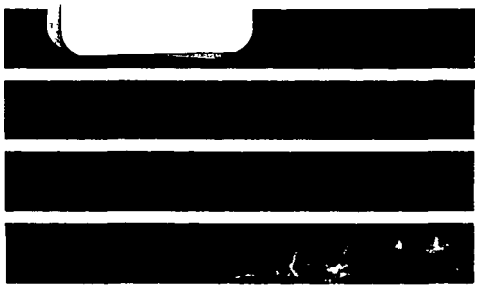

Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1985-1991

by Adrian P. Visocky

ILLINOIS STATE WATER SURVEY
DEPARTMENT OF ENERGY AND NATURAL RESOURCES

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Abstract: The deep bedrock aquifer system in northeastern Illinois is encountered at depths ranging from about 200 feet below land surface in areas of north-central Illinois to an average of about 1,000 feet at Chicago. The aquifers have a collective thickness of 300 to 1,300 feet in the Chicago region, with an average of 700 feet. They are composed chiefly of sandstones and dolomites, although most of the water is derived from the sandstone units. Pumpage from deep bedrock wells for public and self-supplied industrial use in the Chicago region increased from 200,000 gallons per day in 1864 to a peak withdrawal of 182.9 million gallons per day (mgd) in 1979. Between 1985 and 1991, pumpage decreased from 157.7 mgd to 112.7 mgd, mostly due to a shift to Lake Michigan water. As a result, water levels in many deep wells rose between 1985 and 1991, particularly in northwestern Cook and southern Lake Counties. Average annual water-level changes during the six-year period varied from a rise of 12 feet in Cook County to a decline of 8 feet in Will County, for an overall average rise of about 3 feet. This marked the first time that the average change was upward since detailed record-keeping began in the 1950s.

Reference: Visocky, Adrian P. Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1985-1991. Illinois State Water Survey, Champaign, Circular 177.

Indexing Terms: Chicago, northeastern Illinois, Cook County, Lake Michigan diversion. Lake Michigan allocations, aquifers, Cambrian-Ordovician aquifers, deep sandstone wells, deep bedrock aquifers, ground water, public water supplies, industrial water supplies, water levels, water-level changes, pumpage, ground-water withdrawals.

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WATER-LEVEL TRENDS AND PUMPAGE IN THE DEEP BEDROCK AQUIFERS IN THE CHICAGO REGION, 1985-1991

by
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SUMMARY

This report considers pumpage and water-level changes from 1985 through 1991 in deep bedrock wells penetrating the Cambrian and Ordovician aquifers in northeastern Dlinois. These aquifers are the most highly developed system for large ground-water supplies in Dlinois. Collectively this system has been described as the "Cambrian-Ordovician aquifer" in past reports, but formal hydrostratigraphic unit names, reported by Visocky et al. (1985), have designated this system as the "Midwest Bedrock Aquigroup." An informal term, "deep bedrock aquifers," is used in this report for convenience.

The deep bedrock aquifer system is encountered at depths ranging from about 200 feet below the land surface in areas of north-central Illinois to an average of about 1,000 feet at Chicago. The aquifers have a collective thickness of 300 to 1,300 feet in the Chicago region, averaging 700 feet, and are composed chiefly of sandstones and dolomites. Most of the water is derived from the sandstone units. In this report, emphasis has been given to the eight counties of the Chicago metropolitan area.

Pumpage from deep bedrock wells for public and self-supplied industries in the Chicago region increased from 200,000 gallons per day (gpd) in 1864 to 175.9 million gallons per day (mgd) in 1980. By 1991 pumpage had declined to 112.7 mgd. Peak pumpage of 182.9 mgd occurred in 1979. As a result of the pumpage, artesian pressure in the deep bedrock aquifers declined more than 850 feet at Chicago.

In 1991 pumpage from deep wells in the Chicago region was concentrated in northern and western Cook County; eastern DuPage, eastern Kane, southeastern McHenry, and southern Lake Counties; and in the Joliet area of Will County. In 1992, implementation of Lake Michigan allocations in DuPage County and parts of Lake County caused a significant decrease in deep pumpage in those areas. Outside the Chicago region, heavy pumpage from deep wells occurred at Rockford in southeastern Winnebago County, Belvidere in south-central Boone County, DeKalb-Sycamore in central DeKalb County, Rochelle in southeastern Ogle County, and Ottawa-Peru in central and west-central LaSalle County.

During the period from 1980 through 1985, pumpage from deep wells in the Chicago region dropped from 175.9 to 157.7 mgd, adecrease of 18.2 mgd or 10.3 percent. This was the first extended period of decreased pumpage from deep wells in the area since the post-depression, pre-World War II period. Pumpage continued to decline from 1985 through 1991, but at a sharper rate. While yearly declines averaged about 3.6 mgd from 1980 to 1985, declines during the period 1985-1991 averaged 7.5 mgd—more than double the earlier rate. Most of the decline, about 21.8 mgd per year, occurred during the first two years due to shifts in deep pumpage in Cook County to Lake Michigan water and

decreases in industrial pumpage. During the latter four years, pumpage fluctuated and experienced an overall average decline of only about 0.4 mgd per year.

As a result of the shift to lake water, levels in deep wells in some areas of the Chicago region rose between 1985 and 1991, particularly in northwestern Cook and southern Lake Counties. On average, water levels rose in five of the eight counties in the Chicago region. Elsewhere, significant declines continued as total deep well pumpage continued to exceed the sustained yield. Average annual water-level changes during the six-year period varied from a rise of 12 feet in Cook County to a decline of 8 feet in Will County, with an average overall rise of about 3 feet. This is the first time that the average water-level change was positive since detailed record keeping began in the 1950s.

Despite these gains, Chicago regional withdrawals for 1985-1991 continued to exceed the practical sustained yield of the deep bedrock aquifers, albeit at a diminishing rate. With the subsequent switch to lake water in 1992 in DuPage County and portions of Lake County, total deep bedrock withdrawals were expected to fall within the sustained yield.

INTRODUCTION

In May 1959, the Illinois State Water Survey and the Illinois State Geological Survey published Cooperative Ground-Water Report 1 (Suteret al., 1959), which discussed the geology and hydrology of the ground-water resources of the Chicago region, the yields of aquifers, and the possible consequences of future ground-water development. Special emphasis was placed on the deep bedrock aquifers, which have been most widely used for large ground-water supplies. Cooperative Report 1 indicated that pumpage from deep wells during 1958 approached the amount that could be continuously withdrawn without eventually dewatering the most productive formation of the deep bedrock aquifers. Future water-level declines were predicted (1958-1980), ranging from 190 feet at Elgin to 300 feet at Chicago and DesPlaines. It was recognized that actual water-level declines would vary from the predicted declines if future distribution and pumpage rates deviated from extrapolations of past ground water used.

In 1959, as a result of the findings of Cooperative Report 1, the Water Survey expanded its program of collecting and reporting water-level and pumpage data for deep wells in the Chicago region. The objectives of the program were: 1) to provide long-term continuous records of pumpage and water-level fluctuations, 2) to delineate problem areas, and 3) to report hydrologic information to facilitate the planning and development of water resources of the deep bedrock aquifers in the Chicago region. The importance of the program became apparent during the ensuing years because of the increasing demands for water and the continuing decline of ground-water levels.

Many reports on water levels and pumpage from deep wells have been issued by the Water Survey since the publication of Cooperative Report 1: Circular79 (Walton et al., 1960); and Circulars 83, 85, 94, 113, 125, 154, and 166 (Sasman et al., 1961, 1962, 1967, 1973,1977,1982, and 1986, respectively). These reports summarized data for 1959, 1960, 1961, 1962-1966,1966-1971,1971-1975, 1971-1980, and 1980-1985, respectively. Reports of Investigation 50 (Sasman, 1965) and 52 (Sasman and Baker, 1966) summarized data on ground-water pumpage in 17 northern Illinois counties through 1962 and 1963, respectively. Report of Investigation 73 (Sasman et al., 1974)

discussed ground-water pumpage in 20 northern Dlinois counties during the period 1960-1970. Reports of Investigation 83 (Schicht et al., 1976) and 97 (Singh and Adams, 1980) described available ground-water and surface water resources for the Chicago region, predicted water shortages depending on various water-use schemes, and offered alternatives for meeting projected water supply needs to the year 2010. Contract Report 292 (Visocky, 1982) and Research Report 119 (Burch, 1991) described the impact of additional Lake Michigan withdrawals on deep-well pumpage and water-level trends. Cooperative Ground-Water Report 10 (Visocky et al., 1985) provided an updated hydrogeologic evaluation of the water resources of the deep bedrock aquifers.

In response to expanding urban development, the outward migration of declining water levels, the increasing use of lake water for public supplies, and growing interest in regional water resources development, this report provides a detailed discussion of ground-water withdrawals and water-level trends in northeastern Illinois. The report covers a 15-county area from Lake Michigan to north-central Illinois and from the Wisconsin border south to Kankakee County. Particular emphasis, however, has been given to the eight counties of the Chicago region because of ongoing heavy pumpage from the deep bedrock aquifers and water-level changes due to increasing ground-water withdrawals in some areas and decreasing withdrawals in others.

During spring 1992, major new Lake Michigan allocations were implemented in DuPage County, and many deep-well pumps were turned off. Since this report describes water levels measured in fall 1991, prior to the switch to Lake Michigan water, it is an important record of conditions when water levels were still subject to the stresses of higher pumpages. The next detailed water-level measurement, scheduled for fall 1995, will document the response of the deep bedrock aquifers to major pumpage reductions resulting from the switch to lake water in DuPage and Lake Counties.

Pumpage figures for the period 1986-1991 used in this report were taken from the Illinois Water Inventory Program, which gathers water-use information from questionnaires filled out by public water supply operators and self-supplied industries. Since these data have not yet been published formally and are subject to final revisions, they must be considered preliminary.

In this report, pumpage for public use includes use by municipalities, subdivisions, mobile home parks, and institutions. No attempt has been made to determine the final use of water within these categories. Available records indicate that 105 public water supplies obtained water from deep wells in 1991, compared to 129 in 1985.

Pumpage for self-supplied industries includes only pumpage from wells owned and operated by the industries. (For convenience, country clubs are included in this category in mis report.) Records indicate that at least 85 self-supplied industries in the Chicago region used deep wells in 1991, compared to 119 in 1985.

Pumpage from deep wells for individual domestic and rural residences or for farm supplies is not included in this report, since few wells serve these uses in the Chicago region, and total estimated pumpage for these uses in northeastern Illinois is extremely limited.

Water levels in deep wells were measured by a variety of methods and under a wide range of operating conditions and reliability. Most measurements were taken with altitude gages attached to air lines suspended in the wells. Other measurements were obtained with graduated steel tapes or electric droplines that set off either light or sound signals when the probe touches water. A few wells

are open holes and can be measured very accurately. Most wells, however, are equipped with pumps that limit or prevent access for measurement. Water levels are affected by recent pumpage of the well itself or by pumpage at adjacent wells. The reliability of the water-level measuring equipment and the experience of the person taking the measurement are also important considerations. Altitude gages, for example, are generally limited to a precision of about a foot, while steel tapes and electric droplines can be read with a precision of as much as 0.01 foot and 0.02 foot, respectively.

The eight counties of the Chicago region, with abbreviations used in this report, are:

Cook	COK	Kendall	KEN
DuPage	DUP	Lake	LKE
Grundy	GRY	McHenry	MCH
Kane	KNE	Will	WIL

The seven northern counties in the extended area outside of the Chicago region included in this report are:

Boone	BNE	Lee	LEE
DeKalb	DEK	Ogle	OGL
Kankakee	KNK	Winnebago	WIN
LaSalle	LAS		

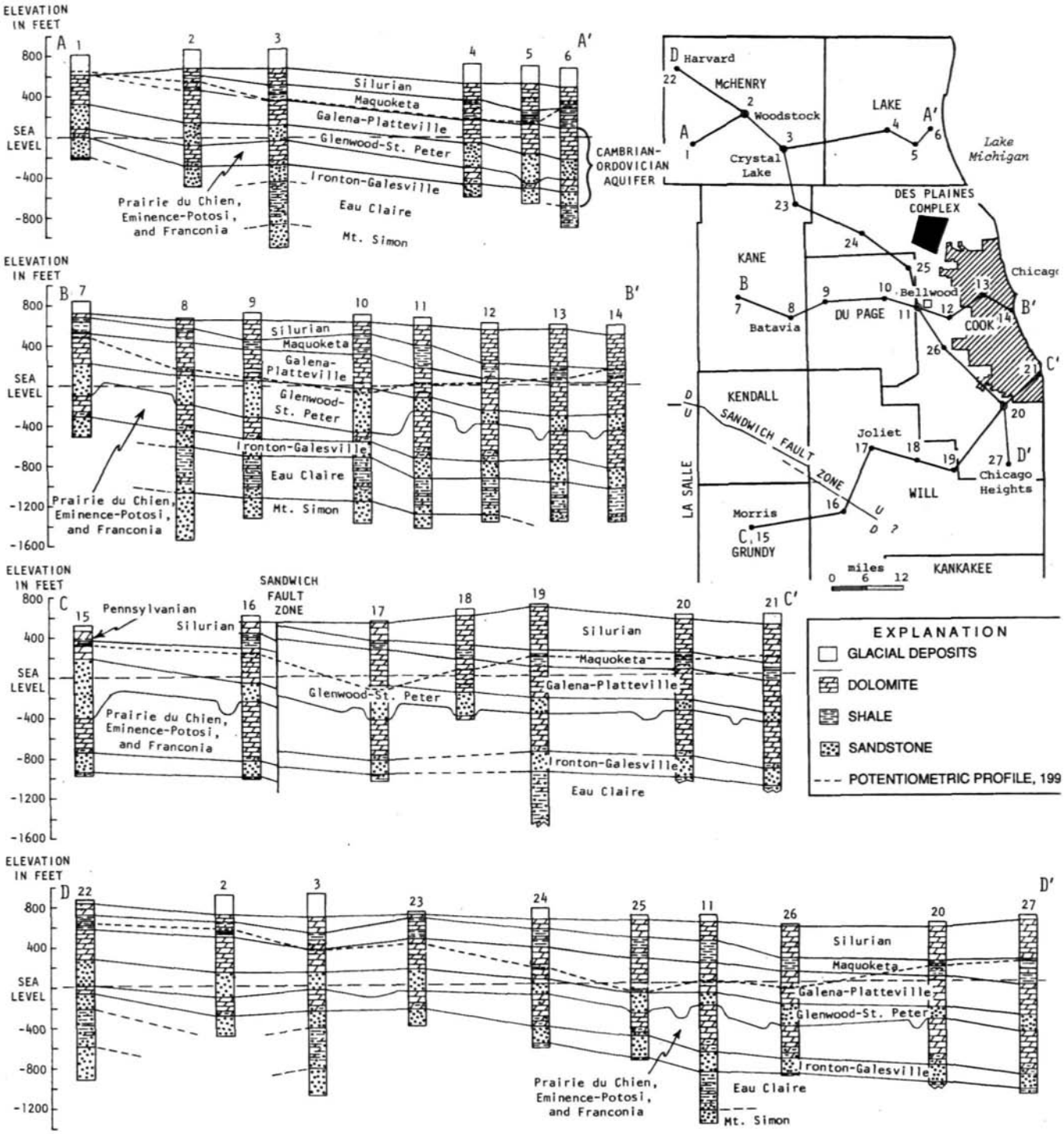
Acknowledgments

Partial support for the fall 1991 field data collection described in this report was provided by the Illinois Department of Transportation, Division of Water Resources. The author wishes to acknowledge the numerous individuals and organizations who generously contributed information incorporated in this report. Operators of more than 85 percent of the public and self-supplied industrial water supply systems reported their annual pumpage in response to mailed questionnaires. Water-level data were largely obtained in visits of Illinois State Water Survey personnel to system operators. Water-level data were collected by Northern Illinois University students Amjad Asaf, David Munday, and Robert Pell; and by Curtis Benson, Dean Jurss, Scott Meyer, and Adrian Visocky of the Water Survey. Kris Klindworth supplied pumpage information and statistics from the Illinois Water Inventory Program and developed mailing lists for contacting water supply operators. Dorothy Woller provided data and statistics about the status of deep bedrock production wells. Editorial review was done by Laurie Talkington, and graphic support was provided by Linda Hascall and David Cox. Word processing was done by Patti Hill and Lori Woller.

