 1973)	120,000	1973	Silurian System (Niagaran-Alexandrian dolomite)	1 2	555 556	180 265	1/13/53 SWS 1/24/58 SWS	Adequate
					71. Saline County					
Stonefort	325		8,200	1972	Pennsylvanian System (sandstone)	1	90	40	8/18/58 SWS	Adequate
					72. Sangamon County					
Curran-Gardner Township OWD		3,230 (Est. 1977)	320,000	1977	Sand and gravel	1 2	50 55	300 250	12/12/68 SWS 11/22/68 SWS	Adequate
Dawson	427	504 (1974)	80,000	1976	Sangamon River Valley alluvium	1 2	35.5 54	100 100	1/24/67 SWS 1/21/67 SWS	Adequate
Fancy Creek Township PWD					Sangamon River Valley alluvium					Several test holes drilled including aquifer analysis of TH/2 on 12/30/66. As of Feb. '78, no record of any public groundwater supply system installed.
Illiopolis	1,122		165,000	1977	Illinoian sand and gravel	1	45	30		Adequate. Village is obtaining public water supply from DeKalb Agricultural Research, Inc. which obtained 7 mgd from 4 drilled drift wells. Local village well *01* is active only for emergency cases.

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
DeKalb Agricultural Research, Inc.		1,200 (Est. 1977)	1,000,000	1977	Sangamon River Valley alluvium	9 10 11 12	56.5 58 60 59.5	300 300 200 200	1/17/69 3/5/69 5/2/72 5/3/72	Marginal. Furnishes water to: 1) Illiopolis public water supply 2) Agricultural Research Inc. 3) Borden Chemical Co.
Mechanicsburg-Buffalo Water Comm.		1,000 (Est. 1977)	120,000	1975	Sand and gravel	1 2	44.5 48	150 153	11/30/56 SWS 9/9/71 SWS	Adequate
Pleasant Plains	644		53,400	1977	Sand and gravel	2 3	60 62	200 200	12/12/75 SWS 12/6,28/76 SWS	Adequate
Riverton	2,090		275,000	1976	Sand and gravel	1 2 3	47 52 53	200 200 250	11/30/61 12/1/61 9/11/72 SWS	Adequate
Spauldlng Height PWD		550 (Est. 1973)	25,000	1973						Adequate. Water is obtained from Riverton.
Sugar Creek PWD		700 (Est. 1973)	35,000	1973						Adequate. Water is obtained from Riverton.
Williamsville	923		100,000	1972	Sangamon River Valley alluvium	3 4	55 56	70 100	9/6/55 SWS 5/19/64 SWS	Adequate
73. Schuyler County										
Browning	276		*		Illinois River Valley alluvium	1	90	85	5/19/77	Adequate. Well drilled in 1977. No record of operation.
Rushville	3,300		415,000	1976	Illinois River Valley alluvium	1 4 5	60 61 62	320 Standby 350		Adequate
74. Scott County										
Bluffs	866		82,000	1976	Illinois River Valley alluvium	2 3	57 59	50 250	10/9/58 SWS	Adequate
Manchester	335		20,000	1972						As of 1977, village is obtaining water directly from Roodhouse public water supply, Greene Co.

