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Public Groundwater Supplies in Lake County

by DOROTHY M. WOLLER and JAMES P. GIBB

ILLINOIS STATE WATER SURVEY

URBANA

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PUBLIC GROUNDWATER SUPPLIES IN LAKE COUNTY

by Dorothy M. Woller and James P. Gibb

Introduction

This publication presents all available information on production wells used for public water supplies in Lake County. Bulletin 60, which is divided by county into separate publications, supersedes Bulletin 40 and its Supplements 1 and 2.

The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Systems and wells described furnish water for drinking or general domestic use in: 1) incorporated municipalities; 2) unincorporated communities where 10 or more separate lots or properties are being served or are intended to be served; 3) state-owned parks and memorials; and 4) state-owned educational, charitable, or penal institutions.

This report includes separate descriptions for 57 public water supply systems furnishing water to 23 municipalities, 32 subdivisions, 2 state parks, and 1 treatment plant in Lake County. These are preceded by brief summaries of the groundwater geology of the county and the development of groundwater sources for public use. An explanation of the format used in the descriptions is also given.

Acknowledgments. This report was prepared under the general direction of Dr. William C. Ackermann, Chief of the Illinois State Water Survey, and John B. Stall, Head of the Hydrology Section. Special thanks are given to E. W. Sanderson, Associate Engineer, and R. T. Sasman, Hydrologist, who checked all of the data and reviewed the manuscript. Mrs. J. L. Ivens edited the manuscript, Mrs. Suzi S. O'Connor typed the camera-copy, and John W. Brother, Jr., prepared the illustrations. The chemical analyses, unless otherwise stated, were made by personnel of the Water Survey Chemistry Section under the supervision of Laurel M. Henley. The analyses made by personnel of the Illinois Environmental Protection Agency were under the supervision of Ira M. Markwood. Thanks are due to M. L. Sargent of the Illinois State Geological Survey who prepared the generalized column of rock stratigraphic units and aquifers and, with R. D. Brower, reviewed the geological information in the manuscript. Grateful acknowledgment also is given to consulting engineers, well drillers, water superintendents, and municipal officials who have provided valuable information used in this report.

Geology

The geology of Lake County is described in Illinois State Geological Survey Circular 481, *Geology for Planning in Lake County, Illinois,* Circular 198, *Groundwater Possibilities in Northeastern Illinois,* Circular 406, *Bedrock Aquifers of Northeastern Illinois,* Report of Investigation 218, *Cambrian and Ordovician Strata of Northeastern Illinois,* and in Illinois State Water Survey and State Geological Survey Cooperative Ground-Water Report 1, *Preliminary Report on Ground-Water Resources of the Chicago Region, Illinois.* The following brief discussion of geologic conditions in the county is taken largely from these publications. For a more detailed definition of the geology in this portion of the state, the reader is referred to the State Geological Survey which is located on the University of Illinois campus, Urbana.

The glacial drift deposits in Lake County vary in thickness from about 90 ft in the southeastern part of the county to more than 300 ft along the west-central portion of the county. Sand and gravel deposits are present in the glacial drift and where sufficiently thick offer potential for developing moderate to large quantities of water (100 to 1000 gpm) from individual wells. Beach deposits are present along the shore of Lake Michigan in the northeastern part

of the county and shallow outwash deposits are present along the Des Plaines River in the eastern part of the county, and the Fox River along the western border of the county. The buried sand and gravel deposits are present at most sites in the county.

Beneath the glacial deposits, the upper bedrock formations consist principally of beds of dolomite (a limestone-like rock) and shale which dip easterly at about 10 to 15 ft per mile. The rock formations in Lake County range in age from Silurian to Precambrian (see generalized stratigraphic sequence in figure 1).

The bedrock unit underlying the glacial drift is the Silurian dolomite in all of Lake County except for a few small areas totaling about 10 square miles along the western edge. This unit is part of the geohydrologic system referred to as the shallow dolomite aquifer. These rocks are encountered at depths from about 90 to 300 ft and range in thickness from a featheredge in a few locations along the western part of the county where they have been eroded, and the underlying Maquoketa Group is exposed, to more than 200 ft in the southeast corner of the county. The yield capability of the Silurian rocks depends primarily upon the number, size, and degree of interconnection of water-filled cracks and crevices within the rock that are penetrated by a well bore. In some areas the Silurian rocks directly underlie permeable deposits of water-bearing sand and gravel. Under such geohydrologic conditions, formation of solution cracks and crevices and free exchange of water from the glacial drift to the bedrock is possible, thereby enhancing the yield capability of the Silurian aquifer.

The Maquoketa Group (Ordovician age) is composed primarily of nonwater-bearing shales that separate the Silurian aquifer from deeper lying water-bearing units. These shales lie at depths from about 200 ft in the southwest corner of the county to about 400 ft along the eastern edge. They range in thickness from about 100 ft in the southeast to about 250 ft in the west-central part of the county. The Maquoketa Group generally is not considered as a source for water supplies. However, locally, small supplies for domestic use are obtained from minor systems of cracks and crevices in the more dolomitic parts of these rocks, usually in the upper part of the middle unit of this group (see description on figure 1).

Below the Maquoketa Group occurs a thick sequence of hydrologically connected rocks that are referred to as the Cambrian-Ordovician aquifer in Lake County. This aquifer system consists in downward order of the Galena-Platteville Dolomite, Glenwood-St. Peter Sandstone, Eminence-Potosi Dolomite, Franconia Formation, and Ironton-Galesville Sandstone.

The Galena-Platteville Dolomite (Ordovician age) lies below the Maquoketa rocks at depths from about 350 ft in the Fox River Valley in southwestern Lake County to over 650 ft in the northeast corner of the county. It is relatively uniform in thickness ranging from about 270 ft to about 335 ft. The yield capability of the Galena-Platteville rocks depends primarily upon the number, size, and degree of interconnection of water-filled cracks and crevices that are intersected by a well bore.

The Glenwood-St. Peter Sandstone (Ordovician age) lies below the Galena-Platteville Dolomite. These sandstone formations are encountered at depths from about 650 ft in the southwest portion of the county to approximately 950 ft along the eastern border and range in thickness from about 165 to 300 ft. It is estimated that the Galena-Platteville Dolomite and the Glenwood-St. Peter Sandstone produce about 15 percent of the total potential yield from the Cambrian-Ordovician aquifer system.

Below the Glenwood-St. Peter lie the Eminence-Potosi and Franconia Formations (Cambrian age) which consist of interbedded sandstones, shales, and dolomites. These units are encountered at depths from about 800 ft in the northwest to about 1200 ft in the southeast and have total thicknesses varying from about 40 to 180 ft. The shales and dolomites yield small quantities of water, but the sandy parts of these formations may contribute moderate quantities of water to wells where they are not cased off by liners. It is estimated that these formations produce about 35 percent of the total yield from the Cambrian-Ordovician aquifer system. However, wells tapping only these formations seldom are constructed.

The Ironton-Galesville Sandstone (Cambrian age) is the most consistently permeable and productive unit of the Cambrian-Ordovician aquifer in northeastern Illinois. In Lake County it lies at depths of about 950 ft along the west edge to about 1300 ft in the southeast and varies in thickness from about 100 to 190 ft. It is estimated that this unit produces about 50 percent of the total Cambrian-Ordovician aquifer yield.

Below the Ironton-Galesville Sandstone lies the Eau Claire Formation. The upper and middle parts of the Eau Claire are composed primarily of nonwater-bearing shales that separate the Cambrian-Ordovician aquifer from deeper water-bearing units. The Elmhurst Sandstone Member at the base of the Eau Claire Formation and the underlying Mt. Simon Sandstone are hydrologically connected and form the Elmhurst-Mt. Simon aquifer, the deepest fresh water aquifer in northern Illinois. In Lake County, this aquifer lies at depths of about 1550 to 1700 ft and ranges in thickness from about 1200 ft in the northwest part to about 2000 ft in the southeast part of the county. Water wells usually penetrate only a few hundred feet into this aquifer because the quality of the water deteriorates with depth. Water obtained below an elevation of about 1300 ft below sea level is generally too highly mineralized for use.

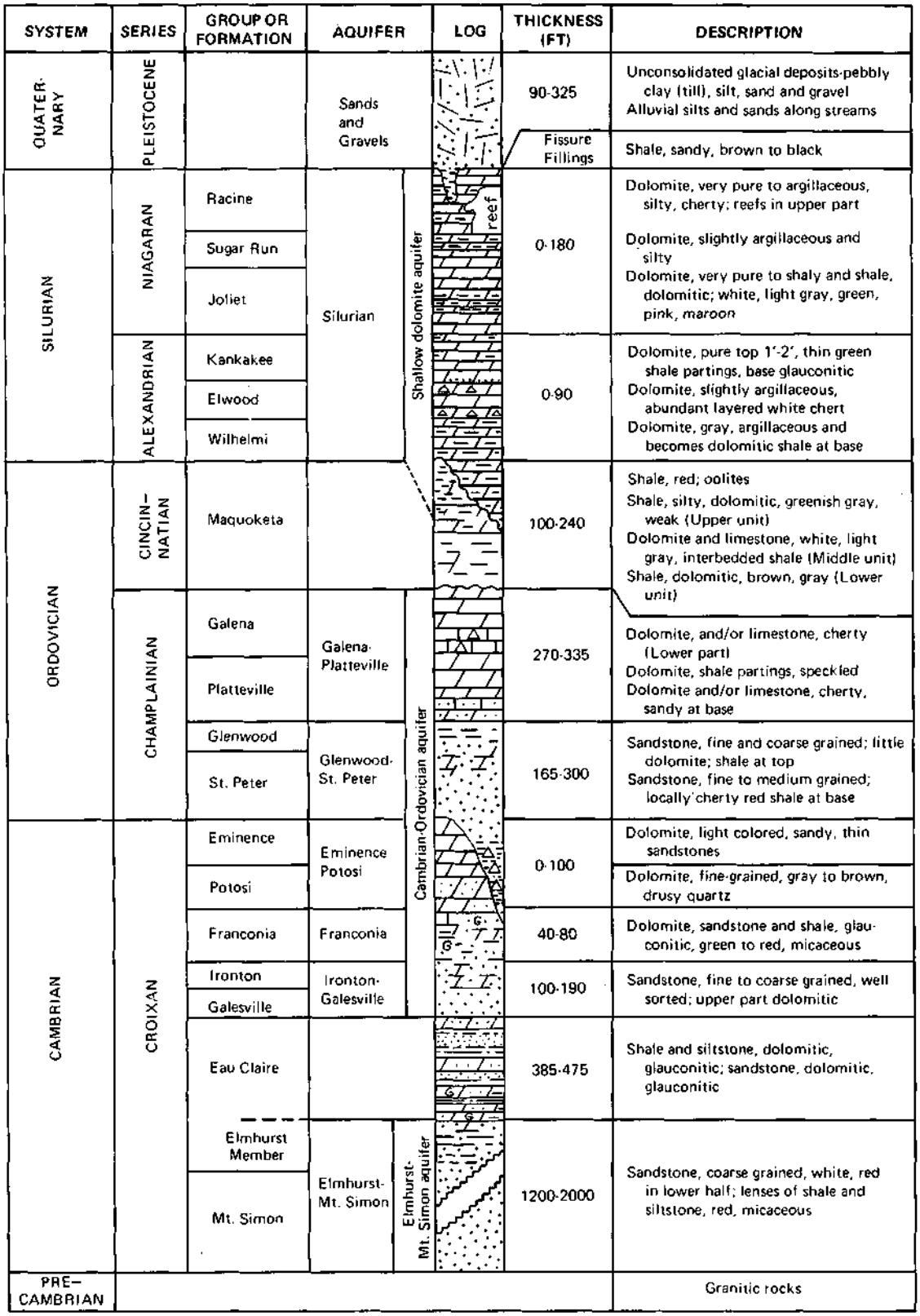

Figure 1. Generalized column of rock stratigraphic units and aquifers in Lake County
(Prepared by M. L. Sargent, Illinois State Geological Survey)

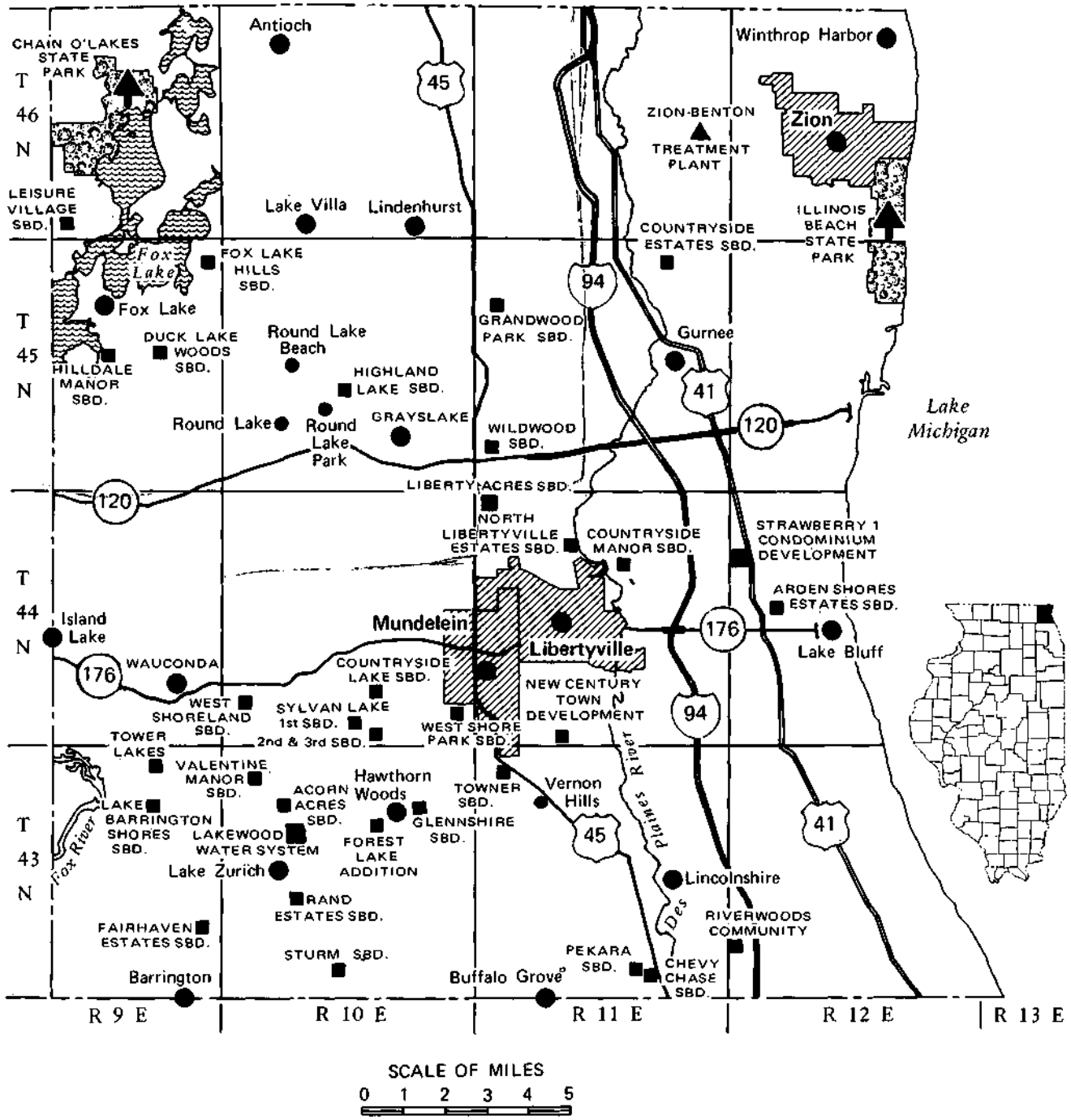

Figure 2. Location of public groundwater supply systems in Lake County

Groundwater Development for Public Use

Groundwater is used as a source of public water supply at 23 municipalities, 32 subdivisions, 2 state parks, and 1 treatment plant in Lake County. The locations of these supplies are shown in figure 2.

Sand and gravel deposits in the unconsolidated materials above bedrock are tapped by 24 public water systems in Lake County as a source of all or part of their water supply. There are presently 52 production and standby wells, ranging in depth from 35 to 292 ft, tapping only the sand and gravel deposits. Their reported yields range from 10 to 1500 gpm depending primarily upon the type of well and the permeability, thickness, and areal extent of the sand and gravel unit tapped by each well. Production from these wells for 1972 through 1975 was estimated to be about 3,330,000 gpd.

The analyses of water from these wells show that the iron content ranges from 0.0 to 2.5 mg/1 and the hardness from 118 to 580 mg/1. The sulfate content of water from

3 wells exceeds the recommended limit of 250 mg/1. Treatment provided for these supplies is as follows: 20 chlorinate, 5 fluoridate, 10 add polyphosphate to keep iron in solution, and 2 supplies provide no treatment.

The upper bedrock units in Lake County, the Silurian dolomite and the Maquoketa Group, are tapped by 32 public water systems as a source of all or a portion of their water supply. There are presently 76 production and standby wells finished in these units (including one well that also taps overlying sand and gravel deposits). They range in depth from 130 to 443 ft and are pumped at rates of 15 to 850 gpm. The yield of an individual well depends primarily on the thickness of the aquifer and the number, size, and degree of interconnection of the crevices intersected by the well bore. Withdrawals from the upper bedrock units for 1972-1975 were estimated to be about 3,580,000 gpd.

The analyses of water from wells tapping only the upper bedrock units show the iron content ranges from 0.0 to 3.0 mg/1 and the hardness from 41 to 979 mg/1. The sulfate content of water from 28 wells exceeds the recommended limit of 250 mg/1. The barium content of water from 1 well was 0.9 mg/1. Hydrogen sulfide gas was also noted in water from 4 wells. Treatment provided at the 32 supply systems is as follows: 17 chlorinate, 5 fluoridate, 1 treats for iron removal, 5 add polyphosphate to keep iron in solution, and 14 provide no treatment.

Wells tapping various combinations of formations within the Cambrian-Ordovician aquifer are used at 15 public water systems as a source of water supply. There are presently 25 production wells, ranging in depth from 510 to 1517 ft, finished within the Cambrian-Ordovician aquifer system (including Buffalo Grove Well No. 5, Grayslake Well No. 1, and Zion Well No. 1 which are also open to the Silurian dolomite). These wells are pumped at rates of 200 to 1100 gpm. Production from these wells for 1972-1975 was estimated to be about 5,240,000 gpd.

The analyses of water from these wells show the iron content to range from 0.0 to 4.0 mg/1 and the hardness from 176 to 396 mg/1. The barium content of water from 2 wells ranges from 1.2 to 2.7 mg/1. Water treatment for these supplies is as follows: 12 chlorinate, 1 adds fluoride, and 6 add polyphosphate to keep iron in solution.

Throughout most of northeastern Illinois the Cambrian-Ordovician aquifer system has been overdeveloped resulting in marked declines in water levels of this aquifer. In Lake County water levels have declined at an average rate of 14 ft per year for the period 1966-1971 and 10 ft per year for 1971-1975. The deepest cones of depression in Lake County are centered near Libertyville, Mundelein, and Buffalo Grove where nonpumping water levels are less than 150 ft above mean sea level.

Wells tapping various combinations of formations within the Cambrian-Ordovician aquifer and the Elmhurst-Mt. Simon aquifer are used at 4 public water systems as a source of supply. There are presently 5 production wells, ranging in depth from 1828 to 1926 ft, finished within the Elmhurst-Mt. Simon aquifer system. These wells are pumped at rates of 500 to 1200 gpm. Production from these wells for 1972-1975 was estimated to be about 920,000 gpd.

The analyses of water from these wells show the iron content to range from 0.2 to 2.8 mg/1 and the hardness from 266 to 370 mg/1. Treatment of water from these wells is as follows: 2 chlorinate, 1 adds polyphosphate to keep iron in solution, and 1 is not treated.

The Elmhurst-Mt. Simon aquifer has not been extensively developed in Lake County and nonpumping water levels in this aquifer system are reported to be about 50 ft higher than those in the overlying Cambrian-Ordovician aquifer.

The total public water supply pumpage in Lake County for 1972-1975 was about 13,070,000 gpd. Of this total approximately 26 percent was obtained from sand and gravel aquifers, 27 percent from the Silurian dolomite and Maquoketa Group, 40 percent from combinations of formations within the Cambrian-Ordovician aquifer, and 7 percent from combinations of formations within the Cambrian-Ordovician and the Elmhurst-Mt. Simon aquifers.

Format

In this publication the descriptions of public water supplies are presented in alphabetical order by place name.

At the beginning of each description the U.S. Census of population for 1970 is given for incorporated places. For unincorporated places, the population is estimated on the basis of the number of services or residential units and an assumed number of 3.5 persons per service.

The number of services and quantity of water distributed at each supply are given where available for the earliest and the latest reported values.

Individual production wells for each supply are described in the order of their construction. The description for each well includes the *aquifer or aquifers tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses.*

When available, sample study logs prepared by the Illinois State Geological Survey are presented. When these are not available, drillers logs are used as reported. Commonly used drillers terms such as clay, silt, or pebbly clay generally are synonymous with the glacial tills tabulated by the State Geological Survey. Similarly, limestones or dolomites reported by drillers usually are carbonate rocks which in most of Illinois are dolomitic in composition. When stating the

bedrock aquifers tapped by a well, the sample study log provided by the State Geological Survey and the drillers casing record are used to determine the geohydrologic units open to the hole. If only a drillers log is available and the geohydrologic units cannot be readily determined, only the principal rock type as described by the driller is given (dolomite, sandstone, etc.).

The screen sizes given in this publication are for continuous slot type screens unless stated otherwise. Slot sizes given indicate the width of the slot openings in thousandths of an inch. For example, a 20 slot screen has slot openings 0.020 in. wide and a 100 slot screen has slots 0.100 in. wide. Approximate equivalent slot openings for other types of screens are given in parentheses after the screen description.

Abbreviations Used

est	estimated
ft	foot (feet)
gal	gallon(s)
gpd	gallons per day
gpm	gallons per minute
HCl	hydrochloric acid
hp	horsepower
hr	hour(s)
ID	inside diameter
in	inch(es)
Lab	laboratory
lb	pound(s)
me/l	milliequivalents per liter
mg/l	milligrams per liter
min	minute(s)
No.(s)	number(s)
OD	outside diameter
pc/l	picocuries per liter
R	range
rpm	revolutions per minute
T	township
TDH	total dynamic head
Tr	trace

PUBLIC WATER SUPPLIES

(concluded on next page)

PUBLIC WATER SUPPLIES *(Concluded)*

ACORN ACRES SUBDIVISION

Acorn Acres Subdivision (est. 140), located within the village of Hawthorn Woods, installed a public water supply in 1959. The water system is owned and operated by Edward and Lydia Sandman. Seven wells are in use. Each well has a separate pressure system and serves several homes. In 1975 there were 40 services, all metered; the estimated average and maximum daily pumpages were 8400 and 12,600 gpd, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in June 1966 to a depth of 272 ft by the Henry Boysen Co., Libertyville. The well is located at the end of Echo Court, approximately 2600 ft S and 300 ft W of the NE corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 860 ft.

The well is cased with 6-in. pipe from 1.5 ft above the roof of the well pit to a depth of 256 ft. The top of the well casing is equipped with a Martinson pitless adapter.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 3 ft from a nonpumping water level of 115 ft.

The pumping equipment presently installed consists of a 2-hp Red Jacket electric motor (Serial No. M902), a Red Jacket submersible pump (Model No. 200K1-12CB, Serial No. GAM P 870) set at 168 ft, rated at 20 gpm, and has 168 ft of 1.2-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004947) of a sample collected January 14, 1974, showed the water to have a hardness of 191 mg/1, total dissolved minerals of 328 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in October 1959 to a depth of 280 ft by the Henry Boysen Co., Libertyville. The well is located adjacent to the Sandman residence on Acorn Drive, approximately 2000 ft S and 1300 ft W of the NE corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 873 ft.

The well is cased with 5-in. pipe from 1.5 ft above the roof of the well pit to an unknown depth. The top of the well casing is equipped with a Monitor pitless adapter.

Upon completion, the nonpumping water level was reported to be 126 ft.

The pumping equipment presently installed consists of a 1 1/2-hp Red Jacket electric motor, a Red Jacket submersible pump set at 147 ft, rated at 20 gpm, and has 147 ft of 1.2-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004949) of a sample collected January 14, 1974, showed the water to have a hardness of 223 mg/1, total dissolved minerals of 380 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 3, finished in Silurian dolomite, was completed in May 1966 to a depth of 323 ft by the Henry Boysen Co., Libertyville. The well is located on lot 49 at the junction of Bruce Circle North and Acorn Drive, approximately 1900 ft S and 2450 ft W of the NE corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 865 ft.

The well is cased with 6-in. pipe from 1.3 ft above land surface to a depth of 280 ft. The top of the well casing is equipped with a Martinson pitless adapter.

Upon completion, the well reportedly produced 15 gpm with a drawdown of 12 ft from a nonpumping water level of 122 ft.

The pumping equipment presently installed consists of a 2-hp Red Jacket electric motor, a Red Jacket submersible pump (Model No. N12CB 200T1, Serial No. P128) set at 168 ft, rated at 20 gpm, and has 168 ft of 1.2-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005210) of a sample collected January 23, 1974, showed the water to have a hardness of 242 mg/1, total dissolved minerals of 390 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 4, finished in Silurian dolomite, was completed in February 1964 to a depth of 333 ft by the Henry Boysen Co., Libertyville. The well is located on the south side of Bruce Circle South about one-half block west of Acorn Drive on the right of way, approximately 2350 ft S and 2100 ft E of the NW corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 865 ft.

The well is cased with 5-in. pipe from 1.3 ft above land surface to an unknown depth. The top of the well casing is equipped with a Monitor pitless adapter.

Upon completion, the well reportedly produced 15 gpm with very little drawdown from a nonpumping water level of 124 ft.

The pumping equipment presently installed consists of a 1 1/2-hp Red Jacket electric motor (Serial No. FTYM6), a Red Jacket submersible pump (Model No. 15BA-1SOK1, Serial No. FTYP6) set at 168 ft, rated at 10 gpm, and has 168 ft of 1-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005207) of a sample collected January 23, 1974, showed the water to have a hardness of 246 mg/1, total dissolved minerals of 366 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 5, finished in Silurian dolomite, was completed in July 1965 to a depth of 290 ft by the Henry Boysen Co., Libertyville. The well is located on the south side of Robin Crest Road about one-half block west of Acorn Drive, approximately 2200 ft N and 2150 ft E of the SW corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 835 ft.

The well is cased with 5-in. pipe from 0.8 ft above land surface to an unknown depth. The top of the well casing

is equipped with a Monitor pitless adapter.

Upon completion, the well reportedly produced 15 gpm with very little drawdown from a nonpumping water level of 125 ft.

The pumping equipment presently installed consists of a 1-hp Red Jacket electric motor, a Red Jacket submersible pump (Model No. 100N1-11BB, Serial No. GZEP412) set at 168 ft, and has 168 ft of 1-in. column pipe.

WELL NO. 6, finished in Silurian dolomite, was completed in November 1968 to a depth of 285 ft by the Henry Boysen Co., Libertyville. The well is located at the east end of Robin Crest Road a few ft east of the turn around, approximately 2000 ft N and 1750 ft W of the SE corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 850 ft.

The well is cased with 6-in. pipe from 0.5 ft above land surface to an unknown depth. The top of the well casing is equipped with a Martinson pitless adapter which extends about 2 ft above land surface.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 50 ft from a nonpumping water level of 100 ft.

The pumping equipment presently installed consists of a 3/4-hp Red Jacket electric motor (Serial No. 4FLF AK201), a Red Jacket submersible pump (Model No. 75W1-12BC2) set at 168 ft, and has 168 ft of 1.2-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005208) of a sample collected January 23, 1974, showed the water to have a hardness of 144 mg/1, total dissolved minerals of 268 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 7, finished in Silurian dolomite, was completed in April 1971 to a depth of 315 ft by the Henry Boysen Co., Libertyville. The well is located on the north side of Bruce Circle North near the west end of the road where Bruce Circle South begins, approximately 1800 ft S and 1500 ft E of the NW corner of Section 8, T43N, R10E. The land surface elevation at the well is approximately 845 ft.

The well is cased with 5-in. pipe to an unknown depth. The top of the well casing is equipped with a Baker pitless adapter which extends about 1 ft above land surface.

Upon completion, the nonpumping water level was reported to be 120 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (Model No. 200T1-14CC) set at 168 ft, rated at 20 gpm, and powered by a 2-hp Red Jacket electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004948) is for a water sample from the well collected January 14, 1974.

WELL NO. 7, LABORATORY NO. C004948

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	16	
Manganese	Mn	0.00		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.48	0.03	Boron	B	0.6	
Sodium	Na	33	1.44	Nitrate	NO_3	0.2	0.00
Potassium	K	2.0	0.05	Chloride	Cl	2	0.06
Calcium	Ca	30	1.50	Sulfate	SO_4	45	0.94
Magnesium	Mg	28	2.30	Alkalinity (as $CaCO_3$)		222	4.44
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		190	3.80
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		302	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.2	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.4	
Silver	Ag	0.00		±deviation		1.3	
Cyanide	CN	0.00		Beta *pc/l*		2.7	
Zinc	Zn	0.17		±deviation		1.7	

ANTIOCH

The village of Antioch (3189) installed a public water supply in 1907. Two wells (Nos. 3 and 4) are in use and two wells (Nos. 1 and 2) are available for emergency use. In 1949 there were 500 services, all metered; the estimated average and maximum daily pumpages were 25,000 and 50,000 gpd, respectively. In 1974 there were 1400 services, all metered; the average and maximum daily pumpages were 575,000 and 850,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in 1907 to a depth of 216 ft by Charles Thome, DeKalb. This well is available for emergency use. The well is located at the southwest corner of Orchard and Broadway Sts., approximately 1900 ft N and 1200 ft E of the SW corner of Section 8, T46N, R10E. The land surface elevation at the well is approximately 780 ft.

A 6-in. diameter hole was drilled to a depth of 216 ft. The well is cased with 6-in. steel pipe from 0.8 ft above the pumphouse floor to a depth of 207 ft followed by *9* ft of 4.5-in. Johnson screen.

On November 3, 1932, the nonpumping water level was reported to be 40 ft below the pump base.

The pumping equipment presently installed consists of a 20-hp U.S. electric motor (Serial No. 915264), a 6-in., 20-stage Peerless turbine pump set at 150 ft, rated at 150 gpm, and has 150 ft of 4-in. column pipe. A 30-ft section of 4-in. suction pipe is attached to the pump intake. The well is equipped with 150 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B100780) of a sample collected July 15, 1974, after pumping for 1 hr, showed the water to have a hardness of 173 mg/1, total dissolved minerals of 327 mg/1, and an iron content of 0.16 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in 1906 to a depth of 226 ft, and rebuilt in November 1949 to a depth of 231.5 ft by C. L. Wertz, Antioch. This well is available for emergency use. The well is located about 27 ft south of Well No. 1, approximately 1873 ft N and 1200 ft E of the SW corner of Section 8, T46N, R10E. The land surface elevation at the well is approximately 780 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Soil	**15**	**15**
Gravel and clay	**141**	**156**
Quicksand	**50**	**206**
Coarse gravel	**20**	**226**
No record	**5.5**	**231.5**

A 10-in. diameter hole was drilled to a depth of 210 ft and finished 6 in. in diameter from 210 to 231.5 ft. The well is cased with 10-in. steel pipe from 0.6 ft above the pumphouse floor to a depth of 207.5 ft and a 6-in. pipe from 198.5 ft to a depth of 220.5 ft followed by 11 ft of 6-in. No. 100 slot pipe base Johnson Everdur screen.

On July 11,1938, the nonpumping water level was reported to be 40 ft below the pump base.

On August 30, 1946, after a 1-hr idle period, the nonpumping water level was reported to be 39 ft below the pump base and after 30 min of pumping at 200 gpm, the drawdown was 22 ft.

In November 1949, after new casing and screen were installed, the well reportedly produced 200 gpm with a drawdown of 70 ft from a nonpumping water level of 45 ft below land surface.

On July 10, 1952, the well reportedly produced 115 gpm with a drawdown of 74 ft from a nonpumping water level of 58 ft.

The pumping equipment presently installed consists of a 20-hp General Electric motor (Serial No. SFJ801827), a 7-in., 7-stage Peerless turbine pump set at 130 ft, rated at 250 gpm, and has 130 ft of 5-in. column pipe. A 20-ft section of 4-in. suction pipe is attached to the pump intake. The well is equipped with 130 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B100679) of a sample collected July 15, 1974, after pumping for 1 hr at 250 gpm, showed the water to have a hardness of 166 mg/1, total dissolved minerals of 311 mg/1, and an iron content of 0.26 mg/1.

Prior to the construction of Well No. 3, a 6-in. test well was drilled to a depth of 149 ft in December 1952 and had a nonpumping water level of 32.7 ft below land surface.

WELL NO. 3, finished in sand and gravel, was completed in October 1953 to a depth of 140.5 ft by the Layne-Western Co., Aurora. The well is located 500 ft south of Ida St. and 88 ft east of the Soo Line RR right-of-way, approximately 600 ft N and 2360 ft W of the SE corner of Section 8, T46N, R10E. The land surface elevation at the well is approximately 770 ft.

A sample study summary log of Well No. 3 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Silt, buff, yellow	**50**	**50**
Clay, gray, laminated	**20**	**70**
Till, buff, gray, very silty	**20**	**90**
Sand, very fine to fine, well sorted, clean	**5**	**95**
Gravel, coarse, poorly sorted; till, brownish gray, sandy	**5**	**100**
Sand, fine well sorted, clean	**5**	**105**
Till gray, very silty	**10**	**115**
Gravel, granular to coarse, clean; sand medium to very coarse	**15**	**130**
Sand, very fine to very coarse, well sorted, clean; little till brownish gray	**15**	**145**
Silt, brownish gray, clayey	**5**	**150**

A 28-in, diameter hole was drilled to a depth of 140.5 ft. The well is cased with 12-in. ID black steel pipe from 0.8 ft above the pumphouse floor to a depth of 120.5 ft followed by 20 ft of 12-in. ID No. 5 (0.105 in.) Layne stainless steel shutter screen. The annulus between the bore hole and casing-screen assembly is filled with cement grout from 0 to 40 ft, with clay from 40 to 90.5 ft, and with gravel from 90.5 to 140.5 ft.