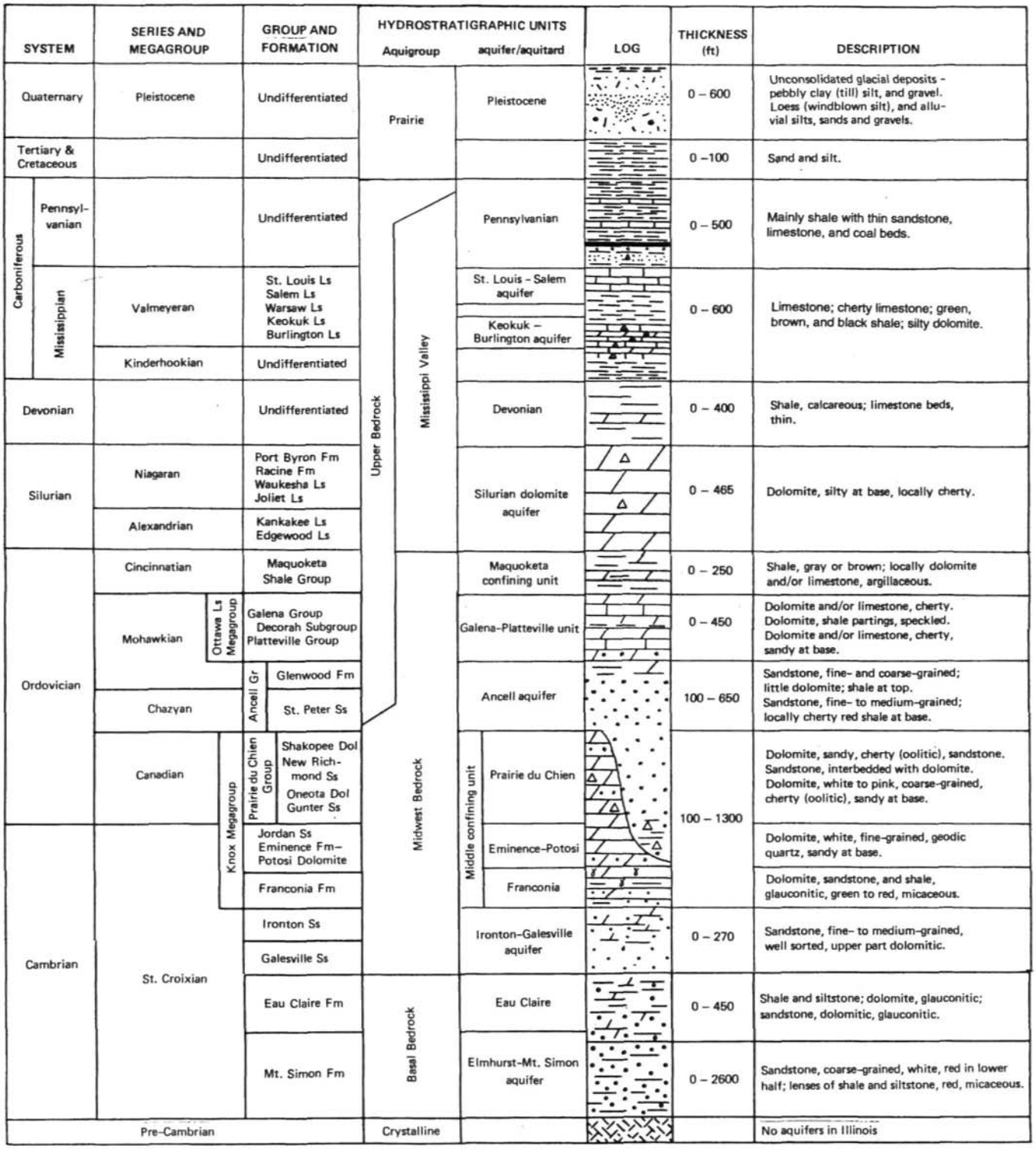
GEOLOGY AND HYDROLOGY

Ground-water resources in the Chicago region are developed mainly from three aquifer systems: 1) sand-and-gravel deposits of the glacial drift; 2) shallow dolomite formations, mainly of Silurian age; and 3) deep sandstone and dolomite formations of Cambrian and Ordovician age, of which the Ironton-Galesville Sandstone is the most productive. Supplemental yields are obtained from a diminishing number of wells that still penetrate the Elmhurst-Mt. Simon aquifer, a very thick

sandstone that is separated from the overlying Ironton-Galesville Sandstone by the shales, siltstones, and dolomites of the Eau Claire Formation. The sequence, structure, and general characteristics of these rocks are shown in figures 1 and 2.



Bedrock cross sections and stratigraphy and potentiometric profile of the deep bedrock aquifers in the Chicago region (after Suter et al., 1959)



Note: The rock-stratigraphic and hydrostratigraphic-unit classifications follow the usage of the Illinois State Geological Survey.

Figure 2. Stratigraphy and water-yielding properties of the rocks and the character of the ground water in northeastern Illinois (after Visocky et al., 1985)

DRILLING AND CASING CONDITIONS	WATER-YIELDING PROPERTIES	CHEMICAL QUALITY OF WATER	WATER TEMPERATURE, °F
Boulders, heaving sand locally; sand and gravel wells usually require screens and development; casing in wells into bedrock.	Sand and gravel, permeable. Locally, wells yield as much as 3000 gpm. Specific capacities vary from about 0.1 to 5600 gpm/ft.	TDS generally between 400 and 600 mg/L. Hardness 300–400 mg/L. Iron generally 1–5 mg/L.	50 – 64
Shale requires casing.	Extremely variable. Sandstone and limestone units generally yield less than 10 gpm.	TDS extremely variable regionally and with depth. North–central Illinois, 500–1500 mg/L; southern, 500–3000 mg/L. Hardness: 150–400 mg/L north; 150–1000 mg/L south. Iron generally 1–5 mg/L.	53 – 57
	In southern two-thirds of state, yields generally less than 25 gpm.	TDS ranges between 400 and 1000 mg/L. Hardness is generally between 200 and 400 mg/L. Iron: 0.3–1.0 mg/L.	53 – 59
Upper part usually weathered and broken; crevicing varies widely.	Yields inconsistent. Major aquifer in NE and NW Illinois. Yields in fractured zones more than 1000 gpm.	TDS: 350–1000 mg/L; Hardness: 200–400 mg/L; Iron: 0.3–1.0 mg/L.	52 – 54
Shale requires casing.	Shales generally not water yielding. Crevices in dolomite units yield small local supplies.		
Crevicing commonly where formations underlie drift. Top of Galena usually selected for hole reduction and seating of casing.	Where overlain by shales, crevicing and well yields small. Where overlain by drift, wells yield moderate quantities of water.	For Midwest Bedrock Aquigroup as a whole, TDS ranges from 400 to 1400 mg/L in NW and up to 2000 mg/L in south. Hardness ranges from 175 mg/L in northern recharge areas to 600 mg/L in E. Cook and S. Fulton Counties. Iron generally less than 1.0 mg/L.	52 – 73
Lower cherty shales cave and are usually cased. Friable sand may slough.	Small to moderate quantities of water. Transmissivity approximately 15 percent of that of the Midwest Bedrock Aquigroup.		
Crevices encountered locally in the dolomite, especially in the Eminence–Potosi. Casing not required.	Crevices in dolomite and sandstone yield small to moderate quantities of water. Transmissivity approximately 35 percent of that of the Midwest Bedrock Aquigroup.		
Amount of cementation variable. Lower part more friable. Sometimes sloughs.	Most productive unit of the Midwest Bedrock Aquigroup. Yields over 500 gpm common in northern Illinois. Transmissivity approximately 50 percent of that of the Midwest Bedrock Aquigroup.		
Casing not usually necessary. Locally weak shales may require casing.	Shales generally not water yielding.		
Casing not required.	Moderate quantities of water in upper units. Comparable in permeability to the Glenwood–St. Peter Sandstone.	Varies northwest to southeast and with depth. At shallower depths, TDS: 235–4000 mg/L. Hardness: 220–800 mg/L, Iron: 0.1–20 mg/L. High chloride concentrations with depth.	51 - 62 in the north, 80 or more in the south

Figure 2. Concluded

The sequence of rocks that make up the Cambrian and Ordovician units described in this report were first defined by Suter et al. (1959) as the "Cambrian-Ordovician aquifer" and have been referred to by tins name in most subsequent reports. A local term often used informally in northeastern Illinois is "deep sandstone aquifer," in reference to the two major sandstone aquifers within the deep bedrock system. Visocky et al. (1985) introduced formal hydrostratigraphic names first proposed by Cartwright (1983) in describing major aquifers, in order to reduce confusion with rock stratigraphic terminology. The name "Midwest Bedrock Aquigroup" was suggested for the sequence of rocks from the Maquoketa Shale Group (the top of the overlying confining layer) to the top of the Eau Claire Formation (the underlying confining layer). Since this formal terminology is not as yet familiar to most readers and is in the process of undergoing formal acceptance by the scientific community, an informal description, "deep bedrock aquifers," will be used in this report.

The deep bedrock aquifers consist of two major sandstone aquifers, the Ancell aquifer (composed of the Glen wood Formation and the St. Peter Sandstone) and the Ironton-Galesville aquifer (composed of the Ironton and Galesville Sandstones). Separating these two aquifers is a confining unit made up mainly of dolomite and shale with some sandstone.

The Ancell aquifer is present throughout northeastern Illinois and frequently exceeds 200 feet in thickness. In some sections of north-central Illinois, faulting and erosion have placed this aquifer immediately below the glacial drift. The majority of public and industrial wells finished in the Ancell aquifer in the Chicago region produce less than about 200 gallons per minute (gpm). In north-central Illinois, however, the Ancell aquifer yields several hundred gpm to wells and is the primary source of ground water for some municipal and industrial supplies.

The Prairie du Chien, Eminence-Potosi, and Franconia Formations underlie the Ancell aquifer and constitute the "middle confining unit" above the Ironton-Galesville aquifer. The formations of the confining unit are present throughout much of northern Illinois, although the upper units have been eroded extensively in the north. In some areas, tiiese formations provide moderate amounts of water to wells tapping the deep bedrock aquifers.

The Ironton-Galesville aquifer underlies the FranconiaFormation and overlies the Eau Claire Formation, another confining unit. It occurs throughout northeastern Illinois, and on a regional basis it is the most consistently permeable and productive unit of the deep bedrock aquifers. Most of the high-capacity deep municipal and industrial wells in the Chicago region obtain a major part of then-yields from this aquifer.

Prior to the switch to Lake Michigan water, supplemental yields were obtained from wells penetrating the Elmhurst-Mt. Simon aquifer, particularly in parts of western and northwestern Cook County, eastern Kane County, parts of DuPage and Lake Counties, the Joliet area of Will County, and farther west in Ogle and Winnebago Counties. A major problem with the Elmhurst-Mt. Simon aquifer is the possibility of obtaining water high in chloride concentrations. In the Chicago region, water below an elevation of about 1,300 feet below sea level (msl) is commonly too salty for municipal or industrial use. Over the years, heavy pumping of the deep bedrock aquifers has gradually caused degradation of the water quality in some areas by inducing upward migration of highly mineralized water from the deeper sections of the Elmhurst-Mt. Simon aquifer. The potentiometric surface of the Ironton-Galesville aquifer is lower than that of the Elmhurst-Mt. Simon aquifer, causing upconing of the poorer quality water. Numerous wells in Cook, DuPage, and Kane Counties,

originally drilled into the Elmhurst-Mt. Simon aquifer, have since been plugged above these formations to exclude this poor-quality water.

The primary source of recharge to the deep bedrock aquifers is precipitation, which percolates through the glacial deposits where the Galena-Platteville dolomite or older rocks are the uppermost bedrock formation. This area is defined essentially by the western limits of the Maquoketa Shale Group and, to a small extent, by the northern limits of the Pennsylvanian-age shales. It encompasses major portions of north-central and northwestern Illinois. The Maquoketa Shales are the primary overlying confining material in the Chicago region, along with the underlying Galena-Platteville unit, which locally yields small quantities of water.

Heavy ground-water withdrawals over the years have lowered water levels at the major pumping centers and established steep hydraulic gradients north, west, and southwest of Chicago and Joliet. As a result, large quantities of water from recharge areas in northern Illinois and relatively minor quantities from southeastern Wisconsin are being transmitted toward pumping centers, along with small amounts derived from vertical leakage downward through the Maquoketa and Galena-Platteville units (Walton, 1960). Because of the overpumpage, water derived from storage within the deep bedrock aquifers supplements the water moving horizontally or vertically, and it too moves toward the cones of depression in the potentiometric surface (see discussion later in the report). In addition, lesser amounts of water are derived from the south in Illinois, from the southeast in Indiana, and from the northeast beneath Lake Michigan.

PRODUCTION FROM DEEP BEDROCK WELLS

The first deep well in northern Illinois was drilled in Chicago in 1864. It had an artesian flow at ground surface estimated at 150 gpm, or about 200,000 gpd. A considerable number of deep wells were in operation in the Chicago region by 1900, and pumpage was estimated at 23 mgd. Pumpage increased at a rather irregular rate during the first half of this century and reached 75.6 mgd in 1955, as shown in figure 3. During the succeeding 24 years, pumpage for public and industrial uses increased dramatically by 142 percent at an average rate of 4.5 mgd per year. It reached an all-time high of 182.9 mgd in 1979. Public and industrial pumpage dropped to 175.9 mgd in 1980, 157.7 mgd in 1985, and 112.7 mgd in 1991.

Pumpage, 1985 through 1991

In comparison with the period from 1980 to 1985, when pumpage declined at a rate of 3.6 mgd each year from its record level in 1979, pumping rates between 1985 and 1991 continued downward, but at a steeper rate of decline—7.5 mgd per year—double the rate of decline of the previous five years. The largest part of the decline occurred during the first two years, when pumpage decreased at a rate of 21.8 mgd per year. In contrast, pumpage fluctuated during the last four years of the period, trending downward at an average rate of only 0.4 mgd per year. The cause of the initial sharp decline in pumpage can be attributed to continued shifts of public water supplies in Cook County to Lake Michigan water and decreased pumpage by industries.

Other reasons for the pumpage fluctuations between 1985 and 1991 are a combination of several factors. They include climate (water use rises during warm, dry periods) shifts in population,

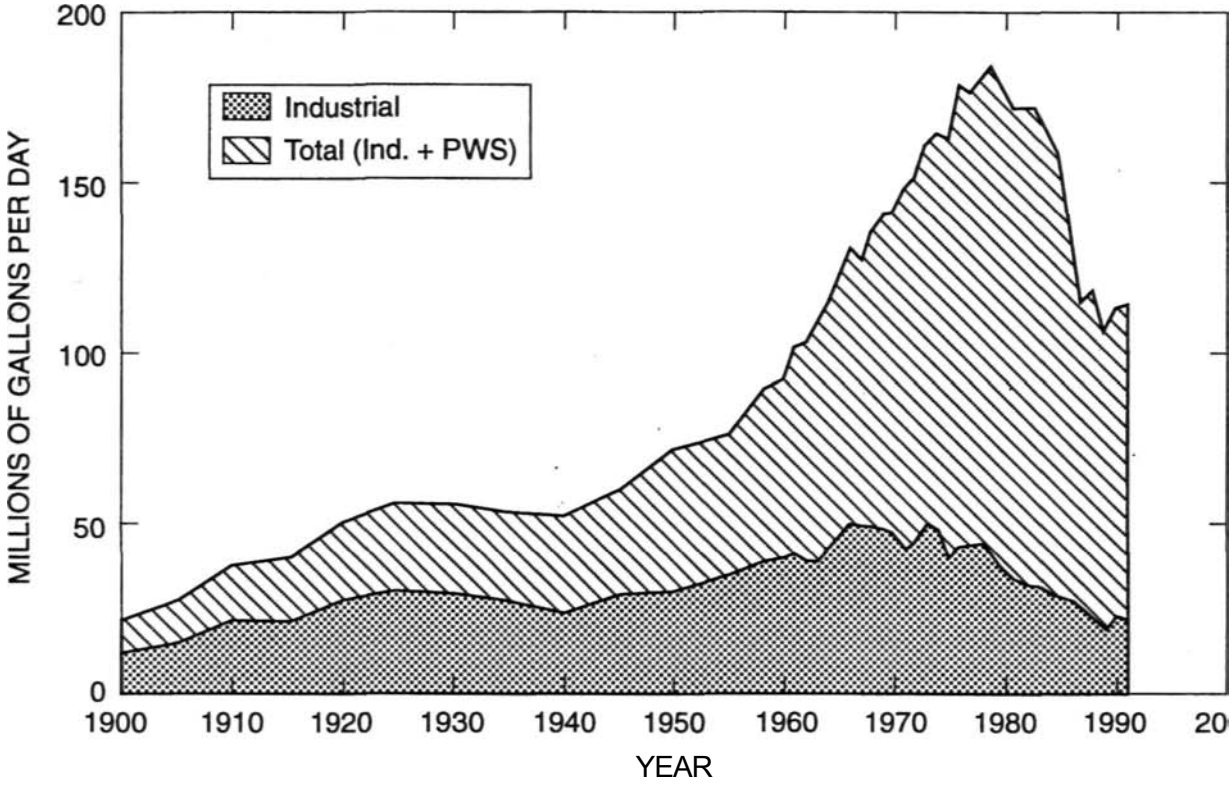


Figure 3. Production from the deep bedrock aquifers in the eight-county Chicago region, 1900-1991, subdivided by use.

and the replacement of deep bedrock wells with shallower wells in order to meet the Safe Drinking Water Standards for radium and barium (USEPA, 1976,1991).

During the period 1985 through 1991, pumpage for public and industrial supplies from deep bedrock wells declined from 157.7 to 112.7 mgd. The 1989 pumpage was 105.0 mgd, the smallest deep bedrock well pumpage since 1962, when it was 101.9 mgd. The distribution of pumpage in the eight-county Chicago region for the period 1985 through 1991, subdivided by public and industrial use categories and by counties, is shown in table 1.

Ground-water production from the deep bedrock aquifers decreased in all counties but DuPage and Grundy in amounts ranging from 42.6 mgd in Cook County to 0.2 mgd in Kendall County. Production in DuPage and Grundy Counties increased by 2.0 mgd and 0.5 mgd, respectively.

Production for public supplies decreased 38.2 mgd or 29 percent during the period 1985-1991 and was 92.7 mgd in 1991. This represents 82 percent of the total deep bedrock production in the Chicago region. Self-supplied industrial water use decreased 6.8 mgd or 25 percent during this period to 20.0 mgd in 1991. This represents approximately 18 percent of the deep well production.

Another interesting part of the deep bedrock water-use statistics is the number of new deep wells constructed and the number taken out of service and sealed. During the years 1986 -1991,41 new wells were drilled, 29 by public water systems and 12 by industries. By contrast, 61 deep wells were sealed, 59 by public water facilities and 2 by industries.

Public Pumpage

Public pumpage took a sharp drop from 130.9 to 92.0 mgd between 1985 and 1987, and then fluctuated between 87.6 and 97.3 mgd, ending at 92.7 mgd in 1991. The greatest decreases in public

Table 1. Distribution of Pumpage from Deep Bedrock Wells in Northeastern Illinois, 1985-1991, Subdivided by Use and County (millions of gallons per day)

Year	*County*	*Public*	*Industrial*	*Total*
1985	COK	48.67	8.72	57.39
	DUP	31.60	0.29	31.89
	GRY	2.11	7.26	9.37
	KNE	22.01	0.39	22.40
	KEN	0.92	0.32	1.74
	LKE	7.54	1.16	8.70
	MCH	3.26	1.28	4.54
	WIL	14.81	6.88	21.69
	Total	**30.92**	**26.80**	**157.72**
1986	COK	27.08	6.44	33.52
	DUP	29.01	0.06	29.06
	GRY	2.13	8.63	10.76
	KNE	21.58	0.43	22.01
	KEN	0.91	0.68	1.59
	LKE	6.89	1.30	8.19
	MCH	3.05	1.27	4.32
	WIL	14.50	6.95	21.45
	Total	**105.15**	**25.76**	**130.91**
1987	COK	12.40	4.51	16.91
	DUP	31.17	0.04	31.21
	GRY	2.23	8.09	10.32
	KNE	21.08	0.34	21.42
	KEN	0.94	0.51	1.45
	LKE	6.64	1.29	7.93
	MCH	2.98	1.16	4.14
	WIL	14.53	6.18	20.71
	Total	**91.97**	**22.12**	**114.09**

Table 1. (cont.)