Winchester	1,788	200,000	1978	Sandy Creek Valley alluvium	7	63	100	1/19/65	Marginal
					8	52	100	5/8/69	
					9	46	85		
					10	48	85		
				75. Shelby County					
Cowden	537	68,000	1976	Kaskaskia River Valley alluvium	2	56	115		Adequate
					3	51	95	10/22/54 SWS	
Findlay	809	93,200	1975	Kaskaskia River Valley alluvium	1	154	130	6/26/35 SWS	Adequate
					2	163	155	3/12/71 SWS	
Herrick	537	32,000	1976	Illinoian sand and gravel	1	78	55	5/22/64 SWS	Adequate
Moweaqua	1,687	110,000	1971	Sand and gravel	4	30	25		Adequate. New well field was developed northwest of village in Macon & Christian Counties. New system is expected to be operational in the fall of 1978.
					5	30	35		
					6	30	35		
					7	28	10		
					8	28	15		
					9	28	15		
					10	30	18		
					11	30	25		
					12	30	25		
Shelbyville	4,887	575,000	1975	Kaskaskia River Valley alluvium	1	60	190	10/24/55 SWS	Adequate
					3	57	275	6/8/55 SWS	
					4	59	350	7/20/70 SWS	
					5	61	350	2/20/69 SWS	
					6	63	350	7/14/70 SWS	
					7	60.5	250	7/3/69 SWS	
Sigel	337	15,000	1975	Illinoian sand and gravel	1	65	23	1/5/72 SWS	Adequate
					2	64	25	9/22/72 SWS	
Stewardson	729	70,000	1976	Sand and gravel	1	50	90	6/1/55 SWS	Adequate
Strasburg	456	30,000	1972	Sand and gravel	1	37	50	4/27/64 SWS	Adequate
Tower Hill	683	24,200	1975	Sand and gravel	4	48	60	11/26/71	Adequate
					5	48	60	11/26/71	
Windsor	1,126	107,500	1977	Sand and gravel	2	131	24	2/22/49	Marginal
					5	63	20	4/10/72	
					6	100	27	2/27/74 SWS	
					7	64.5	20		
					8	100	27		
				76. Stark County					
Bradford	885	113,000	1976	Ordoviclan System (Galena-Platteville Limestone, Glenwood Sandstone)	1	2,082	85		Adequate
					2	2,052	190	10/7/36 SWS	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth	Discharge (gpm)	Aquifer test	Aquifer assessment
LaFayette	268		10,500	1975	Devonian-Silurian Systems (limestone and dolomite)	1	758	85	9/8/59 SWS	Adequate
Toulon	1,207		102,000	1975	Silurian System (Alexandrian limestone)	1	1,452	175	12/7/43 SWS 6/10/57 SWS	Adequate
					Ordovlclan System (St. Peter Sandstone)	2	780	238	9/10/42 SWS	
Wyoming	1,563		150,000	1976	Ordovlclan System (Galena-Plattevllle Dolomite, St. Peter Sandstone)	1	1,557	195		Adequate
						2	1,400	300	4/17/47 SWS	
					77. St. Clair County					
Fayetteville	379		24,100	1977	Kaskaskia River Valley alluvium	1	88	100	5/4/59 SWS	Adequate
Millstadt	2,168	2,332 (1972)	163,800	1975	Mississippian System (Aux Vases Sandstone)	1	300	23		Marginal
						2	300	2		
						3	310	4		
						4	317	10		
						6	320	34		
						7	305	33		
						8	338	15		
						9	301	11		
						10	300	70		
Mound PWD		.1,950 (Est. 1975)	92,000	1975	Sand and gravel	1	90	100	7/29/58	Adequate
						2	92	100		
Smithton	847	1,147 (1975)	58,100	1975	Mississippian System (Chester Series sandstone)	2	200	21	12/4/50 SWS 6/2/70 SWS	Adequate
						5	200	35		
						6	202	35	10/26/70 SWS	
St. Libory	448		35,000	1975	Sand and gravel	1	65	100	10/23/63 SWS	Adequate
					78. Stephenson County					
Cedarville	578	724 (1974)	60,000	1977	Ordovlclan System (St. Peter Sandstone)	1	401.5	200	4/26/49 SWS	Adequate
						2	245	300		
Dakota	440		53,000	1977	Ordovlclan System (St. Peter Sandstone)	1	516	215	9/5/57 SWS	Adequate
						2	480	340		