Upon completion, the well reportedly produced 596 gpm with a drawdown of 9 ft from a nonpumping water level of 41 ft below land surface.

On May 29, 1958, after 2 hr of pumping at a rate of 415 gpm, the drawdown was 7 ft from a nonpumping water level of 45 ft below the pump base.

On March 7, 1967, the well reportedly produced 457 gpm with a drawdown of 19 ft from a nonpumping water level of 44 ft.

In December 1970, the well reportedly produced 525 gpm with a drawdown of 9 ft from a nonpumping water level of 56 ft.

The pumping equipment presently installed consists of a 40-hp 1800 rpm U.S. electric motor (Serial No. 2308221), a 10-in., 7-stage Layne turbine pump (Serial No. 26899) set at 70 ft, rated at 400 gpm at about 235 ft TDH, and has 70 ft of 6-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 70 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B34773) of a sample collected March 1, 1976, after pumping for 1 hr at 500 gpm, showed the water to have a hardness of 237 mg/1, total dissolved minerals of 363 mg/1, and an iron content of 0.6 mg/1.

WELL NO. 4, finished in sand and gravel, was completed in June 1965 to a depth of 129 ft by the Layne-Western Co., Aurora. The well is located on Bartlett Road at the end

of McMillen Drive, approximately 350 ft N and 1500 ft W of the SE corner of Section 8, T46N, R10E. The land surface elevation at the well is approximately 770 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Fill	3	3
Soft sandy yellow clay	5	8
Sand and gravel and boulders	16	24
Soft sticky gray clay, some thin sand streaks	56	80
Fine to coarse sand and gray clay	5	85
Fine gray sand	5	90
Blue clay	4	94
Very fine gray sand	8	102
Soft gray clay	3	105
Medium fine to coarse sand, some gravel and boulders 115 to 121 ft very coarse	16	121
Medium fine to coarse sand, gravel and boulders, not as much coarse stuff, also not as tight	4	125
Very coarse sand and gravel, some fine showing at 129 ft	4	129
Very fine gray sand	12	141

A 34-in. diameter hole was drilled to a depth of 15 ft, reduced to 30 in. between 15 and 26 ft, and finished 28 in. in diameter from 26 to 141 ft. The well is cased with 12-in. welded steel pipe from 2 ft above land surface to a depth of 109 ft followed by 20 ft of 12-in. No. 5 (0.105 in.) Layne stainless steel shutter screen. The annulus between the bore hole and casing-screen assembly is filled with cement grout from 0 to 40 ft, with pea gravel from 40 to 86 ft, and with Muscatine No. 3 gravel from 86 to 141 ft.

A production test using one observation well was conducted by the driller on June 22, 1965. After 8 hr of pumping at a rate of 632 gpm, the drawdown was 12 ft from a nonpumping water level of 32 ft below land surface.

On March 1, 1967, the well reportedly produced 800 gpm with a drawdown of 15 ft from a nonpumping water level of 34 ft.

In December 1970, the well reportedly produced 825 gpm with a drawdown of 14 ft from a nonpumping water level of 33 ft.

The pumping equipment presently installed is a 5-stage Jacuzzi oil-lubricated turbine pump (Model No. 10HCA6T-490) set at 75 ft, rated at 775 gpm at about 175 ft TDH, and powered by a 60-hp General Electric motor (Model No. 5K6257XHIA, Serial No. KAJ1006465).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B34770) is for a water sample from the well collected March 1, 1976, after 2 hr of pumping at 750 gpm.

WELL NO. 4 , LABORATORY NO. B34770

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.7		Silica	SiO_2	21	
Manganese	Mn	0.00		Fluoride	F	0.7	0.04
Ammonium	NH_4	1.2	0.07	Boron	B	0.4	
Sodium	Na	36	1.57	Nitrate	NO_3	0	0.00
Potassium	K	1.5	0.04	Chloride	Cl	4.5	0.13
Calcium	Ca	43	2.15	Sulfate	SO_4	43	0.89
Magnesium	Mg	29	2.39	Alkalinity (as $CaCO_3$)		256	5.12
Arsenic	As	0.00		Hardness (as $CaCO_3$)		226	4.52
Barium	Ba	0.1					
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		329	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.4	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.2	
Silver	Ag	0.00		±deviation		1.2	
Cyanide	CN	0.00		Beta *pc/l*		1.7	
Zinc	Zn	0.0		±deviation		1.2	

A 5-in. diameter test hole was constructed in July 1975 to a depth of 228 ft by the J. P. Miller Artesian Well Co., Brookfield. The test hole was located approximately 1320 ft S and 1250 ft W of the NE corner of Section 17, T46N, R10E. Upon completion, the nonpumping water level was reported to be 43 ft below land surface.

ARDEN SHORES ESTATES SUBDIVISION

Arden Shores Estates Subdivision (est. 67), located approximately 1 mile northwest of Lake Bluff, installed a public water supply in 1953. The water system is owned and operated by the Arden Shores Civic Improvement Association. One well is in use. In 1972 there were 19 services, none metered; the estimated average daily pumpage was 5000 gpd. The water is not treated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in June 1954 to a depth of 283 ft by Paul Neely, Batavia. The well is located on an unoccupied lot at 237 Bay Shore Drive, approximately 1000 ft S and 2300 ft W of the NE corner of Section 17, T44N, R12E. The land surface elevation at the well is approximately 693 ft.

The well is cased with 6-in. pipe from 1 ft above the floor of a 6-ft deep pit to an unknown depth.

In 1957, the well reportedly produced 30 gpm with a drawdown of 90 ft from a nonpumping water level of 33 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump (Model No. 20P4F2) set at 189 ft, rated at 20 gpm at about 250 ft TDH, and powered by a 1 1/2-hp 3450 rpm electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B37397) is for a water sample from the well collected March 22, 1976.

WELL NO. 1, LABORATORY NO. B37397

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1		Silica	SiO_2	13	
Manganese	Mn	0.02		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.28	0.02	Boron	B	0.7	
Sodium	Na	75	3.26	Nitrate	NO_3	0.5	0.01
Potassium	K	1.1	0.03	Chloride	Cl	7.5	0.21
Calcium	Ca	28	1.40	Sulfate	SO_4	190	3.95
Magnesium	Mg	19	1.56	Alkalinity (as $CaCO_3$)		112	2.24
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		148	2.96
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		382	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.9	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.0		Alpha *pc/l*		1.2	
Silver	Ag	0.00		± deviation		1.2	
Cyanide	CN	0.00		Beta *pc/l*		1.7	
Zinc	Zn	0.0		± deviation		1.4	

BARRINGTON

The village of Barrington (7701) installed a public water supply in 1898. This village also extends into Cook County and two of the wells are located there. Four wells are in use. This supply is cross connected with the Jewel Companies, Inc., and the Quaker Oats Co. In 1950 there were 1321 services; the average and maximum daily pumpages were 500,000 and 850,000 gpd, respectively. In 1973 there were 3110 services, all metered; the average and maximum daily pumpages were 1,170,000 and 2,170,000 gpd, respectively. The water is aerated, chlorinated, and fluoridated.

WELL NO. 1, finished in Silurian dolomite, was completed in 1898 to a depth of 305 ft. The well is located in the rear of the village hall near Hough and Station Sts., approximately 425 ft S and 1200 ft E of the NW corner of Section 1, T42N, R9E, Cook County. The land surface elevation at the well is approximately 830 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	200	200
Lime rock	105	305

A 12-in. diameter hole was drilled to a depth of 200 ft and finished 10 in. in diameter from 200 to 305 ft. The well is cased with 12-in. ID pipe from 0.5 ft above the pumphouse floor to a depth of 200 ft.

On November 9, 1922, after a 12-hr idle period, the well reportedly produced 270 gpm for 9 hr with a drawdown of 5 ft from a nonpumping water level of 56 ft below the pumphouse floor (3.5 ft above top of casing).

In 1923, after pumping at a rate of 400 gpm, the drawdown was 16 ft from a nonpumping water level of 60 ft.

On June 21, 1928, after pumping at a rate of 380 gpm, the drawdown was 16 ft from a nonpumping water level of 61 ft.

On November 7, 1933, the well reportedly produced 350 gpm for 4.5 hr with a drawdown of 3.65 ft from a nonpumping water level of 60.77 ft below the pumphouse floor.

On July 20, 1943, the nonpumping water level was reported to be 66.1 ft below the pump base when Well No. 2 was pumping.

In 1962, the nonpumping water level was reported to be 90 ft.

In 1973, after the Henry Boysen Co., Libertyville, installed new pump bowls, the well reportedly produced 800 gpm with a drawdown of 7 ft from a nonpumping water level of 108 ft.

The pumping equipment presently installed is a 2-stage Layne & Bowler turbine pump (Serial No. 24887) set at 130 ft, rated at 850 gpm, and powered by a 50-hp U.S. electric motor (Serial No. 917501).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007451) is for a water sample from the well collected April 22, 1974, after 30 min of pumping at 850 gpm.

WELL NO. 1, LABORATORY NO. C007451

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.4		Silica	SiO_2	27.0	
Manganese	Mn	0.00		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.84	0.05	Boron	B	0.2	
Sodium	Na	18	0.78	Nitrate	NO_3	0.2	0.00
Potassium	K	1.6	0.04	Chloride	Cl	2	0.06
Calcium	Ca	55	2.74	Sulfate	SO_4	71	1.48
Magnesium	Mg	41	3.37	Alkalinity (as $CaCO_3$)		286	5.72
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		306	6.12
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		402	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.7	
Silver	Ag	0.00		± deviation		1.2	
Cyanide	CN	0.00		Beta *pc/l*		2.1	
Zinc	Zn	0.00		± deviation		1.8	

WELL NO. 2, open to the Silurian dolomite and shales and dolomites of the Maquoketa Group, was completed in October 1929 to a depth of 210 ft (originally drilled to 310 ft but the lower 100 ft was filled with gravel and sealed) by the W. L. Thorne Co., Des Plaines. The well is located in the main pumping station on Station St. just west of the village hall, approximately 325 ft S and 1150 ft E of the NW corner of Section 1, T42N, R9E, Cook County. The land surface elevation at the well is approximately 830 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SYSTEM		
Till	85	85
Gravel, clayey	35	120
Gravel, clean	10	130
Sand, some pebbles in upper part	25	155
Clay	5	160
Sand	10	170
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite, little crevice sand	60	230
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale and dolomite	80	310

A 16-in. diameter hole was drilled to a depth of 210 ft. The well is cased with 16-in. pipe from 1.5 ft above the pumphouse floor to a depth of 192 ft.

Upon completion, the well reportedly produced 540 gpm for 4 hr with a drawdown of 13.75 ft from a nonpumping water level of 5 3.45 ft below the pump base. When the pump in Well No. 1 was operating, the nonpumping water level in this well was 57.85 ft.

Nonpumping water levels have been reported as follows: 51.95 ft on November 7, 1933; 85 ft in 1957; and 89 ft in 1962.

On May 11, 1970, the well reportedly produced 750 gpm for 3 hr with a drawdown of 16 ft from a nonpumping water level of 96 ft.

In 1973, after the Henry Boysen Co., Libertyville, removed the pump, inspected, cleaned, and repaired it, the well reportedly produced 800 gpm with a drawdown of 12 ft from a nonpumping water level of 101 ft.

The pumping equipment presently installed is an Aurora oil-lubricated turbine pump set at 130 ft, rated at 850 gpm at about 120 ft head, and powered by a 40-hp U.S. electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007450) of a sample collected April 22, 1974, after pumping for 1.5 hr at 800 gpm, showed the water to have a hardness of 364 mg/1, total dissolved minerals of 446 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 3, finished in sand and gravel, was completed in February 1964 to a depth of 148 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located on Bryant St. just off the Northwest Highway, approximately 2400 ft S and 200 ft W of the NE corner of Section 35, T43N, R9E, Lake County. The land surface elevation at the well is approximately 820 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Clay and boulders	100	100
Gravel and boulders	48	148

A 38-in. diameter hole was drilled to a depth of 148 ft. The well is cased with 16-in. pipe from 1.5 ft above land surface to a depth of 104 ft followed by 44 ft of 16-in. by 1/8-in. slot Doerr stainless steel shutter screen. The annulus between the bore hole and casing-screen assembly is filled with cement grout from 0 to 20 ft, with impervious material from 20 to 73 ft, and with Silica graded gravel from 73 to 148 ft.

A production test was conducted by Consoer, Townsend & Associates on February 12-13, 1964. After 24 hr of pumping at rates of 500 to 1000 gpm, the drawdown was 8 ft from a nonpumping water level of 71 ft below land surface.

On May 11, 1970, the well reportedly produced 1000 gpm for 0.5 hr with a drawdown of 5 ft from a nonpumping water level of 81 ft.

In 1973, after the Henry Boysen Co., Libertyville, removed the pump, inspected, cleaned, and repaired the motor, the well reportedly produced 1260 gpm with a drawdown of 4 ft from a nonpumping water level of 90 ft.

The pumping equipment presently installed consists of a 40-hp U.S. electric motor, a 12-in., 3-stage Johnson vertical turbine pump set at 110 ft, rated at 1000 gpm, and has 110 ft of 8-in. column pipe. The well is equipped with 110 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007457) is for a water sample from the well collected April 22, 1974, after 2.5 hr of pumping at 1200 gpm.

WELL NO. 3, LABORATORY NO. C007457

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.1		Silica	SiO_2	25.0	
Manganese	Mn	0.00		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.71	0.04	Boron	B	0.1	
Sodium	Na	10	0.44	Nitrate	NO_3	0.2	0.00
Potassium	K	1.2	0.03	Chloride	Cl	9	0.25
Calcium	Ca	80	3.99	Sulfate	SO_4	96	2.00
Magnesium	Mg	55	4.53	Alkalinity (as $CaCO_3$)		346	6.92
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		428	8.56
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		508	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.2	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha pc/l		1.3	
Silver	Ag	0.00		± deviation		1.7	
Cyanide	CN	0.00		Beta pc/l		3.0	
Zinc	Zn	0.00		± deviation		2.2	

WELL NO. 4, finished in sand and gravel, was completed in April 1974 to a depth of 151 ft by the J. P. Miller Artesian

Well Co., Brookfield. The well is located at the corner of Bryant and Waverly Sts., approximately 1950 ft S and 80 ft E of the NW corner of Section 36, T43N, R9E, Lake County. The land surface elevation at the well is approximately 820 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Yellow clay	10	10
Gray clay, gravel, boulder	95	105
Hard clay	2	107
Clay and sandy gravel	14	121
Sand and gravel	30	151
Clay	2	153

A 38-in. diameter hole was drilled to a depth of 153 ft. The well is cased with 16-in. OD pipe from 1.5 ft above land surface to a depth of 126 ft followed by 25 ft of 16-in. No. 125 slot Johnson stainless steel screen. The annulus between the bore hole and casing-screen assembly is filled with cement from 0 to 10 ft, with clay and Aquagel from 10 to 100 ft, and with graded silica gravel from 100 to 153 ft.

During well development by the driller on March 21-22, 1974, several short production tests were conducted. Near the end of the development work, the well was pumped at 1200 gpm for 1 hr with a drawdown of 10 ft from a nonpumping water level of 74.5 ft below land surface.

The pumping equipment presently installed is a Johnston turbine pump set at 122 ft, rated at 1200 gpm, and powered by a 50-hp 1765 rpm U.S. electric motor.

A partial analysis of a sample (Lab. No. 195164) collected during the initial production test, after pumping for 1 hr at 1200 gpm, showed the water to have a hardness of 388 mg/1, total dissolved minerals of 467 mg/1, and an iron content of 0.2 mg/1.

BUFFALO GROVE

The village of Buffalo Grove (11,799) was partially served by the Buffalo Grove Utility Co. from 1957 until 1968 when the village installed its own public water supply. The Buffalo Grove Utility Co. system was purchased by the village in November 1970. Five wells are in use. Although most of this village is in Cook County, one of the wells is located in this county. In 1959 there were 160 services, none metered; the average and maximum daily pumpages were 26,000 and 35,000 gpd, respectively. In 1975 there were 4400 services, all metered; the average and maximum daily pumpages in 1974 were 1,570,000 and 2,300,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Cambrian-Ordovician aquifer, was completed in March 1967 to a depth of 1335 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at 345 South Arlington Heights Road, approximately 2040 ft S and 40 ft E of the NW corner of Section 5, T42N, R11E, Cook County. The land surface elevation at the well is approximately 725 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	182	182
Dolomite	68	250
Shale	200	450
Dolomite	305	755
St. Peter sandstone	160	915
Prairie du Chien dolomite and shale	175	1090
Galesville sandstone	200	1290
Eau Claire shale	45	1335

A 20-in. diameter hole was drilled to a depth of 465 ft, reduced to 15.2 in. between 465 and 985 ft, and finished 12 in. in diameter from 985 to 1335 ft. The well is cased with 20-in. pipe from land surface to a depth of 182 ft, 16-in. pipe from land surface to a depth of 465 ft (cemented in), and a 12-in. liner pipe from 902 ft to a depth of 985 ft.

A production test was conducted by the driller on March 29-30, 1967. After 24 hr of pumping at rates ranging from 1130 to 600 gpm, the final drawdown was 150 ft from a nonpumping water level of 512 ft below land surface. Five min after pumping was stopped, the water level had recovered to 584 ft.

On September 10, 1968, the nonpumping water level was reported to be 550 ft.

On March 22, 1974, after the well was shot and cleaned out by the driller, it reportedly produced 1000 gpm for 4 hr with a drawdown of 182 ft from a nonpumping water level of 615 ft below the top of the casing.

The pumping equipment presently installed consists of a 400-hp 1800 rpm Ideal electric motor, an 18-stage Peerless vertical turbine pump set at 950 ft, rated at 1100 gpm, and has 950 ft of column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C002864) of a sample collected October 8, 1974, after pumping for 30 min at 1000 gpm, showed the water to have a hardness of 306 mg/1, total dissolved minerals of 538 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 2, open to the Cambrian-Ordovician aquifer, was completed in November 1968 to a depth of 1355 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at 525 North Arlington Heights Road, approximately 1795 ft S and 115 ft E of the NW corner of Section 32, T43N, R11E, Lake County. The land surface elevation at the well is approximately 703 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	130	130
Niagaran limestone	150	280
Maquoketa shale	190	470
Galena-Platteville limestone	308	778
St. Peter sandstone	252	1030
Prairie du Chien limestone and shale	130	1160
Galesville sandstone	168	1328
Eau Claire shale and limestone	27	1355

A 19.2-in. diameter hole was drilled to a depth of 481 ft, reduced to 15.2 in. between 481 and 1055 ft, and finished 12 in. in diameter from 1055 to 1355 ft. The well is cased with 20-in. steel drive pipe from land surface to a depth of 142 ft, 16-in. OD steel pipe from land surface to a depth of 481 ft (cemented in), and a 12-in. liner pipe from 952 ft to a depth of 1055 ft.

Upon completion, the well was shot with four 250-lb charges of 100 percent nitrogelatine at depths of 1255 to 1265 ft, 1265 to 1275 ft, 1285 to 1295 ft, and 1305 to 1315 ft.

A production test was conducted by the driller on November 5-6, 1968. After 24.6 hr of pumping at rates of 604 to 1421 gpm, the final drawdown was 245 ft from a nonpumping water level of 492 ft below land surface. The water level recovered to 517 ft after pumping had been stopped for 2.2 hr.

The pumping equipment presently installed is a Peerless turbine pump set at 750 ft, rated at 1000 gpm, and powered by a 350-hp Caterpillar natural gas engine.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007989) of a sample collected on May 13, 1974, after pumping for 2 hr at 1000 gpm, showed the water to have a hardness of 268 mg/1, total dissolved minerals of 440 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 3 (formerly known as Buffalo Grove Utility Co. Well No. 1), open to the Cambrian-Ordovician aquifer, was completed in November 1957 to a depth of 1342 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at 160 Raupp Blvd., approximately 730 ft S and 350 ft W of the NE corner of Section 5, T42N, R11E, Cook County. The land surface elevation at the well is approximately 686 ft.

A sample study summary log of Well No. 3 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SERIES		
Till, sand and gravel	171	171
SILURIAN SYSTEM		
Niagaran Series		
Dolomite, white, little pink to orange at base, fine to very fine, crystalline	34	205
Alexandrian Series		
Dolomite, little calcareous, slightly cherty, white to buff, very fine, crystalline	62	267
ORDOVICIAN SYSTEM		
Cincinnatian Series		
Maquoketa Group		
Dolomite, gray, buff to brown, very fine to fine, crystalline; little shale	68	335
Shale, sandy, dolomitic, slightly micaceous, gray to green, weak, little tough; little dolomite	110	445
Champlainian Series		
Galena Group		
Dolomite, light buff to white, fine to medium, crystalline, slightly porous	175	620
Dolomite, slightly silty, slightly calcareous, buff to light gray, black speckled, fine to medium, crystalline	45	665
Platteville Group		
Dolomite, gray, buff to white, very fine to extra fine, crystalline, sandy at base	100	765
Ancell Group		
Glenwood Formation		
Sandstone, slightly silty, slightly dolomitic, light gray to white, fine to coarse, incoherent to compact (no samples 795 to 800 ft, 810 to 815 ft)	90	855
St. Peter Sandstone		
Sandstone, slightly silty, white, fine to medium, little very fine, rounded, frosted, incoherent, little friable (112 ft of samples missing)	177	1032
Chert, oolitic, buff to white; sandstone and shale (38 ft of samples missing)	48	1080
CAMBRIAN SYSTEM		
St. Croixan Series		
Franconia Formation		
Sandstone, silty, glauconitic, dolomitic, green to red, very fine to fine, angular to rounded, compact to incoherent; little shale and dolomite (no samples 1085 to 1090 ft, 1100 to 1110 ft)	60	1140
Ironton Sandstone		
Sandstone, very dolomitic, slightly silty, buff to white, little pink, medium to coarse, little fine to very fine, rounded, little angular at top, slightly frosted to frosted, incoherent to compact; little dolomite	95	1235
Galesville Sandstone		
Sandstone, silty, buff, very fine to fine, rounded to angular, incoherent	70	1305
Eau Claire Formation		
Shale, dolomitic, little glauconite, greenish gray to brown, brittle to weak; little sandstone and dolomite (no samples 1340 to 1342 ft)	37	1342

An 18-in. diameter hole was drilled to a depth of 173 ft, reduced to 17.2 in. between 173 and 496.2 ft, reduced to 12.5 in. between 496.2 and 1148 ft, and finished 10 in. in diameter from 1148 to 1342 ft. The well is cased with 18-in. OD pipe from 0.7 ft above the pumphouse floor to a depth of 173 ft and 13.4-in. OD pipe from land surface to a depth of 496.2 ft (cemented in).

Upon completion, the well reportedly produced 670 gpm for 18 hr with a drawdown of 138 ft from a nonpumping water level of 292 ft below the top of the casing.

The pumping equipment presently installed consists of a 300-hp General Electric motor, a 12-in., 14-stage Peerless turbine pump set at 850 ft, rated at about 800 gpm, and has 850 ft of 8-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007991) is for a

water sample from the well collected May 13, 1974, after 2 hr of pumping.

WELL NO. 3, LABORATORY NO. C007991

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1		Silica	SiO_2	8.0	
Manganese	Mn	0.00		Fluoride	F	1.2	0.06
Ammonium	NH_4	0.55	0.03	Boron	B	0.3	
Sodium	Na	31	1.35	Nitrate	NO_3	0.1	0.00
Potassium	K	11.9	0.30	Chloride	Cl	13	0.37
Calcium	Ca	80	3.99	Sulfate	SO_4	99	2.06
Magnesium	Mg	20	1.65	Alkalinity (as $CaCO_3$)		254	5.08
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		282	5.64
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		442	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.7	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		15.2	
Silver	Ag	0.00		±deviation		4.4	
Cyanide	CN	0.00		Beta *pc/l*		30.9	
Zinc	Zn	0.00		±deviation		3.0	

WELL NO. 4 (formerly Buffalo Grove Utility Co. Well No. 3), open to the Cambrian-Ordovician aquifer, was completed in June 1970 to a depth of 1355 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located approximately 431 ft N and 1314 ft E of the SW corner of Section 4, T42N, R11E, Cook County. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	140	140
Niagaran dolomite	120	260
Maquoketa shale	160	420
Galena-Platteville dolomite	315	735
St. Peter sandstone	270	1005
Prairie du Chien lime and shale	120	1125
Galesville sandstone	190	1315
Eau Claire lime	40	1355

A 24-in. diameter hole was drilled to a depth of 140 ft, reduced to 18.5 in. between 140 and 443 ft, reduced to 13.2 in. between 443 and 1100 ft, and finished 9.9 in. in diameter from 1100 to 1355 ft. The well is cased with 20-in. pipe from land surface to a depth of 140 ft (cemented in) and 14-in. pipe from 2 ft above land surface to a depth of 443 ft (cemented in). A 10-in. liner pipe, originally installed from 980 ft to a depth of 1100 ft, was reportedly removed in 1973.

A production test was conducted by the driller on June 1-2,1970. After 14.5 hr of pumping at rates ranging from 1020 to 1065 gpm, the drawdown was 179 ft from a non-pumping water level of 536 ft below the top of the casing. Pumping was continued for 5 hr at a rate of 900 gpm with a drawdown of 161 ft. Pumping was continued for 3 hr at a rate of 840 gpm with a drawdown of 144 ft. After an additional 1.6 hr of pumping at a rate of 1065 gpm, the final drawdown was 179 ft. Fifty-five min after pumping was stopped, the water level had recovered to 555 ft.

The pumping equipment presently installed is a Peerless turbine pump set at 860 ft, rated at 1000 gpm at about 800 ft TDH, and powered by a 330-hp Caterpillar natural gas engine.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C002863) is for a water sample from the well collected October 8, 1974, after 30 min of pumping at 1000 gpm.

WELL NO. 4, LABORATORY NO. C002863

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	7.5	
Manganese	Mn	0.00		Fluoride	F	1.6	0.08
Ammonium	NH_4	0.36	0.02	Boron	B	0.7	
Sodium	Na	71	3.09	Nitrate	NO_3	1.4	0.02
Potassium	K	13.9	0.36	Chloride	Cl	39	1.10
Calcium	Ca	116	5.79	Sulfate	SO_4	221	4.60
Magnesium	Mg	26	2.14	Alkalinity (as $CaCO_3$)		260	5.20
Arsenic	As	0.000					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		396	7.92
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		656	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.0	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		31.3	
Silver	Ag	0.00		±deviation		6.6	
Cyanide	CN	0.00		Beta *pc/l*		35.1	
Zinc	Zn	0.01		±deviation		4.3	

WELL NO. 5 (formerly Buffalo Grove Utility Co. Well No. 2), finished in the Galena-Platteville Dolomite, was constructed in February 1962 to a depth of 260 ft, and deepened in April 1970 to a depth of 510 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at Buffalo Grove Road and Dundee St., approximately 412 ft N and 1314 ft E of the SW corner of Section 4, T42N, R11E, Cook County. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	145	145
Limestone	107	252
Shale	223	475
Limestone	35	510

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B0016012) is for a water sample from the well collected April 25, 1972, after 1.2 hr of pumping at 225 gpm.

WELL NO. 5, LABORATORY NO. B0016012

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	13.0	
Manganese	Mn	0.0		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.38	0.02	Boron	B	1.2	
Sodium	Na	110	4.78	Nitrate	NO_3	0.0	
Potassium	K	2.4	0.06	Chloride	Cl	9.4	0.26
Calcium	Ca	35	1.75	Sulfate	SO_4	254	5.28
Magnesium	Mg	24	1.97	Alkalinity (as $CaCO_3$)		136	2.72
Barium	Ba	0.0		Hardness (as $CaCO_3$)		180	
Copper	Cu	0.0					
Cadmium	Cd	0.00		Total dissolved minerals		490	
Chromium	Cr	0.0					
Lead	Pb	0.00					
Mercury	Hg	<0.0005		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		2.2	
Silver	Ag	0.0		±deviation		1.8	
Zinc	Zn	0.0		Beta *pc/l*		1.1	
				±deviation		1.4	

A 17.2-in. diameter hole was drilled to a depth of 260 ft and finished 15 in. in diameter from 260 to 510 ft. The well is cased with 18-in. OD drive pipe from 2 ft above the pumphouse floor to a depth of 145.5 ft.

Upon completion in February 1962, the well reportedly produced 60 gpm for 6 hr with a drawdown of 177 ft from a nonpumping water level of 43 ft below the top of the casing. The well was then treated with 3000 gal of acid, and after 4 hr of pumping at a rate of 325 gpm, the drawdown was 85 ft from a nonpumping water level of 50 ft below the top of the casing.

After the deepening in 1970, the well reportedly produced 200 gpm for 2 weeks with a drawdown of 55 ft from a nonpumping water level of 50 ft.

The pumping equipment presently installed is a Peerless turbine pump set at 160 ft, rated at 200 gpm, and powered by a 20-hp U.S. electric motor.

CHAIN O'LAKES STATE PARK

Chain O'Lakes State Park, located 4 miles northwest of Fox Lake, installed a public water supply in 1953. Thirteen wells (Nos. 1-9, and 11-14) are in use. Each well is operated independently and is equipped either with a hand pump or small pressurized pumping system. The water is not treated.

WELL NO. 1 (Boy Scout Area), finished in sand and gravel, was completed in September 1961 to a depth of 133 ft. The well is located in Area No. 1, approximately 2400 ft S and 1750 ft E of the NW corner of Section 28, T46N, R9E. The land surface elevation at the well is approximately 800 ft.

The well is cased with 6-in. pipe from a few in. above a concrete platform to an unknown depth.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 45 ft from a nonpumping water level of 10 ft.

The pumping equipment presently installed is a Baker Manufacturing Co. hand pump. The pump has an angle-jet drinking fountain and a spout for filling buckets or utensils.

WELL NO. 2 (Turner Lake), finished in Silurian dolomite, was constructed to a depth of 133 ft, and deepened and relined in March 1962 to a depth of 218 ft. The well is located in Area No. 3 of the main family camping area, approximately 2100 ft N and 2600 ft E of the SW corner of Section 21, T46N, R9E. The land surface elevation at the well is approximately 751 ft.

The well is cased with 6-in. pipe from above land surface to an unknown depth. The well was relined in March 1962 with 4-in. pipe to a depth of 218 ft. The top of the well casing is equipped with a pitless adapter.

After relining in 1962, the well reportedly produced 20 gpm with a drawdown of 10 ft from a nonpumping water level of 10 ft.

The pumping equipment presently installed is a submersible pump rated at 45 gpm, and powered by an electric motor. This well serves a shower house, drinking fountains, and yard hydrants.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008199) is for a water sample from the well collected in May 1974.

WELL NO. 2, LABORATORY NO. C008199

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.0		Silica	SiO_2	20.0	
Manganese	Mn	0.03		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.09	0.00	Boron	B	0.0	
Sodium	Na	3	0.13	Nitrate	NO_3	0.1	0.00
Potassium	K	1.2	0.03	Chloride	Cl	3	0.08
Calcium	Ca	67	3.34	Sulfate	SO_4	33	0.69
Magnesium	Mg	34	2.80	Alkalinity (as $CaCO_3$)		292	5.84
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		309	6.18
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		368	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)	7.7		
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*	0.0		
Silver	Ag	0.00		±deviation	0.0		
Cyanide	CN	0.00		Beta *pc/l*	1.3		
Zinc	Zn	0.23		±deviation	1.1		

WELL NO. 3 (Northeast), finished in sand and gravel, was completed in September 1960 to a depth of 156 ft. The well is located in Area No. 5 of the wooded camping area northeast of the Ranger's Office, approximately 2200 ft S and 1500 ft W of the NE corner of Section 21, T46N, R9E. The land surface elevation at the well is approximately 750 ft.

The well is cased with 6-in. pipe from a few in. above a concrete platform to an unknown depth.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 5 ft from a nonpumping water level of 10 ft.

The pumping equipment presently installed is a Baker Manufacturing Co. hand pump. This pump has an angle-jet drinking fountain.

A partial analysis of a sample (Lab. No. 199398) collected August 12, 1975, showed the water to have a hardness of 316 mg/1, total dissolved minerals of 355 mg/1, and an iron content of 0.9 mg/1.

WELL NO. 4 (Concession Stand), finished in Silurian dolomite, was constructed in October 1940 to a depth of 234 ft and reportedly deepened in December 1940 to a depth of 270 ft by Henry Boysen, Jr., Libertyville. The well is located in Area No. 7 on Conservation Hill, approximately

525 ft S and 1250 ft W of the NE corner of Section 28, T46N, R9E. The land surface elevation at the well is approximately 775 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	2	2
Sandy yellow clay	40	42
Bank gravel with boulders	14	56
Quicksand	84	140
Fine dirty lake sand	23	163
Red clay and boulders	23	186
Red clay	24	210
Gravel	2	212
Creviced limestone	8	220
Gray limestone	50	270

An 8-in. diameter hole was drilled to a depth of 270 ft. Originally, the well was cased with 8-in. black steel pipe from 1.2 ft above the pumphouse floor to a depth of 212 ft. During deepening, the casing was driven an additional 6 ft to a total depth of 218 ft.

Before deepening, a production test was conducted by the State Water Survey on October 29-30, 1940. After 24.3 hr of pumping at a rate of 52 gpm, the drawdown was 90 ft from a nonpumping water level of 44 ft below the top of the casing. Thirty-five min after pumping was stopped, the water level had recovered to 48 ft.

After deepening, a production test was conducted by the State Water Survey on December 5, 1940. The well reportedly produced 40 gpm for 9 hr with a drawdown of 97 ft. Twenty-two min after pumping was stopped, the water level had recovered to 53.5 ft.

The pumping equipment presently installed consists of a 7 1/2-hp Westinghouse electric motor (No. 1-4C7149), a 6-in., 24-stage Fairbanks-Morse submersible pump (No. T-13827) set at 180 ft, and has 180 ft of 3.5-in. column pipe. A 10-ft section of 4-in. suction pipe is attached to the pump intake. The well is equipped with 180 ft of airline. This well serves a concession stand and a picnic area near the boat launching area.

A partial analysis of a sample (Lab. No. 199399) collected August 12, 1975, showed the water to have a hardness of 260 mg/1, total dissolved minerals of 310 mg/1, and an iron content of 0.2 mg/1. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 5 (Oak Point-West), finished in sand and gravel, was completed in July 1958 to a depth of 57 ft. The well is located in Oak Point at the west end of the camping area, approximately 300 ft S and 1400 ft E of the NW corner of Section 15, T46N, R9E. The land surface elevation at the well is approximately 742 ft.