Year	*County*	*Public*	*Industrial*	*Total*
1988	COK	11.70	5.83	17.53
	DUP	32.37	0.06	32.43
	GRY	2.59	5.71	8.30
	KNE	22.89	0.37	23.26
	KEN	1.24	0.33	1.57
	LKE	7.89	0.33	8.22
	MCH	3.25	1.58	4.83
	WIL	15.41	5.57	20.98
	Total	**97.34**	**19.78**	**117.12**
1989	COK	11.06	4.56	15.62
	DUP	30.74	0.07	30.81
	GRY	0.99	6.47	7.46
	KNE	18.99	0.23	19.22
	KEN	0.66	0.01	0.67
	LKE	7.45	0.99	8.44
	MCH	3.68	0.96	4.64
	WIL	14.00	4.12	18.12
	Total	**87.57**	**17.41**	**104.98**
1990	COK	10.27	4.04	14.31
	DUP	31.42	0.07	31.49
	GRY	2.61	7.75	10.36
	KNE	20.68	0.19	20.87
	KEN	0.90	0.31	1.21
	LKE	7.10	0.31	7.41
	MCH	3.16	1.26	4.42
	WIL	14.06	6.87	20.93
	Total	**90.20**	**20.80**	**111.00**
1991	COK	10.19	4.58	14.77
	DUP	33.80	0.08	33.88
	GRY	2.03	7.83	9.86
	KNE	20.92	0.20	21.12
	KEN	1.21	0.30	1.51
	LKE	7.90	0.32	8.22
	MCH	2.70	0.42	3.12
	WIL	13.98	6.22	20.20
	Total	**92.73**	**19.95**	**112.68**

pumpage occurred in Cook, Kane, and Will Counties, which dropped 38.5, 1.1, and 0.8 mgd, respectively. The only significant increase, 2.2 mgd, occurred in DuPage County. Public pumpage in Grundy, Kendall, Lake, and McHenry Counties changed little from 1985 to 1991.

The number of major pumping centers (those in which facilities withdrew 1.0 mgd or more) decreased between 1985 and 1991. Records identify 40 major public water supply facilities in 1985. By 1991, this number had dropped to 26. The largest number of them (ten) were in eastern DuPage County. Others were in the Fox Valley of Kane County (five), western and northern Cook County (four), Lake County (three), Will County (two), and Grundy and McHenry Counties (one each). Pumpage at these major centers ranged from 1.0 to 11.2 mgd.

Records also indicate that a number of facilities stopped using deep wells during this period: 105 public water facilities relied on deep wells in 1991, compared to 129 in 1985.

Self-Supplied Industrial Pumpage

Self-supplied industries in the Chicago region withdrew 20.0 mgd of ground-water from the deep bedrock in 1991, a decrease of 25 percent since 1985. Pumpage had decreased each year from 1978 to 1989 before rising in 1990 and falling again the next year. The all-time highs for industrial pumpage from deep wells for the region were 48.1 mgd in 1966 and 48.2 mgd in 1973. Pumpage in 1991 was the lowest since about 1915, when withdrawals amounted to about 18.8 mgd. Pumpage dropped after 1985 in all counties except Grundy. The decreases ranged from 0.2 mgd in DuPage and Kane Counties to 4.1 mgd in Cook County. Pumpage remained virtually the same in Kendall County and increased about 0.6 mgd in Grundy County.

The major self-supplied industries in the Chicago region in 1991 were those producing inorganic chemicals and electric power, along with petroleum refineries, business services, and explosives manufacturers. These industries accounted for 12.9 mgd or 65 percent of industrial pumpage. Other industries included manufacturers of construction machinery; soaps and detergents; plastics; irrigation systems; ammunition; and shortening, table oils, and margarine.

The number of industrial facilities using deep wells dropped from 119 to 85 between 1985 and 1991. Three self-supplied industries pumped more than 1.0 mgd from deep wells in 1991, compared to four in 1985. Production from these three ranged from 1.2 to 5.9 mgd and totaled 9.2 mgd, accounting for 46 percent of the industrial deep-well pumpage.

Pumpage Related to the Practical Sustained Yield

Schicht et al. (1976) estimated that the practical sustained yield of the deep bedrock aquifers, regardless of the scheme of well development, cannot exceed about 65 mgd. The practical sustained yield of the deep aquifers is defined as the maximum amount of water that can be withdrawn without eventually dewatering the most productive water-yielding formation, the Ironton-Galesville Sandstone. The yield is largely limited by the rate at which water can move from recharge areas eastward through the aquifers to pumping centers. This movement, in tum, is dependent on the gradient of the potentiometric surface in the direction of flow. Schicht et al. (1976) suggested that the 65 mgd could be obtained by increasing the number of pumping centers, shifting some centers of pumping to the west, and spacing wells at greater distances. Burch (1991), however, concluded from his digital computer model study of the aquifer system that the location of the pumping centers is less important than the **number** of centers.

Based on records of deep well production, the estimated practical sustained yield of the aquifer system has been exceeded since the late 1950s. Despite reductions in pumpage as many communities switched to Lake Michigan water, continued withdrawals at rates above the practical sustained yield have resulted in the partial dewatering of the Ancell (Glenwood-St. Peter) aquifer in a considerable portion of the Chicago region.

Burch (1991) indicated that the switch to lake water in DuPage and Lake Counties in 1992 would reduce total withdrawals from deep wells to amounts at or below the practical sustained yield. This action should have a profound effect on the deep bedrock aquifers.

WATER LEVELS IN DEEP BEDROCK WELLS

The first deep bedrock well in Chicago was drilled in 1864 at the corner of Chicago and Western Avenues (Suter et al., 1959). The well was finished in the lowerpart of the Galena-Platteville dolomite, and the artesian pressure was reported to be 80 feet above ground at an elevation of 695 feet above msl. Because it had such a high artesian pressure, the well flowed freely, as did many of the early wells in the region.

Suter et al. (1959) inferred that the potentiometric head of the water in the sandstone aquifers beneath the Galena-Platteville was somewhat higher than in the overlying dolomite. At the time he wrote, the average elevation of water levels in deep bedrock wells at Chicago and Joliet was about 700 feet above msl. As a result of continued heavy pumpage, by 1980 the nonpumping water levels had declined to elevations ranging from 150 feet above msl to more man 250 feet below msl at Arlington Heights in northern Cook County, at Bellwood in western Cook County, at Elmhurst in eastern DuPage County, and at Joliet in northwestern Will County. From 1864 to 1980, the potentiometric level at Chicago declined more than 850 feet (Sasman et al., 1986).

As described earlier, pumpage from deep bedrock wells peaked in 1979 and then began to diminish. Thus by 1985, for the first time since detailed water levels were recorded, they rose in a significant number of wells in the Chicago region. These rises were attributed to major shifts in the distribution of pumpage and to local reductions in pumpage between 1980 and 1985. Regionally, however, water levels continued to decline, especially in the major pumping centers. They were more than 225 feet below msl in some wells at Elk Grove, Elmhurst, and Joliet.

Water-Level Changes in Observation Wells

Water levels were measured during fall 1991 in 558 deep wells in a 15-county area of northeastern Illinois. Data for these wells are given in the appendix. Water levels for 433 of these wells, including 320 in the eight-county Chicago region, had also been measured in 1985.

Examples of changes in nonpumping water levels in selected deep bedrock wells in northeastern Illinois for the period 1981 through 1991 are shown in figure 4, and their locations are shown in figure 5. The hydrographs reflect both seasonal and long-term pumping trends. Declining water-level trends generally indicate increasing rates of local and regional pumpage, while rising trends indicate reduced rates of pumpage or long idle periods for well pumps.

Figure 6 shows water-level fluctuations and long-term trends since 1940 at a well in central Cook County (see figure 5 also). The hydrograph indicates rapid declines in water levels during the

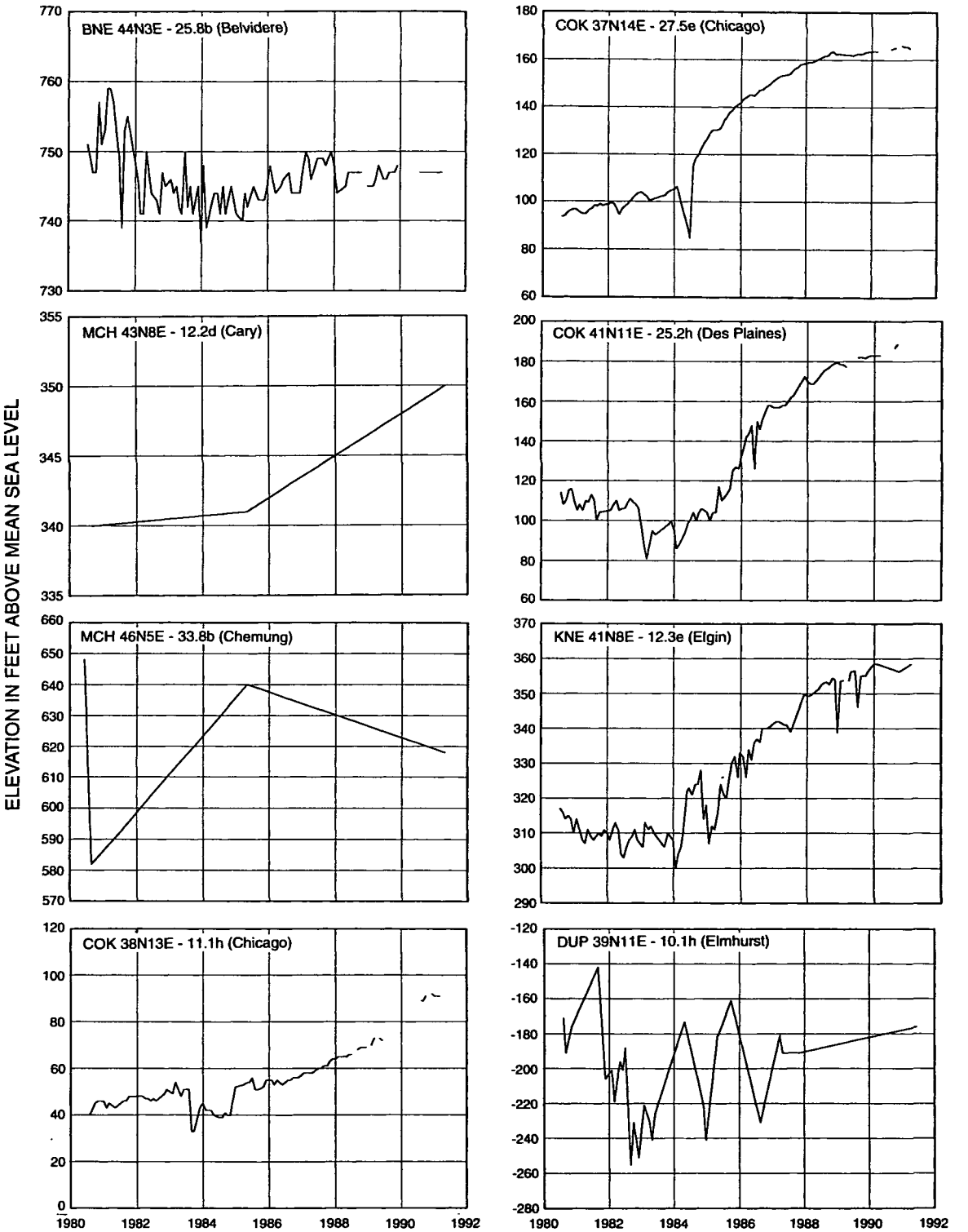


Figure 4. Water levels in selected observation wells in northern Illinois, 1981-1991

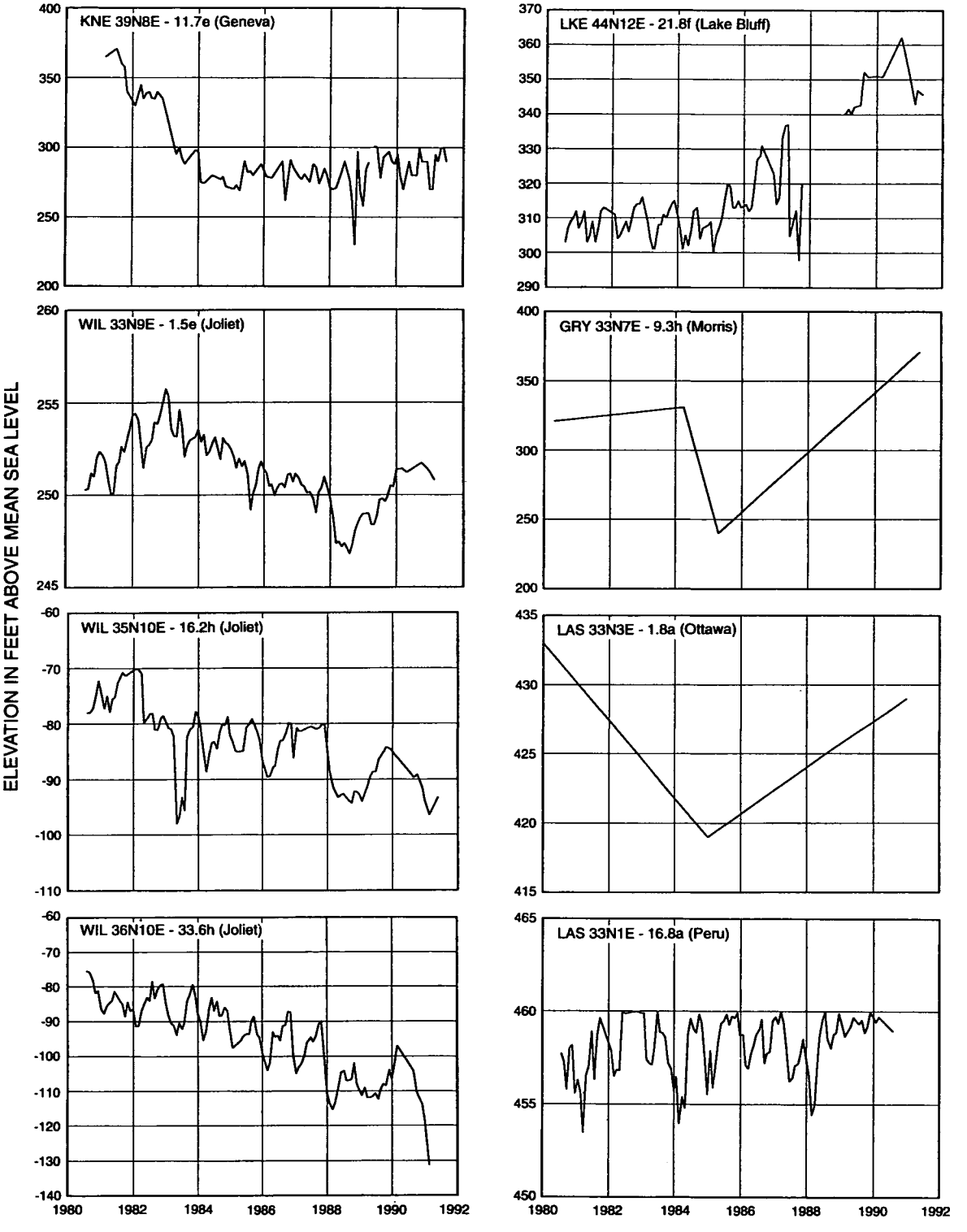


Figure 4. Continued

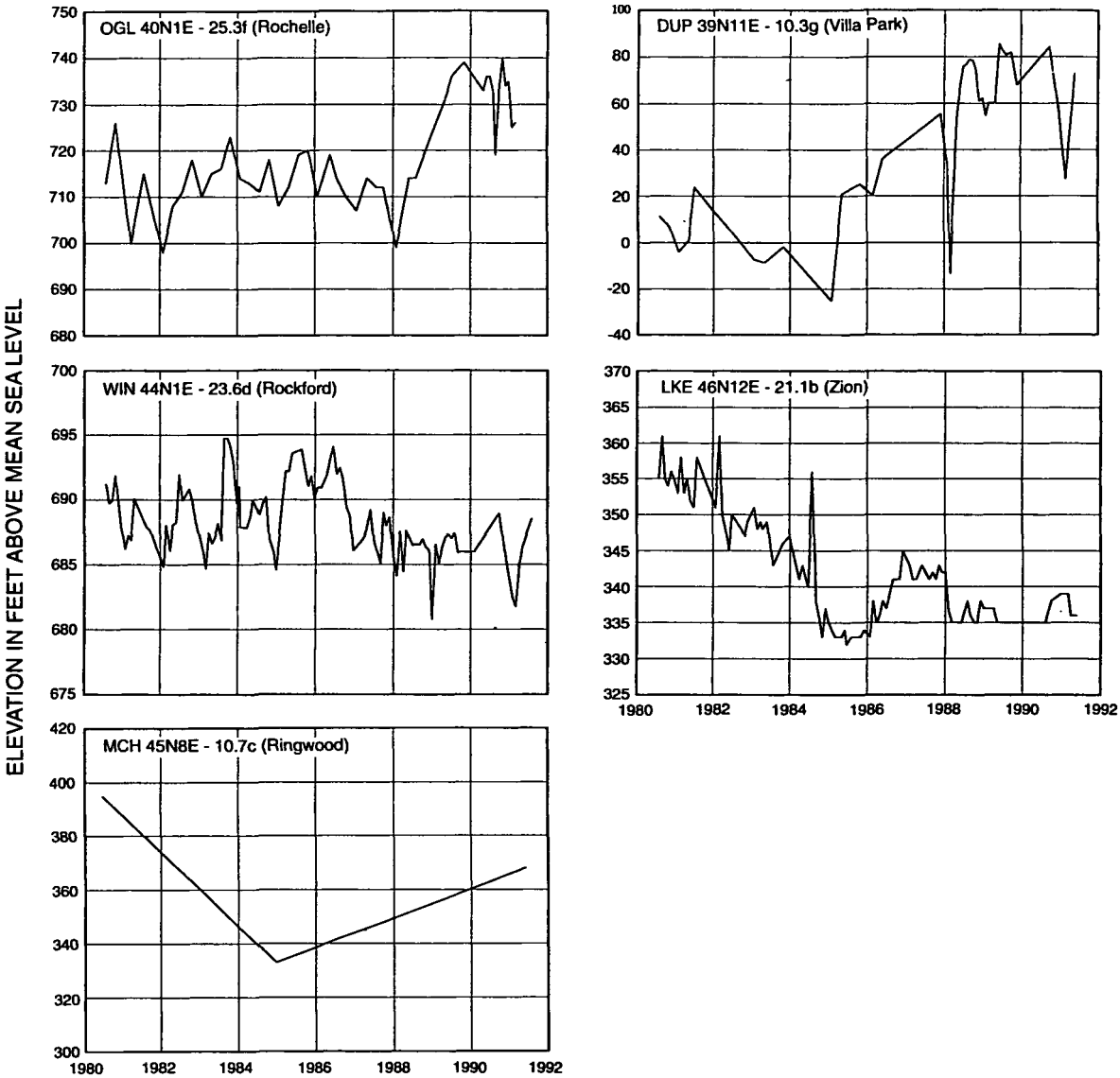


Figure 4. Concluded.