Davis	525		42,000	1977	Ordovician-Cambrian Systems (Glenwood-St. Peter Sandstone)	1 2	430 284	175 60	2/24/55 SWS	Adequate
Freeport	27,736		4,800,000	1977	Ordovician System (St. Peter Sandstone)	2 3 4 5 6	415 502 425 137 472	1,700 1,700 1,650 2,900 1,650	 1/2 7/54 6/29/64 SWS	Adequate
German Valley	206		30,000	1977	Ordovician System (St. Peter Sandstone)	1	560	100	10/18/71 SWS	Adequate
Lena	1,722		190,000	1977	Ordovician-Cambrian Systems (St. Peter Sandstone, Galesville Sandstone)	1 2	606 998	100 400		Adequate
Orangeville	538		40,000	1977	Ordovician System (St. Peter Sandstone)	1 2	304 314	220 220		Adequate
Pearl City	535		85,000	1977	Ordovician System (St. Peter Sandstone)	3 4	625 668	210 210	9/3/69 SWS 7/8/68 SWS	Adequate
Rock City	251		16,000	1977	Ordovician System (Glenwood-St. Peter Sandstone)	1	432	200	2/19/57 SWS	Adequate
Winslow	330		43,000	1977	Ordovician System (St. Peter Sandstone)	2	355	500		Adequate
					79. Tazewell County					
Armington	368		25,000	1976	Sankoty sand and gravel	1 2	213 250	75 100	10/14/48 SWS	Adequate
Creve Coeur	6,440	6,594 (1973)	850,000	1978	Sand and gravel	1 3 4	91 78 81	550 750 1,050	 2/17/71 SWS	Adequate
Deer Creek	647		80,000	1976	Sand and gravel	1 3	267 335	75 150	 6/17/75 SWS	Adequate
Delavan	1,844		180,000	1976	Sand and Gravel	1 2	158 160	265 325		Adequate
East Peoria	21,265		2,100,000	1975	Sand and gravel	Allison St. W#1	51	250	2/28/49	Adequate
						Allison St. W#2	46	250	8/2/50	
						Catherine St. W#1	80	450		
						N. Main St. W#1	95	450		
						N. Main St. W#2	100	350		
						Meadow Ave. W#1	113	350		
						Meadow Ave. W#2	115	300		

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Green Valley	617		40,000	1976	Sand and gravel	1	115	65	10/27/48	Adequate
						2	115	Standby		
Hopedale	923		80,000	1976	Sand and gravel	2	180	200		Adequate
						4	222	210		
						5	205	250	8/2/71 SWS	
Mackinaw	1,293		165,000	1977	Mackinaw River Valley alluvium	1	43	50	11/25-26/41 SWS	Adequate
						3	41	160		
						4	42	140	8/17/71 SWS	
Marquette Heights	2,758		261,000	1976	Sand and gravel	3	125	450		Adequate
						4	95	450	2/13/64 SWS	
						5	94	450	2/24/65 SWS	
Minier	986		85,000	1976	Sand and gravel	3	193	190		Adequate
						4	193	240		
Morton	10,811	12,217 (1973)	1,945,000	1976	Sand and gravel	3	253	650		Adequate. * As of July 1977, W#8, W//9, W#10 drilled & pump test done but no record of operation
						4	264	685		
						5	280	600	7/7/70 SWS	
						6	280	400	8/6/70 SWS	
						7	280	600	9/20/73 SWS	
						8	279	*	7/21/76	
						9	278	*	7/27/77	
						10	275	*	7/7/77	
North Pekin	1,886		179,000	1977	Sand and gravel	1	81	200	5/15/51 SWS	Adequate
						2	104	400	8/15/73 SWS	
North Tazewell Public Water District		10,000 (Est. 1977)	716,000	1977	Sand and gravel	2	283	Standby		Adequate
						3	284	Standby	6/11/58	
						4	270	1,200	1/31/67 SWS	
						5	260	1,200	7/1/68 SWS	
Pekin	31,375	32,315 (1974)	4,600,000	Jan. 1978	Sand and gravel	1	91	1,460		Adequate
						2	92	1,550		
						3	100	1,550		
						4	119	800		
						5	146	1,500		
						6	139	1,500		
						7	120	1,550	8/8/69	
South Pekin	955		95,000	1977	Sand and gravel	3	90	400		Adequate
						4	112	450	2/26/73 SWS	
Tremont	1,942		222,000	1977	Sand and gravel	3	133	Standby		Adequate
						4	154	Standby	3/30/49 SWS	
						5	162	Standby		
						6	212	400	5/25/65 SWS	