A 6-in. diameter hole was drilled to a depth of 57 ft. The well is cased with 6-in. pipe from above the well platform to an unknown depth.

Upon completion the nonpumping water level was reported to be 8 ft.

The pumping equipment presently installed is a Baker Manufacturing Co. hand pump. This pump has an angle-jet drinking fountain.

WELL NO. 6 (Oak Point-East), finished in sand and gravel, was constructed in September 1961 to a depth of 56 ft, and deepened to a depth of 174 ft. The well is located in Oak Point at the east end of the camping area, approximately 500 ft S and 1900 ft E of the NW corner of Section 15, T46N, R9E. The land surface elevation at the well is approximately 747 ft.

A 6-in. diameter hole was drilled to a depth of 174 ft. The well is cased with 6-in. pipe from above the well platform to an unknown depth.

On September 24, 1961, the well reportedly produced 10 gpm with a drawdown of 5 ft from a nonpumping water level of 10 ft.

The pumping equipment presently installed is a Baker Manufacturing Co. hand pump.

WELL NO. 7 (Custodian's House), finished in sand and gravel, was completed to a depth of 103 ft. The well is located by the Park Ranger's home near the park entrance, approximately 1400 ft S and 1250 ft E of the NW corner of Section 28, T46N, R9E. The land surface elevation at the well is approximately 760 ft.

The well is cased with 6-in. pipe to an unknown depth.

The well reportedly produces 10 gpm with a drawdown of 3 ft from a nonpumping water level of 12 ft.

The pumping equipment presently installed is a submersible pump powered by an electric motor.

WELL NO. 8 (Conservation House), finished in sand and gravel, was completed to a depth of 52 ft. The well is located in Area No. 6 on Conservation Hill in a small camping area, approximately 550 ft S and 930 ft W of the NE corner of Section 28, T46N, R9E. The land surface elevation at the well is approximately 800 ft.

The pumping equipment presently installed is a shallow well suction pump powered by an electric motor. This well serves two drinking fountains in the camp area.

The following mineral analysis (Lab. No. 195666) is for a water sample from the well collected May 20, 1974.

WELL NO. 8, LABORATORY NO. 195666

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	Tr		Silica	SiO_2	17.2	
Manganese	Mn	0.00		Fluoride	F	0.2	
Ammonium	NH_4	Tr	Tr	Boron	B	0.0	
Sodium	Na	2.1	0.09	Nitrate	NO_3	0.5	0.01
Potassium	K	0.8	0.02	Chloride	Cl	7	0.20
Calcium	Ca	76.8	3.83	Sulfate	SO_4	32.7	0.68
Magnesium	Mg	37.6	3.09	Alkalinity (as $CaCO_3$)		316	6.32
Strontium	Sr	0.07					
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		346	6.92
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		361	
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity	0		
Lithium	Li	0.00		Color	0		
Nickel	Ni	<0.05		Odor	0		
Zinc	Zn	1.3		Temp.	50.5 F (reported)		

WELL NO. 9 (Pier Area), finished in sand and gravel, was completed to a depth of 146 ft. The well is located in Area

No. 2 at the boat dock camping area about 40 ft from the river bank, approximately 800 ft N and 2300 ft E of the SW corner of Section 21, T46N, R9E. The land surface elevation at the well is approximately 750 ft.

The well is cased with 6-in. pipe to an unknown depth.

The nonpumping water level is reported to be 12 ft.

The pumping equipment presently installed is a hand pump.

WELL NO. 10 (Boat Dock Camping Area), finished in sand and gravel, was completed to a depth of 89 ft. This well was abandoned and sealed prior to 1974. The well was located in Area No. 7 (formerly called Rosie's farm well), approximately 350 ft N and 1550 ft W of the SE corner of Section 21, T46N, R9E. The land surface elevation at the well is approximately 753 ft.

The well was cased with 6-in. pipe from a few in. above a concrete platform to an unknown depth.

WELL NO. 11 (Oak Point Boat Dock), finished in sand and gravel, was completed in June 1967 to a depth of 138 ft by E. A. Glenn & Sons, Inc., Antioch. The well is located in Oak Point in the picnic area on the right side of the entrance road near the boat launching area, approximately 1300 ft N and 1300 ft E of the SW corner of Section 10, T46N, R9E. The land surface elevation at the well is approximately 745 ft.

A drillers log of Well No. 11 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil	2	2
Yellow clay	5	7
Sandy clay	14	21
Blue clay	90	**111**
Sand	12	123
Fine sand	10	**133**
Coarse sand	3	**136**
Gravel	2	**138**

A 6-in. diameter hole was drilled to a depth of 138 ft. The well is cased with 6-in. galvanized steel pipe from land surface to a depth of 138 ft.

Upon completion, the well reportedly produced 30 gpm for 4 hr with a drawdown of 15 ft from a nonpumping water level of 4 ft below land surface.

The pumping equipment presently installed is a Baker Manufacturing Co. hand pump.

A partial analysis of a sample (Lab. No. 199397) collected August 12, 1975, showed the water to have a hardness of 192 mg/1, total dissolved minerals of 345 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 12 (Steven's Farm), finished in sand and gravel, was completed in October 1970 to a depth of 120 ft by the Hoover Water Well Service, Zion. The well is located in front of Steven's farm, approximately 1250 ft S and 100 ft W of the NE corner of Section 21, T46N, R9E. The land surface elevation at the well is approximately 751 ft.

A drillers log of Well No. 12 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	5	5
Yellow till	15	20
Brown sand and gravel	**50**	70
Brown sand	35	**105**
Sand and fine gravel	15	**120**

A 4-in. diameter hole was drilled to a depth of 120 ft. The well is cased with 4-in. pipe from 1 ft above land surface to a depth of 116 ft followed by 4 ft of 3.8-in. No. 12 slot Johnson screen.

Upon completion, the well reportedly produced 15 gpm with a drawdown of 40 ft from a nonpumping water level of 14 ft below land surface.

The pumping equipment presently installed is a Baker Monitor bubbler fountain hand pump set at 42 ft. This pump has an angle-jet drinking fountain.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B104861) is for a water sample from the well collected December 6, 1972, after 30 min of pumping.

WELL NO. 12, LABORATORY NO. B104861

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	6.2	0.22	Silica	SiO_2	15	
Manganese	Mn	0.05	0.00	Fluoride	F	0.1	0.00
Ammonium	NH_4	0		Boron	B	0.0	
Sodium	Na	4	0.17	Nitrate	NO_3	0	
Potassium	K	1.6	0.04	Chloride	Cl	4	0.11
Calcium	Ca	71	3.54	Sulfate	SO_4	50	1.04
Magnesium	Mg	44	3.62	Alkalinity (as $CaCO_3$)		305	6.10
Arsenic	As	0.00		Hardness (as $CaCO_3$)		358	
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		350	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)	7.9		
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*	1.6		
Selenium	Se	0.00		± deviation	1.5		
Silver	Ag	0.00		Beta *pc/l*	4.3		
Zinc	Zn	1.7		± deviation	1.5		

WELL NO. 13 (Farmhouse) was completed to an unknown depth. The well is located on a farm purchased in 1970, approximately 500 ft S and 300 ft W of the NE corner of Section 20, T46N, R9E. The land surface elevation at the well is approximately 775 ft.

The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Sta-Rite submersible pump powered by a 1/3-hp 3450 rpm electric motor (Model No. CP4B2-5, Serial No. F62). This well serves the Assistant Park Ranger's home and surrounding farm buildings.

WELL NO. 14 (Shower Building), finished in sand and gravel, was completed in October 1970 to a depth of 178 ft by the Hoover Water Well Service, Zion. The well is located in Area No. 3 between the shower building and the ranger's office, approximately 400 ft S and 1500 ft W of the NE corner of the SE quarter of Section 21, T46N, R9E. The land surface elevation at the well is approximately 745 ft.

A drillers log of Well No. 14 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	2	2
Clay and gravel	12	14
Yellow sand and gravel	36	**50**
Brown sand	70	**120**
Runny sand	**45**	165
Gravel and sand	13	178

A 6-in. diameter hole was drilled to a depth of 178 ft. The well is cased with 6-in. pipe from 1 ft above land surface to a depth of 170 ft and equipped with 9 ft (8 ft exposed) of 6-in. Johnson screen. The screened section consists of 4.5 ft of No. 20 slot followed by 4.5 ft of No. 15 slot. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 60 gpm with a drawdown of 15 ft from a nonpumping water level of 14 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump set at 105 ft, rated at 28 gpm, and powered by a 2-hp Franklin electric motor. This well serves the new shower building in Camping Area No. 3.

WELL NO. 15 (Cooper Farm), finished in Silurian dolomite, was completed to a depth of 350 ft. Plans are in progress for this well to be capped and filled. The well is located east of Eline Road on the southwest side of Lake Marie, in the NW quarter of Section 24, T46N, R9E. The land surface elevation at the well is approximately 740 ft.

The well is cased with 8-in. pipe from 1 in. into the pump base to a depth of 350 ft.

The pumping equipment presently installed is a hand pump.

CHEVY CHASE SUBDIVISION

Chevy Chase Subdivision (est. 90), located 1.5 miles north of Wheeling on Illinois Route 21, installed a public water supply in 1956. The water system is owned and operated by the Chevy Chase Sewer & Water Co. One well is in use. In 1961 there were 11 services, all metered; the average daily pumpage was 3630 gpd. In 1974 there were 25 services, including two commercial outlets and the Chevy Chase Country Club, all metered; the average and maximum daily pumpages were 10,800 and 16,000 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1, finished in Silurian dolomite, was completed in June 1926 to a depth of 280 ft by the Gray Well Drilling Co., Chicago. The well is located adjacent to the elevated tank in the rear of the clubhouse, approximately 1875 ft N and 1550 ft E of the SW corner of Section 35, T43N, R11E. The land surface elevation at the well is approximately 644 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Drift, no samples	90	90
Clay, gray, dolomitic, sandy	10	100
Glacial till, gray, clayey, dolomitic	15	115
Clay, light gray, dolomitic	9	**124**
Dolomite, light gray to gray	26	**150**
Dolomite, pink and light gray	20	170
Dolomite, very light gray, some slightly pink	**30**	**200**
Dolomite, gray and light greenish gray, chert	10	**210**
Dolomite, very light gray	10	**220**
Dolomite, very light gray, white chert	10	**230**
Dolomite, very light gray	10	**240**
Dolomite, light gray, streaked with dark gray, white chert	**20**	**260**
Dolomite, dark to light blue	20	**280**

A 12-in. diameter hole was drilled to a depth of 280 ft. The well is cased with 12-in. pipe from 0.2 ft above the pump station floor to a depth of 125.5 ft.

In October 1952, the well reportedly produced 217 gpm with a drawdown of 67 ft from a nonpumping water level of 13 ft.

In November 1957, after 24 hr of pumping at 236 gpm, the drawdown was 44 ft from a nonpumping water level of 53 ft below the top of the casing.

In February 1965, the nonpumping water level was reported to be 26 ft.

The pumping equipment presently installed is a submersible pump set at 160 ft, rated at 365 gpm, and powered by a 20-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B36054) is for a water sample from the well collected March 10, 1976, after 30 min of pumping at 265 gpm.

WELL NO. 1, LABORATORY NO. B36054

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1		Silica	SiO_2	11	
Manganese	Mn	0.00		Fluoride	F	0.5	0.03
Ammonium	NH_4	0.57	0.03	Boron	B	1.1	
Sodium	Na	120	5.22	Nitrate	NO_3	0.22	0.00
Potassium	K	1.8	0.05	Chloride	Cl	9.7	0.27
Calcium	Ca	43	2.15	Sulfate	SO_4	380	7.90
Magnesium	Mg	34	2.80	Alkalinity (as $CaCO_3$)		116	2.32
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		247	4.94
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		637	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.8	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha pc/l		0.3	
Silver	Ag	0.00		±deviation		1.7	
Cyanide	CN	0.00		Beta pc/l		2.8	
Zinc	Zn	0.0		±deviation		1.9	

COUNTRYSIDE ESTATES SUBDIVISION

Countryside Estates Subdivision (est. 274), located 2 miles north of Gurnee, installed a public water supply in 1957. The water system is owned and operated by the Charmar Water Co. of Utilities, Inc. Two wells are in use. In 1961 there were 50 services, all metered. In 1974 there were 76 services, all metered; the average and maximum daily pumpages were 11,900 and 18,000 gpd, respectively. The water from Well No. 2 is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in March 1956 to a depth of 208 ft by the Hoover Water Well Service, Zion. The well is located between Delany Road and Shirley Drive, approximately 665 ft N and 280 ft W of the SE corner of Section 2, T45N, R11E. The land surface elevation at the well is approximately 680 ft.

A correlated drillers log of Well No. 1 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Yellow clay	**10**	**10**
Soft blue clay	75	85
Blue hardpan	55	**140**
Blue clay	61	**201**
Mixed sand and gravel fine to coarse	3	**204**
No record	4	**208**

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02432) is for a water sample from the well collected October 25, 1971, after 30 min of pumping.

WELL NO. 1, LABORATORY NO. 02432

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	11	
Manganese	Mn	0.0		Fluoride	F	0.94	0.05
Ammonium	NH_4	0.26	0.01	Boron	B	0.8	
Sodium	Na	100	4.35	Nitrate	NO_3	0.88	0.01
Potassium	K	0.8	0.02	Chloride	Cl	9.5	0.27
Calcium	Ca	24	1.20	Sulfate	SO_4	225	4.68
Magnesium	Mg	15	1.23	Alkalinity (as $CaCO_3$)		88	1.76
				Hardness (as $CaCO_3$)		120	
Barium	Ba	0.0		Total dissolved minerals		432	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		8.2	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		0	
Nickel	Ni	0.05		Beta *pc/l*		1	
Silver	Ag	0.0		±deviation		0	
Zinc	Zn	0.0					

A 5-in. diameter hole was drilled to a depth of 208 ft. The well is cased with 5-in. galvanized pipe from 1.7 ft above the concrete floor of a 4-ft deep pit to a depth of 204 ft and equipped with 4.7 ft (4 ft exposed) of 4.8-in. No. 30 slot Johnson silicon brass screen. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 21 ft from a nonpumping water level of 42 ft below the top of the casing.

The pumping equipment presently installed consists of a 1 1/2-hp U.S. electric motor, a Red Jacket submersible pump set at 157 ft, rated at 25 gpm at about 70 ft head, and has 157 ft of 1.2-in. column pipe.

WELL NO. 2, finished in Silurian dolomite, was completed in April 1957 to a depth of 285 ft by L. J. Watson, Harvey. The well is located 300 ft north of Well No. 1, approximately 965 ft N and 260 ft W of the SE corner of Section 2, T45N, R11E. The land surface elevation at the well is approximately 675 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Shale, sand and gravel	**210**	**210**
Lime	75	285

A 6-in. diameter hole was drilled to a depth of 285 ft. The well is cased with 6-in. pipe from above the roof of a 4-ft deep concrete pit to a depth of 210 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 22 gpm with a drawdown of 175 ft from a nonpumping water level of 25 ft below the top of the casing.

The pumping equipment presently installed is a Red Jacket submersible pump set at 232 ft, and powered by a 1 1/2-hp U.S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02431) is for a water sample from the well collected October 25, 1971, after 30 min of pumping.

WELL NO. 2, LABORATORY NO. 02431

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	11	
Manganese	Mn	0.0		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.3	0.01	Boron	B	0.9	
Sodium	Na	110	4.78	Nitrate	NO_3	0.9	0.01
Potassium	K	0.8	0.02	Chloride	Cl	9.8	0.28
Calcium	Ca	24	1.20	Sulfate	SO_4	225	4.68
Magnesium	Mg	15	1.23	Alkalinity (as $CaCO_3$)		88	1.76
				Hardness (as $CaCO_3$)		120	
Barium	Ba	0.0		Total dissolved minerals		433	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		8.2	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		1	
Nickel	Ni	0.0		Beta *pc/l*		2	
Silver	Ag	0.0		±deviation		2	
Zinc	Zn	0.0					

COUNTRYSIDE LAKE SUBDIVISION

Countryside Lake Subdivision (est. 175), located approximately 1.5 miles west of Mundelein, installed a public water supply in 1928. The water system is owned and operated by the Lake County Public Works Department. One well is in use. In 1961 there were 30 services, none metered, plus a golf course and clubhouse. In 1973 there were 50 services, 50 percent metered; the average and maximum daily pumpages were 37,540 and 56,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in 1928 to a depth of 333 ft by Fred Kiene & Son, Mundelein. The well is located next to the elevated tank west of the golf course, approximately 2600 ft S and 750 ft W of the NE corner of Section 27, T44N, R10E. The land surface elevation at the well is approximately 845 ft.

An 8-in. diameter hole was drilled to a depth of 333 ft. The well is cased with 8-in. pipe from 0.3 ft above the pumphouse floor to a depth of 330 ft.

In December 1970, the nonpumping water level was reported to be 85 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 240 ft, rated at 130 gpm, and powered by a 15-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B37718) is for a water sample from the well collected March 22, 1976, after 13 hr of pumping at 150 gpm.

WELL NO. 1, LABORATORY NO. B37718

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	25	
Manganese	Mn	0.00		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.63	0.04	Boron	B	0.3	
Sodium	Na	38	1.65	Nitrate	NO_3	0.1	0.00
Potassium	K	1.4	0.04	Chloride	Cl	1.3	0.04
Calcium	Ca	44	2.20	Sulfate	SO_4	130	2.70
Magnesium	Mg	40	3.29	Alkalinity (as $CaCO_3$)		216	4.32
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		274	5.46
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		415	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)	7.7		
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*	1.6		
Silver	Ag	0.00		±deviation	1.3		
Cyanide	CN	0.00		Beta *pc/l*	3.1		
Zinc	Zn	0.0		±deviation	1.6		

COUNTRYSIDE MANOR SUBDIVISION

Countryside Manor Subdivision (est. 837), located 1 mile northeast of Libertyville, installed a public water supply in 1960. The water system is owned and operated by the Lake County Public Works Department. One well (No. 2) is in use. This supply is cross connected with the North Libertyville Estates Subdivision and operated as one system. In 1974 there were 239 services, all metered; the average and maximum daily pumpages were 48,800 and 72,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in May 1959 to a depth of 36 ft by the Henry Boysen Co., Libertyville. This well was abandoned and sealed in 1968. The well was located on Oak Grove Ave. about 1 mile south of Buckley Road, approximately 2400 ft N and 2900 ft E of the SW corner of Section 10, T44N, R11E. The land surface elevation at the well is approximately 658 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Brown clay	4	4
Blue clay	20	24
Sand and gravel	12	36

An 8-in. diameter hole was drilled to a depth of 36 ft. The well was cased with 8-in. pipe from land surface to a depth of 32 ft followed by 4 ft of 8-in. No. 14 slot Cook screen.

A production test using one observation well was conducted on September 15, 1959, by representatives of the driller and the State Water Survey. After 58 min of pumping at a rate of 81 gpm, the drawdown was 9.50 ft from a nonpumping water level of 19.50 ft below land surface. Thirty min after pumping was stopped, the water level had recovered to 19.75 ft.

A partial analysis of a sample (Lab. No. 150499) made in September 1959, after pumping for 3 hr at 80 gpm, showed the water to have a hardness of 236 mg/1, total dissolved minerals of 490 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in May 1959 to a depth of 242 ft by the Henry Boysen Co., Libertyville. The well is located on lot 42 of Unit 3 of Cooper's Countryside Manor at 1730 Park Lane, approximately 700 ft N and 1500 ft W of the SE corner of Section 10, T44N, R11E. The land surface elevation at the well is approximately 670 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	2	2
Brown clay	15	17
Blue clay	30	47
Hardpan	85	132
Mucky sand	16	148
Hardpan	13	161
Muck	2	163
Limestone	79	242

A 6-in. diameter hole was drilled to a depth of 242 ft. The well is cased with 6-in. pipe from 1.5 ft above the pumphouse floor to a depth of 166.8 ft.

Upon completion, the well reportedly produced 125 gpm for 24 hr with a drawdown of 120 ft from a nonpumping water level of 47 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump (Model No. 1006F4-5H6) set at 190 ft, rated at 115 gpm, and powered by a 10-hp Franklin electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B37722) is for a water sample from the well collected March 22, 1976, after 1.4 hr of pumping.

WELL NO. 2, LABORATORY NO. B37722

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.9		Silica	SiO_2	18	
Manganese	Mn	0.00		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.60	0.03	Boron	B	0.6	
Sodium	Na	100	4.35	Nitrate	NO_3	0.2	0.00
Potassium	K	1.3	0.03	Chloride	Cl	24	0.68
Calcium	Ca	79	3.94	Sulfate	SO_4	450	9.36
Magnesium	Mg	56	4.61	Alkalinity (as $CaCO_3$)		142	2.84
Arsenic	As	0.00		Hardness (as $CaCO_3$)		427	8.54
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		892	
Cadmium	Cd	0.00					
Chromium	Cr	0.00		pH (as rec'd)		7.7	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	0.0000		Alpha *pc/l*		0.0	
Nickel	Ni	0.0		±deviation		0.0	
Selenium	Se	0.00		Beta *pc/l*		2.0	
Silver	Ag	0.00		±deviation		2.7	
Cyanide	CN	0.00					
Zinc	Zn	0.0					

DUCK LAKE WOODS SUBDIVISION

Duck Lake Woods Subdivision (est. 125), located 2 miles southeast of Fox Lake, installed a public water supply in 1948. The water system is owned and operated by the Duck Lake Woods Water Users Association. One well is in use. In 1973 there were 36 services, none metered; the estimated average and maximum daily pumpages were 7500 and 11,000 gpd, respectively. The water is chlorinated.

WELL NO. 1, finished in sand and gravel, was completed in 1948 to a depth of 55 ft by Clem Wertz, Johnsburg. The well is located on the southeast side of Duck Lake on lot 3 of block 8, approximately 4200 ft S and 2125 ft E of the NW corner of Section 14, T45N, R9E. The land surface elevation at the well is approximately 755 ft.

The well is cased with 6-in pipe from 2 ft above land surface to an unknown depth.

In January 1976, the nonpumping water level was reported to be about 15 ft.

The pumping equipment presently installed is an Aermotor submersible pump set at 42 ft, rated at 40 gpm, and powered by a 1 1/2-hp Franklin electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 04836) is for a water sample from the well collected April 10, 1972, after pumping at 40 gpm.

WELL NO. 1, LABORATORY NO. 04836

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.3		Silica	SiO_2	29	
Manganese	Mn	0.0		Fluoride	F	0.4	0.02
Ammonium	NH_4	0.6	0.03	Boron	B	0.2	
Sodium	Na	18	0.78	Nitrate	NO_3	0.0	
Potassium	K	14	0.36	Chloride	Cl	34	0.96
Calcium	Ca	91	4.54	Sulfate	SO_4	50	1.04
Magnesium	Mg	53	4.36	Alkalinity (as $CaCO_3$)		372	7.44
Barium	Ba	0.0		Hardness (as $CaCO_3$)		452	
Copper	Cu	0.0		Total dissolved minerals		476	
Cadmium	Cd	0.00					
Chromium	Cr	0.0		pH (as rec'd)		7.3	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	<0.0005		Alpha *pc/l*		0	
Nickel	Ni	0.0		±deviation		1	
Silver	Ag	0.0		Beta *pc/l*		3	
Zinc	Zn	0.0		±deviation		2	

FAIRHAVEN ESTATES SUBDIVISION

Fairhaven Estates Subdivision (est. 200), located 1 mile north of Barrington, installed a public water supply in 1960. The water system is owned and operated by the Tri-County Water Co. One well (No. 1) is in use. In 1965 there were 14 services, all metered; the average daily pumpage was 3480 gpd. In 1973 there were 54 services, all metered; the average and maximum daily pumpages were 14,931 and 21,000 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1, finished in Silurian dolomite, was com-

pleted in August 1958 to a depth of 310 ft by the Henry Boysen Co., Libertyville. The well is located on lot 71 on the south side of Cuba Road, 0.2 mile east of Route 59, approximately 2250 ft N and 2000 ft E of the SW corner of Section 25, T43N, R9E. The land surface elevation at the well is approximately 865 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Black soil	1.5	1.5
Brown clay	16.5	18
Blue clay	52	70
Hardpan	45	115
Clay	45	160
Hardpan	10	170
Fine sand	35	205
Coarse sand	34	239
Limestone	68	307
Shale	3	310

A 10-in. diameter hole was drilled to a depth of 310 ft. The well is cased with 10-in. steel pipe from 0.7 ft above the pumphouse floor to a depth of 239 ft. The casing extends through the pressure tank pit and the portion of casing between the pumphouse floor and pressure tank pit floor is encased with an 18-in. outer casing with the annular opening between the two casings sealed with concrete.

Upon completion, the well reportedly produced 716 gpm for 3 hr with a drawdown of 7 ft from a nonpumping water level of 115 ft below land surface.

The pumping equipment presently installed is a 4-in., 6-stage Deming oil-lubricated turbine pump set at 220 ft, rated at 350 gpm, and powered by a 30-hp 1800 rpm U.S. Hollo-shaft electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02919) is for a water sample from the well collected November 22, 1971.

WELL NO. 1, LABORATORY NO. 02919

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	25	
Manganese	Mn	0.0		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.8	0.04	Boron	B	0.2	
Sodium	Na	10	0.44	Nitrate	NO_3	0.0	
Potassium	K	1.3	0.03	Chloride	Cl	1.8	0.05
Calcium	Ca	70	3.49	Sulfate	SO_4	50	1.04
Magnesium	Mg	47	3.86	Alkalinity (as $CaCO_3$)		304	6.08
				Hardness (as $CaCO_3$)		372	
Barium	Ba	0.0		Total dissolved minerals		370	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		8.3	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		1	
Nickel	Ni	0.06		Beta *pc/l*		0	
Silver	Ag	0.0		±deviation		0	
Zinc	Zn	0.0					

WELL NO. 2, finished in Silurian dolomite, was completed in 1960 to a depth of 276 ft by the Henry Boysen Co., Libertyville. This well, which was capped after completion and never used, is located 10 ft south of Well No. 1, approximately 2240 ft N and 2000 ft E of the SW corner of Section 25, T43N, R9E. The land surface elevation at the well is approximately 865 ft.

A 20-in. diameter hole was drilled to a depth of 20 ft and finished 8 in. in diameter from 20 to 276 ft. The well is cased with 12-in. pipe from land surface to a depth of 20 ft and 8-in. pipe from land surface to a depth of 241 ft.

Upon completion, the nonpumping water level was reported to be 119 ft and the production rate was 225 gpm.

FOREST LAKE ADDITION

Forest Lake Addition (est. 217), located about 2 miles northeast of Lake Zurich, installed a public water supply in 1939. The water system is owned and operated by the Lake County Public Works Department. One well is in use. In 1953 there were 38 services. In 1974 there were 62 services, none metered; the average and maximum daily pumpages were 21,000 and 31,000 gpd, respectively. The water is chlorinated.

WELL NO. 1, finished in Silurian dolomite, was completed in 1939 to a depth of 240 ft by Henry Boysen, Jr., Libertyville. The well is located at the southwest corner of Arbor Lane and Lakeside Drive, approximately 900 ft N and 1900 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 810 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	211	211
Limestone	29	240

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02695) is for a water sample from the well collected November 9, 1971, after 30 min of pumping at 40 gpm.

WELL NO. 1, LABORATORY NO. 02695

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.15	0.01	Silica	SiO_2	19	
Manganese	Mn	0.0		Fluoride	F	0.70	0.04
Ammonium	NH_4	1.2	0.06	Boron	B	0.0	
Sodium	Na	88	3.83	Nitrate	NO_3	0	
Potassium	K	2.0	0.05	Chloride	Cl	4.5	0.13
Calcium	Ca	116	5.79	Sulfate	SO_4	650	13.52
Magnesium	Mg	77	6.34	Alkalinity (as $CaCO_3$)		112	2.24
				Hardness (as $CaCO_3$)		584	
Barium	Ba	0.5		Total dissolved minerals		1155	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.7	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		0	
Nickel	Ni	0.0		Beta *pc/l*		0	
Silver	Ag	0.0		±deviation		0	
Zinc	Zn	0.0					

A 6-in. diameter hole was drilled to a depth of 240 ft.

The well is cased with 6-in. pipe from 0.7 ft above the concrete floor of a 6-ft deep pit to a depth of 211 ft.

Upon completion, the well reportedly produced 40 gpm for 7 hr from a nonpumping water level of 42 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump rated at 70 gpm, and powered by a 5-hp Red Jacket electric motor.

FOX LAKE

The village of Fox Lake (4511) installed a public water supply in 1928. One well (No. 2) is in use and another well (No. 1) is available for emergency use. In 1949 there were 427 services; the estimated average and maximum daily pumpages were 60,000 and 80,000 gpd, respectively. In 1976 there were 912 services, 88 percent metered; the estimated average daily pumpage in 1972 was 180,000 gpd. The water is chlorinated, fluoridated, and treated with polyphosphate to keep iron in solution.

WELL NO. 1, open to the Galena-Platteville Dolomite and the Glenwood-St. Peter Sandstone, was completed in 1928 to a depth of 945 ft by the W. L. Thorne Co., Des Plaines. This well was taken out of service in 1943, but has been maintained in operating condition as an emergency unit. The well is located about 60 ft north of the center of Ernest Ave. and 90 ft west of the center of Grace Ave., approximately 700 ft S and 700 ft W of the NE corner of Section 9, T45N, R9E. The land surface elevation at the well is approximately 765 ft.

A sample study log of Well No. 1 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Sand and gravel	20	20
Silt and glacial till	**40**	60
Sand and gravel	175	235
"Hardpan"	10	245
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite	**100**	345
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale, some dolomite	**150**	**495**
Galena-Platteville Group		
Dolomite	**303**	**798**
Ancell Group		
Glenwood Formation		
Dolomite, thin shale beds	12	**810**
St. Peter Sandstone		
Sandstone	**90**	**900**
Conglomerate of sandstone, chert and shale	20	**920**
No record	25	**945**

A 12-in. diameter hole was drilled to a depth of 545 ft and finished 10 in. in diameter from 545 to 945 ft. The well is cased with 12-in. pipe from 1.1 ft above the pump station floor to a depth of 255 ft and 10-in. pipe between the depths of 237 and 545 ft.

The nonpumping water level was reported to be about 40 ft below the pump base during the early 1930's.

The pumping equipment presently installed consists of a 25-hp 1800 rpm U.S. electric motor (Serial No. 165617), an 8-in., 12-stage Sterling turbine pump (Serial No. S-2567) rated at 200 gpm at about 325 ft head, and has 200 ft of 5-in. column pipe. A 10-ft section of 5-in. suction pipe with a 5-in. diameter tapered strainer is attached to the pump intake. A crooked bore hole reportedly limits setting the pump deeper.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B110119) is for a water sample from the well collected May 8, 1973, after 45 min of pumping at 250 gpm. The iron content has been less on previous samples.

WELL NO. 1, LABORATORY NO. B110119

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.40	0.05	Silica	SiO_2	20	
Manganese	Mn	0.0		Fluoride	F	0.60	0.03
Ammonium	NH_4	0.30	0.02	Boron	B	0.3	
Sodium	Na	12.0	0.52	Nitrate	NO_3	0	
Potassium	K	2.1	0.05	Chloride	Cl	2.0	0.06
Calcium	Ca	53	2.64	Sulfate	SO_4	0	
Magnesium	Mg	40	3.29	Alkalinity (as $CaCO_3$)		318	6.36
Arsenic	As	0.00		Hardness (as $CaCO_3$)		247	5.93
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		320	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		8.3	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		0.5	
Selenium	Se	0.00		± deviation		1.2	
Silver	Ag	0.00		Beta *pc/l*		7.0	
Zinc	Zn	0.04		± deviation		2.0	

WELL NO. 2, finished in sand and gravel, was completed in 1941 to a depth of 135 ft by Ray Feuerborn, Batavia. The well is located 13 ft south of Well No. 1, approximately 713 ft S and 700 ft W of the NE corner of Section 9, T45N, R9E. The land surface elevation at the well is approximately 765 ft.

A 16-in. diameter hole was drilled to a depth of 135 ft. The well is cased with 16-in. pipe from 1.3 ft above the pumphouse floor to a depth of 119 ft followed by 16 ft of 15-in. No. 30 slot Johnson brass screen. The well was gravel packed using four "pilot-hole gravel pack wells" evenly spaced on a 10-ft radius.

A production test was conducted by the State Water Survey on August 12, 1941. The well reportedly produced 284 to 281 gpm for 5 hr with a drawdown of 4.2 ft from a non-

pumping water level of 35.8 ft below the top of the casing. Five min after pumping was stopped, the water level had recovered to 36.2 ft.

The pumping equipment presently installed consists of a 40-hp U.S. electric motor (Serial No. 232594), a 10-in., 7-stage Sterling turbine pump (No. S3901) set at 100 ft, rated at 250 gpm, and has 100 ft of 5-in. column pipe. A 10-ft section of 5-in. suction pipe with a 1-ft strainer is attached to the pump intake.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 04385) is for a water sample from the well collected March 1, 1972, after 30 min of pumping at 281 gpm.

WELL NO. 2, LABORATORY NO. 04385

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.5	0.05	Silica	SiO_2	22	
Manganese	Mn	0.10	0.00	Fluoride	F	0.2	0.01
Ammonium	NH_4	0.3	0.02	Boron	B	0.2	
Sodium	Na	8.5	0.37	Nitrate	NO_3	0.0	0
Potassium	K	1.8	0.05	Chloride	Cl	12	0.34
Calcium	Ca	86	4.29	Sulfate	SO_4	33	0.69
Magnesium	Mg	45	3.70	Alkalinity (as $CaCO_3$)		360	7.20
				Hardness (as $CaCO_3$)		392	
Barium	Ba	0.0		Total dissolved minerals		437	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.5	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		0	
Nickel	Ni	0.0		Beta *pc/l*		1	
Silver	Ag	0.0		±deviation		1	
Zinc	Zn	0.0					

Prior to the construction of Well No. 3, a 6-in. diameter test hole was constructed in March 1975 to a depth of 115 ft by the Hoover Water Well Service, Zion. The test hole was located on Washington Ave., approximately 790 ft N and 880 ft E of the SW corner of Section 11, T45N, R9E. A production test was conducted by the driller on March 31, 1975. After 9 hr of pumping at rates of 209 to 201 gpm, the drawdown was 17.3 ft from a nonpumping water level of 4.2 ft below land surface. One hr after pumping was stopped, the water level had recovered to 4.4 ft.