1950s and 1960s, reflecting dramatic increases in municipal and industrial dependence on the deep bedrock aquifers. Water-level declines continued through the 1970s and into the early 1980s, although at slower rates. Decreased pumpage and increased reliance on water from Lake Michigan for public water supplies since 1980 has slowed or reversed the downward trend in water levels in some parts of the Chicago region. Lower rates of decline or rises in water levels are illustrated during the 1980s in many of the hydrographs in figure 4.

Table 2 shows average annual water-level changes in 11 observation wells in the eight-county Chicago region for the periods 1971-1975, 1975-1980, 1980-1985, and 1985-1991. For the period

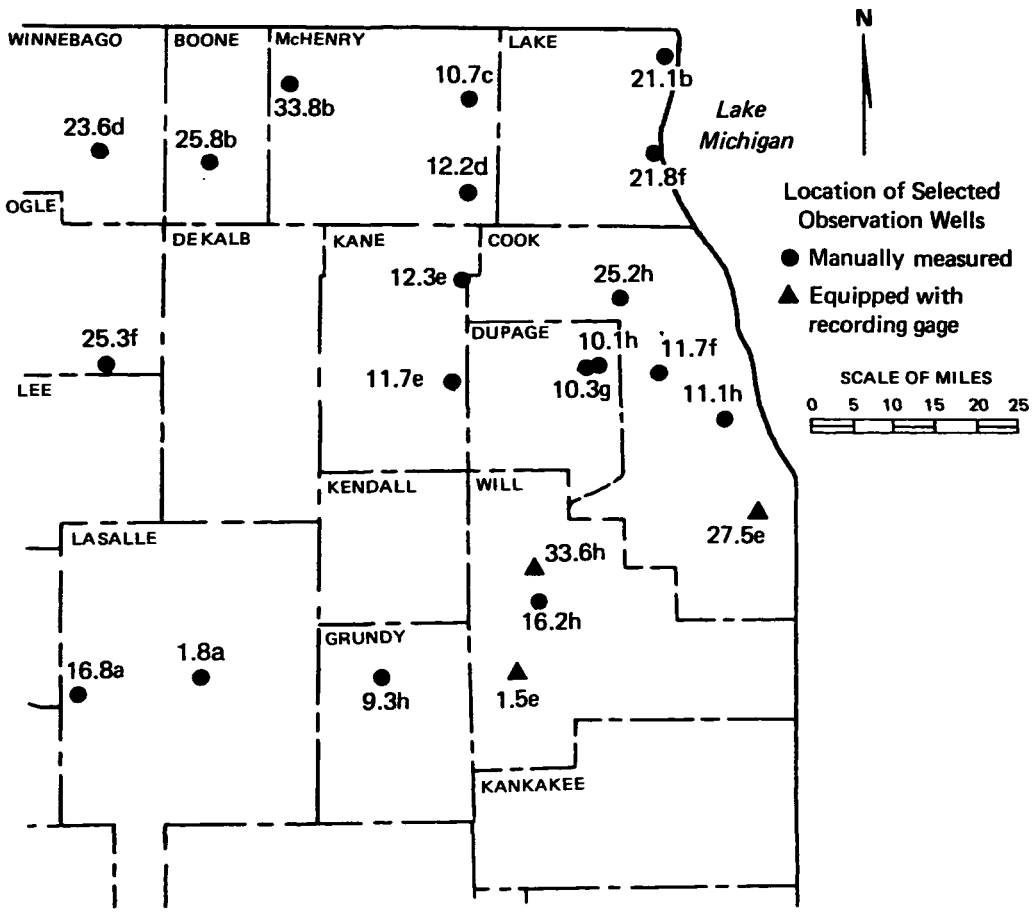


Figure 5. Location of selected wells for which hydrographs are shown in figures 4 and 6.

1971-1975, average changes in the observation wells ranged from a rise of 10.5 feet per year (ft/yr) at Geneva to a decline of 15.0 ft/yr on the north side of Joliet.

Water-level measurements for both 1971 and 1975 were available for 299 wells in the Chicago region. Of the 299, water levels declined in 276 wells, rose in 17 wells, and levels in six showed no change. Declines of 50 to 162 feet occurred in 109 wells. Rises of 84 to 122 feet occurred in three wells in Cook County, and rises of 10 to 45 feet occurred in 13 wells in Cook, Kane, Lake, and Will Counties.

Between 1975 and 1980, average water-level changes in the 11 observation wells shown in table 2 ranged from a rise of 2.2 ft/yr south of Joliet to a decline of 11.6 ft/yr in the center of Joliet. The water level at Geneva continued to rise.

A total of 349 wells were measured in the Chicago region in both 1975 and 1980. In 306 wells, water levels declined, in 40 they rose, and in three no change was noted. Declines of 50 to 149 feet

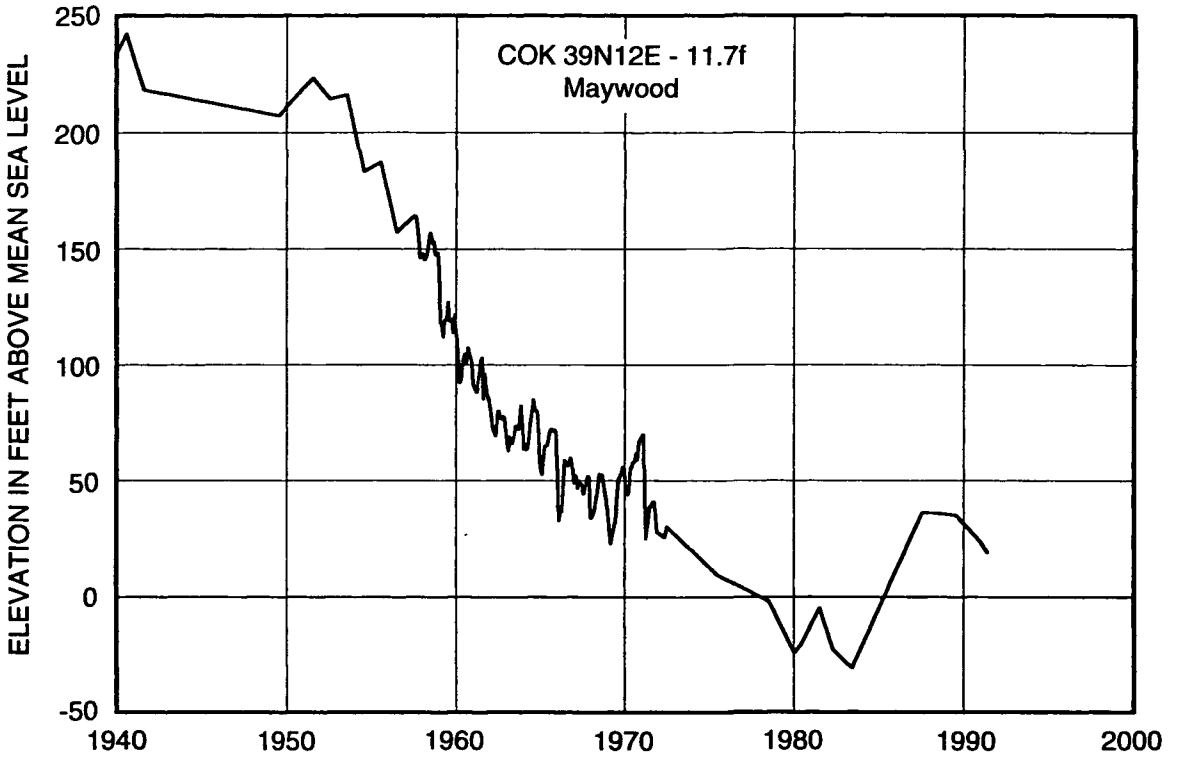


Figure 6. Representative trend of deep-well water levels in Cook County since 1940

were recorded in 148 of the wells. Water-level rises of 52 to 80 feet were observed in four wells in Cook, Kane, and Will Counties; rises of 10 to 47 feet occurred in 22 of them.

Between 1980 and 1985, water-level changes in the 11 observation wells ranged from arise of 8.0 ft/yr in the south part of Chicago to a decline of 25.8 ft/yr at Geneva. In six of the wells, water levels rose, in four they declined, and one showed no change. The dramatic change in levels at Geneva was attributed primarily to a change in the use of the observation well from an institutional supply with limited demand to a municipal supply with heavy demand. The upward trend in water levels noted at the well in south Chicago reflected the major shift of public water supply systems in south Cook County from well water to lake water during that period.

Of the 364 wells measured in both 1980 and 1985, 109 showed rises, 250 showed declines, and five showed no change. Changes in water levels ranged from a rise of 265 feet for one well in Lake County to a decline of 319 feet for one well in DuPage County. Water-level rises were recorded in 43 wells in Cook County, 25 in Will County, 17 in Kane County, and 11 in Lake County. Rises were also recorded in at least one well per county throughout the eight-county region. Water-level declines were also recorded in all eight counties, ranging from 95 wells in Cook County to nine in Kendall County.

From 1985 to 1991, average water-level changes in the 11 observation wells ranged from a rise of 11.5 ft/yr at DesPlaines to a decline of 6.3 ft/yr on the north edge of Joliet. Rises occurred in eight of the wells, and declines were observed in three wells, all in the Joliet area.

Table 2. Average Changes in Nonpumping Water Levels in Selected Cambrian and Ordovician Observation Wells in the Chicago Region (ft/yr)

Well & Location	*1971-1975*	*1975-1980*	*1980-1985*	*1985-1991*
COK 37N14E-27.5e (Chicago)	-7.3	-4.4	+8.0	+5.5
COK 38N13E-11.1h (Chicago)	-6.5	-2.8	+3.2	+5.2
COK 39N12E-11.7f (Maywood)	-6.7	-6.2	+4.6	+2.8
COK 41NllE-25.2h (Des Plaines)	+0.7	-4.4	+0.2	+ 11.5
KNE 39N8E-11.7e (Geneva)	+ 10.5	+ 1.8	-25.8*	+7.7
KNE 41N8E-12.3e (Elgin)	-3.5	-5.2	0.0	+6.8
LKE 44N12E-21.8f (Lake Bluff)	-6.3	-7.7	+ 1.6	+6.0
LKE 46N12E-21.1b (Zion)	-10.0	-9.4	-5.6	+0.5
WIL 33N9E-1.5e (Joliet)	-3.5	+2.2	+0.4	-0.3
WIL 35N10E-16.2h (Joliet)	-11.7	-11.6	-1.2	-1.3
WIL 36N10E-33.6h (Joliet)	-15.0	-6.0	-3.8	-6.3

*Institutional well changed to a municipal supply well.

Of the 387 wells that were measured in the eight-county Chicago region in fall 1991, 320 had also been measured in 1985. Water levels between 1985 and 1991 rose in 174 of these wells (54.4 percent), declined in 140 wells (43.8 percent), and six showed no change. This is a dramatic turnabout in proportions from the 1980-1985 figures, in which declines outnumbered rises by 68.7 to 29.9 percent. Rises and declines were observed in all eight of the Chicago-region counties, ranging from a rise of 218 feet in northern Cook County to a decline of 240 feet at Joliet in Will County. These figures are representative of trends in their respective counties: the largest percentage of rises was found in Cook County, and the largest percentage of declines was found in Will County.

Water-Level Changes —Regional Trends

Eight-County Chicago Region

A Chicago-region, county-by-county comparison of temporal water-level trends can be seen by comparing average annual water-level changes for the periods 1971-1975, 1975-1980, 1980-1985, and 1985-1991 (table 3).

During 1971-1975 and 1975-1980, average water levels declined in all eight counties. The overall weighted averages for the area were -12 ft/yr for 1971-1975, and -9 ft/yr for 1975-1980. Declines during 1971-1975 ranged from 6 ft/yr in McHenry County to 16 ft/yr in Grundy County. Declines exceeded 10 ft/yr in six of the counties. In the 1975-1980 period, declines ranged from 1 ft/yr in Kendall County to 14 ft/yr in Lake County. Declines exceeded 10 ft/yr in only three counties.

Table 3. Average Changes in Nonpumping Water Levels in Deep Bedrock Wells in the Eight-County Chicago Region (ft/yr)

County	*1971-1975*	*1975-1980*	*1980-1985*	*1985-1991*
Cook	-11	-10	-4	+ 12
DuPage	-13	-12	-9	+2
Grundy	-16	-5	-5	-2
Kane	-9	-7	-2	+ 1
Kendall	-12	-1	-3	-3
Lake	-10	-14	-1	+ 1
McHenry	-6	-8	-7	+ 1
Will	-14	-6	+2	-8
Weighted average	-12	-9	-3	+3
Number of observations	290	349	364	320

In 1980-1985, for the first time since about the mid-1950s, average annual water levels rose in one county (1.7 ft/yr in Will County). Also for the first time, average county water-level declines throughout the eight counties were less than 10 ft/yr, and the overall average decline was only 3 ft/yr.

In 1985, about 63 percent of the deep wells in western Cook County, 85 percent in eastern DuPage County, and 93 percent in the Joliet area of Will County had water-level elevations more than 50 feet below msl. In nearly 50 percent of the wells in these areas, water levels were more than 100 feet below msl.

In the period from 1985 to 1991, average water levels declined in only three counties: Grundy, Kendall, and Will. The largest decline was 8 ft/yr in Will County. In contrast, average water-level rises were noted in the remaining five counties. The largest rise, 12 ft/yr, was observed in Cook County. The weighted average for the area was a rise of 3 ft/yr.

In 1991 and 1985, approximately the same percentages of deep wells in western Cook and eastern DuPage Counties and in the Joliet area of Will County had water-level elevations more than 50 feet below msl. Water levels in 56 percent of the wells in these areas were more than 100 feet below msl in 1991.

The Extended Chicago Area

Regional water-level trends in selected deep wells in the extended area outside the eight-county Chicago region (table 4) show less fluctuation and are less well defined. In these areas, wells are fewer and more widely spaced, and in general, regional and local pumpage is considerably less.

Table 4. Average Changes in Nonpumping Water Levels in Selected Deep Bedrock Wells in the Extended Chicago Area (ft/yr)

Well & Location	*1971-1975*	*1975-1980*	*1980-1985*	*1985-1991*
BNE 44N3E-25.8b (Belvidere)	+0.8	+2.8	-2.0	+0.7
LAS 33N1E-16.8a (Peru)	-0.7	-0.6	+0.2	+0.2
LAS 33N3E-1.8a (Ottawa)	+0.8	-0.2	-2.8	+1.7
OGL 40N1E-25.3f (Rochelle)	-3.3	+2.6	+2.6	+1.5
WIN 44N1E-23.6d (Rockford)	-1.0	+0.8	+0.4	-1.2

Also, the proximity to the primary recharge area in north-central Illinois lessens the effect of pumpage on water levels.

During the periods 1971-1975, 1975-1980, and 1980-1985, average water-level changes in five selected observation wells in the extended area ranged from a rise of 2.8 ft/yr (during the middle period at Belvidere in Boone County) to a decline of 3.3 ft/yr (during the early period at Rochelle in Ogle County). None of the five wells exhibited continuous declines or rises during these periods.

During the period 1985-1991, average water-level changes were positive (rises) in all but the well at Rockford in Winnebago County. Rises ranged from 0.2 ft/yr at Peru to 1.7 ft/yr **at** Ottawa, both in LaSalle County. Levels at Rockford declined an average of 1.2 ft/yr.

Water levels in 113 wells in six northeastern Illinois counties in the extended area were measured in both 1985 and 1991. Thirty-one wells, in five of the counties, indicated water-level rises. They ranged from one foot in both LaS alle and Winnebago Counties to 95 feet in Ogle County. Rises of 50 feet or more were observed in two wells in LaSalle County and in one well in Ogle County. Declines were noted in 77 wells in all six counties, ranging from one foot in DeKalb, LaSalle, and Winnebago Counties to 126 feet in Ogle County. The large decline in Ogle County occurred at an industrial well. Declines of 50 feet or more were seen at four wells in DeKalb County and at one well in both Kankakee and Ogle Counties. Overall, the weighted average water-level change was -0.9 ft/yr and ranged from +3.8 ft/yr in Kankakee County to -3.1 ft/yr in DeKalb County.

POTENTIOMETRIC SURFACE OF THE DEEP BEDROCK AQUIFERS

The potentiometric surf ace is an imaginary level to which water will rise in tightly cased wells (which do not allow vertical communication between aquifers). The term "potentiometric surface" is replacing the term "piezometric surface," which was used in all but the most recent reports of this series. "Piezometric surface" was originally used to imply an artesian head at some level above the top of the aquifer. Potentiometric surface more appropriately refers to the water-level surface, whether or not it is above the top of the aquifer.

Previous reports have included several potentiometric surface maps of areas of the deep bedrock aquifers in northern Illinois. Maps of 1950 (Foley and Smith, 1954), 1971 (Sasman et al., 1973), and 1980 (Sasman et al., 1982) cover all of the northern part of the state. Maps of 1958 (Suter etal., 1959), 1959 (Walton etal., 1960), 1960 (Sasman etal., 1961), 1961 (Sasmanetal., 1962), 1966 (Sasman et al., 1967), 1975 (Sasman et al., 1977), 1980 (Sasman et al., 1982), and 1985 (Sasman et al., 1986) have been limited to northeastern Illinois. The 1980 map included coverages of both the northern and northeastern portions of the state.