Washington	7,722	9,466 (1973)	700,000	1977	Sand and gravel	6 7	325 306	650 925	3/12/70 SWS 3/12/70 SWS	Adequate

80. Union County

Anna	4,766		633,000	1974	Mississippian System (Warsaw, Keokuk-Burlington Limestone)	1A 2	1,031 650	250 350	5/21/36 SWS	Adequate. Water is obtained from Anna-Jonesboro Water Commission's public water supply.
Anna-Jonesboro Water Commission		9,038 (Est. 1974)	851,300	1971	Mississippi River Valley alluvium	1 2 3 4	81 81 88 83	625 625 600 650	12/22-23/69 1/21-22/70 2/23/77 12/22/76	Adequate. Water Commission supplies water to Anna, Jonesboro, and Shawnee Valley PWD.
Cobden	1,114		46,400	1964	Mlsslsslpplan System (Cypress Sandstone)	1 2	227 253	160 160	 7/2/64 SWS	Adequate
Dongola	825		48,000	1952	Mlsslsslpplan System (St. Louis Limestone)	1	301	70		Adequate. Water is mainly obtained from lake. Groundwater is for the standby supply.
Jonesboro	1,676		85,000	1962						Adequate. Water is obtained from Anna-Jonesboro Water Commission's Public Water Supply. Well field is located in Anna.

81. Vermilion County

Allerton	327		14,000	1978	Sand and gravel	1 2	50.5 50	50 35	11/26/54 SWS	Adequate
Alvin	318		27,000	1977	Sand and gravel	1	103	50	10/28/69 SWS	Adequate
Bismarck Community Water District		600 (Est. 1974)	35,000	1974	Sand and gravel	1	201	100	8/6/69 SWS	Adequate
East Lynn Community Water System		200 (Est. 1974)	7,000	1974	Sand and gravel	1	150	75	9/14/71 SWS	Adequate
Fairmount	785		60,000	1974	Pleistocene Series (glacial drift), Pennsylvanian (sandstone)	2 3	72 48	40 45	6/12/50 SWS 8/17/64 SWS	Adequate
Fithlan	562		28,000	1975	Pleistocene Series (Wisconsinan drift) Pennsylvanian (sandstone)	1 2 3	36 32 220	60 30 50	3/1/51 SWS 10/21/63 SWS 11/8/71 SWS	Adequate

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Hoopeston	6,461		958,000	1977	Sand and gravel	3	110	625	7/17/63 SWS	Adequate
						4	110	750	7/17/63 SWS	
						5	104	1,425	3/3/65 SWS	
						6	98	1,740	12/12/73 SWS	
Indianola	374		30,600	1978	Swank Creek alluvial deposits	1	21	14	9/16/63 SWS	Marginal.
						2	17.5	7	8/11/52 SWS	
						3	49	40	11/19/76 SWS	
Oakwood	1,367		38,900	1976	Sand and gravel	3	73	27	6/2/77 SWS	Marginal. Additional 76,000 gallons per day obtained from surface supply, Salt Fork of the Vermilion River.
Potomac	909		55,800	1976	Sand and gravel	4	189	80	12/22/64 SWS	Adequate
						5	178	125	9/10/73 SWS	
						Artesian Well		40		
Rankin	727		72,700 *		Sand and gravel	1	270	50		Adequate. *No Master Meter. Consumption based on 100 gallons per day per capita.
						2	282	80		
Ridge Farm	1,015		113,900	1978	Sand and gravel	1	87	125	5/20/35 SWS	Adequate
						2	90	100	4/22/49 SWS	
						3	96	115	3/30/65 SWS	
Rossville	1,420		120,000	1974	Sand and gravel	4	142	340	8/16/73 SWS	Adequate
						5	135	250		
Sldell	645		43,000	1976	Sand and gravel	3	28	30	8/10/66 SWS	Adequate
						5	66	60	12/22/64	
Vermilion Grove Waterworks Corp.		150 (Est. 1978)	7,800	1978						Adequate. Water is obtained from Ridgefarm Public Water Supply.