WELL NO. 3, finished in sand and gravel, was completed in August 1975 to a depth of 95 ft by the Hoover Water Well Service, Zion. As of March 1976, this well was not in use. The well is located north of the service road between the village hall and the village garage, approximately 790 ft N and 880 ft E of the SW corner of Section 11, T45N, R9E. The land surface elevation at the well is approximately 745 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil	3	3
Sand	14	17
Sandy clay	41	58
Sand	37	95

A 30-in. diameter hole was drilled to a depth of 50 ft and finished 24 in. in diameter from 50 to 95 ft. The well is cased with 30-in. pipe from 2 ft above land surface to a depth of 50 ft, 24-in. pipe from 2 ft above land surface to a depth of 55.5 ft, and 12-in. pipe from 1.3 ft above land surface to a depth of 65 ft followed by 30 ft (31 ft overall length) of 12-in. No. 25 slot stainless steel screen. The annulus between the 30- and 24-in. casings is filled with cement from 0 to 50 ft, and the annulus between the 24- and 12-in. casings and between the bore hole and casing-screen assembly is filled with No. 0 Northern gravel from 42 to 95 ft.

A production test was conducted by the driller on August 5-6, 1975. After 23.5 hr of pumping at a rate of 503 gpm, the final drawdown was 33.8 ft from a nonpumping water level of 6.2 ft below land surface. Forty-five min after pumping was stopped, the water level had recovered to 7.75 ft.

As of March 1976, the permanent pumping equipment was not installed.

A partial analysis of a sample (Lab. No. 199382) collected August 6, 1975, after pumping for 24 hr at 503 gpm, showed the water to have a hardness of 410 mg/1, total dissolved minerals of 462 mg/1, and an iron content of 1.0 mg/1.

FOX LAKE HILLS SUBDIVISION

Fox Lake Hills Subdivision (est. 1617), located 2.5 miles northeast of Fox Lake, installed a public water supply in 1955. The water system is owned and operated by the Lake County Public Works Department. Two wells are in use. In 1961 there were 360 services, all metered; the estimated average daily pumpage was 70,000 gpd. In 1974, there were 462 services, all metered; the estimated average and maximum daily pumpages were 88,440 and 132,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in May 1954 to a depth of 130 ft by the Henry Boysen Co., Libertyville. The well is located on the south side of Lehman Road just west of Route 59, approximately 600 ft S and 1848 ft W of the NE corner of Section 1, T45N, R9E. The land surface elevation at the well is approximately 750 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sandy clay	115	115
Sand and gravel	15	130

An 8-in. diameter hole was drilled to a depth of 130 ft. The well is cased with 8-in. threaded steel pipe from 1.2 ft above the pumphouse floor to a depth of 115 ft followed by 15 ft of 8-in. No. 14 slot Cook brass screen.

Upon completion, the well reportedly produced 290 gpm with a drawdown of 76 ft from a nonpumping water level of 16 ft below land surface.

The pumping equipment presently installed is a Cook oil-lubricated turbine pump set at 110 ft, rated at 250 gpm, and powered by a 25-hp 1800 rpm U.S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004950) is for a water sample from the well collected January 14, 1974, after 1 hr of pumping.

WELL NO. 1, LABORATORY NO. C004950

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.4		Silica	SiO_2	25	
Manganese	Mn	0.00		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.84	0.05	Boron	B	0.4	
Sodium	Na	38	1.65	Nitrate	NO_3	0.2	0.00
Potassium	K	1.2	0.03	Chloride	Cl	3	0.08
Calcium	Ca	39	1.95	Sulfate	SO_4	72	1.50
Magnesium	Mg	41	3.37	Alkalinity (as $CaCO_3$)		260	5.20
Arsenic	As	0.00		Hardness (as $CaCO_3$)		266	5.32
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		428	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.0	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.0	
Silver	Ag	0.00		±deviation		0.0	
Cyanide	CN	0.00		Beta *pc/l*		0.8	
Zinc	Zn	0.06		±deviation		2.1	

WELL NO. 2, finished in sand and gravel, was completed in July 1954 to a depth of 126 ft by the Henry Boysen Co., Libertyville. The well is located on the northeast corner of the intersection of Lincoln Blvd. and Fairview Drive, approximately 200 ft N and 2200 ft W of the SE corner of Section 1, T45N, R9E. The land surface elevation at the well is approximately 755 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay and sandy clay	115	115
Gravel	11	126
Clay	14	140

A 10-in. diameter hole was drilled to a depth of 140 ft. The well is cased with 10-in. threaded steel pipe from 1 ft above the pumphouse floor to a depth of 110 ft followed by 16 ft of 10-in. No. 20 slot Cook brass screen.

Upon completion, the well reportedly produced 815 gpm for 8 hr with a drawdown of 40.5 ft from a nonp.umping water level of 33.0 ft.

The pumping equipment presently installed is a Cook oil-lubricated turbine pump set at 100 ft, rated at 250 gpm, and powered by a 30-hp 1800 rpm U.S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B110113) is for a water sample from the well collected May 7, 1973, after 30 min of pumping at 200 gpm.

WELL NO. 2, LABORATORY NO. B110113

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	2.00	0.07	Silica	SiO_2	23.0	
Manganese	Mn	0.02	0.00	Fluoride	F	0.60	0.03
Ammonium	NH_4	0.40	0.02	Boron	B	0.4	
Sodium	Na	21.0	0.91	Nitrate	NO_3	0.00	0.00
Potassium	K	1.6	0.04	Chloride	Cl	2.0	0.06
Calcium	Ca	80.0	3.99	Sulfate	SO_4	85.0	1.77
Magnesium	Mg	52.0	4.27	Alkalinity (as $CaCO_3$)		350	7.00
Arsenic	As	0.00		Hardness (as $CaCO_3$)		413	8.27
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		476	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		8.3	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		0.6	
Selenium	Se	0.00		±deviation		1.5	
Silver	Ag	0.00		Beta *pc/l*		8.0	
Zinc	Zn	0.00		±deviation		2.5	

GLENNSHIRE SUBDIVISION

Glennshire Subdivision (est. 390), located on the northeast edge of Hawthorn Woods, installed a public water supply in 1961. The water system is owned and operated by the Lake County Public Works Department. Eight wells are in use. Each well has a separate pressure tank and Well Nos. 6 and 7 serve isolated distribution systems. The other six wells serve distribution systems that are cross connected. In 1974 there were 88 services, all metered; the average and maximum daily pumpages were 24,000 and 36,000 gpd, respectively. The water of Well Nos. 1, 2, and 3 is chlorinated.

WELL NO. 1, finished in Silurian dolomite, was completed in July 1961 to a depth of 217 ft by Peter Pilgard & Sons, Arlington Heights. The well is located on Falkirk Road west of Carlisle Road, approximately 2350 ft N and 450 ft E of the SW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 771 ft.

A 6-in. diameter hole was drilled to a depth of 217 ft. The well is cased with 6-in. pipe from 4.5 ft below land surface to a depth of 193 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the nonpumping water level was reported to be 60 ft.

The pumping equipment installed is set at 140 ft, rated at 25 gpm, and powered by a 1 1/2-hp electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007666) of a sample collected

April 29, 1974, after pumping for 30 min at 25 gpm, showed the water to have a hardness of 610 mg/1, total dissolved minerals of 1144 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in July 1961 to a depth of 229 ft by Peter Pilgard & Sons, Arlington Heights. The well is located on Falkirk Road between Carlisle Road and Darlington Drive, approximately 2150 ft N and 1000 ft E of the SW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 770 ft.

A 6-in. diameter hole was drilled to a depth of 229 ft. The well is cased with 6-in. pipe from 4.5 ft below land surface to a depth of 201 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the nonpumping water level was reported to be 60 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 140 ft, rated at 22 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007602) of a sample collected April 29, 1974, after pumping for 30 min at 25 gpm, showed the water to have a hardness of 710 mg/1, total dissolved minerals of 1232 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 3, finished in Silurian dolomite, was completed in April 1964 to a depth of 265 ft by Peter Pilgard & Sons, Arlington Heights. The well is located in the back of a lot on the west side of Croydon Road north of Stonehaven Drive, approximately 2550 ft S and 1100 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 775 ft.

A 6-in. diameter hole was drilled to a depth of 265 ft. The well is cased with 6-in. pipe from 1.5 ft above the bottom of a 6-ft deep pit to a depth of 204 ft.

Upon completion, the well reportedly produced 20 gpm with a drawdown of 70 ft from a nonpumping water level of 60 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 127 ft, rated at about 18 gpm, and powered by a 2-hp Red Jacket electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007605) of a sample collected April 29, 1974, after pumping for 30 min at 20 gpm, showed the water to have a hardness of 612 mg/1, total dissolved minerals of 1112 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 4, finished in Silurian dolomite, was completed in June 1966 to a depth of 219 ft by Peter Pilgard & Sons, Arlington Heights. The well is located in the back of a lot on the west side of Darlington Drive north of Stonehaven Drive, approximately 2600 ft S and 1600 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 773 ft.

A 5-in. diameter hole was drilled to a depth of 219 ft. The well is cased with 5-in. pipe from 1 ft above land surface to a depth of 213 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 50 gpm with no noticeable drawdown from a nonpumping water level of 80 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 140 ft, rated at about 18 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007603) of a sample collected April 29, 1974, after pumping for 30 min at 20 gpm, showed the water to have a hardness of 610 mg/1, total dissolved minerals of 1182 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 5, finished in Silurian dolomite, was completed in October 1967 to a depth of 244 ft by Peter Pilgard & Sons, Arlington Heights. The well is located on Croydon Road between Glenn Road and Stonehaven Drive, approximately 1950 ft S and 1300 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 789 ft.

A 5-in. diameter hole was drilled to a depth of 244 ft. The well is cased with 5-in. pipe from 1 ft above land surface to a depth of 222 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 50 gpm with no noticeable drawdown from a nonpumping water level of 80 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 150 ft, rated at about 18 gpm, and powered by a 2-hp Red Jacket electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007604) of a sample collected April 29, 1974, after pumping for 30 min at 20 gpm, showed the water to have a hardness of 550 mg/1, total dissolved minerals of 1036 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 6, finished in Silurian dolomite, was completed in December 1968 to a depth of 254 ft by Peter Pilgard & Sons, Arlington Heights. The well is located in the back of a lot on the east side of Darlington Drive between Stonehaven Drive and Trent Road, approximately 2200 ft S and 2050 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 775 ft.

A 5-in. diameter hole was drilled to a depth of 254 ft. The well is cased with 5-in. pipe from 1 ft above land surface to a depth of 222 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 25 gpm with a drawdown of 20 ft from a nonpumping water level of 80 ft.

The pumping equipment presently installed is a Jacuzzi submersible pump set at 126 ft, rated at about 20 gpm, and powered by a 1-hp Franklin electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007665) of a sample collected

April 29, 1974, after pumping for 30 min at 25 gpm, showed the water to have a hardness of 589 mg/1, total dissolved minerals of 1146 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 7, finished in Silurian dolomite, was completed in April 1971 to a depth of 250 ft by Peter Snelten & Sons, Arlington Heights. The well is located on Aberdeen Road west of Darlington Drive, approximately 400 ft S and 2350 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 772 ft.

A drillers log of Well No. 7 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Brown clay	12	12
Blue clay	60	72
Sand, gravel, with some clay	121	193
Gravel	13	206
Limestone	44	250

The following mineral analysis (Lab. No. 195663) is for a water sample from the well collected May 15, 1974, after 5 min of pumping at 25 gpm.

WELL NO. 7, LABORATORY NO. 195663

		mg/l	*me/l*			*mg/l*	*me/l*
Iron (total)	Fe	0.2		Silica	SiO_2	14.1	
Manganese	Mn	0.00		Fluoride	F	0.6	
Ammonium	NH_4	0.5	0.03	Boron	B	0.7	
Sodium	Na	114	4.96	Nitrate	NO_3	0.5	0.01
Potassium	K	2.9	0.07	Chloride	Cl	5	0.14
Calcium	Ca	111.2	5.55	Sulfate	SO_4	715.6	14.86
Magnesium	Mg	78.4	6.45	Alkalinity (as $CaCO_3$)		78	1.56
Strontium	Sr	3.33	0.08				
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		600	12.00
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		1140	
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity		0	
Lithium	Li	0.02		Color		0	
Nickel	Ni	<0.05		Odor		0	
Zinc	Zn	0.14		Temp.		53.0 F (reported)	

A 5-in. diameter hole was drilled to a depth of 250 ft. The well is cased with 5-in. pipe from land surface to a depth of 206 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 20 gpm for 4 hr with no noticeable drawdown from a nonpumping water level of 74 ft below land surface.

The pumping equipment presently installed is a Reda submersible pump set at 147 ft, rated at 21 gpm, and powered by a 1 1/2-hp Reda electric motor.

WELL NO. 8, finished in Silurian dolomite, was completed in June 1972 to a depth of 250 ft by Peter Snelten & Sons, Arlington Heights. The well is located in the back of a lot between Carlisle and Croydon Roads south of Glenn Road, approximately 1500 ft S and 1100 ft E of the NW corner of Section 11, T43N, R10E. The land surface elevation at the well is approximately 790 ft.

A drillers log of Well No. 8 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Brown clay	15	15
Blue clay	48	63
Sand, gravel with clay	148	211
Gravel	10	221
Limestone	29	250

A 5-in. diameter hole was drilled to a depth of 250 ft. The well is cased with 5-in. pipe from land surface to a depth of 221 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 20 gpm for 4 hr with no noticeable drawdown from a nonpumping water level of 84 ft below land surface.

The pumping equipment presently installed is a Reda submersible pump set at 147 ft, rated at 21 gpm, and powered by a 1 1/2-hp Reda electric motor.

GRANDWOOD PARK SUBDIVISION

Grandwood Park Subdivision (est. 2030), located 5 miles west of Gurnee, installed a public water supply in 1940. The water system is owned and operated by the Lake County Public Works Department. Two wells (Nos. 1 and 3) are in use. In 1962 there were 85 services, none metered; the average and maximum daily pumpages were 17,000 and 20,000 gpd, respectively. In 1974 there were 580 services, all metered; the average and maximum daily pumpages were 167,100 and 248,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in May 1949 to a depth of 145 ft by the Henry Boysen Co., Libertyville. The well is located on Grandwood Drive at the northwest end of Meadow Lane, approximately 1145 ft N and 2900 ft W of the SE corner of Section 7, T45N, R11E. The land surface elevation at the well is approximately 760 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black soil	1	1
Yellow clay	15	16
Sandy blue clay	20	36
Blue clay	48	84
Fine lake sand	14	98
Quicksand	5	103
Gravel	42	145

A 12-in. diameter hole was drilled to a depth of 145 ft. The well is cased with 12-in. pipe from 1.5 ft above the pump station floor to a depth of 120 ft followed by 25 ft of 12-in. Cook red brass screen. The screened section consists of 13 ft of No. 14 slot followed by 12 ft of No. 20 slot.

In 1958, the well reportedly produced 325 gpm for 2.2 hr with a drawdown of 36 ft from a nonpumping water level of 48 ft below the pump base.

The pumping equipment presently installed is a 5-in., 10-stage Deming water-lubricated turbine pump (Serial No. T33094) set at 126 ft, rated at 300 gpm at about 225 ft TDH, and powered by a 25-hp 1800 rpm U.S. electric motor (Serial No. 2802843).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004945) of a sample collected in January 1974, showed the water to have a hardness of 238 mg/1, total dissolved minerals of 462 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in March 1963 to a depth of 159 ft by the Hoover Water Well Service, Zion. This well has been disconnected from the system since 1964 and is now capped. The well is located on Geiger St., approximately 2600 ft Nand 3800 ft W of the SE corner of Section 7, T45N, R11E. The land surface elevation at the well is approximately 773 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Overburden	**145**	**145**
Sand	**14**	**159**

A 6-in. diameter hole was drilled to a depth of 159 ft. The well is cased with 6-in. cast iron pipe from 1.2 ft above the concrete pad to a depth of 145 ft followed by 14 ft of 6-in. Johnson red brass screen.

A production test was conducted by the driller on March 29-30, 1963. After 24 hr of pumping at a rate of 150 gpm, the drawdown was 16 ft from a nonpumping water level of 59 ft below land surface; full recovery was observed 1 min after pumping was stopped. On the basis of available information the long-term safe yield of the well is estimated to be greater than 200 gpm.

A partial analysis of a sample (Lab. No. 160221) made in May 1963, after pumping for 12 hr at 150 gpm, showed the water to have a hardness of 284 mg/1, total dissolved minerals of 468 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 3, finished in sand and gravel, was completed in May 1963 to a depth of 142 ft by the Hoover Water Well Service, Zion. The well is located on the east side of Center Drive, approximately 1800 ft S and 2000 ft W of the NE corner of Section 7, T45N, R11E. The land surface elevation at the well is approximately 750 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow clay	**14**	**14**
Blue clay	**91**	**105**
Silty sand	**5**	**110**
Sand	**32**	**142**
Clay below		

A 10-in. diameter hole was drilled to a depth of 142 ft. The well is cased with 10-in. ID cast iron pipe from 1.5 ft above the pumphouse floor to a depth of 120 ft followed by 22 ft of 10-in. Johnson red brass screen. The screened section from top to bottom consists of 2 ft of No. 15 slot, 4 ft of No. 12 slot, 4 ft of No. 8 slot, 4 ft of No. 10 slot, and 8 ft of No. 15 slot.

A production test using one observation well was conducted on May 6-7, 1963, by representatives of the driller and the State Water Survey. After 23.3 hr of pumping at a rate of 400 gpm, the drawdown was 38.3 ft from a nonpumping water level of 34.5 ft below land surface. On the basis of the production test data, it was estimated that this well would yield 500 gpm (720,000 gpd) on a long-term basis.

On April 26, 1967, the well reportedly produced 360 gpm for 12 hr with a drawdown of 29 ft from a nonpumping water level of 45 ft.

The pumping equipment presently installed is a 6-in., 8-stage Johnston deep well turbine pump set at 110 ft, rated at 300 gpm at about 206 ft head, and powered by a 20-hp 1760 rpm General Electric Induction motor. The well is equipped with 110 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B39591) is for a water sample from the well collected April 5, 1976, after 30 min of pumping at 260 gpm.

WELL NO.3, LABORATORY NO. B39591

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	19	
Manganese	Mn	0.01		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.62	0.03	Boron	B	0.5	
Sodium	Na	46	2.00	Nitrate	NO_3	0.1	0.00
Potassium	K	1.0	0.03	Chloride	Cl	2.3	0.06
Calcium	Ca	42	2.10	Sulfate	SO_4	180	3.74
Magnesium	Mg	37	3.04	Alkalinity (as $CaCO_3$)		166	3.32
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		257	5.14
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		459	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.0	
Silver	Ag	0.00		±deviation		0.0	
Cyanide	CN	0.00		Beta *pc/l*		2.2	
Zinc	Zn	0.0		±deviation		1.4	

GRAYSLAKE

The village of Grayslake (4907) installed a public water supply in 1915. Three wells (Nos. 1, 3, and 4) are in use. This supply is cross connected with the Grayslake Gelatin Co. In 1949 there were 420 services, all metered; the average and maximum daily pumpages were 100,000 and 125,000 gpd, respectively. In 1973 there were 1470 services, all metered; the average and maximum daily pumpages were 395,000 and 590,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Silurian dolomite, Galena-Platteville Dolomite, and the Glenwood-St. Peter Sandstone, was completed in September 1915 to a depth of 1039 ft by Charles Thorne, DeKalb. This well is alternated weekly with Well No. 3. The well is located in the pumphouse on the north side of Hawley St. near the corner of Whitney St., approximately 1200 ft N and 840 ft E of the SW corner of Section 26, T45N, R10E. The land surface elevation at the well is approximately 785 ft.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 01753) is for a water sample from the well collected September 27, 1971, after 1.2 hr of pumping at 375 gpm.

WELL NO. 1, LABORATORY NO. 01753

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	22	
Manganese	Mn	0.0		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.7	0.04	Nitrate	NO_3	0	
Sodium	Na	42	1.83	Chloride	Cl	3.7	0.10
Potassium	K	0.7	0.02	Sulfate	SO_4	160	3.33
Calcium	Ca	41.6	2.08	Alkalinity (as $CaCO_3$)		144	2.88
Magnesium	Mg	33	2.71	Hardness (as $CaCO_3$)		228	
Barium	Ba	0.0		Total dissolved minerals		440	
Copper	Cu	0.0					
Cadmium	Cd	0.00					
Chromium	Cr	0.0		pH (as rec'd)		7.6	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	<0.0005		Alpha *pc/l*		1	
Nickel	Ni	0.0		±deviation		1	
Silver	Ag	0.0		Beta *pc/l*		2	
Zinc	Zn	0.0		±deviation		1	

A 12-in. diameter hole was drilled to a depth of 246 ft and the hole was reported to be 6 in. in diameter at the bottom. The well is cased with 12-in. pipe from land surface to a depth of 246 ft. In 1938, this well was cleaned out by Henry Boysen, Jr., Libertyville. New casing was set inside the old below a depth of 200 ft but was removed when the well showed a marked decrease in yield.

On February 2, 1959, the nonpumping water level was 127 ft below the pump base.

A production test was conducted by the Hoover Water Well Service, Zion, on April 30, 1962. After 1.5 hr of pumping at a rate of 204 gpm, the drawdown was 26 ft from a nonpumping water level of 138 ft.

In 1965, the J. P. Miller Artesian Well Co., Brookfield, reported that after 8 hr of pumping at a rate of 420 gpm, the drawdown was 102 ft from a nonpumping water level of 83 ft below the top of the casing.

On October 28, 1971, the well reportedly produced 390 gpm for 3 hr with a drawdown of 46 ft from a nonpumping water level of 123 ft.

The pumping equipment presently installed consists of a 40-hp 1800 rpm U.S. Holloshaft electric motor (Serial No. 3751190), a 9-in., 7-stage Peerless oil-lubricated turbine pump (Serial No. 308869) set at 240 ft, rated at 430 gpm, and has 240 ft of 6-in. column pipe. The well is equipped with 240 ft of airline.

WELL NO. 2, open to the Cambrian-Ordovician aquifer, was completed in October 1924 to a depth of 1323 ft by F. M. Gray, Jr., Milwaukee, Wis. This well is not in use. The well is located 20 ft east of Well No. 1, approximately 1200 ft N and 860 ft E of the SW corner of Section 26, T45N, R10E. The land surface elevation at the well is approximately 785 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Soil	10	10
Sand and gravel	10	20
Glacial till, silt, and sand	50	70
Gravel	10	80
Till	40	120
Gravel	60	180
Till, silt, and sand	30	210
"Gravel"	20	230
SILURIAN SYSTEM		
Niagaran-Alexendrian Series		
Dolomite	110	340
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale and dolomite	210	550
Galena-Platteville Group		
Dolomite	290	840
Ancell Group		
Glenwood Formation		
Sandstone and dolomite	70	910
St. Peter Sandstone		
Sandstone	120	1030
Conglomerate of shale and sandstone	65	1095
CAMBRIAN SYSTEM		
Franconia Formation		
Sandstone and shale	45	1140
Galesville Sandstone		
Sandstone, dolomitic	50	1190
Sandstone, incoherent	120	1310
Eau Claire Formation		
"Marl, red"	13	1323

A 12.5-in. diameter hole was drilled to a depth of 575 ft, reduced to 10 in. between 575 and 1078 ft, and finished 8 in. in diameter from 1078 to 1323 ft. The well is cased with 12.5-in. drive pipe from land surface to a depth of 241 ft, 10-in. liner pipe from 231.8 ft to a depth of 575 ft, and an 8-in. liner pipe from 995.4 ft to a depth of 1078 ft.

Nonpumping water levels below the pump base reported for this well are: 142 ft on September 11, 1928; 177 ft on July 13, 1944; and 228 ft on February 2, 1959.

A production test was conducted by the Hoover Water Well Service, Zion, on April 27, 1962. After 3 hr of pumping at a rate of 56 gpm, the drawdown was 55 ft from a nonpumping water level of 267 ft.

The pumping equipment presently installed consists of a 20-hp 1760 rpm General Electric motor, an 8-in., 19-stage Fairbanks-Morse Pomona turbine pump (Serial No. SH2562) set at 3 30 ft, rated at 150 gpm at about 450 ft TDH, and has 330 ft of 5-in. column pipe. The well is equipped with 330 ft of airline.

A mineral analysis of a sample (Lab. No. 107555) collected September 3, 1946, after pumping for 15 min at 150 gpm, showed the water to have a hardness of 253 mg/1, total dissolved minerals of 319 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 3, finished in Silurian dolomite, was completed in January 1958 to a depth of 339 ft by the Henry Boysen Co., Libertyville. This well is alternated weekly with Well No. 1. The well is located at Allegheny and Siwiha Sts. about 0.8 mile northwest of Well No. 2, approximately 2000 ft N and 2500 ft E of the SW corner of Section 27, T45N, R10E. The land surface elevation at the well is approximately 794 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Brown clay	19	19
Blue clay	21	40
Gray stoney clay	130	170
Mucky sand	69	239
Mucky sand and gravel	9	248
"Limestone"	91	339

A 12-in. diameter hole was drilled to a depth of 339 ft. The well is cased with 12-in. ID steel pipe from 0.8 ft above the pump station floor to a depth of 250 ft.

Upon completion, the well reportedly produced 435 gpm for 8 hr with a drawdown of 145 ft from a nonpumping water level of 80 ft below land surface.

On December 3, 1959, after 30 min of pumping at a rate of 710 gpm, the drawdown was 106 ft from a nonpumping water level of 87 ft below the pump base.

On May 14, 1970, the well reportedly produced 460 gpm with a drawdown of 90 ft from a nonpumping water level of 90 ft.

The pumping equipment presently installed consists of a 50-hp 1800 rpm U.S. electric motor (Serial No. 1121264), a 10-in., 7-stage Johnston oil-lubricated turbine pump set at 250 ft, rated at 400 gpm at about 360 ft TDH, and has 250 ft of 6-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 250 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B35410) is for a water sample from the well collected March 8, 1976, after 75 hr of pumping at 465 gpm.

WELL NO. 3, LABORATORY NO. B35410

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	12	
Manganese	Mn	0.02		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.45	0.02	Boron	B	0.8	
Sodium	Na	73	3.18	Nitrate	NO_3	0.3	0.00
Potassium	K	1.6	0.04	Chloride	Cl	3.7	0.10
Calcium	Ca	32	1.60	Sulfate	SO_4	200	4.16
Magnesium	Mg	21	1.73	Alkalinity (as $CaCO_3$)		128	2.56
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		166	3.32
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		450	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha pc/l		0.6	
Silver	Ag	0.00		±deviation		1.3	
Cyanide	CN	0.00		Beta pc/l		2.6	
Zinc	Zn	0.0		±deviation		1.5	

WELL NO. 4, open to the Cambrian-Ordovician aquifer, was completed in June 1973 to a depth of 1354 ft by the Wehling Well Works, Beecher. The well is located on Old Center St., approximately 1150 ft N and 1250 ft W of the SE corner of Section 26, T45N, R10E. The land surface elevation at the well is approximately 780 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	200	200
Lime	160	360
Lime and shale	70	430
Shale	70	500
Shale with lime	60	560
Lime	110	670
Lime and sandy lime	155	825
Lime	24	849
Sand	222	1071
Sand and lime	85	1156
Sand	139	1295
Sand and red shale	59	1354

A 23.2-in. diameter hole was drilled to a depth of 213 ft, reduced to 19.2 in. between 213 and 585 ft, reduced to 15.2 in. between 585 and 1156 ft, and finished 11.9 in. in diameter from 1156 to 1354 ft. The well is equipped with a 16-in. diameter Baker pitless adapter from 2 ft above land surface and cased with 24-in. black drive pipe to a depth of 56 ft, 20-in. black pipe from land surface to a depth of 213 ft (cemented in), 16-in. black pipe from land surface to a depth of 585 ft (cemented in), and a 12-in. liner from 1027 ft to a depth of 1156 ft.

A production test was conducted by the driller on May 15, 1973. After 3 hr of pumping at rates ranging from 790 to 813 gpm, the final drawdown was 157 ft from a nonpumping water level of 413 ft below land surface.

This well was then shot with nitroglycerin as follows: 200 lb at 1293 to 1273 ft, 170 lb at 1273 to 1253 ft,

280 lb at 1253 to 1233 ft, and 140 lb at 1233 to 1223 ft. After shooting, a production test was conducted by the driller on June 28-29, 1973. After 24 hr of pumping at rates of 756 to 926 gpm, the final drawdown was 178 ft from a nonpumping water level of 403 ft below land surface. Thirty min after pumping was stopped, the water level had recovered to 443 ft.

The pumping equipment presently installed is a KSB submersible pump rated at 800 gpm at about 700 ft TDH, and powered by a 200-hp KSB electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005240) is for a water sample from the well collected January 13, 1975, after 1 hr of pumping at 800± gpm.

WELL NO.4, LABORATORY NO. C005240

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.4		Silica	SiO_2	8.0	
Manganese	Mn	0.00		Fluoride	F	1.2	0.06
Ammonium	NH_4	0.32	0.02	Boron	B	0.2	
Sodium	Na	17	0.74	Nitrate	NO_3	0.3	0.00
Potassium	K	9.5	0.24	Chloride	Cl	5	0.14
Calcium	Ca	66	3.29	Sulfate	SO_4	40	0.83
Magnesium	Mg	18	1.48	Alkalinity (as $CaCO_3$)		252	5.04
Arsenic	As	0.000					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		239	4.78
Copper	Cu	0.04					
Cadmium	Cd	0.00		Total dissolved minerals		330	
Chromium	Cr	0.00					
Lead	Pb	0.01					
Mercury	Hg	0.0000		pH (as rec'd)		8.3	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		41.8	
Silver	Ag	0.00		±deviation		6.0	
Cyanide	CN	0.00		Beta *pc/l*		32.8	
Zinc	Zn	0.00		±deviation		3.4	

GURNEE

The village of Gurnee (2738) installed a public water supply in 1960. Two wells are in use. This supply is cross connected with the city of Waukegan. In 1961 there were 420 services, all metered; the average and maximum daily pumpages were 80,000 and 130,000 gpd, respectively. In 1975 there were 850 services, all metered; the average and maximum daily pumpages were 308,713 and 380,000 gpd, respectively. The water is softened and chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Ironton-Galesville Sandstone and the Eau Claire Formation, was completed in December 1959 to a depth of 1517 ft by the Hoover'Water Well Service, Zion. The well is located 5 ft from the west side of the pumping station in the rear of the village hall at 4548 West Grand Ave., approximately 200 ft N and 2300 ft E of the SW corner of Section 14, T45N, R11E. The land surface elevation at the well is approximately 665 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	145	145
Silurian dolomite	160	305
Maquoketa shale	215	520
Galena-Platteville dolomite	315	835
Glenwood-St. Peter sandstone	140	975
Trempealeau and Franconia dolomite	135	1110
Galesville sandstone	125	1235
Eau Claire	282	1517

A 15.2-in. diameter hole was drilled to a depth of 1143 ft and finished 10 in. in diameter from 1143 to 1517 ft. The well is cased with 16-in. welded drive pipe from 1.3 ft above land surface to a depth of 145 ft and 10-in. liner pipe from 1.3 ft above land surface to a depth of 1143 ft (cemented in).

A production test was conducted on December 3-4., 1959, by representatives of the driller, the State Water Survey, and Baxter and Woodman, Consulting Engineers. After 5.4 hr of intermittent pumping to clear the well and a recovery period of 25 min, the well was pumped continuously for about 15.1 hr at a rate of 310 gpm. The final drawdown was 190 ft from a nonpumping water level of 145 ft below land surface. One hr after pumping was stopped, the water level had recovered to 150 ft.

In February 1972, the Hoover Water Well Service pulled the existing submersible pump and shot the well with 200 lb of explosives in the Galesville Sandstone at a depth of 1230 to 1235 ft and with 200 lb of explosives at a depth of 1400 to 1410 ft. After shooting, a production test was conducted by the driller on February 9, 1972. The well reportedly produced 510 gpm for 12 hr with a drawdown of 96.0 ft from a nonpumping water level of 255.3 ft below land surface.

On January 15, 1975, the well reportedly produced 420 gpm for 2 hr with a drawdown of 61 ft from a nonpumping water level of 320 ft.

The pumping equipment presently installed is a 6-in., 30-stage Johnston oil-lubricated turbine pump (Serial No. GE12039) set at 560 ft, rated at 500 gpm at about 620 ft TDH, and powered by a 125-hp 1775 rpm U.S. electric motor. The well is equipped with 560 ft of airline.

The following mineral analysis (Lab. No. 197919) is for a water sample from the well collected February 18, 1975, after 1 hr of pumping at 410 gpm. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 1, LABORATORY NO. 197919

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.6		Silica	SiO_2	8.6	
Manganese	Mn	0.01		Fluoride	F	1.1	
Ammonium	NH_4	0.2	0.01	Boron	B	0.2	
Sodium	Na	25.7	1.12	Nitrate	NO_3	0.0	0.00
Potassium	K	12.0	0.31	Chloride	Cl	15	0.42
Calcium	Ca	98.0	4.89	Sulfate	SO_4	97.3	2.02
Magnesium	Mg	16.9	1.39	Alkalinity (as $CaCO_3$)		256	5.12
Strontium	Sr	6.3	0.14	Hardness (as $CaCO_3$)		314	6.28
Barium	Ba	<0.1		Total dissolved minerals		443	
Copper	Cu	0.00					
Cadmium	Cd	0.00		Turbidity	3		
Chromium	Cr	0.00		Color	0		
Lead	Pb	<0.05		Odor	0		
Lithium	Li	0.01		Temp.	66 F (reported)		
Nickel	Ni	<0.05		pH	7.3 (reported)		
Zinc	Zn	0.00					

WELL NO. 2, open to the Cambrian-Ordovician aquifer except for the Galena-Platteville Dolomite, was completed in June 1974 to a depth of 1450 ft by the Wehling Well Works, Beecher. The well is located on Spiney Run Farm, approximately 2580 ft S and 300 ft W of the NE corner of Section 28, T45N, R11E. The land surface elevation at the well is approximately 730 ft.