Potentiometric Surface, 1985

Figure 7 shows the potentiometric surface of the deep bedrock aquifers in fall 1985. Water-level data included in the appendix were used to prepare the map. The general features of the 1985 potentiometric surface map differ very little from those of the potentiometric maps for 1975 and 1980. The deepest cones of depression in the Chicago region were in the vicinity of Elk Grove, Elmhurst, and Joliet, where some levels were more than 225 feet below msl. Pronounced cones of depression were also apparent at Arlington Heights, Mt. Prospect, Bensenville, Bellwood, Oak

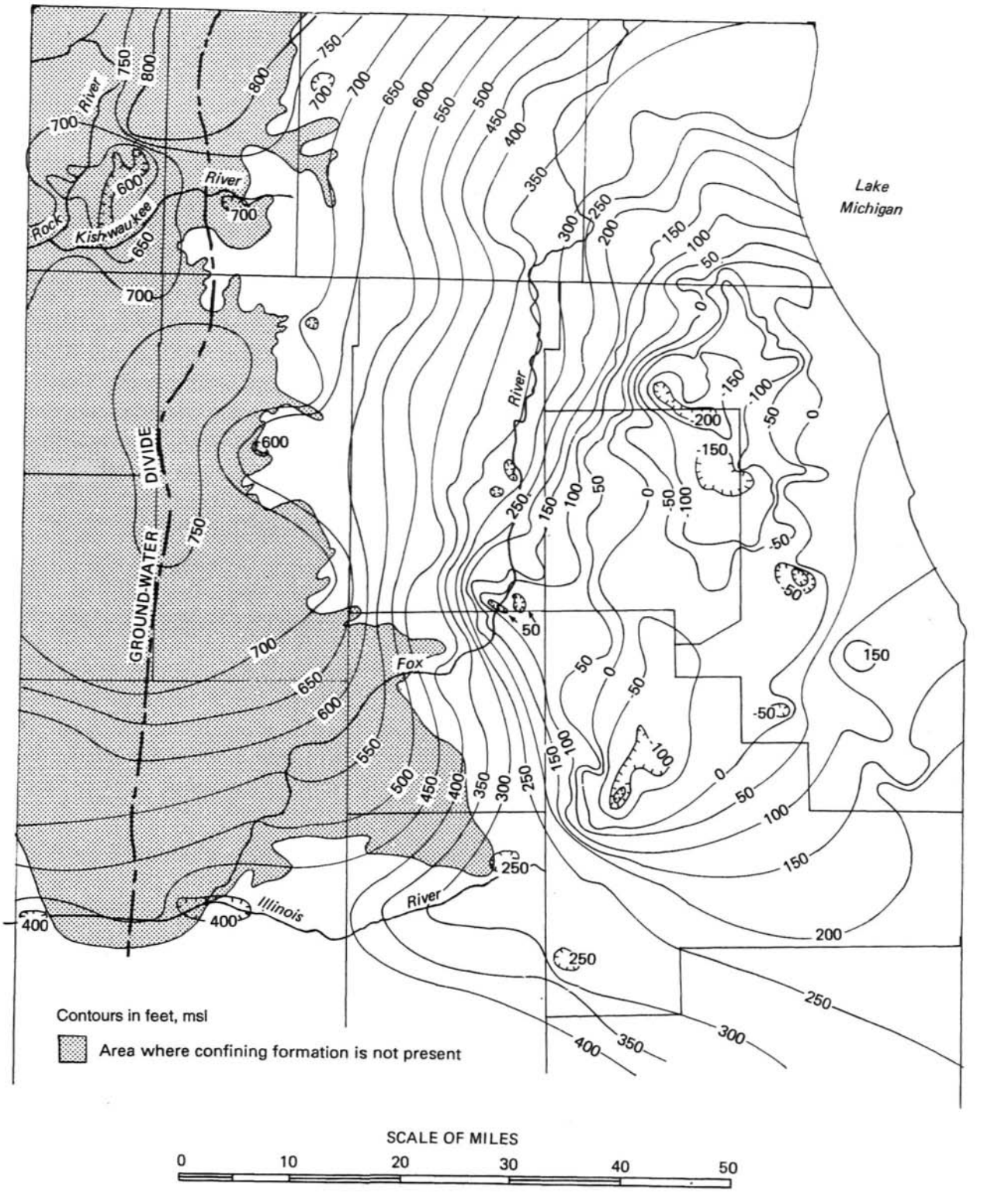


Figure 7. Potentiometric surface of the deep bedrock aquifers in northeastern Illinois, fall 1985 (from Sasman et al., 1986)

Brook, and Aurora. The zero-foot msl potentiometric surface areas, centered around Joliet, Elmhurst, and Arlington Heights, included almost all of western and northern Cook County, most of eastern DuPage County, and a large area of northwestern Will County, totaling about 712 square miles. Contours of -100 feet msl enclosed extensive areas in northern Cook County, western Cook and eastern DuPage Counties, and the Joliet area in Will County, an area of about 166 square miles.

Other depressions in the potentiometric surface in the Chicago region were also apparent in southern and northern Cook County, southwestern DuPage County, eastern McHenry County, and central Grundy County. The potentiometric surface fell below the top of the Ancell aquifer in large areas of northern Cook County, much of DuPage County, and in the Joliet area. Outside of the Chicago region, mis was also the case for an area in LaSalle County centered around the Illinois River valley, where the Ancell is the uppermost bedrock unit due to preglacial faulting and erosion.

The 1985 potentiometric surface map showed die highest elevations in north-central Illinois in Boone/Winnebago and DeKalb/Lee/Ogle Counties. A major cone of depression in the potentiometric surface was apparent at Rockford, and smaller depressions were seen at DeKalb, Belvidere, LaSalle-Peru, and Ottawa.

The general pattern of ground-water flow in the deep bedrock aquifers in 1985 was pri-marily from high elevations in north-central Illinois toward the deep cones of depression centered in Arlington Heights-Elk Grove-Mt. Prospect, Bensenville-Elmhurst, Bellwood, and Joliet. Some of the water moving toward these areas was intercepted by enlarging pumping centers at Aurora, Geneva-St. Charles, Naperville, Lake Zurich, Minooka-Morris, and other locations. In addition, water from the recharge area west of the Chicago region was diverted into cones of depression at Rockford, Belvidere, DeKalb, and the Illinois River valley in LaSalle County.

Potentiometric Surface, 1991

Figure 8 shows the potentiometric surface of the deep bedrock aquifers in fall 1991. Water-level data shown in the appendix were used to prepare the map. The general features of the 1991 potentiometric surface map closely resemble those of the maps for 1980 and 1985.

The deepest cones of depression in the Chicago region in 1991 were again in the Joliet and Elmhurst areas, where levels were as much as 300 feet and 180 feet, below msl, respectively. The major cone of depression observed at Elk Grove in 1985 was no longer present. But significant cones of depression were present at Morton Grove-Niles and Prospect Heights in northern Cook County, Aurora in Kane County, Mundelein-Vernon Hills and Lincolnshire in southern Lake County, and the Crystal Lake and Ringwood areas in McHenry County.

The zero-foot msl contour line encompassed eastern and southern DuPage County, much of western and southwestern Cook County, aportion of southern Lake County, and most of the northern half of Will County. The areal extent of this contour has diminished since 1985 to about 647 square miles. The minus 100-foot contour extended for about 151 square miles around the Elmhurst and Joliet areas.

Other notable depressions in the potentiometric surface were identified in southwestern Will County and northeastern and southeastern Grundy County. The potentiometric surface fell below the top of the Ancell aquifer in large portions of central and eastern DuPage County, in northern Will County, and in small portions of Kane, Kendall, and Grundy Counties. Together, these depressions

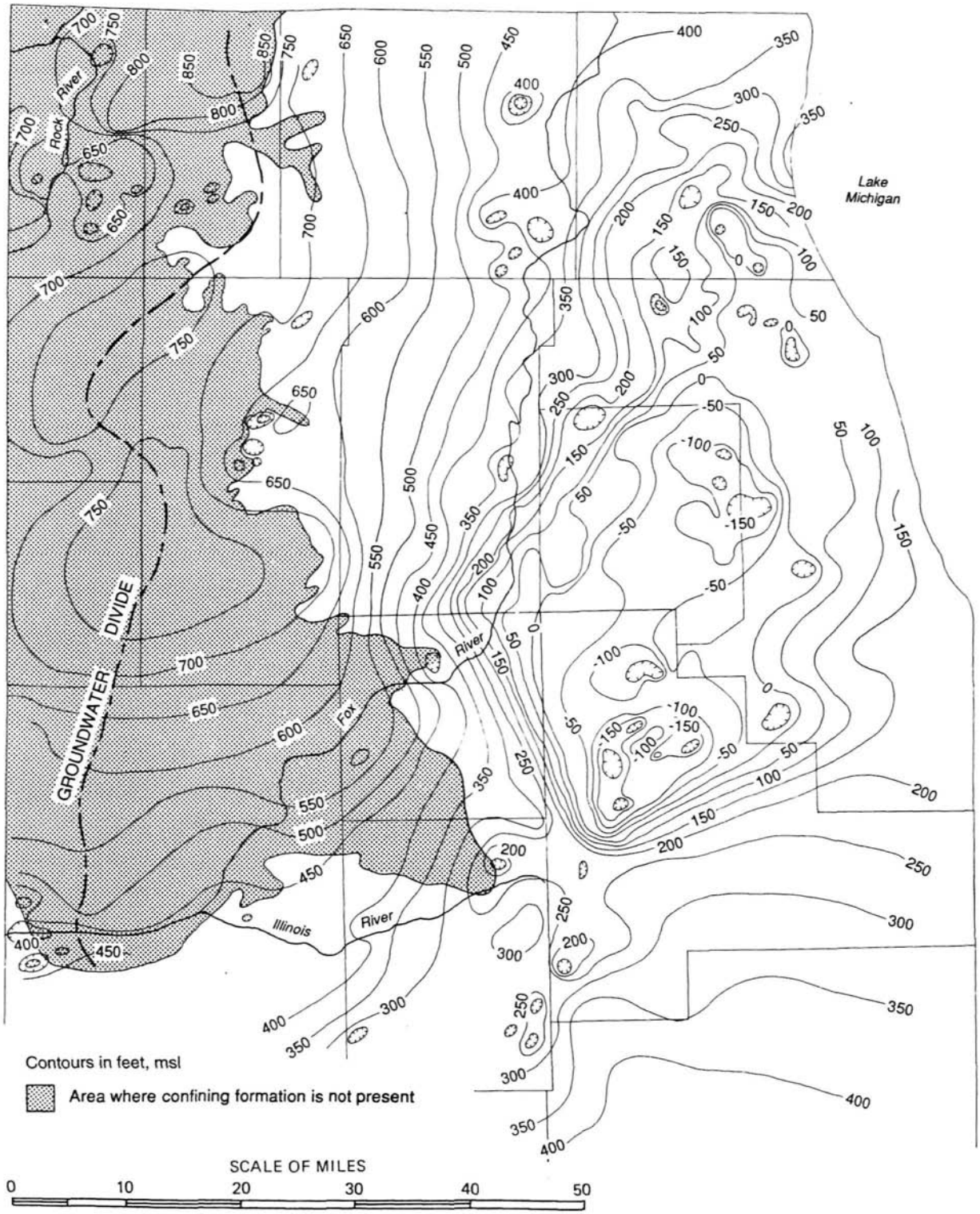


Figure 8. Potentiometric surface of the deep bedrock aquifers in northeastern Illinois, fall 1991

amount to approximately 366 square miles. An area of similar size was dewatered along the Illinois River valley in LaSalle County.

For the entire study area, the 1991 potentiometric surface map showed the areas of highest elevation once more in Boone/Winnebago and DeKalb/Lee/Ogle Counties. A major depression in the potentiometric surface was apparent at Rockford, and smaller depressions were once again seen at Belvidere, DeKalb, Ottawa, and LaSalle-Peru.

The general pattern of ground-water flow in the deep bedrock aquifers continued to originate from high elevations in north-central Illinois toward the east and southeast. Locally, flow traveled toward the deep cones of depression in southern Lake and northern Cook Counties, Elmhurst, and Joliet. Some of the water moving toward these cones of depression was intercepted by pumping centers at Aurora, Bloomingdale-Carol Stream, Geneva-St. Charles, Morris, Naperville, and industrial pumping centers in Grundy, southern Cook, and southern Will Counties. In addition, water from the recharge area west of the Chicago region was diverted into cones of depression at Rockford, Belvidere, DeKalb, and the Illinois River valley in LaSalle County. The approximate limit of diversion for the deep bedrock aquifers west of the Chicago region is shown by the ground-water divides in figures 7 and 8.

Change in Potentiometric Surface, 1985-1991

The potentiometric surface maps and the observed water-level changes in deep wells for 1985 and 1991 were used to prepare a map of water-level changes (figure 9). The potentiometric surface maps were overlaid on one another, and the 1991 contours were subtracted from those on the 1985 map. The resulting data points, along with observed changes in deep wells, were used in constructing the change map. Water-level changes observed in wells between 1985 and 1991 are listed in the appendix.

The changes were considerable, even within areas of heavy regional pumpage. The most obvious **recovery** of deep water levels occurred in northern Cook County, where water levels rose more than 200 feet. This recovery was primarily due to the transition from the use of deep well water to the use of lake water for public supplies. Water-level rises were also found in southeast McHenry, southern Cook, and east-central Will Counties; small areas of eastern and southern Lake County; and at several other limited areas throu ghout the region. In the eight-county Chicago region, water-level rises of 50 feet or more occurred over an area of about 831 square miles or 18.6 percent of the region. Rises of 100 feet or more occurred over an area of about 354 square miles or 7.9 percent of the area.

Declines in the potentiometric surface were greatest in the Joliet area, where water levels fell more than 200 feet. A major area with declines of 50 feet or more extended over large por-tions of northern and southwestern Will County; portions of southern Lake, northern McHenry, northeastern and southwestern Kendall, southern DuPage, and southeastern Kane Counties; and scattered portions of Grundy County. In the eight-county region, declines of 50 feet or more extended over an area of about 557 square miles or 12 percent of the area. Declines of 100 feet or more occurred over an area of about 157 square miles or less than 4 percent of the area.

Outside of the eight-county Chicago region, rises and declines of 50 feet or more were observed in limited areas, the most notable being in the Rockford area.

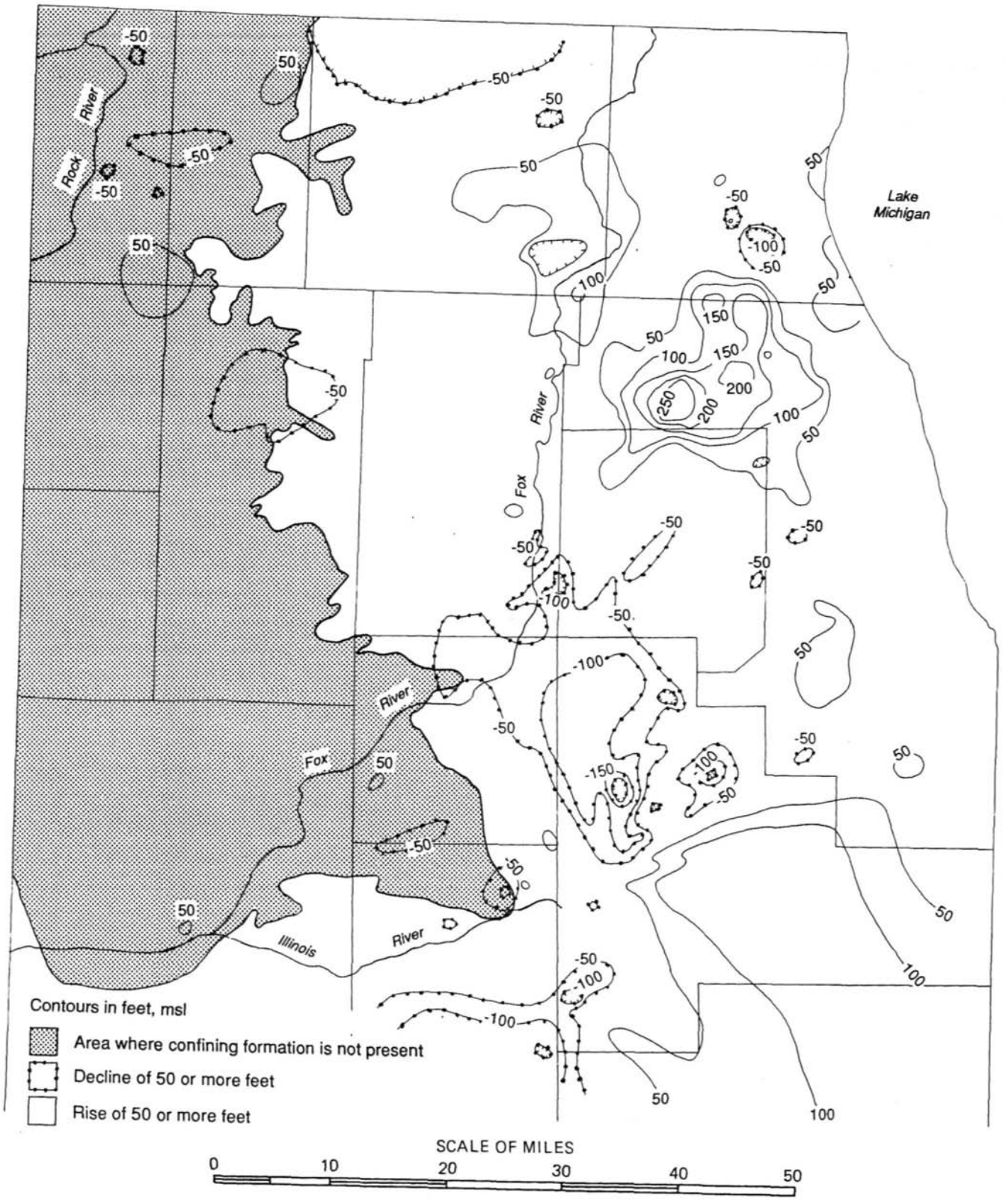


Figure 9. Changes in the potentiometric surface of the deep bedrock aquifers in northeastern Illinois, 1985-1991

Appendix: Water-level Elevations of the Deep Bedrock Aquifers in Northern Illinois, 1985-1991