82. Wabash County

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Allendale	425		21,800	1971	Pennsylvanian System (sandstone)	1	200	6	9/28/49 SWS	Adequate
						2	206	8	10/19/49 SWS	
						3	170	10.4	1/4/49 SWS	
						4	170	8	2/8/50 SWS	
						5	170	13	2/8/50 SWS	
Bellmont	292		12,300	1972	Pennsylvanian System (sandstone)	1	346	12	10/4/54 SWS	Adequate. No records available for well capacities. Discharge rates are based on EPA Report.
						2	335	20		
						3	330	4		
Keensburg	242		11,000	1976	Sand and gravel	1	50	40	4/29/59 SWS	Adequate.

83. Warren County

Alexis	946		72,000	1977	Ordovlclan System	1	1,204	Standby		Adequate
					(Maquoketa shale and	2	1,215	290	2/4-5/52	
					limestone, Galena-					
					Flattevllle Dolomite,					
					St. Peter Sandstone)					
Kirkwood	817		46,000	1977	Ordovlclan System	4	1,069	35		Adequate
					(Maquoketa shale and	5	215	80		
					dolomite, Galena					
					Dolomite)					
Little York	297		35,600	1977	Ordovlclan System	1	326	Standby		Adequate
					(Maquoketa dolomite)	3	872	95	7/29/69	
Monmouth	11,022		2,300,000	1977	Ordovlclan System	4	2,445	1,000		Adequate
					(Galena-Flattevllle	5	2,445	1,000		
					Dolomite, St. Peter	6	2,465	1,000	12/16-17-54 SWS	
					Sandstone, Oneota	7	2,448	1,000	11/17-18/65 SWS	
					Dolomite) Cambrian	8	2,460	1,000		
					System (Franconia-					
					Galesville Sandstone)					
Roseville	1,111		140,000	1975	Illinoian sand and	9	*	145		Marginal. Horizontal infil-
					gravel					tration well.

84. Washington County

Okawville	992	1,276	66,600	1975	Sand and gravel	1	70	50	12/11/70 SWS	Adequate.
		(1973)				4	69	70	1/1/71 SWS	

85. Wayne County

Cisne	615		60,400	1977	Pennsylvanian System	1	225	35	7/14/48 SWS	Adequate
					(sandstone)	2	225	35		
						3	232	35	7/11/72 SWS	
Jeffersonville	294		16,600	1977	Pennsylvanian System	1	211	16	5/11/64 SWS	Adequate
					(sandstone)				1/14/71 SWS	
						2	208.3	4	5/11/64 SWS	
									1/14/71 SWS	
						3	206	12	5/11/64 SWS	
									1/14/71 SWS	
Mt. Erie	149		10,000	1974	Pennsylvanian System	1	207	15	3/2/66 SWS	Adequate
					(sandstone)				1/12/73 SWS	
						2	215	20		

86. White County

Carmi	6,033		671,000	1976	Wabash River Valley	1	98	500		Adequate
					alluvium	2	94.2	500		
						3	90	500	4/7/71	
						4	99	500	4/9/71	