A 24-in. diameter hole was drilled to a depth of 170 ft, reduced to 23 in. between 170 and 580 ft, reduced to 19 in. between 580 and 1185 ft, and finished 15 in. in diameter from 1185 to 1450 ft. The well is cased with 24-in. black steel pipe from land surface to a depth of 170 ft, 20-in. black steel pipe from land surface to a depth of 580 ft (cemented in), and a 16-in. liner from 1065 ft to a depth of 1185 ft.

A production test was conducted by the driller on July 11-12, 1974. After 5.5 hr of pumping at rates ranging from 505 to 783 gpm, the drawdown was 405 ft from a nonpumping water level of 155 ft below land surface. Pumping was continued for 14 hr at rates ranging from 983 to 1096 gpm with a drawdown of 485 ft. After an additional 4.2 hr of pumping at rates ranging from 790 to 780 gpm, the final drawdown was 430 ft.

The pumping equipment presently installed is a KSB pump set at 750 ft, rated at 1000 gpm, and powered by a 250-hp KSB electric motor.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	143	143
Shale with lime and sand	40	183
Lime	134	317
Shale(red and green)	6	323
Shale (green and gray) with lime	29	352
Shale gray with lime	40	392
Shale	76	468
Lime with shale	63	531
Lime	377	908
Sand	125	1033
Sand and shale	8	1041
Sticky and sandy shale, some lime	28	1069
Sandy shale and lime	116	1185
Sand with lime	20	1205
Sand with lime and shale	93	1298
Sand with lime	152	1450

A mineral analysis of a sample (Lab. No. 198271) collected April 9, 1975, showed the water to have a hardness of 286 mg/1, total dissolved minerals of 359 mg/1, and an iron content of 0.4 mg/1.

HAWTHORN WOODS

The village of Hawthorn Woods (939) installed a public water supply in 1951. Twelve wells are in use. The current population receiving wate from this supply is 347 people, and the portion of the village served lies between Old McHenry Road and Lagoon Drive on lots on either side of Lagoon Drive and Orchard Lane. In 1975 there were 104 services, all metered; the estimated average and maximum daily pumpages were 35,000 and 52,000 gpd, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in March 1954 to a depth of 240 ft by Peter Pilgard, Arlington Heights. The well is located near the rear of lot 12 on Oak Drive, approximately 2050 ft N and 2500 ft E of the SW corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 830 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

The pumping equipment presently installed is a Red Jacket submersible pump rated at 20 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 2, finished in Silurian dolomite, was completed in November 1955 to a depth of 230 ft by Peter Pilgard, Arlington Heights. The well is located on lot J & T on the south side of Hawthorn Drive, approximately 1400 ft N and 1550 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 810 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 67 ft.

The pumping equipment presently installed is a Jacuzzi submersible pump set at 126 ft, rated at 30 gpm, and powered by a 1 1/2-hp electric motor.

WELL NO. 3, finished in Silurian dolomite, was completed in December 1956 to a depth of 203 ft by Peter Pilgard, Arlington Heights. The well is located at the rear of lot 28 on the south side of Hawthorn Drive and Hickory

Lane, approximately 1500 ft N and 1025 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 800 ft.

The well is cased with 5-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 65 ft.

The pumping equipment presently installed is a Red Jacket submersible pump rated at 20 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 4, finished in Silurian dolomite, was completed in September 1957 to a depth of 245 ft by Peter Pilgard, Arlington Heights. The well is located near the rear of lot 25 on the east side of Hickory Lane and Hawthorn Drive, approximately 1825 ft N and 525 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 795 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 65 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 105 ft, rated at 20 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 5, finished in Silurian dolomite, was completed in October 1957 to a depth of 280 ft by Peter Pilgard, Arlington Heights. The well is located near the rear of lot 54 on the east side of Walnut Drive, approximately 2250 ft N and 275 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 790 ft.

The well is cased with 6-in. pipe from 1.7 ft above the roof of the well pit to an unknown depth. The top of the well casing is equipped with a Baker pitless adapter.

Upon completion, the nonpumping water level was reported to be 70 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (No. 150N1-11CC) set at 245 ft, rated at 13 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 6, finished in Silurian dolomite, was completed in May 1958 to a depth of 285 ft by Peter Pilgard, Arlington Heights. The well is located near the rear of lot 42 on the east side of Lynn Drive, approximately 2250 ft N and 750 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 800 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 60 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (No. 150N1-1100) set at 165 ft, rated at 20 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 7, finished in Silurian dolomite, was completed in November 1958 to a depth of 240 ft by Peter Pilgard, Arlington Heights. The well is located near the rear of lot 34 on the east side of Victoria Drive, approximately 2150 ft N and 1100 ft W of the SE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 803 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 80 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 126 ft, and powered by a 1-hp Red Jacket electric motor.

WELL NO. 8 was completed to an unknown depth by Peter Pilgard, Arlington Heights. The well is located by a barn on Lagoon Drive northeast of the village hall, approximately 2525 ft S and 1975 ft W of the NE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 804 ft.

The pumping equipment presently installed is a Red Jacket submersible pump powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 9, finished in Silurian dolomite, was completed in March 1960 to a depth of 272 ft by Peter Pilgard, Arlington Heights. The well is located at the rear of lot 84 on the east side of Lagoon Drive, approximately 2175 ft S and 425 ft E of the NW corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 790 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the well reportedly produced 25 gpm with a drawdown of 10 ft from a nonpumping water level of 80 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 150 ft, rated at 25 gpm, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 10, finished in Silurian dolomite, was completed in October 1960 to a depth of 230 ft by Peter Pilgard, Arlington Heights. The well is located on lot 95 on the west side of Lagoon Drive, approximately 2100 ft S and 150 ft E of the NW corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 790 ft.

The well is cased with 6-in. pipe from within an 8-ft deep pit to an unknown depth.

Upon completion, the nonpumping water level was reported to be 60 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 110 ft, and powered by a 1 1/2-hp Red Jacket electric motor.

WELL NO. 11, finished in Silurian dolomite, was completed in May 1961 to a depth of 227 ft by Peter Pilgard, Arlington Heights. The well is located on lot 102 on the west side of Orchard Lane, approximately 1650 ft S and

2175 ft W of the NE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 810 ft.

The well is cased with 5-in. pipe from above land surface to an unknown depth. The top of the well casing is equipped with a pitless adapter.

Upon completion, the nonpumping water level was reported to be 70 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 130 ft, and powered by a 1-hp Red Jacket electric motor.

WELL NO. 12, finished in Silurian dolomite, was completed in July 1962 to a depth of 238 ft by Peter Pilgard, Arlington Heights. The well is located on lot 111 on the east side of Orchard Lane, approximately 2250 ft S and 1800 ft W of the NE corner of Section 10, T43N, R10E. The land surface elevation at the well is approximately 810 ft.

The well is cased with 5-in. pipe from above land surface to an unknown depth. The top of the well casing is equipped with a pitless adapter.

Upon completion, the nonpumping water level was reported to be 80 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 130 ft, and powered by a 1 1/2-hp Red Jacket electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B108941) is for a water sample from the well collected April 4, 1973, after 30 min of pumping.

WELL NO. 12, LABORATORY NO. B108941

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.76	0.03	Silica	SiO_2	19	
Manganese	Mn	0.00		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.6	0.03	Boron	B	0.65	
Sodium	Na	72	3.13	Nitrate	NO_3	0.0	0
Potassium	K	1.9	0.05	Chloride	Cl	3	0.08
Calcium	Ca	67	3.34	Sulfate	SO_4	330	6.86
Magnesium	Mg	48	3.95	Alkalinity (as $CaCO_3$)		166	3.32
				Hardness (as $CaCO_3$)		364	
Arsenic	As	0.00		Total dissolved minerals		720	
Barium	Ba	0.0					
Copper	Cu	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		8.1	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		1.1	
Selenium	Se	0.00		±deviation		1.5	
Silver	Ag	0.00		Beta *pc/l*		10.6	
Zinc	Zn	0.00		±deviation		3.0	

HIGHLAND LAKE SUBDIVISION

Highland Lake Subdivision (est. 294), located 0.5 mile northeast of Round Lake Park, installed a public water supply in 1923. The water system is owned and operated by the Lake County Public Works Department. Three wells are in use. In 1964 there were 83 services, 90 percent metered; the average daily pumpage was 10,900 gpd. In 1974 there were 84 services, all metered; the estimated average and maximum daily pumpages were 38,082 and 45,000 gpd, respectively. The water is not treated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in 1922 to a depth of 316 ft by Van Husen, Alden. The well is located adjacent to the basement of Mrs. Carl F. Clausen's home on the west side of Hainesville Road north of Washington St., approximately 1250 ft N and 1400 ft W of the SE corner of Section 21, T45N, R10E. The land surface elevation at the well is approximately 790 ft.

A 6-in. diameter hole was drilled to a depth of 316 ft. The well is cased with 5-in. steel pipe from the top of a 1-ft high concrete block foundation in a 6.5-ft deep pit to a depth of 300 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (Series 12E) set at 120 ft, rated at 100 gpm, and powered by a 5-hp electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B36968) of a sample collected March 17, 1976, showed the water to have a hardness of 255 mg/1, total dissolved minerals of 420 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in February 1927 to a depth of 400 ft. The well is located on lot 43 on the west side of North Circle Drive near the west shore of the lake, approximately 2140 ft N and 1100 ft W of the SE corner of Section 21, T45N, R10E. The land surface elevation at the well is approximately 785 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	50	50
Fine sand	200	250
Hardpan	25	275
Sand	20	295
Rock	55	350
No record	50	400

A 6-in. diameter hole was drilled to a depth of 400 ft. The well is cased with 6-in. steel pipe from the pumphouse floor to a depth of 300 ft.

The pumping equipment presently installed is a Cook turbine pump (Serial No. 11454) set at 278 ft, rated at 50 gpm, and powered by a 5-hp 1800 rpm U.S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B37055) is for a water sample from the well collected March 17, 1976.

WELL NO. 2, LABORATORY NO. B37055

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.2		Silica	SiO_2	20	
Manganese	Mn	0.00		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.5	0.03	Boron	B	0.6	
Sodium	Na	60	2.61	Nitrate	NO_3	0.0	
Potassium	K	1.3	0.03	Chloride	Cl	7.6	0.21
Calcium	Ca	30	1.50	Sulfate	SO_4	130	2.70
Magnesium	Mg	27	2.22	Alkalinity (as $CaCO_3$)		182	3.64
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		186	3.72
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		352	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0001		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.0		Alpha *pc/l*		0.6	
Silver	Ag	0.00		±deviation		1.4	
Cyanide	CN	0.00		Beta *pc/l*		2.0	
Zinc	Zn	0.0		±deviation		1.4	

WELL NO. 3, finished in Silurian dolomite, was completed in January 1975 to a depth of 263 ft by the Hoover Water Well Service, Zion. The well is located on South Circle Drive between Oak and Lilac Aves., approximately 450 ft N and 675 ft W of the SE corner of Section 21, T45N, R10E. The land surface elevation at the well is approximately 782 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	244	244
Limestone	19	263

An 8-in. diameter hole was drilled to a depth of 263 ft. The well is cased with 8-in. pipe from land surface to a depth of 244 ft. The top of the well casing is equipped with a pitless adapter.

A production test was conducted by the driller on April 10-11, 1975. After 23.6 hr of pumping at rates of 140 to 133 gpm, the final drawdown was 39 ft from a nonpumping water level of 80 ft below land surface. Thirty min after pumping was stopped, the water level had recovered to 83 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 126 ft, rated at 85 gpm, and powered by a 7 1/2-hp 3450 rpm Sta-Rite electric motor.

A partial analysis of a sample (Lab. No. 198347) collected during the initial production test, after pumping at 133 gpm, showed the water to have a hardness of 244 mg/1, total dissolved minerals of 454 mg/1, and an iron content of 0.2 mg/1.

HILLDALE MANOR SUBDIVISION

Hilldale Manor Subdivision (est. 235), located 1 mile south of Fox Lake, installed a public water supply in 1954. The water system is owned and operated by the Hilldale Manor Water Co. Two wells are in use. In 1961 there were 52 services, none metered. In 1973 there were 73 services, none metered; the average and maximum daily pumpages were 8,219 and 12,000 gpd, respectively. The water is fluoridated.

WELL NO. 1, finished in sand and gravel, was completed in July 1954 to a depth of 123 ft by the Henry Boysen Co., Libertyville. The well is located at South Court and Hilldale Drive, approximately 500 ft N and 1700 ft E of the SW corner of Section 15, T45N, R9E. The land surface elevation at the well is approximately 805 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sand and gravel	90	90
Silty sand	14	104
Coarse sand and gravel	19	123

A 6-in. diameter hole was drilled to a depth of 123 ft. The well is cased with 6-in. steel pipe from 1 ft above the floor of an 11-ft deep tank pit to a depth of 108 ft followed by 15 ft of 6-in. Cook screen. The screened section consists of 6 ft of No. 10 slot followed by 9 ft of No. 14 slot. The upper 4 ft of the well casing is cemented in an 8-in. pipe for protection against surface pollution.

Upon completion, the well reportedly produced 253 gpm for 4 hr with a drawdown of 20 ft from a nonpumping water level of 67 ft below land surface.

The pumping equipment presently installed is a Byron Jackson oil-lubricated turbine pump (Model No. 6TS-24STG) set at 90 ft, rated at 200 gpm against 190 ft head, and powered by a 15-hp 1800 rpm U.S. electric motor (Serial No. 2171952). The well is equipped with 90 ft of airline.

A partial analysis of a sample (Lab. No. 182235) made in July 1970, after pumping for 4 hr at 253 gpm, showed the water to have a hardness of 392 mg/1, total dissolved minerals of 428 mg/1, and an iron content of 1.4 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in July 1954 to a depth of 123 ft by the Henry Boysen Co., Libertyville. The well is located 7 ft south of Well No. 1, approximately 493 ft N and 1700 ft E of the SW corner of Section 15, T45N, R9E. The land surface elevation at the well is approximately 805 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sand and gravel	90	90
Silty sand	12	102
Coarse sand and gravel	21	123

An 8-in. diameter hole was drilled to a depth of 123 ft. The well is cased with 8-in. pipe from 1 ft above the floor of an 11-ft deep tank pit to a depth of 107 ft and equipped

with 16.8 ft of 8-in. Cook screen. The screened section consists of 6 ft of No. 10 slot followed by 10.8 ft of No. 14 slot. The upper 6 ft of the well casing is cemented in a 10-in. pipe for protection against surface pollution.

Upon completion, the well reportedly produced 281 gpm with a drawdown of 17 ft from a nonpumping water level of 72 ft below land surface.

The pumping equipment presently installed is a Byron Jackson oil-lubricated turbine pump (Model No. OKHC-9STG) set at 95 ft, rated at 200 gpm against 180 ft head, and powered by a 15-hp 1800 rpm U.S. electric motor (Serial No. 2362563). The well is equipped with 95 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 04508) is for a water sample from the well collected March 15,1972, after 10 min of pumping at 200 gpm.

WELL NO. 2, LABORATORY NO.04508

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.3	0.01	Silica	SiO_2	22	
Manganese	Mn	0.0		Fluoride	F	0.4	0.02
Ammonium	NH_4	0.1	0.01	Boron	B	0.1	
Sodium	Na	2.5	0.11	Nitrate	NO_3	0.0	
Potassium	K	0.9	0.02	Chloride	Cl	3.6	0.10
Calcium	Ca	88	4.39	Sulfate	SO_4	40	0.83
Magnesium	Mg	44	3.62	Alkalinity (as $CaCO_3$)		344	6.88
Barium	Ba	0.0		Hardness (as $CaCO_3$)		392	
Copper	Cu	0.1		Total dissolved minerals		485	
Cadmium	Cd	0.00		pH (as rec'd)		7.3	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha pc/l		0	
Mercury	Hg	<0.0005		±deviation		0	
Nickel	Ni	0.0		Beta pc/l		0	
Silver	Ag	0.0		±deviation		1	
Zinc	Zn	0.15					

ILLINOIS BEACH STATE PARK

Illinois Beach State Park, located along Lake Michigan in the northern part of Lake County, installed a public water supply in 1947. Water was obtained from a deep well until 1965 when the park area water system was connected to the Zion-Benton Treatment Plant. The well is disconnected from the water system but is available for use at a beach side fish hatchery. In 1974 the average and maximum daily consumption rates for the park were 20,386 and 30,000 gpd, respectively.

WELL NO. 1, open to the Silurian dolomite, Galena-Platteville Dolomite, and the Glenwood-St. Peter Sandstone, was constructed in April 1947 to a depth of 160 ft and deepened in August 1947 to 1002 ft (measured in 1972 at 964 ft deep) by the S. B. Geiger & Co., Chicago. The well is located just south of Zion, about 300 ft from Lake Michigan in line with Beach Road extended, approximately 700 ft N and 500 ft E of the SW corner of Section 26, T46N, R12E. The land surface elevation at the well is approximately 585 ft.

A sample study summary log of Well No. 1 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Sand, yellowish brown	25	25
Till, sandy, gravelly, dark yellowish brown	25	50
Till, pinkish brown	40	90
Gravel, light gray	5	95
Till, calcareous, pinkish brown	20	115
No sample	5	120
SILURIAN SYSTEM		
Niagaran Series		
Dolomite, white to yellowish gray; cherty in lower portion	150	270
Alexandrian Series		
Dolomite, white to yellowish gray, cherty at top	25	295
Strata (continued)	*Thickness (ft)*	*Depth (ft)*
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale, dolomitic, green; some dolomite streak at top	200	495
Galena Group		
Dolomite, sandy, pale brown to buff, some yellowish gray at top	155	650
Dolomite, brown to gray	38	688
Platteville Group		
Dolomite, brownish to gray	142	830
Ancell Group		
Glenwood Formation		
Dolomite buff to brown	45	875
Sandstone, white dolomitic, fine to coarse	25	900
St. Peter Sandstone		
Sandstone, yellowish white, fine to coarse, incoherent	102	1002

A 12-in. diameter hole was drilled to a depth of 124 ft, reduced to 8 in. between 124 and 440 ft, and finished 6 in. in diameter from 440 to 1002 ft. The well is cased with 8-in. pipe from land surface to a depth of 124 ft and a 6-in. ID liner from 290 to 440 ft.

A production test was conducted on April 30, 1947, by representatives of the driller, the State Water Survey, and the Illinois State Division of Architecture and Engineering, when the well was 160 ft deep and cased with 8-in. pipe to 124 ft. After 5 hr of pumping at rates of 9.2 to 19.2 gpm, the final drawdown was 128 ft from a nonpumping water level of 17 ft below land surface. Fifteen min after pumping was stopped, the water level had recovered to 77 ft.

A second production test was conducted after deepening on August 18, 1947, by representatives of the driller, the State Water Survey, and the Illinois State Division of Architecture and Engineering. After 2.7 hr of pumping at a rate of 33 gpm, the drawdown was 96.5 ft from a nonpumping

water level of 12.0 ft below the top of the casing. Pumping continued intermittently for 3.7 additional hr at a rate of about 40 gpm. After the pumping was stopped, the water level recovered to 15.0 ft in 1.5 hr.

In 1972, the well reportedly produced 35 gpm continuously for 2 months with a drawdown of 478 ft from a nonpumping water level of 22 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump (Model No. 90P6M3-6) set at 510 ft, rated at 54 gpm at about 450 ft TDH, and powered by a 15-hp Sta-Rite electric motor.

The following mineral analysis (Lab. No. 144672) is for a water sample from the well collected October 3, 1957.

WELL NO. 1, LABORATORY NO. 144672

		mg/l	*me/l*			*mg/l*	*me/l*
Iron (total)	Fe	0.6		Silica	SiO_2	47.5	
Manganese	Mn	0.0		Fluoride	F	0.8	
Calcium	Ca	28.8	1.44	Boron	B	1.0	
Magnesium	Mg	12.4	1.01	Chloride	Cl	27	0.76
Ammonium	NH_4	Tr	Tr	Nitrate	NO_3	0.4	0.01
Sodium	Na	123	5.35	Sulfate	SO_4	222.5	4.63
Turbidity		Tr		Alkalinity (as $CaCO_3$)		120	2.40
Color		0		Hardness (as $CaCO_3$)		123	2.45
Odor		0		Total dissolved			
Temp.		52.7 F (reported)		minerals		525	

ISLAND LAKE

The village of Island Lake (1973) installed a public water supply in 1940. This village also extends into McHenry County and two of the wells are located there. The water system is owned and operated by the Island Lake Water Co. Three wells (Nos. 1, 2, and 3) are in use. In 1952 there were 450 services, 350 were metered. In 1973 there were 580 services, all metered; the average and maximum daily pumpages were 47,022 and 70,000 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1 (Well 19-U), finished in sand and gravel, was completed in July 1940 to a depth of 116 ft (effective depth 115 ft) by Henry Boysen, Jr., Libertyville. The well is located at the corner of Midway and Fairfield Drives, approximately 1130 ft N and 190 ft E of the SW corner of Section 21, T44N, R9E, Lake County. The land surface elevation at the well is approximately 770 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow stoney gravel	40	40
Dirty gravel and sand	51	91
Gravel and sand	25	116

A 10-in. diameter hole was drilled to a depth of 116 ft. The well is cased with 10-in wrought iron pipe from 1.2 ft above the floor of a 12-ft deep pit to a depth of 92 ft followed by 24 ft of 9.6-in. Cook screen. The screened section from top to bottom consists of 5 ft of No. 60 slot, 10 ft of No. 14 slot, and 8 ft of No. 40 slot with 1 ft of blank section at the bottom.

Upon completion, the well reportedly produced 503 gpm for 8 hr with a drawdown of 11 ft from a nonpumping water level of 29 ft below land surface.

On October 27, 1959, the nonpumping water level was reported to be 26 ft below land surface.

The well was acidized in 1960 by the Dow Chemical Co. and the yield was reportedly improved from 115 to 435 gpm.

On May 20, 1963, the nonpumping water level was reported to be 30 ft.

The pumping equipment presently installed consists of a 20-hp 1800 rpm U.S. electric motor, an 8-in., 11-stage Aurora turbine pump (No. 69213) set at 90 ft, rated at 200 gpm at about 250 ft TDH, and has 90 ft of 5-in. column pipe. The well is equipped with 90 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004680) of a sample collected December 18, 1973, after pumping for 30 min at 300 gpm, showed the water to have a hardness of 397 mg/1, total dissolved minerals of 466 mg/1, and an iron content of 1.4 mg/1.

WELL NO. 2 (Well K-9), finished in sand and gravel, was completed in June 1945 to a depth of 95 ft (reported in March 1960 at 92 ft deep) by Henry Boysen, Jr., Libertyville. The well is located at the corner of Eastway and Forest Drives, approximately 1385 ft S and 1255 ft E of the NW corner of Section 21, T44N, R9E, Lake County. The land surface elevation at the well is approximately 770 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Gravel	36	36
Sand	48	84
Gravel	11	95

An 8-in. diameter hole was drilled to a depth of 95 ft. The well is cased with 8-in. steel pipe from 1 ft above land surface to a depth of 84 ft followed by 11 ft (10 ft slotted) of 8-in. No. 14 slot Cook red brass screen.

Upon completion, after pumping for 2 days, the well reportedly produced 280 gpm with a drawdown of 16 ft from a nonpumping water level of 9 ft below land surface.

This well was acidized in March 1960 by the J. P. Miller Artesian Well Co., Brookfield, and the yield was reportedly improved from 75 to 450 gpm. A production test was conducted by the J. P. Miller Artesian Well Co. on March 7, 1960. After 4 hr of pumping at rates of 110 to 360 gpm, the final drawdown was 21 ft from a nonpumping water level of 19 ft below land surface.

On May 20, 1963, the nonpumping water level was reported to be 10 ft.

The pumping equipment presently installed consists of a 15-hp 1800 rpm U.S. electric motor, a 7-in., 11-stage Byron Jackson turbine pump (No. C315645) set at 70 ft, rated at 200 gpm at about 188 ft TDH, and has 70 ft of 4-in. column pipe. A 10-ft section of 4-in. suction pipe is attached to the pump intake.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004679) of a sample collected December 18, 1973, after pumping for 30 min at 200 gpm, showed the water to have a hardness of 365 mg/1, total dissolved minerals of 430 mg/1, and an iron content of 1.3 mg/1.

WELL NO. 3 (Well A-6), finished in sand and gravel, was completed in July 1940 to a depth of 190 ft by Henry Boysen, Jr., Libertyville, and rebuilt in 1954 to a depth of 122 ft by W. R. Boetsch & Son, Crystal Lake. This well was returned to service in July 1969 after being out of use for 10 years. The well is located at the north intersection of Highland and Hillside Drives, approximately 1835 ft S and 685 ft W of the NE corner of Section 20, T44N, R9E, McHenry County. The land surface elevation at the well is approximately 760 ft.

A correlated drillers log of Well No. 3 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Yellow stony gravel	20	20
Stony gravel and sand	67	87
Stone, gravel, and sand	68	155
Red clay	15	170
SILURIAN SYSTEM		
Niagaran Series		
Rock	20	190

A 4.5-in. diameter hole was originally drilled to a depth of 190 ft. When rebuilt in 1954, the hole was reamed to 8 in. in diameter to a depth of 122 ft. The well is cased with 8-in. pipe from above land surface to a depth of 112 ft and equipped with 12 ft (10 ft exposed) of 7.5-in. No. 14 slot Cook screen. The top of the casing is equipped with a pitless adapter.

Upon completion in 1940 at the 190-ft depth, the well reportedly produced 10 gpm for 8 hr with a drawdown of 40 ft from a nonpumping water level of 70 ft below land surface.

After rehabilitation in 1954, the well reportedly produced 75 gpm for 48 hr with a drawdown of 50 ft from a nonpumping water level of 24 ft.

The pumping equipment presently installed is a Fairbanks-Morse submersible pump set at 94 ft, rated at 100 gpm, and powered by a 30-hp Fairbanks-Morse electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02932) is for a water sample from the well collected November 22, 1971.

WELL NO. 3, LABORATORY NO. 02932

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.15	0.00	Silica	SiO_2	23	
Manganese	Mn	0.0		Fluoride	F	0.3	
Ammonium	NH_4	0.4	0.02	Boron	B	0.0	
Sodium	Na	7.5	0.33	Nitrate	NO_3	0.0	0
Potassium	K	1.2	0.03	Chloride	Cl	7.1	0.20
Calcium	Ca	96	4.79	Sulfate	SO_4	44	0.92
Magnesium	Mg	45	3.70	Alkalinity (as $CaCO_3$)		376	7.52
				Hardness (as $CaCO_3$)		420	
Barium	Ba	0.0		Total dissolved minerals		444	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		8.1	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		± deviation		0	
Nickel	Ni	0.0		Beta *pc/l*		3	
Silver	Ag	0.0		± deviation		2	
Zinc	Zn	0.0					

WELL NO. 4, open to the Silurian dolomite and the Cambrian-Ordovician aquifer, was completed in July 1957 to a depth of 1233 ft by the Milaeger Well and Pump Co., Milwaukee, Wis. The well has been disconnected since 1959 because of high sulfur content. The well is located on U.S. Route 176 next to the elevated storage tank, approximately 1200 ft N and 450 ft W of the SE corner of Section 20, T44N, R9E, McHenry County. The land surface elevation at the well is approximately 775 ft.

A correlated drillers log of Well No. 4 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
"Glacial drift"	175	175
SILURIAN SYSTEM		
"Niagaran-Alexandrian"	185	360
ORDOVICIAN SYSTEM		
Maquoketa Group		
"Maquoketa"	105	465
Galena-Platteville Group		
"Platteville"	275	740
Glenwood-St. Peter Sandstone		
"Glenwood shale" (includes some of St. Peter Sandstone)	160	900
"St. Peter Sandstone"	100	1000
CAMBRIAN SYSTEM		
Franconia Formation		
"Franconian"	55	1055
Ironton-Galesville Sandstone		
"Galesville sandstone"	178	1233

A 12-in. diameter hole was drilled to a depth of 465 ft and finished 10 in. in diameter from 465 to 1233 ft. The well is cased with 12-in. drive pipe from 0.7 ft above the pumphouse floor to a depth of 175 ft and a 10-in. steel liner from 360 to 460 ft (cemented in).

A production test was conducted by the driller on July 1-2, 1957. After 16 hr of pumping at rates of 192 to 317 gpm, the drawdown was 159 ft from a nonpumping water level of 136 ft below the top of the casing. The pump broke suction after an additonal 2.6 hr of pumping at 429 gpm. Pumping was then reduced to rates of 307 to 351 gpm for the final 3.9 hr of pumping. Two min after pumping was stopped, the water level had recovered to 203 ft and after 24 hr the well had recovered to 168 ft.

On July 24, 1959, after 20 min of pumping at a rate of 300 gpm, the drawdown was 75 ft from a nonpumping water level of 227 ft.

The pumping equipment presently installed consists of a 60-hp 1760 rpm Louis Allis electric motor (Type OGX, No. 2381057), a 10-in., 12-stage Byron Jackson turbine pump (No. 344228) set at 340 ft, rated at 300 gpm at about 480 ft TDH, and has 340 ft of 5-in. column pipe. The well is equipped with 340 ft of airline.

A mineral analysis of a sample (Lab. No. 150133) collected July 23, 1959, after pumping for 20 min at 300 gpm, showed the water to have a hardness of 244 mg/1, total dissolved minerals of 335 mg/1, and an iron content of 0.2 mg/1. Hydrogen sulfide gas was apparent when this sample was collected.

LAKE BARRINGTON SHORES SUBDIVISION

Lake Barrington Shores Subdivision (est. 135), located 0.2 mile north of North Barrington, installed a public water supply in 1974. The water system is owned and operated by the Lake Barrington Community Homeowners Association. One well is in use. In 1975 there were 72 services, none metered; the average and maximum daily pumpages were 30,200 and 38,600 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution.

WELL NO. 1, finished in sand and gravel, was completed in March 1973 to an effective depth of 127 ft by the Layne-Western Co., Aurora. The well is located in the southeast portion of the subdivision, approximately 500 ft N and 600 ft W of the SE corner of Section 11, T43N, R9E. The land surface elevation at the well is approximately 815 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Brown sandy top soil	1	1
Brown sandy clay	1.5	2.5
Brown clayey sand and gravel	1.5	4
Brown sandy clay with gravel embedded, boulders	21	25
Gray clay, firm with some gravel and boulders	42	67
Gray clay, firm	5	72
Lime ledges, boulder, clay	4	76
Coarse sand and gravel, boulders	14	90
Coarse sand — medium gravel, boulders	8	98
Fine — medium sand and gravel, tight	21	119
Fine — medium sand and gravel, loose	10	129

A 38-in. diameter hole was drilled to a depth of 129 ft. The well is cased with 16-in. pipe from land surface to a depth of 86 ft and from 96 ft to 117 ft and the screened sections consist of 16-in. diameter No. 5 (0.105 in.) Layne stainless steel shutter from 86 ft to 96 ft and from 117 ft to 127 ft. The annulus between the bore hole and casing-screen assembly is filled with cement from 0 to 20 ft, with clay from 20 to 65 ft, and with No. 3 Muscatine gravel from 65 to 129 ft.

A production test was conducted by the driller on March 6-7, 1973. After 24 hr of pumping at rates of 510 to 596 gpm, the drawdown was 18 ft from a nonpumping water level of 55 ft below land surface.

The pumping equipment presently installed consists of a 50-hp 1765 rpm U.S. electric motor, a 10-in., 4-stage Layne turbine pump set at 100 ft, rated at 600 gpm at about 196 ft TDH, and has 100 ft of 8-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005514) is for a water sample from the well collected January 22, 1975, after 30 min of pumping at 600 gpm.

WELL NO.1, LABORATORY NO.C005514

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.3		Silica	SiO_2	26.0	
Manganese	Mn	0.04		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.87	0.05	Boron	B	0.5	
Sodium	Na	47	2.04	Nitrate	NO_3	1.4	0.02
Potassium	K	1.8	0.05	Chloride	Cl	3	0.08
Calcium	Ca	84	4.19	Sulfate	SO_4	275	5.72
Magnesium	Mg	62	5.10	Alkalinity (as $CaCO_3$)		302	6.04
Arsenic	As	0.000					
Barium	Ba	0.2		Hardness (as $CaCO_3$)		467	9.34
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		722	
Chromium	Cr	0.00					
Lead	Pb	0.02					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.7	
Silver	Ag	0.00		±deviation		1.7	
Cyanide	CN	0.00		Beta *pc/l*		3.5	
Zinc	Zn	0.02		±deviation		2.4	

LAKE BLUFF

The village of Lake Bluff (4979) installed a public water supply in 1904. A total of three production wells were utilized as a source of water supply until 1960 when the village began purchasing Lake Michigan water from the city of Lake Forest. One well (No. 3) is available for emergency use. In 1956 there were 730 services, all metered; the average and maximum daily groundwater pumpages were 150,000 and 180,000 gpd, respectively. In 1972 there were

1388 services, all metered; the average daily surface water pumpage was 600,000 gpd.

Water was first obtained from a well variously reported at 1600, 1900, and 2000 ft in depth and 4 in. in diameter. It was purchased by the village in 1896 from the Lake Bluff Camp Meeting Association and was probably drilled between 1880 and 1890. This well furnished the entire public water supply until 1908 and a considerable part of the supply until 1913. It was reported that the original static water level was 45 ft above land surface, and in 1919 was 45 ft below land surface and the yield 75 gpm. The well was sounded in 1921 and found to have a depth of 450 ft. In 1924 it was again sounded and found to have a depth of 250 ft. The well was then completely filled and abandoned.

A second well, 50 ft from the old well and 300 ft in depth, was drilled in 1908. It was reported to be 6 in. in diameter and the bottom 100 ft penetrated rock. The water from this well was reported to be of better quality than water from the deeper sandstone well, but its yield capability was limited. It was abandoned about 1914.

WELL NO. 1 (originally No. 3), finished in Silurian dolomite, was completed in 1913 to a depth of 498 ft by William Cater, Chicago. This well was abandoned and sealed in 1964. The well was located at Center Ave. and Park Drive, approximately 1700 ft S and 500 ft E of the NW corner of Section 21, T44N, R12E. The land surface elevation at the well is approximately 680 ft.

A 10-in. diameter hole was drilled to a depth of 350 ft and finished 8 in. in diameter from 350 to 498 ft. The well was cased with 10-in. pipe from 0.8 ft above the concrete floor in the pump foundation base to a depth of 197 ft.

In June 1924, the nonpumping water level was reported to be 55 ft below the pump base.

On January 1, 193 3, a production test was conducted for . 3 hr during which time the average rates of pumpage were 94.5 gpm for the first hr, 86.8 gpm for the second hr, and 70.2 gpm the third hr. The nonpumping water level was reported to be 87 ft below the pump base.