County Location	*Well no.*	*Owner*	*Depth fi.*	*Surface elev.*	*Watter level elevation 1985*	*Water level elevation 1991*	*Water level changes,ft. 1985-1991*
Boone							
00744N03E24.8a	**6**	**Belvidere**	**868**	**874**	**722**	**717**	**-5**
00744N03E25.3d	**1**	**Pillsbury-Green Giant Pckg Co.**	**627**	**770**		**698**	
00744N03E25.4d	**2**	**Pillsbury-Green Giant Pckg Co.**	**550**	**770**		**704**	
00744N03E25.6d	**2**	**Dean Foods Co.**	**868**	**770**	**712**	**680**	**-32**
00744N03E25.8b	**3**	**Belvidere**	**1803**	**765**	**743**	**747**	**4**
00744N03E26.1e	**4**	**Belvidere**	**1800**	**778**	**716**	**711**	**-5**
00744N03E34.2a	**8**	**Belvidere**	**1393**	**780**		**610**	
00744N03E35.1f	**5**	**Belvidere**	**610**	**800**	**728**	**745**	**17**
00744N03E36.2g	**7**	**Belvidere**	**969**	**840**	**652**	**610**	**-42**
00744N04E11.7h	**1**	**Capron**	**880**	**912**		**860**	
00744N04E19.8f	**1**	**McLay Grain co.**	**570**	**892**	**838**	**834**	**-4**
Cook							
03135N13E01.1d	**602**	**Flossmoor (2A)**	**1764**	**674**	**144**	**173**	**29**
03135N13E02.3a	**606**	**Flossmoor (6A)**	**1784**	**705**	**127**	**159**	**32**
03135N13E12.3b	**607**	**Flossmoor (7A)**	**1722**	**653**	**158**	**182**	**24**
03135N14E08.5e	**32**	**Chicago Heights**	**1777**	**652**	**112**		
03135N14E19.4c	**22**	**Chicago Heights**	**1800**	**677**	**209**	**222**	**13**
03135N14E21.2h	**2**	**Rhone Poulenc Co.**	**1797**	**640**	**127**	**156**	**29**
03135N14E23.6e	**3**	**Ford Heights**	**1858**	**667**	**237**		
03136N12E02.5h	**11**	**Orland Park**	**1683**	**712**	**2**	**54**	**52**
03136N12E03.5d	**609**	**Orland Park (9D)**	**1706**	**705**	**38**	**51**	**13**
03136N12E13.1d	**6**	**Orland Park**	**1809**	**732**	**62**	**91**	**29**
03136N12E15.1a	**10**	**Orland Park**	**1718**	**720**	**-126**		
03136N12E22.6b	**3**	**Citizens Fernway Utility Co.**	**1712**	**720**	**-5**	**-65**	**-60**
03136N13E01.2g	**1**	**NBI Industrial Terminal**	**1618**	**597**	**117**	**139**	**22**
03136N13E09.8b	**1**	**Oak Forest**	**1701**	**672**	**77**	**104**	**27**
03137N11E14.8c	**3**	**Powell Duffryn Terminal**	**1464**	**585**	**-15**	**-25**	**-10**
03137N11E28.3b	**1**	**DeAndreis Seminary**	**1690**	**740**	**-48**	**-40**	**8**
03137N11E29.1g	**4**	**Lemont**	**1685**	**737**	**-54**	**-51**	**3**
03137N11E29.4b	**3**	**Lemont**	**1723**	**743**	**-90**	**-69**	**21**
03137N12E02.8h	**2**	**Hickory Hills**	**1608**	**685**	**-21**	**43**	**64**
03137N13E26.1g	**3**	**Oak Hill Cemetery**	**1637**	**617**	**227**	**235**	**8**
03137N14E27.5e	**1118**	**Met. Wtr. Recl. Dist.**	**1683**	**590**	**131**	**164**	**33**
03138N12E01.8g	**2**	**Lyons**	**2020**	**621**	**-27**		
03138N12E05.8d	**3**	**Western Springs**	**1600**	**673**	**-124**	**-96**	**28**
03138N12E06.6b	**4**	**Western Springs**	**1913**	**642**	**-58**	**-66**	**-8**
03138N12E18.8g	**3**	**Suburban Hospital**	**1540**	**689**	**38**	**10**	**-28**
03138N12E23.2g	**13**	**CPC International, Inc.**	**1525**	**600**	**-92**	**-35**	**57**
03138N12E24.1g	**12**	**CPC International, Inc.**	**1507**	**597**	**-157**		
03138N12E24.7h	**14**	**CPC International, Inc.**	**1481**	**597**	**-158**	**-88**	**70**
03138N13E08.1f	**4**	**Rose Packing Co.**	**1590**	**594**	**44**	**72**	**28**
03138N13E11.1h	**1**	**Bradshaw-Praeger & Co.**	**1224**	**597**	**54**	**85**	**31**
03138N13E19.4f	**3**	**Viskase Corporation**	**1665**	**621**		**-36**	
03138N13E19.6f	**2**	**Viskase Corporation**	**1590**	**619**	**-60**	**-41**	**19**
03138N13E21.1f	**2**	**Cracker Jack Co.**	**1585**	**620**	**37**		
03138N13E27.5g	**1**	**Tootsie Roll Industries**	**1565**	**617**		**62**	
03138N14E07.6c	**1**	**Fleischmann-Kurth Malting Co.**	**1523**	**594**		**102**	
03138N14E07.6d	**2**	**Fleischmann-Kurth Malting Co.**	**1583**	**594**		**94**	
03138N14E07.7g	**3**	**Standard Brands**	**1960**	**602**		**99**	
03139N12E08.5g	**4**	**Bellwood**	**1960**	**645**	**-145**	**-110**	**35**
03139N12E09.3f	**1**	**Bellwood**	**1956**	**636**	**-128**	**-33**	**95**
03139N12E09.5a	**3**	**Bellwood**	**1480**	**624**	**-227**	**-96**	**131**
03139N12E09.5d	**2**	**Bellwood**	**1966**	**632**	**-108**		
03139N12E11.7f	**3**	**Maywood**	**1640**	**630**	**4**	**21**	**17**
03139N12E16.2f	**5**	**Bellwood**	**1845**	**627**	**-159**	**-167**	**-8**
03139N12E35.3h	**2**	**Brookfield Zoological Park**	**2081**	**615**	**-85**	**31**	**116**

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes,ft. 1985-1991
Cook (cont'd)							
03139N12E36.8d	3	Riverside	2047	618			
03139N13E21.6g	1	Kropp Forge Co.	1636	608		-102	
03139N13E33.4a	1	Waste Management	1650	589	41	53	12
03139N14E21.7b	1	Industrial Coatings Group, Inc.	1610	593	69		
03139N14E21.7b	2	Industrial Coatings Group, Inc.	1603	593			
03140N12E18.6c	1	Nelson Wire Co.	1457	663	-133	-81	52
03140N12E31.4c	2	AG Communications System 5 Inc	1468	655	-183	-105	78
03140N12E31.4d	1	AG Communications System 5 Inc	1470	655	-135	-85	50
03140N12E31.4d	3	AG Communications System 5 Inc	1487	655	-55		
03140N12E35.2f	3	Oak Park Country Club	1497	627		30	
03141N09E23.5g	3	Streamwood	1410	820	222	302	80
03141N09E36.3f	2	Hanover Park	1429	828	68	173	105
03141N09E36.6b	4	Hanover Park	1310	820	188		
03141N10E06.5b	10	Hoffman Estates	1357	810	132	228	96
03141N10E12.3g	21	Schaumburg	1355	735		60	
03141N10E31.3e	3	Hanover Park	1952	798	88	201	113
03141N10E34.8h	15	Schaumburg	1350	810		165	
03141N10E36.4g	7	Elk Grove Village	1365	720	-270		
03141N10E36.8b	11	Elk Grove Village	1367	725	-171	34	205
03141N11E08.3a	6	Rolling Meadows	1602	694	-136	82	218
03141N11E09.7g	1	U.S. Army Facility Eng.	1812	712	35	114	79
03141N11E12.8h	3	Mt. Prospect	1935	670	-150		
03141N11E14.5b	3	Citizens Util. Co. - Waycinden	1382	672	-153	32	185
03141N11E16.2h	12	Arlington Heights	1780	714	-111		
03141N11E21.1b	1	Elk Grove Village	1415	715	-106		
03141N11E23.7f	16	Mt. Prospect	1961	675	-144	37	181
03141N11E24.1f	2	Citizens Waycinden Division	1652	660	-160	10	170
03141N11E2S.2h	7	Des Plaines	1815	655	117	186	69
03141N11E2S.6b	4	Touhy Mobile Homes	1515	657	-142	-118	24
03141N11E25.6b	5	Touhy Mobile Homes	940	657	30	65	35
03141N11E26.8a	2	Elk Grove Village	1395	682	-188		
03141N11E27.3f	9	Elk Grove Village	1403	682	-243	-33	210
03141N11E31.3a	14	Elk Grove Village	1390	702	-208	-16	192
03141N11E32.5g	3	Elk Grove Village	1408	705	-125		
03141N11E33.7b	5	Elk Grove Village	1403	685	-199		
03141N12E12.7b	3	North Suburban Public Util.	1423	661	-139	-23	116
03141N12E12.7d	2	North Suburban Public Util.	1402	658	-117		
03141N12E12.8b	1	North Suburban Public Util.	1414	662	-128	-66	62
03141N12E26.6e	1	Park Ridge Country Club	1355	643	-27	10	37
03141N13E08.6d	2	Glenview Club	1546	649	3		
03141N13E20.7e	1	Equity Financial Mgmt. Co.	1414	627	13	27	14
03141N13E22.4g	2	Evanston Country Club	1465	608	-52	34	86
03141N13E29.8d	1	Howard Commons	1465	624	-3	34	37
03142N09E34.7a	1	Allstate Insurance Co.	1250	850	310	450	140
03142N09E34.8a	3	Allstate Insurance Co.	1370	850		310	
03142N10E01.4h	16	Palatine	1616	745	-20		
03142N10E01.8f	15	Palatine	1603	750	-10	174	184
03142N10E14.6h	10	Palatine	1995	750	60	198	138
03142N10E15.3f	7	Palatine	1350	750	-95	40	135
03142N10E24.8a	1	Arlington Park Jockey Club	1825	724	10	144	134
03142N10E25.8g	4	Arlington Park Jockey Club	1906	728	78	33	-45
03142N10E26.4h	5	Rolling Meadows	1555	733	9	140	131
03142N10E29.7e	9	Hoffman Estates	1392	820	92	172	80
03142N11E03.3b	5	Wheeling	1355	650	-106		
03142N11E05.8e	1	Buffalo Grove	1335	725	-75	100	175

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes,ft. 1985-1991
Cook (cont'd)							
03142N11E06.6C	13	Arlington Heights	1795	730	30	140	110
03142N11E08.1a	11	Arlington Heights	1647	689	-36	144	180
03142N11E10.7a	7	Wheeling	1350	661	-110	71	181
03142N11E12.7b	1	Plum Creek Condominiums	1338	640	18	38	20
03142N11E12.8b	2	Plum Creek Condominiums	1323	645	51		
03142N11E17.7e	9	Arlington Heights	1532	691	-19		
03142N11E24.3g	5	Citizens Chicago Sub. Util Div	1320	638	-90	-2	88
03142N11E24.4d	4	Citizens Chicago Sub. Util Div	1323	642	-120	-23	97
03142N11E24.5f	6	Citizens Chicago Sub. Util Div	1323	643	-112	5	117
03142N11E26.4h	2	Prospect Heights	1318	648	-147	-2	145
03142N11E26.7d	2	Citizens Chicago Sub. Util Div	1468	661	-134	36	170
03142N11E27.5h	17	Mt. Prospect	1282	663	-172	11	183
03142N11E30.3b	17	Arlington Heights	1323	708	-80	53	133
03142N11E31.7a	16	Arlington Heights	1810	698	-77	103	180
03142N11E33.3b	4	Mt. Prospect	1950	693	-147	63	210
03142N11E34.4g	5	Mt. Prospect	1822	670	-115	15	130
03142N12E14.2a	3	Sunset Ridge Country Club	1396	655	1	21	20
03142N12E14.2c	2	Sunset Ridge Country Club	1247	655	13	52	39
03142N12E14.8e	3	Divine Word Seminary	1190	665	5	135	130
03142N12E18.1e	1	Mission Brook San. Dist.	1399	685	-36	35	71
03142N12E18.2b	1	Illinois Bell Telephone Co.	1380	660	-33	6	39
03142N12E18.3a	1	Culligan U.S.A.	1380	652	-56	-63	-7
03142N12E18.3e	1	Mission Hills Country Club	1400	660	-17	25	42
03142N12E18.4a	1	Imcera Group Inc.	1330	660	-5	56	61
03142N12E19.1b	3	Allstate Insurance Co.	1401	662	-41	-6	35
03142N12E19.1c	1	Allstate Insurance Co.	1400	663	-64	-3	61
03142N12E19.1d	2	Allstate Insurance Co.	1404	663	-47	25	72
03142N12E19.2a	4	Allstate Insurance Co.	1400	655	-46	6	52
03142N12E19.2e	2	Nielsen Co.	1400	657	-102	23	125
03142N12E19.2h	2	Culligan U.S.A.	1380	655	-45	-100	-55
03142N12E19.3a	1	Allstate Ins. Co. - West Plaza	1352	640		-1	
03142N12E19.3f	1	Nielsen Co.	1400	655	-61	-10	51
03142N12E19.4b	2	Allstate Ins. Co. - West Plaza	1328	650		30	
03142N12E19.4e	1	Household Finance Corp.	1308	648	48	83	35
03142N12E23.5f	3	Convent of the Holy Spirit	1451	648	146		
03142N12E23.6b	2	Sunset Mobil Home Park	1415	626		39	
03142N12E28.7e	1	Signode Steel Strapping Co.	1452	670	-70	-35	35
03142N12E29.1h	1	Glenbrook Hospital	1406	677	-27	22	49
03142N12E32.4f	1	Life Source	1465	670	-29	15	44
03142N12E32.6f	2	Zenith Radio Corp.	1400	662	-41	127	168
03142N12E36.7e	2	North Shore Country Club	2400	645		48	
DeKalb							
03737N05E32.1c	1	Somonauk	190	685	663	656	-7
03737N05E32.1c	2	Somonauk	502	685	662	656	-6
03737N05E36.7g	3	Sandwich	610	655	645	639	-6
03737N05E36.7h	1	Sandwich	600	667	639	647	8
03737N05E36.7h	2	Sandwich	600	667	632	635	3
03738N04E15.8d	3	Waterman	400	813		771	
03738N04E16.2d	2	Waterman	400	825		770	
03738N05E14.4d	3	Hinckley	605	740	708	708	0
03738N05E15.2d	2	Hinckley	708	740	718	718	0
03740N03E15.7c	2	Kishwaukee College	920	910	736	705	-31
03740N03E23.6e	2	Malta	1254	915	741	735	-6
03740N03E23.7e	1	Malta	853	915	771	770	-1

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, ft. 1985-1991
DeKalb (cont'd)							
03740N04E01.4e	7	Sycamore	1233	835	609	525	-84
03740N04E10.7b	14	DeKalb	1313	890		604	
03740N04E15.7a	6	DeKalb	1291	855	599	594	-5
03740N04E16.1g	1	DeKalb Univ. Development Corp.	80S	880	790	730	-60
03740N04E16.2g	2	DeKalb Univ. Development Corp.	970	883	745	720	-25
03740N04E21.4f	10	DeKalb	1310	880	624	623	-1
03740N04E23.5d	4	DeKalb	1325	885	597	592	-5
03740N04E26.3g	1	Del Monte Corp.	1324	890	632	600	-32
03740N04E26.3g	2	Del Monte Corp.	1345	890	625	635	10
03740N04E26.6e	7	DeKalb	1315	885	604	561	-43
03740N04E33.1h	12	DeKalb	1200	862	639	584	-55
03740N04E34.Sc	13	DeKalb	1222	865		641	
03740N05E05.5e	5	Sycamore	1270	872	595		
03740N05E06.7a	8	Sycamore	1300	880		641	
03741N05E32.1g	3	Sycamore	1002	845	819	737	-82
03741N05E32.3e	1	Sycamore	902	870	826	815	-11
03741N05E32.7g	6	Sycamore	1214	845		615	
03742N03E26.3h	0	Kirkland	737	767		761	
03742N03E26.3h	1	Kirkland	636	764	761	752	-9
03742N04E22.7a	2	Kingston	755	830		703	
03742N04E22.7a	3	Kingston	717	830		690	
03742N05E19.4b	3	Genoa	732	830	723	710	-13
03742N05E20.7a	4	Genoa	770	847	647	642	-5
DuPage							
04337NllE02.7d	4	Southeast Region Water Facilty	1610	710	-11	-10	1
04338N09E01.5a	28	Naperville	1490	730		-40	
04338N09E13.2b	7	Naperville	1445	680	-30		
04338N09E15.7d	1	J.S. Plastics Co.	1000	704	136	135	-1
04338N09E22.2h	26	Naperville	1500	700		-17	
04338N09E29.5f	22	Aurora	1420	684	62	-6	-68
04338N10E18.3d	25	Naperville	1491	695		-63	
04338N10E30.4d	16	Naperville	1478	690	-5	-25	-20
04338N10E33.4h	20	Naperville	1572	748	-47		
04338N11E03.7e	13	Westmont	1578	740	-81	-96	-15
04338N11E10.7e	11	Westmont	1604	751	-57	-58	-1
04338N11E11.Sc	7	Clarendon Hills	1585	722	-71	-143	-72
04338N11E23.5e	3	Willowbrook	1620	734	-98	-58	40
04338N11E28.1C	4	Darien	1612	767	-28	-43	-15
04339N09E04.1b	3	West Chicago	1378	762	152	123	-29
04339N09E05.4d	5	West Chicago	1376	751	128	136	8
04339N09E15.7h	4	West Chicago	1465	746	85	48	-37
04339N09E19.6c	4	Fermi Nat. Accelerator Lab.	1432	756	151	131	-20
04339N10E01.5e	1	Comm. Ed. - Lombard Station	1565	740	-45	-47	-2
04339N11E04.1e	7	Villi Park	1420	702	-160	-143	17
04339N11E0S.2c	9	Lombard	1431	710	-137	-125	12
04339NUE06.3a	4	Lombard	2062	698	-86	-67	19
04339N11E09.1h	1	Villa Park	'1441	694	-168	-177	-9
04339N11E09.2h	2	Villa Park	1605	699	-141	-95	46
04339N11E10.1h	4	Elmhurst	1400	669	-181	-176	5
04339NUE10.3g	11	Ovaltine Food Products	1897	670	20	73	53
04339NllE10.4g	7	Ovaltine Food Products	1936	675	73		
04339NllE12.8e	5	Elmhurst	1480	677	-163		
04339NllE13.3g	10	Elmhurst	1567	705	-145	-150	-5
04339NUElS.8d	10	Villa Park	1458	685	-117	-79	38