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
Crossville	860		77,000	1977	Sand and gravel	1	64	200	6/14/56	Adequate
						2	50.5	200	6/19/56	
Enfield	764		37,000	1966	Pennsylvanian System	1	343	14	2/8/49 SWS	Adequate
					(sandstone)	2	410	11	10/3/49 SWS	
						3	381	30	4/27/70 SWS	
						4	353	20	6/19/70 SWS	
Mill Shoals	292		18,000	1975	Sand and gravel	1	545	20	2/5/64 SWS	Adequate
						2	53	10	5/7/64 SWS	
						3	91	8	1/19/76 SWS	
						4	87.75	40	1/12/76 SWS	
Springerton	228		15,000	1975	Pleistocene Series	1	120	14	10/18/66 SWS	Adequate
					(sand and gravel)	2	110	20	6/17/66 SWS	
					Pennsylvanian System					
					(sandstone)					
					87. Whiteside County					
Albany	942		86,500	1976	Sand and gravel	1	75	100	7/9/56 SWS	Adequate
						2	80	120	8/17/70 SWS	
Erie	1,566		130,000	1977	Pleistocene Series	1	567	100		Adequate
					(sand and gravel)	2	172	400	4/14/53 SWS	
					Ordovlclan System					
					(Galena-Plattevllle					
					Dolomite)					
Fulton	3,630		343,000	1977	Ordovlclan System	2	1,260	190		Adequate
					(Galena-Plattevllle	3	1,943	600		
					Dolomite) Cambrian	4	276	400		
					System (Eau Claire					
					& Mt. Simon Sandstones)					
Lyndon	673		36,000	1977	Ordovlclan System	1	243	180	10/7/61 SWS	Adequate
					(Galena-Platteville	2	250	150		
					Dolomite)					
Morrison	4,387		971,000	1977	Ordovlclan System	1	1,643	250		Adequate
					(Galena-Platteville	2	2,048	550	8/15/57	
					Dolomite) Cambrian	3	1,625	600		
					System (Galesville	4	1,769	1,075	2/5/68	
					Sandstone)					
Prophetstown	1,915		180,000	1977	Silurian System	3	235	350	3/15/44	Adequate
					(Niagaran & Alex-	Pemberthy				
					andrian dolomite)	Well	193	Standby		
Rock Falls	10,287		955,000	1976	Sand and gravel	2	136	1,000	2/20/60	Adequate
						3	70	1,000		

Sterling	16,113		2,,021,,000	1974	Pleistocene Series (sand and gravel) Ordovician System (Galena-Plattevllle Dolomite, St. Peter Sandstone) Cambrian System (Galesville Sandstone)	1	1,,430	590	5/24/46	SWS	Adequate
						2	1,,655	440	4/8/47	SWS	
						3	1,,830	475			
						4	1,,630	570	1/3/47	SWS	
						6	86	750	8/30-31/62	SWS	
Tampico	838		80,000	1977	Sand and gravel	1	173	200	1/10/64		Adequate
						2	53	200			
					88. Winnebago County						
Durand	972		115,000	1977	Ordovician System (St. Peter Sandstone) Cambrian System (Galesville Sandstone)	2	201	320	3/18/57	SWS	Adequate
						3	585	500	1/10/75	SWS	
Lake Summerset Subdivision		1,050 (Est. 1976)	117,000	1976	Ordovician System (St. Peter Sandstone)	1	277	200	5/27/69		Adequate
						2	190	250	7/19-20-77		
Loves Park	12,390		2,519,,000	1976	Pleistocene Series (Rock River Valley alluvium) Ordovician System (Glenwood-St. Peter Sandstone)	1	190	2,180			Adequate
						2	190	2,280			
						3	863	850			
Mulford's Wildwood Subdivision		700 (Est. 1976)	51,000	1976	Ordovician System (St. Peter Sandstone)	1	531	225	8/27/57	SWS	Adequate
North Park Public Water District		18,500 (Est. 1976)	1,506,000	1976	Sand and gravel	2	195	1,250			Adequate
						3	238	2,000			
						4	240	3,500	2/2-3/73		
Pecatonica	1,781		387,000	1977	Ordovician System (St. Peter Sandstone) Cambrian System (Galesville Sandstone)	1	660	425	3/26/54	SWS	Adequate
						2	750	425	1/10/56	SWS	
Rock ford	147,370	151,478 (1974)	37,000,,000	1972	Pleistocene Series (sand and gravel) Ordovician System (St. Peter Sandstone) Cambrian System (Mt. Simon Sandstone)	Group lJells:					Adequate
						1	1,600	1,000			
						2	1,600	1,000			
						3	1,600	1,000			
						4	1,633	1,000			
						5	1,615	1,000			
						6	1,605	1,000			
						Unit Wells:					
						1	1,530	2,100	5/5-6/65	SWS	
						3	1,127	2,000			
						4	1,219	2,100			
						5	1.312	2,000	6/5/45		
						6	1,372	1,900	2/2/61		