A mineral analysis of a sample (Lab. No. 63774) collected April 3, 1929, showed the water to have a hardness of 91 mg/1, total dissolved minerals of 295 mg/1, and an iron content of 0 mg/1.

WELL NO. 2 (originally No. 4), finished in the Mt. Simon Sandstone, was completed in 1921 to a depth of 1804 ft by William Cater, Chicago. This well was capped and disconnected in 1964. The well is located at Center Ave. and Park Drive, approximately 1700 ft S and 460 ft E of the NW corner of Section 21, T44N, R12E. The land surface elevation at the well is approximately 680 ft.

A 12-in. diameter hole was drilled to a depth of 670 ft, reduced to 8 in. between 670 and 1256 ft, and finished 6.2 in. in diameter from 1256 to 1804 ft. The well was cased from 1.5 ft above the pumphouse floor to an unknown depth.

Upon completion, the well produced 134 gpm for 1 hr with a drawdown of 18 ft from a nonpumping water level of 58 ft below the top of the casing.

A production test was conducted on March 21, 1950, by representatives of the village and the State Water Survey. After 3 hr of pumping at rates of 270 to 362 gpm, the final drawdown was 28.6 ft from a nonpumping water level of 148.5 ft below the pump base. Thirty min after pumping was stopped, the water level had recovered to 150.3 ft.

Nonpumping water levels reported for this well are: 156 ft below land surface on November 28, 1951; 210 ft on October 22, 1958; and 245.1 ft below land surface on November 16, 1964.

Monthly measurements of the nonpumping water levels during the period January 1965 to January 1975 show a regional decline from about 242 to 332 ft below land surface.

A correlated drillers log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Clay	55	55
Quicksand	7	62
Gravel	5	67
Clay	45	112
Gravel	4	116
Clay	65	181
Gravel	3	184
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite	308	492
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale, some dolomite	138	630
Galena-Platteville Group		
Rock	304	934
Glenwood-St. Peter Formations		
Sand rock	212	1146
CAMBRIAN SYSTEM		
Franconia and Galesville Formations		
Shale, blue	54	1200
Sand	204	1404
Eau Claire and Mt. Simon Formations		
Pencil rock		1404
Lime, shale and sand	261	1665
Sand	139	1804

A mineral analysis of a sample (Lab. No. 107458) collected August 21,1946, after pumping for 40 min at 500 gpm, showed the water to have a hardness of 374 mg/1, total dissolved minerals of 512 mg/1, and an iron content of 0.5 mg/1.

WELL NO. 3, open to the Galena-Platteville Dolomite and the Glenwood-St. Peter, Ironton-Galesville, and Mt. Simon Sandstones, was completed in November 1956 to a depth of 1828 ft by L. Cliff Neely, Batavia. This well is available for emergency use. The well is located about 760 ft west of Well No. 2, approximately 1700 ft S and 300 ft W of the NE corner of Section 20, T44N, R12E. The land surface elevation at the well is approximately 685 ft.

A 30-in. diameter hole was drilled to a depth of 180 ft, reduced to 25 in. between 180 and 665 ft, reduced to 19 in. between 665 and 1260 ft, reduced to 15 in. between 1260 and 1693 ft, and finished 12 in. in diameter from 1693 to

1828 ft. The well is cased with 30-in. OD pipe from land surface to a depth of 171 ft, 20-in. OD pipe from land surface to a depth of 665 ft (cemented in), 16-in. galvanized wrought iron liner from 1109 to 1260 ft, and 12-in. galvanized wrought iron liner from 1378 to 1693 ft.

A production test was conducted by the driller on November 20, 1956. After 11 hr of pumping at rates of 1420 to 1526 gpm, the final drawdown was 90 ft from a nonpumping water level of 210 ft.

The pumping equipment presently installed consists of a 200-hp Byron Jackson electric motor, a 10-stage Byron Jackson submersible pump (No. 328456) set at 460 ft, rated at 1000 gpm at about 558 ft TDH, and has 45.0 ft of 8-in. column pipe.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	110	110
Gravel	6	116
Clay	12	128
Clay and gravel mixed	28	156
Gravel	15	171
Lime	304	475
Shale	38	513
Lime	11	524
Shale	12	536
Lime and shale	19	555
Shale	78	633
Limestone	232	865
Shale	2	867
Lime	75	942
Sandy lime	12	954
Lime	11	965
Sand, St. Peter	160	1125
Gray shale	5	1130
Red rock or red shale	5	1135
Gray shale	6	1141
Chert	10	1151
Chert and lime	18	1169
Lime	36	1205
Red rock	5	1210
Shale and lime shells	8	1218
Strata (continued)	*Thickness (ft)*	*Depth (ft)*
Sand and lime	6	1224
Shale	6	1230
Sand and lime	8	1238
Sand	6	1'244
Sandy lime	7	1251
Sand	134	1385
Red rock	2	1387
Green shale	26	1413
Lime	2	1415
Green shale	5	1420
Shale and lime shells	41	1461
Shale, lime and red rock	28	1489
Lime	17	1506
Sandy lime	15	1521
Sand	89	1610
Sandy lime	44	1654
Sand	39	1693
Sandy lime	7	1700
Sand	127	1827
Shale	1	1828

The following mineral analysis (Lab. No. 148037) is for a water sample from the well collected October 22, 1958, while pumping at a rate of 1526 gpm.

WELL NO. 3, LABORATORY NO. 148037

		mg/l	*me/l*			*mg/l*	*me/l*
Iron (total)	Fe	2.8		Silica	SiO_2	9.4	
Manganese	Mn	0.0		Fluoride	F	0.9	
Calcium	Ca	110.5	5.52	Boron	B	0.2	
Magnesium	Mg	19.9	1.64	Chloride	Cl	10	0.28
Ammonium	NH_4	0.3	0.02	Nitrate	NO_3	0.2	Tr
Sodium	Na	31	1.34	Sulfate	SO_4	156.7	3.26
				Alkalinity (as $CaCO_3$)		248	4.96
Turbidity		6		Hardness (as $CaCO_3$)		358	7.16
Color		0					
Odor		0		Total dissolved minerals		510	
Temp.		63.5 F (reported)					

A series of partial analyses of samples (Lab. Nos. 150600 to 150604) collected September 2, 1958, during the first 10 min of pumping at 1000 gpm, showed the water to range in hardness from 350 to 370 mg/1, total dissolved minerals from 566 to 518 mg/1, and an iron content from 5.6 to 1.5 mg/1.

LAKE VILLA

The village of Lake Villa (1090) installed a public water supply in 1937. Two wells (Nos. 2 and 4) are in use and another well (No. 3) is available for emergency use. This supply is cross connected with the Allendale Farm School for Boys. In 1949 there were 98 services, all metered; the average daily pumpage was 7000 gpd. In 1974 there were 274 services, all metered; the average and maximum daily pumpages were 101,174 and 150,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

Prior to constructing a public water supply, a test well was drilled to a depth of 148 ft by Charles Madsen, Lake Villa. The test well was located about 30 ft southeast of the village hall in the business section of town. It was cased with 3-in. pipe to a depth of 144.5 ft followed by a 3.5-ft section of 1.5-in. No. 60 (0.010 in.) gauze wire screen. On March 8, 1937, this test well reportedly produced from 25 to 28 gpm for almost 6 hr from a nonpumping water level of 55 ft below land surface. No pumping water levels were obtained.

WELL NO. 1, finished in sand and gravel, was constructed in 1937 to an effective depth of 164.6 ft by R. E. Milaeger, Milwaukee, Wis. This well was filled with pea gravel and capped with concrete during 1963. The well was located about 50 ft south of the village hall, approximately 150 ft N and 225 ft E of the SW corner of Section 33, T46N, R10E. The land surface elevation at the well is approximately 798 ft.

A summary sample study log of Well No. 1 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SYSTEM		
Wisconsin glacial drift		
Till, calcareous, grayish-brown, flaky	20	20
Till, calcareous, mottled gray and yellow	4	24
Till, calcareous, silty, grayish-brown, flaky	8	32
Till, calcareous, silty, brownish-gray, flaky	8	40
Sand, calcareous, light buff, very fine	4	44
Till, calcareous, silty, brownish-gray, flaky	12	56
Gravel, dolomitic, white and light buff, clean	4	60
Same; till, calcareous, silty, grayish-brown	4	64
Till, calcareous, silty, brownish-gray, flaky	44	108
Sand, calcareous, light buff, very fine to coarse, fairly clean	8	116
Same; gravel, gray and brown; till, calcareous, brown	4	120
Till, calcareous, pinkish-brown	8	128
Sand, calcareous, slightly silty, light buff, very fine to medium, fairly clean	44	172
Same; silt, sandy, calcareous, light yellow, wood fragments	8	180
Sand, calcareous, light buff, fine to medium, clean	4	184
Till, calcareous, silty, pink	2	186
Sand, calcareous, silty, light buff, fine to coarse	1	187
Till, calcareous, silty, pinkish-brown and pink	4	191
Sand, calcareous, buff, fine to coarse, fairly clean	12	203
Till, calcareous, silty, buff, pink and yellow	16	219
Till, calcareous, silty, pinkish-brown	15	234
Sand and gravel, dolomitic, white and light buff, clean	8	242
Till, calcareous, pinkish-brown, flaky	4	246
Same; sand, dolomitic, buff, medium to coarse, clean	4	250
Sand and gravel, dolomitic, buff and white, fine to coarse, clean	8	258
Gravel, dolomitic, sandy, light gray and buff, clean	10	268
Till, calcareous, silty, pinkish-brown, flaky	1	269
Dolomite, gravel, sandy, light gray to buff, fine to coarse, clean	3	272
Till, calcareous, pink, at top; dolomite, gravel, light gray, clean	6	278
SILURIAN SYSTEM		
Dolomite, light gray and green, very fine, vesicular, fossiliferous	16	294

A 12-in. diameter hole was drilled to a depth of 131 ft and finished 10 in. in diameter from 131 to 294 ft. The well was cased with 12-in. pipe from land surface to a depth of 131 ft and 10-in. pipe from 131 to 141 ft followed by a 26-ft length of Cook brass strainer over an 8-in. diameter perforated pipe with the bottom set at a depth of 166.4 ft. The screened section from top to bottom consisted of 11 ft of No. 20 slot, 2 ft of blank, 11 ft of No. 20 slot, and 2 ft of blank. Due to the amount of sand being pumped from the well, R. E.Milaeger installed a 20-ft length of 4-in. No. 40 slot Johnson screen inside the 8-in. screen between depths of 137.5 and 157.5 ft below the pump base in 1939. The annular space between the two screens was filled with very small gravel particles.

A production test was conducted by the State Water Survey on March 8-9, 1938. After 24 hr of pumping at rates of 106 to 154 gpm, the final drawdown was 4.5 ft from a nonpumping water level of 55.5 ft below the pump base. A large amount of sand was pumped during the first part of the test, and after 24 hr, a small amount of sand was still being pumped.

After the additional screen was installed, a production test was conducted on October 11 and 13, 1939, to determine the effectiveness of the repairs to exclude the sand. Water was pumped at a rate of 85 gpm for periods of 3 to 4 hr with nonpumping intervals of about 1 hr. The pump discharged into a steel tank from which the sand was collected when pumping stopped. The amount of sand was dried and weighed. These tests indicated that the amount of sand pumped decreased from 0.19 to 0.04 mg/1. The nonpumping water level before the test was 45 ft below the pump base and during the tests, the pumping water levels were 78 to 79 ft below the pump base.

A mineral analysis of a sample (Lab. No. 107531) collected August 29, 1946, after pumping for 3 hr at 80 gpm, showed the water to have a hardness of 164 mg/1, total dissolved minerals of 324 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in April 1961 to a depth of 156 ft by the Hoover Water Well Service, Zion. The well is located at 145 Belmont Ave., 2 blocks south of Illinois Route 132 and immediately west of the Soo Line RR tracks, approximately 950 ft S and 1200 ft E of the NW corner of Section 4, T45N, R10E. The land surface elevation at the well is approximately 800 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Glacial drift	15	15
Clay	125	140
Sand and gravel	16	156

A 6-in. diameter hole was drilled to a depth of 156 ft. The well is cased with 6-in. threaded steel pipe from 1.5 ft above land surface to a depth of 143 ft followed by 13 ft (15 ft overall length) of 6-in. No. 15 slot red brass screen.

Upon completion, the well reportedly produced 110 gpm for 4 hr with a drawdown of 41 ft from a nonpumping water level of 66 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump set at 125 ft, rated at 150 gpm at about 310 ft TDH, and powered by a 10-hp Franklin electric motor (Model No. 1006F5).

A partial analysis of a sample (Lab. No. 155224) made in July 1961, after pumping for 4 hr at 110 gpm, showed the water to have a hardness of 324 mg/1, total dissolved minerals of 374 mg/1, and an iron content of 0.7 mg/1.

WELL NO. 3, finished in sand and gravel, was completed in March 1963 to a depth of 154 ft by the Henry Boysen Co., Libertyville. This well is available for emergency use. The well is located 200 ft west of Illinois Route 83 and 200 ft south of Burnette St., approximately 1000 ft S and 3000 ft E of the NW corner of Section 4, T45N, R10E. The land surface elevation at the well is approximately 810 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Yellow clay	16	16
Blue clay	77	93
Sandy clay	19	112
Sand (dirty some clay)	2	114
Very sandy clay	26	140
Lake sand	14	154

A 6-in. diameter hole was drilled to a depth of 154 ft. The well is cased with 6-in. threaded steel pipe from land surface to a depth of 142 ft followed by 12 ft (13 ft overall length) of 6-in. No. 14 slot Cook red brass screen.

Upon completion, the well reportedly produced 250 gpm for 4 hr with a drawdown of 47 ft from a nonpumping water level of 71 ft below land surface.

On April 15, 1964, the well reportedly produced 200 gpm for 20 min with a drawdown of 26 ft from a nonpumping water level of 77 ft.

In April 1966, the well was acidized by the Henry Boysen Co., Libertyville. The pumping rate had dropped to 100 gpm from an original rate of 190 gpm, and it was restored to 185 gpm.

In March 1971, this well was acidized by the Henry Boysen Co., Libertyville. After acidizing, the nonpumping water level was reported to be 70 ft and the pump would break suction at 115 gpm, but would pump at 90 gpm without breaking suction.

The pumping equipment presently installed is a Deming oil-lubricated turbine pump (Serial No. OT-21385) set at 130 ft, rated at 200 gpm at about 110 ft TDH, and powered by a 15-hp 1800 rpm U.S. Holloshaft electric motor (Serial No. 3549046).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B39808) of a sample collected April 6, 1976, after pumping for 30 min at 80 gpm, showed the water to have a hardness of 243 mg/1, total dissolved minerals of 375 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 4, finished in sand and gravel, was completed in July 1971 to a depth of 153 ft by the Henry Boysen Co., Libertyville. The well is located on Belmont Ave., 12 ft east of Well No. 2, approximately 950 ft S and 1212 ft E of the NW corner of Section 4, T45N, R10E. The land surface elevation at the well is approximately 800 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	138	138
Sand	15	153

An 8-in. diameter hole was drilled to a depth of 153 ft. The well is cased with 8-in. steel pipe from land surface to a depth of 141 ft followed by 12 ft of 8-in. No. 15 slot Johnson stainless steel screen.

Upon completion, the well reportedly produced 250 gpm for 2 hr with a drawdown of 47 ft from a nonpumping water level of 72 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump (No. SN-P613) set at 132 ft, rated at 250 gpm at about 280 ft TDH, and powered by a 25-hp Red Jacket electric motor (No. SN-J-1416810).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004843) is for a water sample from the well collected January 7,1974, after 5 hr of pumping at 230 gpm.

WELL NO. 4, LABORATORY NO. C004843

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.5		Silica	SiO_2	26	
Manganese	Mn	0.00		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.41	0.02	Boron	B	0.4	
Sodium	Na	36	1.57	Nitrate	NO_3	0.3	0.00
Potassium	K	1.2	0.03	Chloride	Cl	6	0.17
Calcium	Ca	36	1.80	Sulfate	SO_4	67	1.39
Magnesium	Mg	36	2.96	Alkalinity (as $CaCO_3$)		252	5.04
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		239	4.78
Copper	Cu	0.05					
Cadmium	Cd	0.00		Total dissolved minerals		342	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.5	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha pc/l		0.8	
Silver	Ag	0.00		±deviation		0.9	
Cyanide	CN	0.00		Beta pc/l		0.6	
Zinc	Zn	0.03		±deviation		1.7	

LAKEWOOD WATER SYSTEM

The Lakewood Water System, formerly known as the Echo Lake Subdivision (est. 25), located 0.5 mile north of Lake Zurich, installed a public water supply in 1949. One well is in use. In 1970 there were 12 services, none metered; the estimated average daily pumpage was 2000 gpd. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in May 1949 to a depth of 375 ft by J. C. Wayman & Son. The well is located in the rear of the Oakley Home, approximately 1200 ft S and 1250 ft W of the NE corner of Section 17, T43N, R10E. The land surface elevation at the well is approximately 855 ft.

A 5-in. diameter hole was drilled to a depth of 375 ft. The well is cased with 5-in. pipe from 0.3 ft above the concrete floor of a 6-ft deep pit to an unknown depth.

The pumping equipment presently installed is a Goulds submersible pump set at 170 ft, rated at 18 gpm, and powered by a 2-hp Franklin electric motor (Model No. CBC1028Y501).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 04278) is for a water sample from the well collected February 24, 1972, after 5 to 10 min of pumping at approximately 18 gpm.

WELL NO. 1, LABORATORY NO. 04278

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	17	
Manganese	Mn	0.0		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.06	0.00	Boron	B	0.8	
Sodium	Na	41	1.78	Nitrate	NO_3	1.8	0.03
Potassium	K	1.6	0.04	Chloride	Cl	2	0.06
Calcium	Ca	50	2.50	Sulfate	SO_4	145	3.02
Magnesium	Mg	36	2.96	Alkalinity (as $CaCO_3$)		200	4.00
				Hardness (as $CaCO_3$)		268	
Barium	Ba	0.0		Total dissolved minerals		381	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.6	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		± deviation		1	
Nickel	Ni	0.0		Beta *pc/l*		1	
Silver	Ag	0.0		± deviation		2	
Zinc	Zn	0.3					

LAKE ZURICH

The village of Lake Zurich (4082) installed a public water supply in 1912. Two wells (Nos. 2 and 7) are in use and two wells (Nos. 3 and 5) are available for emergency use. In 1951 there were 400 services, all metered; the average and maximum daily pumpages were 60,000 and 80,000 gpd, respectively. In 1975 there were 1800 services, all metered; the average and maximum daily pumpages were 685,000 and 1,000',000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water from Well Nos. 5 and 7 is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in 1912 to a depth of 218 ft. This well was abandoned and filled with sand and gravel in 1957. The well was located on the village lot on Main St. near the intersection of Lake View Ave., approximately 650 ft S and 1950 ft E of the NW corner of Section 20, T43N, R10E. The land surface elevation at the well is approximately 865 ft.

The well was cased with 6-in. pipe from land surface to a depth of 218 ft. No screen was installed.

On June 3,1915, the nonpumping water level was reported to be 100 ft below land surface.

A mineral analysis of a sample (Lab. No. 71969) collected November 2,1932, showed the water to have a hardness of 882 mg/1, total dissolved minerals of 1601 mg/1, and an iron content of 3.2 mg/1.

WELL NO. 2, open to the Silurian dolomite and shales and dolomites of the Maquoketa Group, was constructed in 1921 to a depth of 214 ft by Rieke Brothers, Barrington, and reportedly deepened in July 1951 to a depth of 421 ft by Henry Boysen, Jr., Libertyville. The well is located 40 ft south of Well No. 1, approximately 690 ft S and 1950 ft E of the NW corner of Section 20, T43N, R10E. The land surface elevation at the well is approximately 865 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
"Till"	212	212
Gravel, clean	6	218
Sand, pale yellowish brown	27	245
Silt, pale yellowish brown	16	261
SILURIAN SYSTEM		
Kankakee-Edgewood Formation		
Dolomite, yellowish gray, greenish, brown, white	56	317
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale, olive to greenish	13	330
Dolomite, yellowish gray	19	349
Shale, greenish to greenish	19	368
Dolomite, gray	25	393
Shale, greenish gray	28	421

A 10-in. diameter hole was drilled to a depth of 421 ft. The well is cased with 10-in. pipe from 1.5 ft above the pumphouse floor to a depth of 272 ft.

Upon completion in 1921 (before deepening), the well reportedly produced 100 gpm for 12 hr with a drawdown of 20 ft from a nonpumping water level of 95 ft below land surface.

After deepening the well, a production test was conducted on July 26,1951, by representatives of the driller and the State Water Survey. After 4 hr of pumping at rates of 376 to 505 gpm, the final drawdown was 11 ft from a nonpumping water level of 108 ft below the top of the casing.

On June 6,1958, the nonpumping water level was reported to be 134 ft below the pump base (airline reading).

The pumping equipment presently installed consists of a 40-hp 1800 rpm U.S. electric motor (No. 2096503), a 10-in., 8-stage Cook turbine pump (No. 13863) set at 160 ft, rated at 400 gpm at about 115 ft TDH, and has 160 ft of 8-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 160 ft of airline.

A mineral analysis of a sample (Lab. No. 185328) made in April 1971, showed the water to have a hardness of 710

mg/1, total dissolved minerals of 1244 mg/1, and an iron content of 0.6 mg/1.

WELL NO. 3, open to the Silurian dolomite and shales and dolomites of the Maquoketa Group, was completed in March 1949 to a depth of 443 ft by Henry Boysen, Jr., Libertyville. This well is available for emergency use. The well is located on the northwest corner of Rand Road and Cedar St., approximately 2570 ft S and 1250 ft W of the NE corner of Section 20, T43N, R10E. The land surface elevation at the well is approximately 885 ft.

A sample study log of Well No. 3 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Silt, calcareous, grayish brown	5	5
Till, grayish brown to gray	210	215
Gravel, gray, fine, clean	5	220
Till, gray	5	225
Sand, silty, gray, fine, little gravel	50	275
Till, grayish brown	15	290
SILURIAN SYSTEM		
Alexandrian Series		
Kankakee Dolomite	55	345
Edgewood Dolomite	10	355
ORDOVICIAN SYSTEM		
Maquoketa Group		
Dolomite, shaly	85	440
"Shale"	3	443

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004704) is for a water sample from the well collected December 19, 1973, after 10 hr of pumping at 210 gpm.

WELL NO. 3, LABORATORY NO. C004704

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	16	
Manganese	Mn	0.00		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.90	0.05	Boron	B	0.8	
Sodium	Na	128	5.57	Nitrate	NO_3	0.3	0.00
Potassium	K	1.3	0.03	Chloride	Cl	9	0.25
Calcium	Ca	168	8.38	Sulfate	SO_4	900	18.72
Magnesium	Mg	82	6.75	Alkalinity (as $CaCO_3$)		74	1.48
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		756	15.12
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		1544	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.9	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.4	
Silver	Ag	0.00		± deviation		1.6	
Cyanide	CN	0.00		Beta *pc/l*		1.5	
Zinc	Zn	0.01		± deviation		3.4	

A 6-in. diameter hole was drilled to a depth of 443 ft. The well is cased with 6-in. pipe from 1.5 ft above the pumphouse floor to a depth of 300 ft.

A production test was conducted on March 11, 1949, by representatives of the driller and the State Water Survey. After 15 hr of pumping at rates of 39 to 209 gpm, the final drawdown was 29.0 ft from a nonpumping water level of 134.5 ft below land surface. Ten min after pumping was stopped, the water level had recovered to 137.0 ft.

The pumping equipment presently installed consists of a 20-hp Sta-Rite electric motor (Serial No. MP6N3E), a Sta-Rite submersible pump (Model No. 190P6N3, Serial No. D67) set at 210 ft, rated at 210 gpm at about 280 ft TDH, and has 210 ft of 3-in. column pipe.

WELL NO. 4 (formerly Zurich Heights Sanitary District well), finished in Silurian dolomite, was constructed in 1947 to a depth of 272 ft and reportedly deepened in 1951 to a depth of 300 ft by Henry Boysen, Libertyville. This well was abandoned in November 1972 because of a flooded pit. The well is located on the south side of Country Club Road about 150 ft west of U.S. Route 12, approximately 1425 ft N and 2250 ft E of the SW corner of Section 18, T43N, R10E. The land surface elevation at the well is approximately 860 ft.

A 6-in. diameter hole was drilled to a depth of 300 ft. The well is cased with 6-in. pipe from 1 ft above the floor of a 3-ft deep pit to a depth of 272 ft.

On June 5, 1958, the nonpumping water level was reported to be 128 ft.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03360) of a sample collected December 21, 1971, after pumping for 30 min at 90 gpm, showed the water to have a hardness of 796 mg/1, total dissolved minerals of 1490 mg/1, and an iron content of 0.07 mg/1.

WELL NO. 5, open to the Cambrian-Ordovician aquifer, was completed in April 1963 to a depth of 1340 ft by the J. P. Miller Artesian Well Co., Brookfield. This well is available for emergency use. The well is located about 0.1 mile south of Miller Road on the east side of U.S. Route 12, approximately 500 ft S and 2500 ft W of the NE corner of Section 18, T43N, R10E. The land surface elevation at the well is approximately 822 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	215	215
Niagaran limestone	173	388
Maquoketa shale	87	475
Galena-Platteville dolomite	320	795
St. Peter sandstone	151	946
Prairie du Chien limestone	209	1155
Galesville sandstone	153	1308
Eau Claire dolomite and shale	32	1340

A 12-in. diameter hole was drilled to a depth of 550 ft, reduced to 10 in. between 550 and 1210 ft, and finished 8 in. in diameter from 1210 to 1340 ft. The well is cased with 12-in. outer pipe from land surface to a depth of 240 ft and 10-in. inner pipe from 2 ft above land surface to a depth of 550 ft (cemented in). The well was shot with 156 lb of explosive before testing.

Upon completion, the well reportedly produced 600 gpm for 24 hr with a drawdown of 98 ft from a nonpumping water level of 423 ft below the top of the casing.

The pumping equipment presently installed consists of a 10-in., 17-stage Layne RKEH turbine pump (No. 49050)

set at 810 ft, rated at 500 gpm at about 878 ft TDH, and powered by a 150-hp 1800 rpm U.S. electric motor. A 20-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 810 ft of airline.

The following mineral analysis (Lab. No. 185330) is for a water sample from the well made in April 1971.

WELL NO. 5, LABORATORY NO. 185330

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1		Silica	SiO_2	6.8	
Manganese	Mn	0.00		Fluoride	F	0.9	
Ammonium	NH_4	0.4	0.02	Boron	B	0.2	
Sodium	Na	24.5	1.07	Nitrate	NO_3	0.0	0.00
Potassium	K	10.0	0.26	Chloride	Cl	9	0.25
Calcium	Ca	68.0	3.39	Sulfate	SO_4	34.4	0.72
Magnesium	Mg	22.0	1.81	Alkalinity (as $CaCO_3$)		274	5.48
Strontium	Sr	4.33	0.10				
Barium	Ba	2.3*		Hardness (as $CaCO_3$)		260	5.20
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		356	
Chromium	Cr	0.00					
Lead	Pb	0.0					
Lithium	Li	0.02		Turbidity		3	
Nickel	Ni	0.0		Color		0	
Zinc	Zn	0.00		Odor		0	

* Determination made by the Environmental Protection Agency laboratory in Springfield, Illinois

WELL NO. 6 (formerly Lake Zurich Manor Woodlands well), finished in Silurian dolomite, was completed in January 1956 to a depth of 415 ft by Henry Boysen, Libertyville. This well is not in use. The well is located on the south side of Miller Road about 0.5 mile east of Route 12, approximately 75 ft S and 1100 ft E of the NW corner of Section 17, T43N, R10E. The land surface elevation at the well is approximately 860 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	109	109
Clay and gravel	5	114
Fine sand	36	160
Sandy clay	23	173
Clay	42	215
Fine gravel	33	248
Sandy clay	8	256
Sandy clay, gravel and lime	8	264
Shale	69	333
Lime and shale	16	349
Lime	66	415

An 8-in. diameter hole was drilled to a depth of 415 ft. The well is cased with 8-in. galvanized pipe from land surface to a depth of 275 ft.

Upon completion, the well reportedly produced 240 gpm with a drawdown of 58 ft from a nonpumping water level of 110 ft.

The pumping equipment presently installed consists of a 20-hp 1800 rpm U.S. electric motor (Serial No. 2464769), a 7.2-in., 14-stage Byron Jackson oil-lubricated turbine pump (Model No. OKHC-14STG, Serial No. C322399) set at 200 ft, rated at 200 gpm at 280 ft TDH, and has 200 ft of 5-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02603) is for a water sample from the well collected November 3, 1971, after 30 min of pumping at 150 gpm.

WELL NO. 6, LABORATORY NO. 02603

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1	0.00	Silica	SiO_2	17	
Manganese	Mn	0.0		Boron	B	0.8	
Ammonium	NH_4	0.5	0.03	Fluoride	F	0.8	0.04
Sodium	Na	57	2.48	Nitrate	NO_3	0.4	0.01
Potassium	K	2.4	0.06	Chloride	Cl	4.0	0.11
Calcium	Ca	56	2.79	Sulfate	SO_4	291	6.06
Magnesium	Mg	45	3.70	Alkalinity (as $CaCO_3$)		130	2.60
				Hardness (as $CaCO_3$)		320	
Barium	Ba	0.3		Total dissolved minerals		550	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.6	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		1	
Nickel	Ni	0.0		Beta *pc/l*		0	
Silver	Ag	0.0		±deviation		1	
Zinc	Zn	0.0					

WELL NO. 7, open to the Cambrian-Ordovician aquifer, was completed in October 1971 to a depth of 1333 ft by the Layne-Western Co., Aurora. The well is located next to 445 Old Mill Grove Road in Old Mill Grove Subdivision, approximately 2100 ft S and 2550 ft E of the NW corner of Section 21, T43N, R10E. The land surface elevation at the well is approximately 850 ft.

A drillers log of Well No. 7 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black top soil	2	2
Yellow clay	8	10
Brown clay	120	130
Brown gravel and clay	15	145
Gray clay	15	160
Gray sandy clay	105	265
Hard limestone	135	400
Hard limestone with streaks of shale	30	430
Hard limestone	15	445
Green shale	55	500
Hard gray limestone	140	640
Medium gray limestone	30	670
Hard gray limestone	148	818
Soft sandstone	22	840
Hard sandstone	20	860
Medium sandstone	40	900
Soft white sandstone	35	935
Medium white sandstone	5	940
Hard white sandstone	5	945
Medium white sandstone	50	995
Medium pink sandstone	20	1015
White hard sandstone	50	1065
Red shale	20	1085
Medium sandy limestone	45	1130
Hard sandy limestone	5	1135
Medium sandy limestone	25	1160
Hard sandy limestone	25	1185
Hard sandstone	5	1190
Medium sandstone	20	1210
Hard sandstone	20	1230
Medium sandstone	50	1280
Soft sandstone	40	1320
Green shale	13	1333

A 26-in. diameter hole was drilled to a depth of 267 ft, reduced to 25 in. between 267 and 525 ft, reduced to 21 in. between 525 and 1086 ft, and finished 17 in. in diameter from 1086 to 1333 ft. The well is cased with 26-in. pipe from 0.5 ft above land surface to a depth of 267 ft, 22-in.

pipe from land surface to a depth of 525 ft (cemented in), and 18-in. slotted pipe from 1003 ft to a depth of 1086 ft.

A production test was conducted by the driller on October 22,1971. After 7.7 hr of pumping at rates of 967 to 1001 gpm, the final drawdown was 140 ft from a nonpumping water level of 570 ft below the top of the casing.

The pumping equipment presently installed is a 10-in., 10-stage Johnston vertical turbine pump (Serial No. GD4578) rated at 1000 gpm at about 970 ft TDH, and powered by a 400-hp 1800 rpm General Electric Holloshaft motor.

A partial analysis of a sample (Lab. No. 187004) collected during the initial production test, after pumping for 8 hr at 1001 gpm, showed the water to have a hardness of 176 mg/1, total dissolved minerals of 361 mg/1, and an iron content of 0.4 mg/1.

LEISURE VILLAGE SUBDIVISION

Leisure Village Subdivision (est. 400), located 2 miles northwest of Fox Lake, installed a public water supply in 1972. The water system is owned and operated by Fox Lake Utilities. One well (No. 1) is in use. In 1973 there were 330 services, all metered; the average and maximum daily pumpages were 42,000 and 210,000 gpd, respectively. The water is chlorinated.

WELL NO. 1, finished in sand and gravel, was completed in May 1972 to a depth of 146 ft by the Wehling Well Works, Beecher. The well is located at 700 Grass Lake Road, approximately 100 ft S and 1800 ft E of the NW corner of Section 33, T46N, R9E. The land surface elevation at the well is approximately 775 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sand and gravel	150	150

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C006056) is for a water sample from the well collected March 4, 1974, after 0.5 hr of pumping at 1500 gpm.

WELL NO. 1, LABORATORY NO. C006056

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.2		Silica	SiO_2	20.5	
Manganese	Mn	0.04		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.32	0.02	Boron	B	0.1	
Sodium	Na	5.2	0.23	Nitrate	NO_3	0.4	0.01
Potassium	K	1.2	0.03	Chloride	Cl	5	0.14
Calcium	Ca	68	3.39	Sulfate	SO_4	38	0.79
Magnesium	Mg	37	3.04	Alkalinity (as $CaCO_3$)		290	5.80
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		322	6.44
Copper	Cu	0.02					
Cadmium	Cd	0.00		Total dissolved minerals		344	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.8	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.7	
Silver	Ag	0.00		± deviation		0.8	
Cyanide	CN	0.00		Beta *pc/l*		1.6	
Zinc	Zn	0.01		± deviation		1.6	

A 17-in. diameter hole was drilled to a depth of 111 ft and finished 12.8 in. in diameter from 111 to 150 ft. The well is cased with 12-in. pipe from 2 ft above land surface to a depth of 111 ft followed by 35 ft of 10-in. screen. The screened section from top to bottom consists of 2 ft of No. 80 slot, 30 ft of No. 120 slot, and 3 ft of No. 80 slot.

A production test was conducted by the driller on May 12, 1972. After 7.8 hr of pumping at rates of 620 to 1700 gpm, the final drawdown was 22 ft from a nonpumping water level of 34 ft below land surface. Fifteen min after pumping was stopped, full recovery was observed.