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, ft. 1985-1991
DuPage (cont'd)							
04339N11E16.1b	8	Villa Park	1485	705	-148	-143	5
04339N11E17.8d	7	Lombard	1520	730	-71	-100	-29
04339N11E20.7a	8	Lombard	1590	775	-106	-114	-8
04339N11E24.3b	5	Oak Brook	1503	680	-135	-170	-35
04339N11E26.5h	2	Oak Brook (Well #1)	1521	685	-135	-123	12
04339N11E26.8h	1	Oak Brook (Well #2)	1458	690		-141	
04339N11E27.6g	7	Oak Brook	1513	715	-130	-135	-5
04339N11E33.6h	6	Oak Brook	1522	695	-155	-122	33
04340N09E11.6h	4	Bartlett	1985	770	108	10	-98
04340N09E13.8d	5	Hanover Park	1445	793	74	136	62
04340N09E23.1e	5	Carol Stream	1357	775	15		
04340N10E09.3h	5	Roselle	1423	805	-5	63	68
04340N10E09.4a	7	Bloomingdale	1420	790	-83	-24	59
04340N10E14.8c	2	Bloomingdale	1395	750	-75	-27	48
04340N10E20.4g	8	Bloomingdale	1415	765	-38	-17	21
04340N10E32.1c	4	Carol Stream	1963	790	22	25	3
04340N11E03.5e	8	Elk Grove Village	1445	700	-230		
04340N11E10.4h	5	Wood Dale	1400	695	-165	-80	85
04340N11E13.4b	6	Soo Line Railroad	1440	671	68	93	25
04340N11E13.8e	2	Bensenville	1442	676	-152		
04340N11E14.4e	3	Bensenville	1445	670	-125		
04340N11E16.6g	7	Wood Dale	1356	693	-132	42	174
04340N11E26.1d	9	Elmhurst	1479	675	-225	-175	50
04340N11E26.2h	6	Bensenville	1900	684	-171		
04340N11E31.5a	5	Lombard	1793	738	-104	-92	12
04340N11E35.5e	6	Elmhurst	1476	703		135	
Grundy							
06331N06E06.2e	1	Kinsman	700	658			
06331N06E06.2e	2.	Kinsman	785	658		240	
06331N08E04.1a	4	Gardner	1933	588	469	381	-88
06331N08E04.2b	3	Gardner	972	586	328	228	-100
06331N08E11.6a	4	South Wilmington	970	585		182	
06331N08E11.6b	3	South Wilmington	994	586		172	
06332N08E03.1e	4	Coal City	793	567	315	295	-20
06332N08E26.1f	1	Braceville	868	580		121	
06333N06E29.3d	2	Explosives Technologies Intl.	1433	502		417	
06333N06E29.4e	3	Explosives Technologies Intl.	1545	606			
06333N06E29.4e	6	Explosives Technologies Intl.	1530	610		399	
06333N07E04.2a	3	Morris	1485	523	333	283	-50
06333N07E04.4c	5	Morris	1462	506	350	300	-50
06333N07E06.3g	1	Morris	520	549			
06333N07E09.3h	4	Morris	1501	519	240	371	131
06333N08E07.4c	3	Comm. Ed. - Collins Station	1513	525	252	247	-5
06333N08E07.5d	2	Comm. Ed. - Collins Station	1477	525	235		
06333N08E07.5f	1	Comm. Ed. - Collins Station	1510	515	103	220	117
06333N08E07.8d	4	Comm. Ed. - Collins Station	1495	520	275	231	-44
06333N08E34.1d	5	Coal City	1785	560	310	317	7
06333N08E36.4b	2	Diamond	850	562	322		
06333N08E36.5a	1	Diamond	723	562	322	459	137
06334N08E01.3e	3	Minooka	1508	610	254	240	-14
06334N08E01.3e	4	Minooka	725	610	362	311	-51
06334N08E20.2e	1	Quantum Chemical	1453	524	161		
06334N08E21.3f	2	Alumax Mill Products, Inc.	1515	525	216	223	7
06334N08E21.3g	1	Alumax Mill Products, Inc.	1540	525	211	213	2

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, ft. 1985-1991
Grundy (cont'd)							
06334N08E21.4f	3	Alumax Mill Products, Inc.	1540	528		183	
06334N08E21.9a	3	Quantum Chemical	1463	523	186	101	-85
06334N08E21.9c	2	Quantum Chemical	1470	526	142	110	-32
06334N08E22.6e	2	Northern Il1. Gas Co. SNG Pit.	1519	523	42	223	181
06334N08E22.8e	1	Northern Il1. Gas Co. SNG Pit.	1511	522	42	202	160
06334N08E28.5f	5	Quantum Chemical	1455	502	187	181	-6
06334N08E34.7h	1	Reichhold Chemicals, Inc.	706	510	425	246	-179
06334N08E34.7h	2	Reichhold Chemicals, Inc.	710	518	437	406	-31
06334N08E35.1e	2	Comm. Ed. - Dresden Station	1500	515	279	286	7
06334N08E35.1g	1	Comm. Ed. - Dresden Station	1499	519	254	241	-13
06334N08E35.4d	2	General Electric *Co.*	788	533		303	
Kane							
08938N07E05.2d	1	Waubonsee College	1323	703	495	466	-29
08938N07E19.7e	4	Sugar Grove	1475	705	441	429	-12
08938N07E24.6h	21	Aurora	1447	670		224	
08938N07E2S.5b	23	Aurora	1420	670	200	144	-56
08938N08E01.2c	20	Aurora	1400	715	135	46	-89
08938N08E03.6g	5	North Aurora	1330	700	172	142	-30
08938N08E04.3g	3	North Aurora	1305	675	173	148	-25
08938N08E04.8d	4	North Aurora	1325	689	185	237	52
08938N08E08.3e	25	Aurora	1460	695	136	130	-6
08938N08E13.7b	2	Aurora Paperboard Co.	2251	696	169		
08938N08E13.8b	1	Aurora Paperboard Co.	1397	696	118	49	-69
08938N08E15.4g	11	Aurora	1434	635	110		
08938N08ElS.Se	1	Aurora Bleachery Co.	1276	648	268		
08938N08E15.5f	2	Aurora Bleachery Co.	1368	650	155		
08938N08E15.6f	1	Oberweiss Dairy	875	660	160	69	-91
08938N08E16.4d	17	Aurora	2152	685	305	305	0
08938N08E19.5a	19	Aurora	1424	685	115	118	3
08938N08E22.7b	8	Aurora	1500	628	86		
08938N08E24.7c	18	Aurora	1486	715	89	46	-43
08938N08E29.2h	15	Aurora	1719	665	115	76	-39
08938N08E32.4f	4	Montgomery	1333	642	37	42	5
08938N08E33.7c	3	Montgomery	1336	635	14	57	43
08938N08E34.6b	8	Montgomery	1378	665	54	21	-33
08938N08E34.8g	16	Aurora	2139	660	161	116	-45
08939N07E05.8f	1	Elburn	1350	850	497	494	-3
08939N07E10.4f	1	Broadview Academy	1335	790	398	380	-18
08939N08E02.4c	5	Geneva	2292	753	373	359	-14
08939N08E03.1b	2	Geneva	2217	678	271	320	49
08939N08E03.5e	1	Burgess Norton Mfg. Co.	1308	760	332	346	14
08939N08E03.8g	3	Geneva	2300	759		273	
08939N08E09.8h	6	Geneva	1350	758	193	357	164
08939N08E11.7e	7	Geneva	2001	730	269	315	46
08939N08E22.3e	2	Batavia	2200	667	220	169	-51
08939N08E22.3e	3	Batavia	2200	667	333	388	55
08939N08E23.8f	4	Batavia	1357	721	205	190	-15
08939N08E26.6g	5	Batavia	1440	780	206	186	-20
08939N08E33.5g	2	Mooseheart Home	1508	704	227	181	-46
08939N08E33.5g	3	Mooseheart Home	1386	713	239	208	-31
08940N06E30.5a	4	Maple Park	960	862	588	601	13
08940N07E32.8b	3	Elburn	1393	900	491	486	-5
08940N08E24.6g	1	Royal Fox Golf Course	1345	760		340	
08940N08E25.4a	8	St. Charles	1368	761	350	340	-10

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, ft. 1985-1991
Kane (cont'd)							
08940N08E27.5a	3	St. Charles	1191	690	239	271	32
08940N08E27.6b	4	St. Charles	1647	692	231	279	48
08940N08E31.6f	5	Illinois Youth Center	1292	763	363		
08940N08E31.6h	4	Illinois Youth Center	1322	790	369	364	-5
08940N08E34.6e	5	St. Charles	1713	764	224	333	109
08940N08E34.6e	6	St. Charles	1502	755	259		
08941N06E09.1g	2	Burlington	1105	922	562		
08941N06E09.1g	3	Burlington	1105	925	564	576	12
08941N07E19.3d	2	Burlington Ctl Middle School	1022	1037	475		
08941N08E11.1h	2	Elgin (Slade Ave. #2)	1965	723	289	365	76
08941N08E11.1h	3	Elgin (Slade Ave. #3)	1960	725	285	345	60
08941N08Ell.lh	4	Elgin (Slade Ave. #4)	1880	720	280	340	60
08941N08E11.2g	5	Elgin (Slade Ave. #5)	1225	720		350	
08941N08E11.3f	6	Elgin (Slade Ave. #6)	1300	720	220	350	130
08941N08E12.3e	1	Simpson Co.	998	805	316	357	41
08941N08E16.2d	704	Elgin (4A)	1345	831		357	
08941N08E16.4c	701	Elgin (1A)	1305	858		398	
08941N08E16.4d	702	Elgin (2A)	1353	861		377	
08941N08E16.7c	705	Elgin (5A)	1310	815		400	
08941N08E23.3b	1	Elgin Mental Health Center	2000	748	538		
08942N06E03.1e	7	Ill. Toll Highway Comm. (M6)	962	910	633	618	-15
08942N06E21.4b	5	Hampshire	818	878	618	565	-53
Kankakee							
09129N10E04.2a	1	Nat. Gas Ppl. (Holtman #1)	1837	690	429	416	-13
09130N09303.8g	1	Nat. Gas Ppl. (P. Cook #G-1)	1815	613		396	
09130N09E06.8a	1	Reddick	1188	612	344	289	-55
09130N10E08.5a	1	Nat. Gas Ppl. (Heimburger #1)	2582	628	414		
09130N10E16.8c	1	Nat. Gas Ppl. (J. Karcher #1)	1825	635	410	400	-10
09130N10E19.3h	1	Nat. Gas Ppl. (Ruder #1)	1769	638	415	403	-12
09130N10E28.8h	6	Herscher	773	645		404	
09130N10E29.2h	5	Herscher	789	648	452	423	-29
09130N10E30.1h	1	Nat. Gas Ppl. (Saffer #1)	1788	649	424	409	-15
09130N10E34.8f	1	Nat. Gas Ppl. (G. Clodi #1)	1881	670	434	408	-26
Kendall							
09335N06E05.6a	3	Newark	336	690	605	607	2
09335N06E06.2e	2	Newark	287	663	583	583	0
09336N07E06.1g	1	Fox Lawn Home Owners Wtr. Assn.	715	665		476	
09336N07E16.5g	1	Ill. Division of Highways	750	725	501	482	-19
09336N07E27.2b	1	Hide-A-Way Lakes Inc.	550	590	405	386	-19
09336N07E28.8b	4	Yorkville	1393	628	343	313	-30
09336N07E31.5b	1	Hoover Outdoor Ed. Center	850	640	497	558	61
09336N07E32.1e	3	Yorkville	1335	584	382	330	-52
09337N08E05.5i	1	AT&T	1332	640	125		
09337N08E05.6e	2	Aurora Sanitary District	1325	628	135	104	-31
09337N08E05.9f	1	Caterpillar Tractor Co.	1384	661	123	97	-26
09337N08E06.2d	3	Caterpillar Tractor Co.	1352	661	141	123	-18
09337N08E06.2f	2	Caterpillar Tractor Co.	1346	660	172	110	-62
09337N08E17.2e	4	Oswego	1396	658	195		
09337N08E20.8h	3	Oswego	1378	640	203	185	-18
Lake							
09743N09E11.2a	2	Lake Barrington Shores	1305	815	140	200	60
09743N10E14.7d	1	Kemper Insurance	1400	796	161	147	-14

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes,ft. 1985-1991
Lake (cont'd)							
09743N10E15.2d	2	Kemper Insurance	1402	796	105	125	20
09743N10E16.4d	8	Lake Zurich	1373	868	86	159	73
09743N10E19.4h	10	Lake Zurich	1340	850		170	
09743N10E21.5e	7	Lake Zurich	1333	846	166		
09743N10E29.2h	9	Lake Zurich	1365	875		146	
09743N41E09.4a	8	Vernon Hills (Well 3)	1265	700		-81	
09743N11E21.3g	1	Powernail Co.	1258	685	170	220	50
09743N11E22.6d	3	Lincolnshire	1300	667	-34	-3	31
09743NllE23.5f	1	Lincolnshire	1305	645	4	-11	-15
09743NllE32.8f	2	Buffalo Grove	1355	703	11	118	107
09743NllE33.1b	6	Buffalo Grove	1355	675	-100		
09743N12E31.3c	1	Walgreen Co.	1465	680	-1		
09743N12E31.6e	1	Baxter Healthcare Corp.	1456	685	-47	-56	-9
09743N12E33.6f	1	Kitchens of Sara Lee, Inc.	1350	690	-80	2	82
09744N09E24.5d	4	Wauconda	1264	792	293	303	10
09744N10E12.8a	9	Mundelein	1380	830		260	
09744N10E2S.lc	10	Mundelein	1421	760		-75	
09744N11E10.3b	3	Countryside Manor	1040	672		167	
09744N11E19.3b	606	Mundelein (6A)	1405	743	143	115	-28
09744N11E21.7f	11	Libertyville	1490	703	132	118	-14
09744N11E28.4e	12	Libertyville	1926	700	161	175	14
09744N11E31.4h	8	Mundelein	1383	730	168	65	-103
09744NllE32.6a	6	Vernon Hills	1912	725	110	120	10
09744NllE33.3g	1	Cuneo Museum Gardens	1290	690	122	134	12
09744NllE33.5a	7	Vernon Hills	1875	685	90	-25	-115
09744N12E18.3f	2	Ingrid Co.	1600	680	200		
09744N12E21.8f	2	Lake Bluff	1804	680	310	346	36
09744N12E32.2c	1	Owentsia Golf Club	1020	660	135		
09745N09E36.6c	1	Baxter Healthcare Corp.	2010	810	315		
09745N10E15.7e	6	Round Lake Beach	1287	790	332	350	18
09745N10E20.4h	7	Round Lake Beach	2044	760	284	264	-20
09745N10E26.2b	4	Grayslake	1354	780	250	240	-10
09745N10E30.3d	3	Round Lake	1241	791	292	313	21
09745N11E14.5a	1	Gurnee	1517	667		282	
09745N11E16.2g	1	Ill. Toll Highway Comm. (M-4)	980	730	336	341	5
09745N11E28.1e	2	Gurnee	1450	730	265		
09745N11E30.1a	2	Wildwood	1845	785	202	215	13
09745N11E30.4g	4	Wildwood	1320	795	249	235	-14
09745N11E31.5g	7	Wildwood	1320	813		223	
09745N11E36.7c	3	Baxter Healthcare Corp.	1415	710	231	229	-2
09745NllE36.7d	1	Baxter Healthcare Corp.	1421	710	395	293	-102
09746N12E14.6g	1	U.S. Geological Survey	1250	585	347	351	4
09746N12E21.1b	1	Zion	1100	633	333	336	3
LaSalle							
09931N01E24.6e	4	Lostant	1881	700		442	
09931N03E22.8h	1	Kangley	542	632		446	
09932N01E04.7b	1	Cedar Point	1749	653		350	
09932N02E05.4h	2	Matthiesen State Park	304	640		560	
09932N05E17.1a	2	Comm. Ed. - Lasalle Station	1620	711		479	
09932N05E17.2f	1	Comm. Ed. - Lasalle Station	1629	712		438	
09933N01E08.2f	8	Peru	2764	638		390	
09933N01E16.8a	4	Peru	1506	460	458	459	1
09933N01E16.8a	6	Peru	2665	540	400	382	-18
09933N01E20.1h	7	Peru	2591	460	400	385	-15