Facility	Population 1970 census	Population spec. census	Average daily pumpage (gallons)	(yr)	Aquifer description	Well no.	Depth (ft)	Discharge (gpm)	Aquifer test	Aquifer assessment
						7	1,503	1,580		
						7A	200	1,700	7/26/47	
						8	1,502	1,900		
						8A	245	3,500		
						9	1,600	1,300		
						9A	237	2,000		
						10	1,426	2,100		
						11	245	2,400		
						12	245	2,500		
						13	1,457	1,550		
						14	235	4,200		
						15	1,355	1,200		
						16	1,310	1,525		
						17	1,195	2,200	1/13/65	
						18	1,380	2,300	10/17/61	
						19	176	3,700		
						20	1,200	1,600	6/1/64	
						21	1,205	1,500		
						22	1,200	1,450	1/31/62	
						23	93	3,700	6/22/64	
						24	222	1,890		
						25	1,290	1,850		
						26	1,326	2,550		
						27	1,280	2,350	8/22/69	
						28	233	5.500	10/18/68	
						30	1,325	1,800	7/28/70	
						35	214	1,845	8/5/71	
						38	238	2,400		
						Camp Grant Well:				
						6	153.6	640	10/15-18/63 SWS	
Rockton	2,099		600,000	1977	Pleistocene Series (sand and gravel) Ordovician System (St. Peter Sandstone) Cambrian System (Galesville Sandstone)	4 5 6	429 120 728	200 750 750	 1/30/69 SWS	Adequate
South Belolt	3,804	3,895 (1974)	668,000	1976	Cambrian System (Eau Claire Sandstone) Pre-Cambrian System (Fond du Lac Sandstone)	3	1,200	1,450		Adequate. Public water supply system is interconnected with Belolt, Wisconsin which has 6 wells.
Winnebago	1,285		143,000	1976	Ordovician System (St. Peter Sandstone) Cambrian System (Galesville Formation)	2 3	810 835	240 600	8/4/49 SWS 3/28/68 SWS	Adequate

89. Woodford County

Benson	490		25,100	1976	Sand and gravel	4	73	27		Adequate
						5	116	72	9/2/65 SWS	
Caterpillar Trails Public Water District		1,700 (Est. 1976)	184,000	1976	Sand and gravel	1	358	150	11/30/56 SWS	Adequate
						2	368	210	6/19/67 SWS	
Congerville	266	301 (1973)	25,000	1977	Sand and gravel	1	47	74	7/18/75 SWS	Adequate
El Paso	2,291		310,000	1977	Sand and gravel	1	120	350		Adequate
						2	120	300		
Eureka	3,028		493,000*	1977	Sand and gravel	4	191	Standby		Adequate. At present, main water source is Eureka Lake. Wells have been used to maintain water levels in the lake, and Eureka is trying to convert to groundwater as sole source.
						5	338	600	8/7/75 SWS	
						6	370	800		
Goodfleld	329		34,000	1977	Sand and gravel	1	330	50	3/4/78	Adequate
						2	320	100	12/20/63	
Low Point Water District		245 (Est. 1976)	22,500	1973	Sand and gravel	4	84	22		Adequate
						5	84	22		
Metamora	2,176		206,000	1975	Sand and gravel	5	215	170		Adequate
						6	326	300	1/28-29/60 SWS	
						7	418	400	11/21/74 SWS	
Minonk	2,267		148,000	1974	Ordovician System (Glenwood-St. Peter Sandstone)	1	1,850	100		Adequate
						2	2,005	160		
Roanoke	2,040		185,000	1975	Sand and gravel	1	39	200		Adequate
						2	42	200		
						3	52	400	9/23/63 SWS	
						4	60.5	100	4/4/74 SWS	
						5	50.5	400	7/1/74 SWS	
Secor	508		62,000	1976	Sand and gravel	2	158	85		Adequate
						3	156	100		
Washburn	1,173		145,000	1976	Sand and gravel	1	137	400		Adequate
						2	137	125		