The pumping equipment presently installed is a 4-stage Johnston vertical turbine pump set at *96* ft, rated at 1500 gpm at about 185 ft TDH, and powered by a 100-hp 1800 rpm General Electric motor.

WELL NO. 2, finished in sand and gravel was completed in March 1976 to a depth of 133 ft by the Layne-Western Co., Aurora. As of May 1976, this well was not in use. The well is located south of the ground storage tank on Grass Lake Road about 0.4 mile east of the county line, approximately 280 ft S and 1865 ft W of the NE corner of Section 33, T46N, R9E. The land surface elevation at the well is approximately 780 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay and gravel	1	1
Sand, gravel, boulders	38	39
Sandy clay with sand streaks	2	41
Sand, gravel, boulders	47.5	88.5
Sandy clay	1.5	90
Sand and gravel	18	108
Sand and gravel, few boulders, trace of fine sand	22	130
Sand, gravel, boulders	3	133
Clay	15	148

A 20-in. diameter hole was drilled to a depth of 133 ft. The well is cased with 12-in. pipe from 2 ft above land surface to a depth of 97 ft followed by 36 ft (41 ft overall length) of 12-in. Johnson stainless steel screen. The screened section from top to bottom consists of 11 ft of No. 120 slot, 7 ft of No. 80 slot, and 23 ft of No. 120 slot. The annulus between the bore hole and casing-screen assembly is filled with cement from 0 to 50 ft, with pea gravel from 50 to 75 ft, and with No. 3 Muscatine gravel from 75 to 133 ft.

A production test was conducted by the driller on March 4, 1976. After 8 hr of pumping at rates ranging from 717 to 760 gpm, the final drawdown was 42 ft from a nonpump-

ing water level of 41 ft below land surface.

As of May 1976, the permanent pumping equipment was not installed.

A partial analysis of a sample (Lab. No. 201322) collected during the initial production test, after pumping for 8 hr at 752 gpm, showed the water to have a hardness of 328 mg/1, total dissolved minerals of 352 mg/1, and an iron content of 0.6 mg/1.

LIBERTY ACRES SUBDIVISION

Liberty Acres Subdivision (est. 110), located 3.5 miles north of Mundelein, installed a public water supply in 1958. The water system is owned and operated by the Lake County Public Works Department. Two wells (Nos. 1 and 2) are in use. In 1974 there were 31 services, all metered; the average and maximum daily pumpages were 6480 and 9700 gpd, respectively. The water from Well No. 2 is hypochlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in July 1958 to a depth of 150 ft by the Hoover Water Well Service, Zion. The well is located on lot 28 at the intersection of Ranch and Casey Roads, approximately 2556 ft N and 580 ft E of the SW corner of Section 6, T44N, R11E. The land surface elevation at the well is approximately 795 ft.

A 6-in. diameter hole was drilled to a depth of 150 ft. The well is cased with 6-in. galvanized steel pipe from 0.5 ft above land surface to a depth of 146 ft followed by 4 ft of 6-in. No. 10 slot Johnson brass screen.

In 1958, the well reportedly produced 30 gpm for 6 hr with a drawdown of 15 ft from a nonpumping water level of 100 ft.

The pumping equipment presently installed is a Fairbanks-Morse submersible pump set at 140 ft, rated at 15 gpm, and powered by a 1-hp 3450 rpm Franklin electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004946) is for a water sample from the well collected January 14,1974, after 1 hr of pumping.

WELL NO. 1, LABORATORY NO. C004946

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	16	
Manganese	Mn	0.00		Fluoride	F	1.1	0.06
Ammonium	NH_4	0.51	0.03	Boron	B	0.6	
Sodium	Na	55	2.39	Nitrate	NO_3	0.3	0.00
Potassium	K	0.9	0.02	Chloride	Cl	4	0.11
Calcium	Ca	30	1.50	Sulfate	SO_4	145	3.02
Magnesium	Mg	21	1.73	Alkalinity (as $CaCO_3$)		130	2.60
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		162	3.24
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		412	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.2	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.4	
Silver	Ag	0.00		±deviation		1.1	
Cyanide	CN	0.00		Beta *pc/l*		1.7	
Zinc	Zn	0.04		±deviation		1.6	

WELL NO. 2, finished in sand and gravel, was completed in May 1960 to a depth of 150 ft by the Hoover Water Well Service, Zion. The well is located on lot 28 about 6 ft south of Well No. 1 at the intersection of Ranch and Casey Roads, approximately 2550 ft N and 580 ft E of the SW corner of Section 6, T44N, R11E. The land surface elevation at the well is approximately 795 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black dirt	1	1
Yellow clay	19	20
Stoney hard blue clay	15	35
Softer blue clay	55	90
Mucky sand and clay	10	100
Blue clay	30	130
Sandy clay	10	140
Fine dirty sand	3	143
Clean sand, coarser	7	150
Clay below		

A 12-in. diameter hole was drilled to a depth of 150 ft. The well is cased with 12-in. galvanized steel pipe from 1.2 ft above the pumphouse floor to a depth of 144 ft followed by 6 ft of 12-in. No. 10 slot Johnson red brass screen.

On September 23,1960, the well reportedly produced 30 gpm for 8 hr with a drawdown of 37 ft from a nonpumping water level of 96 ft below the top of the casing.

The pumping equipment presently installed is an 11-stage Sta-Rite submersible pump set at 140 ft, rated at 20 gpm at about 250 ft TDH, and powered by a 1 1/2-hp 3450 rpm Sta-Rite electric motor.

WELL NO. 3, finished in Silurian dolomite, was completed in May 1967 to a depth of 275 ft by the Henry Boysen Co., Libertyville. This well is not in use. The well is located on lot 11 at the junction of Ranch and Stegman Roads, approximately 1500 ft N and 550 ft E of the SW corner of Section 6, T44N, R11E. The land surface elevation at the well is approximately 795 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	236	236
Dolomite	39	275

A 6-in. diameter hole was drilled to a depth of 275 ft. The well is cased with 6-in. pipe from 0.5 ft above land surface to a depth of 236 ft.

Upon completion, the well reportedly produced 25 gpm with a drawdown of 38 ft from a nonpumping water level of 120 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (Serial No. EBJP422) set at 189 ft, rated at 22 gpm, and powered by a 2-hp 3450 rpm Franklin electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B110114) is for a water sample from the well collected May 7, 1973, after 1 hr of pumping at 50 gpm.

WELL NO. 3, LABORATORY NO. B110114

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.32	0.01	Silica	SiO_2	16	
Manganese	Mn	0.00	0.00	Fluoride	F	1.1	0.06
Ammonium	NH_4	0.4	0.02	Boron	B	0.9	
Sodium	Na	65	2.83	Nitrate	NO_3	0.0	0.00
Potassium	K	1.3	0.03	Chloride	Cl	3	0.08
Calcium	Ca	30	1.50	Sulfate	SO_4	170	3.54
Magnesium	Mg	23	1.89	Alkalinity (as $CaCO_3$)		128	2.56
Arsenic	As	0.00		Hardness (as $CaCO_3$)		169	3.39
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		376	
Cadmium	Cd	0.005					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)	8.4		
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*	0.7		
Selenium	Se	0.00		±deviation	1.3		
Silver	Ag	0.00		Beta *pc/l*	5.2		
Zinc	Zn	0.00		±deviation	1.9		

LIBERTYVILLE

The village of Libertyville (11,684) installed a public water supply in 1905. Seven wells (Nos. 3, 5, 6, 8, and 10-12) are in use and another well (No. 4) is available for emergency use. In 1949 there were 1600 services; the average and maximum daily pumpages were 400,000 and 600,000 gpd, respectively. In 1975 there were 3500 services, all metered; the average and maximum daily pumpages were 2,351,416, and 3,500,000 gpd, respectively. The water from Well Nos. 3-6, 8, 11, and 12 is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

For a number of years water was obtained from a group of four wells located at the old Cook Ave. Station at the northeast corner of Cook Ave. and First St. These wells are no longer in service and were abandoned prior to 1936. The first three wells, finished in sand and gravel, flowed by gravity into the reservoir from underground connections to the well casings. The natural flow from these wells was sufficient to supply demands of the village except during periods of high consumption when airlift equipment was used during the daytime. The first well in this group was drilled in 1905 to a depth of 170 ft and cased with 4-in. pipe. The second well was drilled in 1906 to a depth of 180 ft and was 5 in. in diameter. In August 1926, when pumping by airlift from a depth of 150 ft, the average production of the second well was 280 gpm. A third well drilled in 1910 was 180 ft deep, 8 in. in diameter, and was reported to have a 6-in. diameter Johnson strainer. The fourth well in this group was a dolomite well drilled in 1921 to a depth of 240 ft, and was reported to be cased to rock at a depth of 200 ft with 8-in. pipe. Water was pumped for 4 or 5 hr at 70 gpm, and the water level was lowered about 35 ft. Later tests of longer pumping periods indicated a maximum yield of about 50 gpm and a pumping water level of 140 ft below the pump base.

A mineral analysis of a sample from the fourth well (Lab. No. 69282) collected June 3, 1931, showed the water to have a hardness of 314 mg/1, total dissolved minerals of 657 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 1 (Second St. well), finished in Silurian dolomite, was completed in 1929 to a depth of 251 ft (originally drilled to 180 ft) by William Cater, Chicago. This well was abandoned-prior to 1975. The well is located at 515 North Second St., approximately 1400 ft N and 1100 ft W of the SE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 670 ft.

A 24-in. diameter hole was drilled to a depth of 56 ft, reduced to 16 in. in diameter from 56 to 198 ft, and finished at an unknown diameter from 198 to 251 ft. The well is cased with 24-in. pipe from land surface to a depth of 56 ft and a 16-in. pipe from land surface to a depth of 198 ft.

A production test was conducted by the State Water Survey on October 3, 1935. After 4.8 hr of pumping at rates of 500 to 442 gpm, the drawdown was 130 ft from a nonpumping water level of 1 ft above the pump base.

On July 1, 1943, the well reportedly produced 450 gpm with a drawdown of 196 ft from a nonpumping water level at land surface.

On December 18, 1958, the well reportedly produced 300 gpm with a drawdown of 57 ft from a nonpumping water level of 96 ft.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008405) of a sample collected June 3, 1974, showed the water to have a hardness of 433 mg/1, total dissolved minerals of 742 mg/1, and an iron content of 0.6 mg/1. Hydrogen sulfide gas was present in a previous sample.

WELL NO. 2 (Garfield Ave. well), finished in sand and gravel, was completed in 1935 to a depth of 83 ft by the Kelly Well Co., Grand Island, Neb. This well was filled and

capped in February 1967. The well was located 65 ft east of Garfield Ave. and 200 ft south of Lincoln Ave., approximately 1700 ft S and 1000 ft E of the NW corner of Section 21, T44N, R11E. The land surface elevation at the well is approximately 703 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	53	53
Sand and gravel	30	83

A 34-in. diameter hole was drilled to a depth of 83 ft. The well was cased with 24-in. OD by 18-in. ID concrete pipe from land surface to a depth of 53 ft followed by 30 ft of slotted concrete screen.

In July 1943, the well reportedly produced 380 gpm for 8 hr with a drawdown of 14 ft from a nonpumping water level of 28 ft below land surface.

On December 18, 1958, the well reportedly produced 400 gpm for 10 min with a drawdown of 25 ft from a nonpumping water level of 43 ft.

On November 3, 1960, after 78 hr of pumping at a rate of 250 gpm, the drawdown was 31 ft from a nonpumping water level of 32 ft.

On June 14, 1966, the well reportedly produced 400 gpm for 20 min with a drawdown of 16 ft from a nonpumping water level of 38 ft.

A partial analysis of a sample (Lab. No. 169097) collected June 14, 1966, after pumping for 20 min at 400 gpm, showed the water to have a hardness of 570 mg/1, total dissolved minerals of 801 mg/1, and an iron content of 2.2 mg/1. Hydrogen sulfide gas also was apparent when this sample was collected.

Prior to drilling Well Nos. 3 and 4, a 6-in. test well (No. 46-1), finished in dolomite, was completed in October 1946 to a depth of 286 ft by Henry Boysen, Jr., Libertyville.

WELL NO. 3 (Appley Ave. Well No. 1), finished in Silurian dolomite, was completed in January 1947 to a depth of 287 ft by Henry Boysen, Jr., Libertyville. The well is located on Appley Ave. at First St., approximately 2580 ft S and 1600 ft W of the NE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 675 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Black loam	3	3
Yellow clay	10	13
Blue clay	29	42
Soft blue clay	9	51
Stoney blue clay	7	58
Blue clay	9	67
Stoney blue hard clay	52	119
Sandy clay	21	140
Sand and gravel	16	156
Limestone	131	287

A 12-in. diameter hole was drilled to a depth of 287 ft. The well is cased with 12-in. ID pipe from 1.2 ft above land surface to a depth of 172 ft.

A production test using two observation wells was conducted on January 17-18, 1947, by representatives of the driller and the State Water Survey. After 24 hr of pumping at rates of 335 to 495 gpm, the drawdown was 82 ft from a nonpumping water level of 15 ft below the top of the casing. Ninety-seven min after pumping was stopped, the water level had recovered to 39 ft.

On December 18, 1958, the well reportedly produced 325 gpm for 8 hr with a drawdown of 14 ft from a nonpumping water level of 52 ft. During a portion of this test, Well No. 4 located 10 ft south, was also pumping and resulted in an additional drawdown of 11 ft in Well No. 3.

The pumping equipment presently installed is a Pomona turbine pump set at 130 ft, rated at 250 gpm, and powered by a 40-hp Fairbanks-Morse electric motor. The well is equipped with 130 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004712) of a sample collected December 18, 1973, after 5 hr of pumping at 165 gpm, showed the water to have a hardness of 396 mg/1, total dissolved minerals of 748 mg/1, and an iron content of 0.6 mg/1.

WELL NO. 4 (Appley Ave. Well No. 2), finished in Silurian dolomite, was completed in January 1947 to a depth of 286 ft by Henry Boysen, Jr., Libertyville. This well is available for emergency use. The well is located at the site of Test Hole No. 46-1 near the intersection of Appley Ave. and First St. about 10 ft south of Well No. 3, approximately 2590 ft S and 1600 ft W of the NE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 675 ft.

A correlated drillers log of Test Hole No. 46-1 located at the site of Well No. 4 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SYSTEM		
Soil	3	3
Clay, yellow	10	13
Clay, blue	29	42
Clay, soft, blue	9	51
Clay, stoney, blue	7	58
Clay, blue	9	67
Clay, stoney, blue, hard	52	119
Clay, sandy	21	140
Clay and gravel	14	154
Sand and gravel	2.5	156.5
SILURIAN SYSTEM		
Limestone, very hard	28.5	185
Limestone, shaly, not so hard	101	286

A 12-in. diameter hole was drilled to a depth of 286 ft. The well is cased with 6-in. pipe from land surface to a depth of 157.3 ft.

In September 1950, the well reportedly produced from 200 to 250 gpm for 20 min with a drawdown of 6 ft from a nonpumping water level of 38 ft below the pump base. During this test Well No. 3, 10 ft north was pumping continuously at a rate of about 300 gpm.

On December 18, 1958, after 8 hr of pumping at a rate of 150 gpm, the drawdown was 14 ft from a nonpumping water level of 52 ft.

The pumping equipment presently installed is a Fairbanks-Morse submersible pump (Serial No. P2B6613) set at 130 ft, rated at 150 gpm at about 241 ft TDH, and powered by a 20-hp General Electric motor. The well is equipped with 130 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008406) of a sample collected June 3, 1974, showed the water to have a hardness of 388 mg/1, total dissolved minerals of 780 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 5 (Newberry Ave. well), finished in Silurian dolomite, was completed in February 1951 to a depth of 227 ft by Henry Boysen, Jr., Libertyville. The well is located on Newberry Ave. about 1.5 blocks east of Milwaukee Ave., approximately 2210 ft N and 2230 ft W of the SE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Fill	4	4
Clay, yellow	8	12
Clay, blue	33	45
Clay, sandy, gray	37	82
Sand and gravel, fine to coarse, muddy in spots	85	167
Clay, gritty	6	173
Limestone, hard, white	6	179
Limestone, gray, and shale, white	20	199
Limestone gray and green	3	202
Limestone, gray, and shale, green	12	214
Limestone, gray and green	13	227

A 12-in. diameter hole was drilled to a depth of 227 ft. The well is cased with 12-in. pipe from 0.7 ft above the pumphouse floor to a depth of 174 ft.

A production test was conducted on February 27, 1951, by representatives of the driller, the village, and the State Water Survey. After 11.2 hr of pumping at rates of 305 to 590 gpm, the drawdown was 43 ft from a nonpumping water level of 38 ft below land surface. Twenty-five min after pumping was stopped, the water level had recovered to 53 ft.

On December 18, 1958, the well reportedly produced 500 gpm with a drawdown of 26 ft from a nonpumping water level of 79 ft.

The pumping equipment presently installed consists of a 60-hp 1765 rpm Fairbanks-Morse electric motor, a 10-in., 6-stage Fairbanks-Morse turbine pump (No. AM5787) set at 140 ft, rated at 425 gpm, and has 140 ft of 8-in. column pipe. The well is equipped with 140 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008407) of a sample collected June 3, 1974, showed the water to have a hardness of 415 mg/1, total dissolved minerals of 772 mg/1, and an iron content of 0.9 mg/1.

WELL NO. 6 (North Ave. well), finished in Silurian dolomite, was completed in April 1955 to a depth of 297 ft by Henry Boysen, Jr., Libertyville. The well is located just west of the Public Works Bldg. at 600 North Ave., approximately 1110 ft N and 50 ft W of the SE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 658 ft.

A 6-in. diameter hole was drilled to a depth of 297 ft. The well is cased with 6-in. pipe from 1.5 ft above the pumphouse floor to a depth of 198 ft (cemented in from 0 to 70 ft).

Upon completion, a production test was conducted by the driller. The well reportedly produced 376 gpm with a drawdown of 180 ft from a nonpumping water level of 20 ft below land surface. Development of the well was continued on April 13, 1955, by introducing 4000 gal HC1. On April 15, during pumping at a rate of 728 gpm, the drawdown was 150 ft from a nonpumping water level of 20 ft below land surface.

On December 18, 1958, the well reportedly produced 200 gpm for 8 hr with a drawdown of 24 ft from a nonpumping water level of 53 ft.

On December 3, 1973, the well reportedly produced 240 gpm for 1 hr with a drawdown of 30 ft from a nonpumping water level of 67 ft below land surface.

The pumping equipment presently installed consists of a 75-hp Fairbanks-Morse electric motor (Serial No. 10406701), a Fairbanks-Morse turbine pump (No. AT7273) set at 220 ft, rated at 650 gpm, and has 220 ft of 4-in. column pipe. The well is equipped with 220 ft of airline.

A partial analysis of a sample (Lab. No. 194319) collected December 3, 1973, after pumping for 1 hr at 240 gpm, showed the water to have a hardness of 416 mg/1, total dissolved minerals of 699 mg/1, and an iron content of 0.7 mg/1. Hydrogen sulfide was apparent on a previous sample.

WELL NO. 7 (North Ave. well), finished in Silurian dolomite, was completed in May 1955 to a depth of 300 ft by the Henry Boysen Co., Libertyville. This well is not in use. The well is located in the same pumphouse as Well No. 6, approximately 1100 ft N and 58 ft W of the SE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 658 ft.

A drillers log of Well No. 7 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Fill	5	5
Old storm sewer	1	6
Yellow clay	2	8
Gravel with clay	24	32
Gravel, blue clay	23	55
Gray blue clay	60	115
Sandy	10	125
Hardpan and gravel	25	150
Gravel	40	190
Lime	45	235
White shale	5	240
Lime	60	300

A 24-in. diameter hole was drilled to a depth of 56 ft and finished 16 in. in diameter from 56 to 300 ft. The well is cased with 24-in. outer pipe from land surface to a depth of 56.2 ft and 16-in. inner pipe from land surface to a depth of 198.2 ft (cemented in).

After acidizing this well with 3300 gal of HC1, a production test using one observation well was conducted on May 4, 1955. After 6 hr of pumping at a rate of 630 gpm, the drawdown was 152 ft from a nonpumping water level of 33 ft below land surface.

On December 18,1958, with No. 6 pumping, the well reportedly produced 700 gpm with a drawdown of 24 ft from a nonpumping water level of 53 ft.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004707) of a sample collected December 18, 1973, after pumping for 8 hr at 780 gpm, showed the water to have a hardness of 402 mg/1, total dissolved minerals of 704 mg/1, and an iron content of 0.4 mg/1. Hydrogen sulfide was apparent on a previous sample.

WELL NO. 8 (Cook Ave. well), finished in Silurian dolomite, was completed in June 1961 to a depth of 330 ft by the Henry Boysen Co., Libertyville. The well is located 160 ft north of the Cook Ave. Pumping Station, approximately 1700 ft N and 1800 ft W of the SE corner of Section 16, T44N, R11E. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 8 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	167	167
Gravel	33	200
Lime	120	320
Shale	10	330

An 8-in. diameter hole was drilled to a depth of 200 ft and finished 6 in. in diameter from 200 to 330 ft. The well is cased with 8-in. pipe from 1 ft above the pump station floor to a depth of 200 ft.

Upon completion, the well reportedly produced 247 gpm for 8 hr with a drawdown of 40 ft from a nonpumping water level of 95 ft below land surface.

The pumping equipment presently installed is a Fairbanks-Morse submersible turbine pump rated at 240 gpm at about 139 ft TDH, and powered by a 25-hp 3450 rpm electric motor (Serial No. P2D5360).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008404) of a sample collected June 3, 1974, showed the water to have a hardness of 433 mg/1, total dissolved minerals of 792 mg/1, and an iron content of 0.5 mg/1.

Prior to drilling Well No. 9, a test hole finished in sand and gravel, was constructed in August 1964 to a depth of 225 ft by the J. P. Miller Artesian Well Co., Brookfield. The test hole was located approximately 1420 ft N and 2550 ft E of the SW corner of Section 18, T44N, R11E. The land surface elevation at the well is approximately 760 ft.

A drillers log of this test hole follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Loam and clay	40	40
Gravel and clay	50	90
Fine gravel	15	105
Medium coarse gravel	25	130
Fine gravel with some clay	30	160
Gravel and boulders	5	165
Medium gravel	30	195
Gravel	25	220
Bottom clay	at	220

A 6-in. diameter hole was drilled to a depth of 225 ft. The test hole was cased with 6-in. pipe from land surface to a depth of 205 ft followed by 20 ft of 6-in. No. 80 slot Howco screen.

Upon completion, the test hole reportedly produced 90 gpm for 8 hr with a drawdown of 95 ft from a nonpumping water level of 100 ft below the top of the casing.

A partial analysis of a sample (Lab. No. 163726) made in September 1964, after pumping for 8 hr at 90 gpm, showed the water to have a hardness of 466 mg/1, total dissolved minerals of 942 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 9 (Winchester Road well), finished in Silurian dolomite, was completed in October 1964 to a depth of 300 ft by the Henry Boysen Co., Liberty ville. This well is not in use. The well is located on Winchester Road west of U.S. Route 45, approximately 400 ft S and 802 ft W of the NE corner of Section 13, T44N, R10E. The land surface elevation at the well is approximately 770 ft.

A drillers log of Well No. 9 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow clay	12	12
Blue clay	16	28
Clay and gravel	6	34
Gravel	4	38
Blue clay, soft	92	130
Gravel	4	134
Sand, some gravel	19	153
Blue clay	50	203
Gravel	11	214
Lime	86	300

A 6-in. diameter hole was drilled to a depth of 300 ft. The well is cased with 6-in. pipe from land surface to a depth of 223 ft.

This well was acidized with 2107 gal of HC1 on October 19, 1964. On October 22,1964, after 8.8 hr of pumping at a rate of 212 gpm, the drawdown was 67 ft from a nonpumping water level of 96 ft below land surface.

The pumping equipment presently installed is a Worthington turbine pump set at 211 ft, rated at 200 gpm, and powered by a 30-hp General Electric motor. The well is equipped with 211 ft of airline.

A partial analysis of a sample (Lab. No. 187168) collected November 18, 1971, showed the water to have a hardness of 274 mg/1, total dissolved minerals of 670 mg/1, and an iron content of 0.1 mg/1. Hydrogen sulfide was apparent on a previous sample.

A well finished in dolomite, was completed in February 1965 to a depth of 298 ft by the Milaeger Well and Pump Co., Milwaukee, Wis. The well caved in November 1965 and subsequently was filled and abandoned early in 1966. It was located southeast of the International Mineral Corp., approximately 1500 ft N and 2400 ft W of the SE corner of Section 18, T44N, R11E. The land surface elevation at the well is approximately 748 ft.

A 19-in. diameter hole was drilled to a depth of 298 ft. The well was cased with 20-in. pipe from land surface to a depth of 228 ft.

A production test was conducted by the driller on February 26, 1965. After 5.5 hr of pumping at rates of 473 to 765 gpm, the drawdown was 21 ft from a non-pumping water level of 100 ft below land surface.

WELL NO. 10 (IMC well), open to sand and gravel and Silurian dolomite, was completed in October 1966 to a depth of 304 ft by the Egerer-Galloway Well Corp., Milwaukee, Wis. The well is located southeast of the International Mineral Corp. property on the northwest side of the village, approximately 1500 ft N and 2380 ft W of the SE corner of Section 18, T44N, R11E. The land surface elevation at the well is approximately 748 ft.

A drillers log of Well No. 10 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	**227**	**227**
Limestone	**77**	**304**

A 16-in. diameter hole was drilled to a depth of 185 ft, reduced to 15 in. between 185 and 232 ft, and finished 13 in. in diameter from 232 to 304 ft. The well is cased with 16-in. steel pipe from land surface to a depth of 185 ft, 12-in. pipe from 172 ft to a depth of 219 ft, and 12-in. pipe from 229 ft to a depth of 232 ft. A 15-in. diameter No. 100 slot Johnson stainless steel screen was placed from 219 ft to a depth of 229 ft.

A production test was conducted by the driller on October 15-16, 1966. After 24 hr of pumping at rates ranging from 710 to 683 gpm, the final drawdown was 16 ft from a non-pumping water level of 106 ft below land surface.

On May 10, 1967, the well reportedly produced 535 gpm for several hr with a drawdown of 13 ft from a nonpumping water level of 111 ft below land surface.

The pumping equipment presently installed consists of a 75-hp 1760 rpm Westinghouse (Type VHS) electric motor (Serial No. 2-37V8104), an 8-in., 8-stage Peerless turbine pump (Serial No. 313440) set at 200 ft, rated at 500 gpm at about 400 ft TDH, and has 200 ft of 8-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 200 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No.B38538) is for a water sample from the well collected March 30, 1976, after 30 min of pumping at 290 gpm. Hydrogen sulfide was apparent on a previous sample.

WELL NO. 10, LABORATORY NO. B38538

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	16	
Manganese	Mn	0.00		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.37	0.02	Boron	B	0.6	
Sodium	Na	83	3.61	Nitrate	NO_3	0.6	0.01
Potassium	K	1.0	0.03	Chloride	Cl	6.6	0.19
Calcium	Ca	77	3.84	Sulfate	SO_4	400	8.32
Magnesium	Mg	42	3.46	Alkalinity (as $CaCO_3$)		129	2.58
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		365	7.30
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		794	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.5	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.5	
Silver	Ag	0.00		± deviation		1.6	
Cyanide	CN	0.00		Beta *pc/l*		3.2	
Zinc	Zn	0.0		± deviation		2.1	

WELL NO. 11 (Garfield Ave. well), open to the Cambrian-Ordovician aquifer, was completed in January 1969 to a depth of 1490 ft by the Egerer-Galloway Well Corp., Milwaukee, Wis. The well is located in the Garfield Ave. pumphouse 25 ft east of Well No. 2, approximately 1700 ft S and 1025 ft E of the NW corner of Section 21, T44N, R11E. The land surface elevation at the well is approximately 703 ft.

A summary sample study log of Well No. 11 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Soil	**5**	**5**
Till	**55**	**60**
Gravel	**10**	**70**
Till	**5**	**75**
Gravel, sandy	**10**	**85**
Till	**60**	**145**
SILURIAN SYSTEM		
Niagaran Series		
Dolomite	**130**	**275**
Alexandrian Series		
Dolomite	**80**	**355**
ORDOVICIAN SYSTEM		
Cincinnatian Series		
Maquoketa Group		
Shale and dolomite	**170**	**525**
Champlainian Series		
Galena and Platteville Groups		
Dolomite	**288**	**813**
Ancell Group		
Glenwood Formation		
Sandstone, dolomite	**62**	**875**
St. Peter Sandstone	**75**	**950**
Kress Member (chert, sandstone, shale)	**37**	**987**
CAMBRIAN SYSTEM		
Croixan Series		
Potosi Dolomite	**103**	**1090**
Franconia Formation		
Dolomite, sandstone	**55**	**1145**
Ironton Sandstone	**85**	**1230**
Galesville Sandstone	**45**	**1275**
Eau Claire Formation		
Shale, sandstone	**210**	**1485**

A 24-in. diameter hole was drilled to a depth of 170 ft, reduced to 22 in. between 170 and 575 ft, and finished 17 in. in diameter from 575 to 1490 ft. The well is cased with 24-in. pipe from land surface to a depth of 170 ft and 18-in.

pipe from land surface to a depth of 575 ft (cemented in).

A production test was conducted by the driller on January 9-11, 1969. After 48.5 hr of pumping at rates of 1049 to 1167 gpm, the final drawdown was 233.5 ft from a nonpumping water level of 343.0 ft below land surface. The water level recovered to 395.0 ft after pumping was stopped for 1.3 hr.

In January 1971, the nonpumping water level was reported to be 480 ft.

The pumping equipment presently installed is a 300-hp Fairbanks-Morse (Type K2KVY) vertical Holloshaft squirrel cage induction motor (Serial No. B9490), a 14-in., 9-stage Fairbanks-Morse turbine pump set at 650 ft, rated at 1050 gpm, and has 650 ft of 10-in. column pipe. The well is equipped with 650 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B38540) is for a water sample from the well collected March 30, 1976, after 4 hr of pumping at 940 gpm.

WELL NO. 11, LABORATORY NO. B38540

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	9	
Manganese	Mn	0.00		Fluoride	F	1.1	0.06
Ammonium	NH_4	0.46	0.03	Boron	B	0.3	
Sodium	Na	26	1.13	Nitrate	NO_3	0.0	
Potassium	K	10	0.26	Chloride	Cl	8.7	0.24
Calcium	Ca	74	3.69	Sulfate	SO_4	76	1.58
Magnesium	Mg	23	1.89	Alkalinity (as $CaCO_3$)		248	4.96
Arsenic	As	0.00		Hardness (as $CaCO_3$)		279	5.58
Barium	Ba	0.1					
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		404	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.6	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		43.6	
Silver	Ag	0.00		±deviation		5.7	
Cyanide	CN	0.00		Beta *pc/l*		38.7	
Zinc	Zn	0.0		±deviation		3.3	

WELL NO. 12, open to the Cambrian-Ordovician and Elmhurst-Mt. Simon aquifers, was completed in May 1973 to a depth of 1926 ft by the Hoover Water Well Service, Zion. The well is located west of South Milwaukee Ave., approximately 2500 ft S and 2600 ft W of the NE corner of Section 28, T44N, R11E. The land surface elevation at the well is approximately 700 ft.

A drillers log of Well No. 12 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	**161**	**161**
Silurian limestone	**186**	**347**
Maquoketa shale	168	**515**
Galena-Platteville dolomite	**307**	**822**
Glenwood-St. Peter sandstone	**143**	**965**
Prairie du Chien	**145**	**1110**
Ironton-Galesville sandstone	**180**	**1290**
Eau Claire	**291**	**1581**
Mt. Simon	**345**	**1926**

A 24-in. diameter hole was drilled to a depth of 550 ft, reduced to 20 in. between 550 and 1035 ft, and finished 16 in. in diameter from 1035 to 1926 ft. The well is cased with 24-in. pipe from 1.5 ft above the pumphouse floor to a depth of 161 ft, 20-in. pipe from 1.5 ft above the pumphouse floor to a depth of 550 ft (cemented in), and a 16-in. liner from 868 ft to a depth of 1035 ft.

After the well was detonated with 256 lb of 100 percent nitro-gel at 1475 ft and cleaned out, a production test was conducted by the driller on August 6-7, 1973. After 31.7 hr of pumping at rates of 500 to 1500 gpm, the final drawdown was 203 ft from a nonpumping water level of 407 ft below land surface.

The pumping equipment presently installed consists of a 400-hp General Electric motor, a 12-in., 15-stage Layne & Bowler turbine pump set at 760 ft, rated at 1500 gpm, and has 760 ft of 10-in. column pipe. The well is equipped with 760 ft of airline.

A partial analysis of a sample (Lab. No. 192942) collected during the initial production test, after pumping for 30 hr at 1500 gpm, showed the water to have a hardness of 326 mg/1, total dissolved minerals of 471 mg/1, and an iron content of 0.4 mg/1.

LINCOLNSHIRE

The village of Lincolnshire (2531) installed a public water supply in 1956. Two wells (Nos. 1 and 3) are in use and another well (No. 2) is available for emergency use. In 1961 there were 212 services, all metered; the average daily pumpage was 50,000 gpd. In 1973 there were 880 services, all metered; the average and maximum daily pumpages were 364,000 and 546,000 gpd, respectively. The water from all wells is chlorinated and the water from Well No. 3 is treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Cambrian-Ordovician aquifer, was completed in October 1956 to a depth of 1305 ft by the Henry Boysen Co., Libertyville. The well is located about 0.5 mile south of Lake Zurich Road on Lincolnshire Drive in the pumphouse adjacent to the elevated tank, approximately 1850 ft S and 2400 ft E of the NW corner of Section 23, T43N, R11E. The land surface elevation at the well is approximately 646 ft.

A 12-in. diameter hole was drilled to a depth of 555 ft, reduced to 10 in. between 555 and 1100 ft, and finished 8 in. in diameter from 1100 to 1305 ft. The well is cased with 12-in. steel outer pipe from 1.2 ft above the pumphouse floor to a depth of 138 ft, 10-in. inner pipe from 1.2 ft

above the pumphouse floor to a depth of 555 ft (cemented in), and an 8-in. liner from 1026 ft to a depth of 1100 ft.