County Location	*Well no.*	*Owner*	*Depth ft.*	*Surface elev.*	*Water level elevation 1985*	*Water level elevation 1991*	*Water level changes,ft. 1985-1991*
LaSalle (cont'd)							
09933N01E20.2h	**5**	**Pern**	**2601**	**465**	**387**	**389**	**2**
09933N01E36.6g	**3**	**Oglesby**	**2821**	**630**	**406**	**400**	**-6**
09933N01E36.6g	**4**	**Oglesby**	**2795**	**630**	**401**	**390**	**-11**
09933N02E09.7b	**2**	**Utica**	**1078**	**470**	**474**	**500**	**26**
09933N02E09.8b	**1**	**Utica**	**618**	**480**		**510**	
09933N02E21.3g	**2**	**Starved Rock State Park**	**475**	**470**		**466**	
09933N03E01.6b	**7**	**Ottawa**	**1187**	**489**		**436**	
09933N03E01.7c	**11**	**Ottawa**	**1203**	**488**	**426**		
09933N03E01.8a	**8**	**Ottawa**	**1180**	**489**	**419**	**429**	**10**
09933N03E02.4a	**10**	**Ottawa (City Well #9)**	**1220**	**495**	**439**		
09933N03E03.2b	**1**	**American Hoechst Film Div.**	**1225**	**490**	**416**	**457**	**41**
09933N03E03.5a	**2**	**American Hoechst Film Div.**	**1255**	**490**	**413**	**430**	**17**
09933N03E12.2h	**12**	**Ottawa**	**1200**	**492**		**434**	
09933N03E16.2b	**5**	**Libbey-Owens-Ford Glass Co.**	**1255**	**470**		**333**	
09933N03E16.2f	**1**	**Naplate**	**420**	**485**	**374**	**437**	**63**
09933N03E17.7c	**2**	**Buffalo Rock State Park**	**480**	**542**	**452**	**457**	**5**
09933N04E13.2f	**5**	**Marseilles**	**1450**	**670**	**421**	**493**	**72**
09933N04E13.3c	**3**	**Marseilles**	**850**	**498**		**433**	
09933N04E15.7e	**2**	**General Electric Plastic Plant**	**1292**	**480**	**356**	**352**	**-4**
09933N04E15.7f	**1**	**General Electric Plastic Plant**	**1253**	**480**	**410**	**400**	**-10**
09933N04E15.8f	**3**	**General Electric Plastic Plant**	**1243**	**490**	**366**	**387**	**21**
09933N04E16.3g	**1**	**Ottawa Steel & Wire**	**442**	**480**	**398**	**401**	**3**
09933N04E16.6g	**1**	**Garvey International**	**440**	**480**		**414**	
09933N05E07.6a	**4**	**Marseilles**	**1466**	**688**	**419**	**406**	**-13**
09933N05E20.4e	**1**	**Kaiser Estech**	**360**	**496**	**441**	**441**	**0**
09933N05E21.5c	**1**	**Texas Gulf**	**570**	**490**	**439**	**420**	**-19**
09933N05E24.8c	**1**	**Seneca**	**700**	**510**		**418**	
09933N05E24.8c	**2**	**Seneca**	**704**	**510**	**430**		
09934N01E05.1h	**15**	**Northern Ill. Gas Co.**	**1007**	**678**	**582**	**584**	**2**
09934N01E05.2h	**9**	**Northern Ill. Gas Co.**	**1022**	**676**	**580**	**581**	**1**
09934N03E35.7a	**1**	**Land & Water Association**	**540**	**612**		**472**	
09934N04E09.4d	**2**	**Wedron Silica Co.**	**242**	**500**		**340**	
09934N04E09.4g	**1**	**Wedron Silica Co.**	**261**	**545**		**470**	
09934N04E25.2b	**1**	**Illinois Prairie Estates**	**681**	**760**		**476**	
09934N05E02.2i	**1**	**AT&T**	**1348**	**770**	**511**	**510**	**-1**
09934N05E02.3h	**2**	**AT&T**	**1353**	**770**	**512**	**502**	**-10**
09935N01E34.8g	**1**	**Northern Ill. Gas Co.**	**1292**	**675**	**590**	**592**	**2**
09935N05E08.6b	**1**	**Sheridan Correctional Ctr.**	**885**	**591**	**573**	**571**	**-2**
09935N05E17.7h	**3**	**Sheridan Correctional Ctr.**	**900**	**592**	**565**	**562**	**-3**
09935N05E20.1b	**1**	**Girl Scouts - Camp Merrybrook**	**300**	**610**		**565**	
09936N01E27.4a	**1**	**Del Monte Corp.**	**1384**	**730**	**591**	**605**	**14**
09936N01E27.5b	**2**	**Del Monte Corp.**	**1385**	**740**	**580**	**570**	**-10**
09936N01E29.2d	**6**	**Mendota**	**1408**	**771**	**570**	**561**	**-9**
09936N01E32.1a	**4**	**Mendota**	**1360**	**740**	**585**	**572**	**-13**
09936N01E33.3g	**3**	**Mendota**	**1377**	**740**	**566**	**574**	**8**
09936N03E18.4d	**2**	**Earlville**	**150**	**700**		**640**	
09936N03E18.4d	**3**	**Earlville**	**625**	**703**	**673**	**659**	**-14**
09936N05E08.4g	**3**	**Lake Holiday Utilities**	**664**	**670**		**638**	
09936N05E08.5g	**1**	**Lake Holiday Utilities**	**663**	**670**		**620**	
Lee							
10319NllE09.1a	**2**	**Sublette**	**771**	**920**		**672**	
10322NllE27.5c	**1**	**Ash ton**	**545**	**810**		**675**	
10322NllE27.6f	**3**	**Ashton**	**1212**	**862**		**672**	
10322NllE29.2e	**1**	**Funk Seed Co.**	**300**	**825**			

County Location	*Well no.*	*Owner*	*Depth ft.*	*Surface elev.*	*Water level elevation 1985*	*Water level elevation 1991*	*Water level changes,ft. 1985-1991*
Lee (cont'd)							
10337N01E08.7d	4	West Brooklyn	676	945		704	
l0337N01E08.8c	5	West Brooklyn	680	945		665	
10337N02E10.1c	2	Paw Paw	1053	945		751	
10337N02E10.2b	1	Paw Paw	1018	928		726	
10339N02E20.1h	2	Steward	400	822			
McHenry							
11143N08E05.4g	2	Crystal Lake	1218	917	467		
11143N08E06.4a	6	Crystal Lake	1295	892	327	310	-17
11143N08E08.2c	8	Crystal Lake	1300	900	380	406	26
11143N08E12.2d	4	Cary	1345	855	341	350	9
11143N08E14.1e	6	Cary	1300	840	322	332	10
11143N08E20.4c	5	Lake-in-the-Hills	910	870	415	471	56
11143N08E21.3a	1	Material Service Corp.	1262	835	433	433	C
11143N08E32.4C	1	The Golf Club of Illinois	1295	910		423	
11143N08E33.4h	4	Algonquin	955	870	421	491	70
11143N08E34.1e	2	Algonquin	1255	860	308		
11144N05E35.5h	1	Arnold Engineering Co.	846	818	668	661	-7
11144N08E33.5a	7	Crystal Lake	1400	930	344	365	21
11145N08E10.7c	8	Morton International	1160	835	333	368	35
1114SN08E10.8a	2	Modine Mfg. Co.(owner #1)	1200	843	377	342	-35
11145N08E10.8d	7	Morton International	1161	850	395	390	-5
11145N08E15.8h	3	Modine Mfg. Co.(owner #2)	1220	835	381	290	-91
11146N05E33.8a	2	Dean Foods Co.(owner #1)	1783	880	640	618	-22
11146N05E33.8b	4	Dean Foods Co.	825	880		639	
Ogle							
14124N10E24.2h	2	Coram. Ed. - Byron Station	1500	875	635	627	-8
14124N10E24.4h	1	Comm. Ed. - Byron Station	1500	860	631		
14124N11E01.2b	1	Stillman Valley	300	733		696	
14124N11E01.3a	2	Stillman Valley	460	747		693	
14140N01E12.6b	1	Hillcrest	387	825		823	
14140N01E23.2d	5	Rochelle	502	810		742	
14140N01E23.3b	1	Del Monte Corp., Plant 110	494	793	728	602	-126
14140N01E24.5h	7	Rochelle	925	795	716	710	-6
14140N01E24.7a	4	Rochelle	1450	793	725	693	-32
14140N01E25.2h	9	Rochelle	888	785	715	705	-10
14140N01E25.3f	6	Rochelle	867	800	717	726	9
14140N01E26.5h	3	Del Monte Corp., Plant 109	420	778	603	698	95
14140N02E21.1e	1	Hughes Hybrid Company	452	840		773	
14140N02E23.1f	2	Creston	737	905	774	792	18
14140N02E23.2f	3	Creston	724	905		704	
14140N02E30.3b	8	Rochelle	935	793	690	672	-18
Will							
19732N09E01.6c	3	Lakewood Shores	700	562		292	
19732N09E01.6d	4	Lakewood Shores	700	564		284	
19732N09E05.6d	3	Braidwood	1733	560	230	146	-84
19732N09E08.5c	1	Braidwood	1025	575	235	130	-105
19732N09E19.3h	1	Comm. Ed. Braidwood Station	1753	599	360	355	-5
19732N09E28.1d	2	Comm. Ed. Braidwood (Tr Or 1)	1690	594	372		
19732N10E36.2d	3	Illinois Youth Center	1700	610		341	
19733N09E01.5e	5	Joliet Army Ammunition Plant	935	570	252	250	-2
19733N09E25.4g	1	CPI Inorganics	708	565	276		
19733N09E25.6b	2	Wilmington	1566	546		203	

County Location	Well no.	Owner	Depth ft.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, ft. 1985-1991
Will (cont'd)							
19733N09E36.7h	3	Wilmington	1578	530	263		
19734N09E03.1a	4	Amoco Chemical Corp.	1415	570	-6	-39	-33
19734N09E09.4a	1	Channahon	765	570	294	206	-88
19734N09E10.1h	2	Amoco Chemical Corp.	1405	568	4	-60	-64
19734N09E11.2d	2	Stepan Chemical Co.	1402	520		-10	
19734N09E11.2e	3	Stepan Chemical Co.	1410	525		-91	
19734N09E11.7g	1	Amoco Chemical Corp.	1422	569	-5		
19734N09E11.8f	3	Amoco Chemical Corp.	1400	575	-8	-20	-12
19734N09E21.2d	1	Mobil Chemical Corp.	1573	545	300	245	-55
19734N09E21.8a	2	Van Den Bergh Foods Co.	1555	530	240	230	-10
19734N09E21.8b	1	Van Den Bergh Foods Co.	1555	530	140	110	-30
19734N09E25.5a	8	Joliet Army Ammunition Plant	1641	606	251		
19734N09E25.5d	9	Joliet Army Ammunition Plant	1603	590	230	225	-5
19734N09E25.5h	10	Joliet Army Ammunition Plant	1569	591		235	
19734N09E28.5h	1	Dow Chemical Co.	1605	534	249	205	-44
19734N09E29.2d	2	Dow Chemical Co.	800	523	255		
19734N09E34.7d	2	Hager Wood Preserving	1593	530	200	200	0
19734N09E35.5a	1	Joliet Army Ammunition Plant	1598	539	214		
19734N09E35.8a	2	Joliet Army Ammunition Plant	1612	532	242	242	0
19734N09E36.5a	6	Joliet Army Ammunition Plant	1653	578	243	213	-30
19734N09E36.Se	7	Joliet Army Ammunition Plant	1649	601	249	246	-3
19734N10E07.1a	1	Liquid Carbonic Corp.	1630	620	65	45	-20
19734N10E07.5a	1	Peoples Gas SNG Plant	1581	609	56	49	-7
19734N10E07.6b	2	Peoples Gas SNG Plant	1597	609	49	40	-9
19734N10E31.7a	12	Joliet Army Ammunition Plant	1709	625	241		
19735N09E01.3e	11	Joliet (11D, Gael Drive)	1623	619		-216	
19735N09E09.3c	2	Shorewood	1499	605	115	-5	-120
19735N09E10.3a	2	Days Inn	1556	570	20	-30	-50
19735N09Ell.lb	10	Joliet (10D, Essington Rd)	1572	610	88	-139	-227
19735N09E25.1e	3	Caterpillar Tractor Co.	1556	547	-63		
19735N10E02.8b	4	Joliet (4D, Williamson Ave)	1608	558		-277	
19735N10E03.4e	3	Joliet Correctional Center	1600	560	-150	-148	2
19735N10E03.5e	2	Joliet Correctional Center	1550	549	-149	-140	9
19735N10E04.2h	1	Sheffield Steel	1595	553	-93	-42	51
19735N10E07.4b	9	Joliet (9D, Campbell St)	1671	647	-73	-206	-133
19735N10E09.1d	1	Joliet (ID, Ottawa St)	1621	536	-114	-130	-16
19735N10E11.7g	1	EJ & E Railroad	1589	560		-30	
19735N10E14.5d	1	Ivex Corp.	1639	593	-107		
19735N10E14.6h	5	Joliet (SD, Washington St)	1608	564		-188	
19735N10E16.2h	604	Joliet (Des Plaines St)	1575	531	-85	-93	-8
19735N10E16.5c	3	Joliet (3D, Jasper St)	1565	537	-1	-241	-240
19735N10E19.2b	4	Comm. Ed. - Sta. 9, Units 7,8	1525	523	-141	-182	-41
19735N10E20.6a	2	Comm. Ed. - Sta. 9, Units 7,8	1505	536	-154	-137	17
19735N10E20.7g	2	Rockdale	1586	556	-112		
19735N10E21.4b	2	American Cyanamid Co.	1612	583			0
19735N10E22.8g	1	Joliet Equipment	1608	569	69	256	187
19735N10E29.8c	5	Olin Co.	1490	567	-136		
19735N10E29.8h	5	Comm. Ed. - Station 9	1505	527		-54	
19735N10E30.lc	4	Olin Co.	1555	583	-211		
19735N10E30.1e	1	Olin Co.	1520	548	-232	-323	-91
19735N10E30.1e	2	Olin Co.	1495	550	-229	-290	-61
19735N10E30.2h	3	Comm. Ed. - Sta. 9, Units 7,8	1525	510		96	
19735N10E30.6e	2	Caterpillar Tractor Co.	1543	546	-129	-189	-60
19735N10E30.7f	1	Caterpillar Tractor Co.	1560	544	-74	-106	-32
19735NllE05.7h	8	Joliet (8D, Hadley VaUey)	1660	648		-244	

County Location	Well no.	Owner	Depth fi.	Surface elev.	Water level elevation 1985	Water level elevation 1991	Water level changes, fi. 1985-1991
Will (cont'd)							
19735N11E08.8h	7	Joliet (7D, Hadley Valley)	1701	674		-133	
19736N09E04.4a	4	Plainfield	1443	620	38	-81	-119
19736N09E10.7d	3	Plainfield	1481	612	34	-78	-112
19736N09E25.6d	12	Joliet (12D, Homart Site)	1557	602		-106	
19736N10E02.7f	1	Comm. Ed. - Station 18	1500	587	-88	-93	-5
19736N10E02.8f	3	Coram. Ed. - Station 18	1507	590	-64	-64	0
19736N10E02.8h	2	Comm. Ed. - Station 18	1536	590	-67		
19736N10E04.6g	4	Romeoville	1524	670	-41	-149	-108
19736N10E16.4e	3	Lewis University	1523	666		-78	
19736N10E21.3a	6	Stateville Correctional Center	1611	642	-105	-233	-128
19736N10E27.7b	1	Met. Water Recl. Dist.	852	547	-71	-88	-17
19736N10E28.1b	1	Alcan Ingot and Powder	1546	563	-98	-133	-35
19736N10E28.6f	4	Stateville Correctional Center	1566	640	-90	-157	-67
19736N10E33.6h	1	Nash Brothers	1558	593	-94	-132	-38
19736NllE31.8a	6	Joliet (6D, Hadley Valley)	1656	642	-87	-154	-67
19737N09E12.8c	21	Naperville	1441	645	75	-45	-120
19737N10E25.7a	3	Uno-Ven, North Plant	1501	600		-44	
19737N10E25.7c	2	Uno-Ven, North Plant	1456	590		-46	
19737N10E33.1h	2	Romeoville	1520	640	-40	-152	-112
19737N10E35.3c	1	Uno-Ven, South Plant	1460	585	-74	-168	-94
19737N10E35.3c	2	Uno-Ven, South Plant	1460	585	-86	-183	-97
Winnebago							
20143N02E17.7h	36	Rockford (Unit Well 36)	1505	864	585	558	-27
20144N01E02.3b	3	Rockford (Unit Well 3)	1127	760		635	
20144N01E09.1c	20	Rockford (Unit WeU 20)	1200	735	652	615	-37
20144N01Ell.ld	1	Essex International Inc.	1150	740	690	685	-5
20144N01E12.6b	1	Ingersoll Milling Machine Co.	729	746	698	663	-35
20144N01E15.3c	1	Dean Foods Co.	1125	725	639	643	4
20144N01E17.2d	22	Rockford (Unit Well 22)	1381	760	656	633	-23
20144N01E20.7f	21	Rockford (Unit Well 21)	1205	820	657	648	-9
20144N01E21.1e	15	Rockford (Unit Well 15)	1355	810	621	594	-27
20144N01E23.6d	801	Rockford (Beattie Pk/Obs WeU)	1300	708	693	686	-7
20144N01E27.1e	1	Reed-Chatwood, Inc.	300	705	643	665	22
20144N01E28.5c	18	Rockford (Unit Well 18)	1380	820		634	
20144N01E33.8f	1	Muller-Pinehurst Dairy	482	760	729	726	-3
20144N01E33.8f	2	Muller-Pinehurst Dairy	465	759	724	720	-4
20144N01E34.6h	4	Rockford (Unit WeU 4)	1219	730	634	647	13
20144N01E35.2f	2	National Business & Ind. Ctre.	1140	731	677		
20144N02E03.4c	30	Rockford (Unit Well 30)	1325	905	599	578	-21
20144N02E07.7e	1	Woodward Governor Co. (Well 2)	1227	725	697	700	3
20144N02E08.2g	29	Rockford (Unit Well 29)	1357	845	595	597	2
20144N02E09.3a	25	Rockford (Unit Well 25)	1290	878	615	610	-5
20144N02E14.5d	31	Rockford (Unit Well 31)	1505	880	592		
20144N02E16.2a	27	Rockford (Unit Well 27)	1280	840	575	569	-6
20144N02E17.6g	17	Rockford (Unit Well 17)	1195	785	645		
20144N02E18.7a	5	Rockford (Unit Well 5)	1312	792	610	600	-10
20144N02E20.4h	13	Rockford (Unit Well 13)	1457	835	594	593	-1
20144N02E23.1a	3	Best Western Clock Tower Inn	860	818	650	612	-38
20144N02E25.7g	1	Rockford Park District	1185	793		598	
20144N02E28.Sh	26	Rockford (Unit Well 26)	1326	835	630	632	2
20144N02E29.3a	10	Rockford (Unit Well 10)	1426	865	606	588	-18
20144N02E31.7f	6	Rockford (Unit Well 6)	1372	790		652	
20144N02E32.4a	16	Rockford (Unit Well 16)	1310	840	600	592	-8
20144N02E35.5e	3	Cherry Valley	682	800	675	670	-5

County Location	*Well no.*	*Owner*	*Depth ft.*	*Surface elev.*	*Water level elevation 1985*	*Water level elevation 1991*	*Water level changes,ft. 1985-1991*
Winnebago (cont'd)							
20144N02E35.6h	**2**	**Cherry Valley**	**1206**	**800**		**655**	
20144N02E35.8e	**1**	**Cherry Valley**	**1201**	**800**	**648**	**648**	**0**
20145N02E33.3a	**4**	**Loves Park**	**1313**	**888**	**682**	**680**	**-2**
20145N02E34.4g	**3**	**Loves Park**	**863**	**885**	**845**	**845**	**0**
20146N01E24.8a	**6**	**Rockton**	**728**	**828**	**728**	**718**	**-10**
20146N02E05.7d	**3**	**Wis. Pwr & Lght Co. (S Beloit)**	**1200**	**745**	**706**	**692**	**-14**
20146N02E06.Sq	**5**	**Wis. Power & Light Co.**	**1225**	**779**	**709**	**691**	**-18**
20146N02E15.5b	**1**	**Colt Industries**	**301**	**820**	**774**	**775**	**1**
20146N02E28.8b	**1**	**North Park Public Water Dist.**	**780**	**750**		**686**	
20146N02E28.8b	**2**	**North Park Public Water Dist.**	**780**	**750**		**638**	

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