Upon completion, the well reportedly produced 195 gpm for 8 hr with a drawdown of 100 ft from a nonpumping water level of 230 ft below land surface.

On August 15, 1958, the nonpumping water level was reported to be 238 ft (airline reading).

In October 1965, the well was renovated by the Milaeger Well and Pump Co., Milwaukee, Wis. They pulled the old pump, shot the well with eight 50-lb charges, bailed out the sand, and installed a new pump which was in service until June 1971. Upon completion of this repair work, the well reportedly produced approximately 400 gpm with a drawdown of 195 ft from a nonpumping water level of 285 ft.

On March 22, 1972, after pumping at a rate of 400 gpm, the drawdown was 80 ft from a nonpumping water level of 495 ft.

The pumping equipment presently installed is an 8-in., 22-stage Byron Jackson submersible pump set at 745 ft, rated at 400 gpm at about 860 ft TDH, and powered by a 100-hp Byron Jackson electric motor.

A correlated drillers log of Well No. 1 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Drift	138	138
SILURIAN SYSTEM		
Limestone	180	318
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale and limestone	158	476
Galena-Platteville Group		
Limestone	324	800
Glenwood-St. Peter Formation		
Sandstone	151	951
CAMBRIAN SYSTEM		
Franconia Formation		
Limestone	150	1101
Ironton-Galesville Formation		
Sandstone	204	1305

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03123) of a sample collected December 7, 1971, after pumping for 2 hr at 400 gpm, showed the water to have a hardness of 308 mg/1, total dissolved minerals of 452 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in July 1962 to a depth of 35.3 ft (effective depth 32.3 ft) by the J. P. Miller Artesian Well Co., Brookfield. This well is available for emergency use. The well is located west of Lincolnshire Drive and south of Wiltshire Drive (extended), about 125 ft from the Des Plaines River, approximately 800 ft S and 1200 ft E of the NW corner of Section 23, T43N, R11E. The land surface elevation at the well is approximately 642 ft.

A 52-in. diameter hole was drilled to a depth of 35.3 ft. The well is equipped with a King pitless adapter from 1.5 ft above land surface to a depth of 6 ft and cased with 12-in. pipe from 6 to 13 ft and then swedged to a 16-in. OD steel pipe to a depth of 24.3 ft followed by 8 ft of 16-in. No. 125 slot A. D. Cook wire-wrapped screen and 3 ft of blank pipe. The annulus between the bore hole and casing-screen assembly is filled with concrete from about 6 to 10 ft and with gravel from about 10 to 35.3 ft.

In 1962, the well reportedly produced 1020 gpm for 36 hr with a drawdown of 10 ft from a nonpumping water level of 8 ft.

The pumping equipment presently installed is a 5-stage Peerless water-lubricated submersible pump rated at 500 gpm at about 172 ft TDH, and powered by a 30-hp 1750 rpm Peerless electric motor.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	**11**	**11**
Gravel and boulders	**20**	**31**
Clay	**4**	**35**

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B0016515) is for a water sample from the well collected April 26, 1972, after 30 min of pumping at 500 gpm.

WELL NO. 2, LABORATORY NO. B0016515

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	10.0	
Manganese	Mn	0.05	0.00	Fluoride	F	0.2	0.01
Ammonium	NH_4	0.58	0.03	Boron	B	0.35	
Sodium	Na	52	2.26	Nitrate	NO_3	0.0	
Potassium	K	3.0	0.08	Chloride	Cl	98	2.76
Calcium	Ca	110	5.49	Sulfate	SO_4	190	3.95
Magnesium	Mg	57	4.68	Alkalinity (as $CaCO_3$)		268	5.36
				Hardness (as $CaCO_3$)		510	
Barium	Ba	0.0		Total dissolved			
Copper	Cu	0.0		minerals		690	
Cadmium	Cd	0.00		pH (as rec'd)		7.4	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0.0	
Mercury	Hg	<0.0005		±deviation		2.6	
Nickel	Ni	0.0		Beta *pc/l*		0.8	
Silver	Ag	0.0		±deviation		2.5	
Zinc	Zn	0.0					

WELL NO. 3, open to the Cambrian-Orodvician aquifer, was completed in September 1971 to a depth of 1300 ft by the Hoover Water Well Service, Zion. The well is located on Schelter Road about 0.5 mile south of Lake Zurich Road, approximately 2650 ft S and 1500 ft E of the NW corner of Section 22, T43N, R11E. The land surface elevation at the well is approximately 667 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	**109**	**109**
Silurian limestone	**117**	**286**
Maquoketa shale	**155**	**441**
Galena-Platteville dolomite	**321**	**762**
Glenwood	**59**	**821**
St. Peter sandstone	**121**	**942**
Franconia	**168**	**1110**
Ironton-Galesville sandstone	**155**	**1265**
Eau Claire	**35**	**1300**

A 20-in. diameter hole was drilled to a depth of 451 ft, reduced to 16 in. between 451 and 987 ft, reduced to 12 in. between 987 and 1109 ft, and finished 10 in. in diameter from 1109 to 1300 ft. The well is cased with 20-in. outer pipe from 1 ft above the pumphouse floor to a depth of 109 ft, 16-in. inner pipe from 1 ft above the pumphouse floor to a depth of 451 ft (cemented in), a 12-in. liner from 905 ft to a depth of 987 ft, and a 10-in. liner from 974 ft to a depth of 1109 ft. The well was shot three times with 250 lb charges and cleaned after each shot.

A production test was conducted by the driller on September 10-11, 1971. After 23 hr of pumping at a rate of 1000 gpm, the drawdown was 237 ft from a nonpumping water level of 500 ft below land surface.

The pumping equipment presently installed is a Johnston vertical pump set at 750 ft, rated at 1100 gpm, and powered by a 379-hp V-8 Caterpillar natural gas engine.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004708) is for a water sample from the well collected December 18, 1973, after 5 hr of pumping at 350 gpm. The iron content in this sample is appreciably higher than in Well No. 1.

WELL NO. 3, LABORATORY NO. C004708

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.0		Silica	SiO_2	8	
Manganese	Mn	0.00		Fluoride	F	1.2	0.06
Ammonium	NH_4	0.35	0.02	Boron	B	0.4	
Sodium	Na	36	1.57	Nitrate	NO_3	0.1	0.00
Potassium	K	12.7	0.32	Chloride	Cl	15	0.42
Calcium	Ca	85	4.24	Sulfate	SO_4	121	2.52
Magnesium	Mg	19	1.56	Alkalinity (as $CaCO_3$)		252	5.04
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		292	5.84
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		438	
Lead	Pb	0.00					
Mercury	Hg	0.0004		pH (as rec'd)		7.9	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		10.2	
Silver	Ag	0.00		±deviation		3.4	
Cyanide	CN	0.00		Beta *pc/l*		22.1	
Zinc	Zn	0.00		±deviation		3.1	

LINDENHURST

The village of Lindenhurst (3141) installed a public water supply in 1956. The water system is owned and operated by the Lindenhurst Water Co. Two wells are in use. In 1958 there were 126 services, all metered. In 1974 there were 965 services, all metered; the average and maximum daily pumpages were 219,941 and 330,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in sand and gravel, was completed in May 1955 to a depth of 165 ft by the Hoover Water Well Service, Zion. The well is located on Hawthorne Drive between Fairfield Road and Grand Ave., approximately 385 ft S and 1450 ft E of the NW corner of Section 2, T45N, R10E. The land surface elevation at the well is approximately 788 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow clay	12	12
Blue clay	**120**	132
Silt and sand	6	**138**
Blue clay	**11**	**149**
Sand	16	**165**

An 8-in. diameter hole was drilled to a depth of 165 ft. The well is cased with 8-in. black steel pipe from 1.2 ft above the pumphouse floor to a depth of 149 ft followed by 16 ft of 8-in. No. 15 slot Johnson brass screen.

Upon completion, the well reportedly produced 300 gpm for 4 hr with a drawdown of 36 ft from a nonpumping water level of 52ft.

The pumping equipment presently installed is a 9-stage Johnston turbine pump set at 120 ft, rated at 325 gpm at about 250 ft TDH, and powered by a 30-hp 1750 rpm U.S. electric motor (Serial No. 2510209).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02293) of a sample collected October 20, 1971, after pumping for 24 hr at 330 gpm, showed the water to have a hardness of 256 mg/1, total dissolved minerals of 360 mg/1, and an iron content of 0.25 mg/1.

WELL NO. 2, finished in sand and gravel, was completed in November 1946 to a depth of 151 ft by the Henry Boysen Co., Libertyville. The well is located beyond the end of Beck Road, approximately 3150 ft N and 300 ft E of the SW corner of Section 36, T46N, R10E. The land surface elevation at the well is approximately 770 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sand	**15**	**15**
Clay blue	**32**	47
Gravel	3	**50**
Clay	92	**142**
Sand and gravel	9	**151**

An 8-in. diameter hole was drilled to a depth of 151 ft. The well is cased with 8-in. pipe from land surface to a depth of 141 ft followed by 10 ft of 8-in. No. 20 slot Cook brass screen.

In March 1967, the well reportedly produced 500 gpm for 6 hr with a drawdown of 21.5 ft from a nonpumping water level of 51.5 ft below land surface.

The pumping equipment presently installed is a Johnston vertical turbine pump (Serial No. J24599) set at 138 ft, rated at 350 gpm at about 63 ft TDH, and powered by a 25-hp 1765 rpm U.S. Holloshaft electric motor (Serial No. 9008823).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02292) is for a water sample from the well collected October 20, 1971, after 24 hr of pumping at 350 gpm.

WELL NO. 2, LABORATORY NO. 02292

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.05	0.00	Silica	SiO_2	20	
Manganese	Mn	0.0		Fluoride	F	1.1	0.06
Ammonium	NH_4	0.5	0.03	Boron	B	0.6	
Sodium	Na	47	2.04	Nitrate	NO_3	0.0	
Potassium	K	0.9	0.02	Chloride	Cl	3	0.08
Calcium	Ca	33.6	1.68	Sulfate	SO_4	73	1.51
Magnesium	Mg	30	2.47	Alkalinity (as $CaCO_3$)		212	4.24
				Hardness (as $CaCO_3$)		200	
Barium	Ba	0.0		Total dissolved minerals		330	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.5	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		1	
Nickel	Ni	0.0		Beta *pc/l*		0	
Silver	Ag	0.0		±deviation		0	
Zinc	Zn	0.0					

MUNDELEIN

The village of Mundelein (16,128) installed a public water supply in 1915. Five wells (Nos. 5, 6A, 7, 8, and 9) are in use and two wells (Nos. 3 and 4) are available for emergency use. In 1949 there were 850 services; the average and maximum daily pumpages were 150,000 and 200,000 gpd, respectively. In 1974 there were 4265 services, all metered; the average and maximum daily pumpages were 1,898,417 and 2,850,000 gpd, respectively. This supply also furnishes water to the West Shore Park Subdivision. Water from all wells is chlorinated, and for Well Nos. 5, 6A, 7, and 8, it is treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in 1915 to a depth of 242 ft by Henry R. Luebbe, Mundelein. This well was abandoned and sealed in 1970 because of high sulfur content. The well was located in the rear of the city garage at 428 North Chicago Ave., approximately 190 ft N and 600 ft E of the SW corner of Section 19, T44N, R11E. The land surface elevation at the well is approximately 765 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	220	220
Rock	22	242

A 6-in. diameter hole was drilled to a depth of 242 ft. The well was cased with 6-in. pipe from land surface to a depth of 235 ft.

Upon completion, the well reportedly produced 75 gpm for 48 hr without materially lowering the water level.

In September 1926, the nonpumping water level was reported to be 40 ft below the pump base.

A mineral analysis of a sample (Lab. No. 107478) collected August 23, 1946, after pumping for 3 hr at 70 gpm, showed the water to have a hardness of 212 mg/1, total dissolved minerals of 444 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in January 1930 to a depth of 285 ft by Henry R. Luebbe, Mundelein. This well was abandoned and sealed in 1970 because of high sulfur content. The well was located at 428 North Chicago Ave. about 45 ft east of Well No. 1, approximately 190 ft N and 645 ft E of the SW corner of Section 19, T44N, R11E. The land surface elevation at the well is approximately 765 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Gravel	120	120
Clay, blue (till)	113	233
Gravel	6	239
Limestone	46	285

A 12-in. diameter hole was drilled to a depth of 285 ft. The well was cased with 12-in. ID wrought iron pipe from land surface to a depth of 239 ft.

Upon completion, the well reportedly produced 125 gpm with a drawdown of 57 ft from a nonpumping water level of 64 ft below the pump base.

This well was treated with 1500 gal HCl in 1956 by Fred Kiene & Sons, Mundelein. Following this treatment the production rate was reportedly increased from 60 to 210 gpm.

On November 19, 1958, the nonpumping water level was reported to be 49 ft.

A mineral analysis of a sample (Lab. No. 107479) collected August 23, 1946, after pumping for 3 hr at 125 gpm, showed the water to have a hardness of 183 mg/1, total dissolved minerals of 425 mg/1, and an iron content of 0.1 mg/1.

OLD WELL NO. 3, finished in Silurian dolomite, was completed in July 1946 to a depth of 213 ft by Fred Kiene & Sons, Mundelein. This well was abandoned and capped

prior to 1956. The well is located back of the village hall, approximately 300 ft N and 1550 ft E of the SW corner of Section 19, T44N, R11E. The land surface elevation at the well is approximately 765 ft.

Upon completion, the well reportedly produced 125 gpm for 6 hr with a drawdown of 60 ft from a nonpumping water level of 90 ft below the top of the casing.

OLD WELL NO. 4, finished in sand and gravel, was completed as a test well in June 1949 to a depth of 200 ft by Fred Kiene & Son, Mundelein. This well was abandoned and capped prior to 1956. The well is located in Lakewood Park in the southern part of the village, approximately 1835 ft N and 1465 ft E of the SW corner of Section 30, T44N, R11E. The land surface elevation at the well is approximately 743 ft.

A 6-in. diameter hole was drilled to a depth of 200 ft. The well is cased with 6-in. pipe from 1.5 ft above the pumphouse floor to a depth of 192 ft followed by 8 ft of 6-in. No. 30 slot Johnson screen.

A production test was conducted on June 8, 1949, by representatives of the driller, the State Water Survey, and Baxter, Nelson, and Woodman, Consulting Engineers. After 2.2 hr of pumping at rates ranging from 143 to 112 gpm, the drawdown was 82.5 ft from a nonpumping water level of 46.5 ft below the pump base.

A partial analysis of a sample (Lab. No. 118449) collected during the initial production test, after pumping for 4 hr at 103 gpm, showed the water to have a hardness of 324 mg/1, total dissolved minerals of 558 mg/1, and an iron content of 0.7 mg/1.

OLD WELL NO. 5, finished in sand and gravel, was completed in May 1950 to a depth of 194 ft by R. E. Milaeger, Milwaukee, Wis. This well was abandoned and capped prior to 1956. The well is located 10 ft north of Old Well No. 4, approximately 1845 ft N and 1465 ft E of the SW corner of Section 30, T44N, R11E. The land surface elevation at the well is approximately 743 ft.

A sample study summary log of Old Well No. 5 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Upper Wisconsin Drift		
Soil, dark brown and till, yellow, decomposed, noncalcareous	**5**	**5**
Till, yellow, clayey, some sand, calcareous	**5**	**10**
Clay, gray, homogeneous, probably water laid, calcareous	**5**	**15**
Interstadial Wisconsin?		
Soil, dark brown, noncalcareous and till, yellow, calcareous	**5**	**20**
Gravel, fine, crystalline, mostly clean	**5**	**25**
Clay, gray, homogeneous, probably water laid, calcareous	**. 35**	**60**
Clay and silt, gray, homogeneous, probably water laid, calcareous	**5**	**65**
Lower Wisconsin Drift		
Till, gray, sandy, calcareous	**10**	**75**
Sangamon Interglacial Sediment?		
Sand, yellow, fine-coarse, clean, well sorted above	**10**	**85**
Strata (continued)	*Thickness (ft)*	*Depth (ft)*
Clay, gray, homogeneous, some silt, calcareous	**85**	**170**
Sand, medium-coarse, and gravel fine, largely fractured dolomite, clean	**20**	**190**

A 16-in. diameter hole was drilled to a depth of 174 ft and finished 8 in. in diameter from 174 to 194 ft. The well is cased with 16-in. OD pipe from 1.5 ft above the pumphouse floor to a depth of 174 ft and 8-in. OD pipe from land surface to, a depth of 174 ft followed by 20 ft of 8-in. No. 100 slot Johnson screen. The annulus between the 16 and 8-in. casings is filled with 1/2-in. graded gravel from a local pit.

Upon completion, no satisfactory production test could be made due to failure of the water to clear. Reportedly, the well was pumped at rates from 50 to 100 gpm.

On October 31, 1951, Dowell Inc. introduced 2000 gal HO into the well at the rate of 100 gpm. On November 1, 1951, the well reportedly produced at rates from 88 to 158 gpm for 3.4 hr with a final drawdown of 105 ft from a nonpumping water level of 50 ft below land surface.

In 1956, after Old Well Nos. 3, 4, and 5 were abandoned, the village of Mundelein purchased the wells and distribution system of the Loch Lomond Subdivision, which are now called Well Nos. 3, 4, and 5.

WELL NO. 3, finished in Silurian dolomite, was completed in April 1954 to a depth of 276 ft by Henry Boysen, Libertyville. This well is available for emergency use. The well is located on block 1, plot 3 on Beach Place in the southeast area of Loch Lomond Subdivision, approximately 2400 ft N and 1492 ft W of the SE corner of Section 24, T44N, R10E. The land surface elevation at the well is approximately 750 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	**110**	**110**
Hardpan	**122**	**232**
Sand	**2**	**234**
Limestone	**42**	**276**

A 12-in. diameter hole was drilled to a depth of 276 ft. The well is cased with 12-in. pipe from 1.5 ft above the pumphouse floor to a depth of 234 ft.

When the well was being developed, 2200 gal HC1 was introduced into the well, reportedly increasing the production from 50 to 350 gpm.

On December 3, 1959, when pumping at 300 gpm the pumping water level was 182 ft below the pump base.

In 1963, the nonpumping water level was reported to be 85 ft.

The pumping equipment presently installed consists of a 40-hp 1800 rpm U.S. electric motor (No. 2352603), a 10-in., 11-stage Byron Jackson turbine pump (No. C299322) set at 220 ft, rated at 400 gpm at about 266 ft TDH, and has 220 ft of 6-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is

equipped with 240 ft of airline.

A partial analysis of a sample (Lab. No. 148281) collected November 18, 1958, after pumping for 1 hr at 320 gpm, showed the water to have a hardness of 264 mg/1, total dissolved minerals of 380 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 4, finished in Silurian dolomite, was completed in February 1954 to a depth of 270 ft by Henry Boysen, Jr., Libertyville. This well is available for emergency use. The well is located about 10 ft west of Well No. 3 on Beach Place, approximately 2400 ft N and 1500 ft W of the SE corner of Section 24, T44N, R10E. The land surface elevation at the well is approximately 750 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	**110**	**110**
Hardpan	**122**	**232**
Sand	2	**234**
Limestone	36	**270**

A 6-in. diameter hole was drilled to a depth of 270 ft. The well is cased with 6-in. black steel pipe from 1 ft above the pumphouse floor to a depth of 231 ft.

Upon completion, the well reportedly produced 183 gpm with a drawdown of 13.5 ft from a nonpumping water level of 64.0 ft below land surface.

The pumping equipment presently installed consists of a 15-hp 1800 rpm U.S. electric motor (No. 2017096), a 6-in., 22-stage Aurora turbine pump (No. 52685) set at 170 ft, rated at 100 gpm at about 280 ft TDH, and has 170 ft of 4-in. column pipe. A 10-ft section of 4-in. suction pipe is attached to the pump intake. The well is equipped with 170 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B0027) is for a water sample from the well collected June 27, 1972, after 3 hr of pumping at 112 gpm.

WELL NO. 4, LABORATORY NO. B0027

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.10	0.00	Silica	SiO_2	23.4	
Manganese	Mn	0.01		Fluoride	F	0.8	0.04
Ammonium	NH_4	0.0		Boron	B	0.33	
Sodium	Na	42.2	1.84	Nitrate	NO_3	1.3	0.02
Potassium	K	1.7	0.04	Chloride	Cl	2	0.06
Calcium	Ca	45.8	2.28	Sulfate	SO_4	128	2.66
Magnesium	Mg	36.8	3.02	Alkalinity (as $CaCO_3$)		192	3.84
Arsenic	As	0.00		Hardness (as $CaCO_3$)		272	
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		409	
Cadmium	Cd	0.00					
Chromium	Cr	0.0					
Lead	Pb	0.00		pH (as rec'd)	7.9		
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*	1.9		
Selenium	Se	0.00		±deviation	1.8		
Silver	Ag	0.00		Beta *pc/l*	2.7		
Zinc	Zn	0.0		±deviation	1.3		

WELL NO. 5, finished in sand and gravel, was completed in May 1954 to a depth of 140 ft by Henry Boysen, Libertyville. The well is located on Killarney Pass Circle about 0.2 mile north of Well Nos. 3 and 4, approximately 1225 ft S and 1550 ft W of the NE corner of Section 24, T44N, R10E. The land surface elevation at the well is approximately 750 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	**110**	**110**
Sand and gravel	30	**140**

A 12-in. diameter hole was drilled to a depth of 140 ft. The well is cased with 12-in. pipe from 1.2 ft above the pumphouse floor to a depth of 116 ft followed by 24 ft of 12-in. Cook screen. The screened section consists of 12 ft of No. 14 slot followed by 12 ft of No. 40 slot. This well is gravel packed from 110 to 140 ft.

Upon completion, the well reportedly produced 700 gpm with a drawdown of 17 ft from a nonpumping water level of 69 ft.

On December 3, 1959, the nonpumping water level was reported to be 90 ft.

This well was acidized in 1970 by the Egerer-Galloway Well Corp., Milwaukee, Wis., with 1000 gal HC1 inhibited acid with stabilizers. The pumping rate was reportedly increased from about 110 to over 400 gpm.

The pumping equipment presently installed consists of a 50-hp 1760 rpm General Electric motor, a 6-in., 5-stage Fairbanks-Morse turbine pump (Model No. AV950) set at 110 ft, rated at 700 gpm at about 250 ft head, and has 110 ft of 8-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 120 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C009100) of a sample collected June 25, 1974, after pumping for 1 hr at 300 gpm, showed the water to have a hardness of 315 mg/1, total dissolved minerals of 606 mg/1, and an iron content of 0.0 mg/1.

WELL NO. 6, finished in sand and gravel, was completed in May 1955 to a depth of 104 ft by the J. P. Miller Artesian Well Co., Brookfield. This well was abandoned and sealed in 1966 with concrete from land surface to 62 ft and with sand from 62 to 104 ft. The well was located at Hawley and Brice Sts., approximately 1300 ft N and 1800 ft W of the SE corner of Section 19, T44N, R11E. The land surface elevation at the well is approximately 743 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow clay	**14**	14
Blue clay	60	74
Sand and gravel	**11**	85
Gravel	**21**	106

A 30-in. diameter hole was drilled to a depth of 106 ft. The well was cased with 12-in. pipe (grouted in) from 1 ft above the pumphouse floor to a depth of 84 ft followed by 20 ft of 12-in. No. 90 slot Cater stainless steel screen.

Upon completion, the driller reported that after 24 hr of pumping at a rate of 500 gpm, the drawdown was 22 ft from a nonpumping water level of 55 ft below the pump base.

In 1963, the nonpumping water level was reported to be 86 ft.

A partial analysis of a sample (Lab. No. 148236) collected November 18, 1958, after pumping for 30 min at 370 gpm, showed the water to have a hardness of 420 mg/1, total dissolved minerals of 626 mg/1, and an iron content of 0.6 mg/1.

WELL NO. 6A (replacement of Well No. 6), open to the Cambrian-Ordovician aquifer and Eau Claire Formation, was completed in April 1967 to a depth of 1405 ft by the Egerer-Galloway Well Corp., Milwaukee, Wis. The well is located on Hawley and Brice Sts. about 10 ft northeast of Well No. 6, approximately 1310 ft N and 1790 ft W of the SE corner of Section 19, T44N, R11E. The land surface elevation at the well is approximately 743 ft.

A drillers log of Well No. 6A follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	192	192
Limestone	213	405
Shale	135	540
Dolomite	300	840
Sandstone	226	1066
Limestone	73	1139
Sandstone	266	1405

A 20-in. diameter hole was drilled to a depth of 250 ft, reduced to 19 in. between 250 and 590 ft, reduced to 15 in. between 590 and 1060 ft, and finished 12 in. in diameter from 1060 to 1405 ft. The well is cased with 20-in. ID welded steel pipe from inside the concrete pedestal to a depth of 250 ft, 16-in. ID welded steel pipe from 2 ft above land surface to a depth of 590 ft (cemented in), and a 12-in. liner from 990 ft to a depth of 1060 ft. The well was shot with 300 lb of nitro-gel in four shots: 50 lb at 1300 ft, 50 lb at 1230 ft, 100 lb at 1310 ft, and 100 lb at 1240 ft.

Upon completion, after 24 hr of pumping at 637 gpm, the drawdown was 166 ft from a nonpumping water level of 392 ft.

On August 1, 1967, the well reportedly produced 817 gpm for 24 hr with a drawdown of 173 ft from a nonpumping water level of 390 ft.

The pumping equipment presently installed is a KSB submersible pump set at 750 ft, rated at 700 gpm at about 920 ft head, and powered by a 200-hp electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02850) of a sample collected November 18, 1971, after pumping for 9 hr at 609 gpm, showed the water to have a hardness of 280 mg/1, total dissolved minerals of 404 mg/1, and an iron content of 0.05 mg/1.

WELL NO. 7, finished in sand and gravel, was completed in April 1959 to a depth of 165 ft (originally drilled to 190 ft) by the J. P. Miller Artesian Well Co., Brookfield. The well is located near the Soo Line RR tracks on Banbury Road, 1 block south of Dunbar Ave., approximately 1000 ft S and 300 ft W of the NE corner of Section 24, T44N, R10E. The land surface elevation at the well is approximately 777 ft.

A drillers log of Well No. 7 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Yellow clay	15	15
Blue clay	122	137
Gravel	7	144
Blue clay	6	150
Gravel	15	165
Blue clay	25	190

A 52-in. diameter hole was drilled to a depth of 165 ft. The well is cased with 20-in. steel pipe from 1.3 ft above the pumphouse floor to a depth of 145 ft followed by 20 ft of 20-in. No. 70 slot Cater stainless steel screen.

Upon completion, the well reportedly produced 1000 gpm for 12 hr with a drawdown of 41 ft from a nonpumping water level of 104 ft below the top of the casing.

In September 1960, after 1.5 hr of pumping at a rate of 700 gpm, the drawdown was 20 ft from a nonpumping water level of 114 ft below the pump base.

In 1963, the nonpumping water level was reported to be 122 ft.

This well was acidized in January 1966 by the Egerer-Galloway Well Corp., Milwaukee, Wis. The yield was reportedly increased from 156 to 486 gpm. In 1968 the well was reportedly producing about 150 gpm and was acidized again by this firm using 2000 gal of inhibited HC1 acid with stabilizers. The pumping rate was reportedly restored to about 480 gpm.

The pumping equipment presently installed consists of a 125-hp 1775 rpm Westinghouse electric motor, a 12-in., 9-stage Layne and Bowler vertical centrifugal turbine pump (Type 12RKLC, No. 41121) set at 150 ft, rated at 700 gpm at about 470 ft TDH, and has 150 ft of 8-in. column pipe. The well is equipped with 150 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B0010) is for a water sample from the well collected June 27, 1972, after 3 hr of pumping at 460 gpm.

WELL NO. 7, LABORATORY NO. B0010

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.27	0.01	Silica	SiO_2	17.6	
Manganese	Mn	0.01		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.06	0.00	Boron	B	0.78	
Sodium	Na	72.4	3.15	Nitrate	NO_3	1.8	0.03
Potassium	K	1.3	0.03	Chloride	Cl	5	0.14
Calcium	Ca	66	3.29	Sulfate	SO_4	285	5.93
Magnesium	Mg	37.5	3.08	Alkalinity (as $CaCO_3$)		150	3.00
Arsenic	As	0.00		Hardness (as $CaCO_3$)		320	
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		600	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)	7.9		
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*	0.0		
Selenium	Se	0.00		± deviation	1.4		
Silver	Ag	0.00		Beta *pc/l*	1.3		
Zinc	Zn	0.0		± deviation	1.6		

WELL NO. 8, open to the Cambrian-Ordovician aquifer, was completed in July 1964 to a depth of 1383 ft by the Egerer-Galloway Well Corp., Milwaukee, Wis. The well is located on Allanson Road, 1000 ft west of the Soo Line RR tracks, approximately 100 ft S and 2200 ft W of the NE corner of Section 31, T44N, R11E. The land surface elevation at the well is approximately 730 ft.

A drillers log of Well No. 8 follows:

Strata	Thickness (ft)	Depth (ft)
Black soil	3	3
Peat soil	9	12
Hardpan	150	162
Broken lime and gravel	10	172
Limestone	155	327
Shale	183	510
Limestone	311	821
Sandstone	28	849
Limestone	26	875
Sandstone	117	992
Red and green shale	42	1034
Sandstone	349	1383

A 30-in. diameter hole was drilled to a depth of 103 ft, reduced to 26 in. between 103 and 522 ft, reduced to 19 in. between 522 and 977 ft, and finished 15 in. in diameter from 977 to 1383 ft. The well is cased with 30-in. pipe from land surface to a depth of 103 ft, 26-in. pipe from land surface to a depth of 174 ft, 20-in. welded steel pipe from 1 ft above grade to a depth of 522 ft (cemented in), and a 15-in. steel liner from 977 ft to a depth of 1039 ft. The well was shot with 1900 lb of nitro-gel in seven shots: 200 lb at 1295 ft, 200 lb at 1290 ft, 300 lb at 1260 ft, 300 lb at 1240 ft, 300 lb at 1220 ft, 300 lb at 1200 ft, and 300 lb at 1180 ft.

A production test was conducted on July 27-28, 1964, by representatives of the driller and Consoer, Townsend and Associates, Consulting Engineers. After 23.2 hr of pumping at rates from 800 to 1200 gpm, the final drawdown was 161 ft from a nonpumping water level of 316 ft below land surface. Thirty min after pumping was stopped, the water level had recovered to 368 ft.

The pumping equipment presently installed consists of a 250-hp 1800 rpm U.S. electric motor (Serial No. 1 361963), a 12-in., 11-stage Layne and Bowler vertical centrifugal pump set at 650 ft, rated at 1000 gpm at about 760 ft TDH, and has 650 ft of 10-in. column pipe. A 30-ft section of 10-in. suction pipe is attached to the pump intake. The well is equipped with 650 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02851) of a sample collected November 18, 1971, after pumping for 9 hr at 750 gpm, showed the water to have a hardness of 260 mg/1, total dissolved minerals of 377 mg/1, and an iron content of 0.0 mg/1.

WELL NO. 9, open to the Cambrian-Ordovician aquifer, was completed in May 1969 to a depth of 1380 ft by the Layne-Western Co., Aurora. The well is located on Winchester Road, 0.2 mile west of Midlothian Road, approximately 150 ft N and 150 ft E of the SW corner of Section 12, T44N, R10E. The land surface elevation at the well is approximately 830 ft.

A drillers log of Well No. 9 follows:

Strata	Thickness (ft)	Depth (ft)
Yellow clay	5	5
Blue clay, boulders 80-95 ft and 115-130 ft	145	150
Blue clay and gravel, boulders 170-180 ft	55	205
Blue clay, very sticky	20	225
Blue clay with gravel	18	243
Gray medium limestone	147	390
Light brown shale	14	404
Gray medium limestone	16	420
Buff shale and limestone	5	425
Gray medium limestone	23	448
Gray medium shale	52	500
Shale with lime streaks	4	504
Gray hard limestone, shale breaks at 515-520 ft	26	530
Dark gray shale with lime shells	10	540
Gray medium shale	50	590
Gray medium limestone	190	780
Gray hard limestone	30	810
Hard brown limestone	15	825
Gray hard limestone	70	895
White hard sandy limestone	10	905
White medium sandstone	10	915
Gray medium limestone	31	946
Medium sandy lime	4	950
White medium to soft sandstone	75	1025
White medium sandstone	25	1050
White hard sandstone	10	1060
Buff hard sandy dolomite with red shale breaks	30	1090
Gray hard limestone, crevices at 1100 ft	20	1110
Gray hard sandy dolomite	45	1155
Gray hard limestone	15	1170
Sandy limestone with red shale breaks	35	1205
Red hard sandy dolomite	10	1215
White medium and hard sandstone	10	1225
Hard sandstone and dolomite	5	1230
White medium sandstone	25	1255
Buff hard sandy dolomite	10	1265
White medium sandstone, hard 1270-1280 ft	40	1305
White medium to soft sandstone	10	1315
White soft sandstone	15	1330
White medium sandstone	5	1335
Brown hard sandstone	10	1345
Pink medium to soft sandstone	5	1350
Pink medium sandstone	5	1355
Red medium sandstone	5	1360
Red hard sandy dolomite and shale	10	1370
Red limestone and shale	10	1380

A 24-in. diameter hole was drilled to a depth of 256 ft, reduced to 23 in. between 256 and 600 ft, and finished 17.2 in. in diameter from 600 to 1380 ft. The well is cased with 24-in. pipe from 1.7 ft above the pumphouse floor to a depth of 256 ft and 18-in. pipe from 2 ft above land surface to a depth of 600 ft (cemented in).

A production test was conducted by the driller on May 7-8, 1969, after shooting with 540 lb of 100 percent nitroglycerine gelatin. After 24 hr of pumping at rates ranging from 955 to 1018 gpm, the final drawdown was 134 ft from a nonpumping water level of 448 ft below land surface. Fourteen min after pumping was stopped, the water level had recovered to 488 ft.

The pumping equipment presently installed is an 11-stage Layne and Bowler turbine pump set at 680 ft, rated at 1000 gpm at about 803 ft TDH, and powered by a 325-hp 1200 rpm Waukesha natural gas engine.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02852) is for a water sample from the well collected November 18, 1971, after 11 hr of pumping at 900 gpm.

WELL NO. 9, LABORATORY NO. 02852

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	8.0	
Manganese	Mn	0.0		Fluoride	F	1.3	0.07
Ammonium	NH_4	0.5	0.02	Boron	B	0.3	
Sodium	Na	22	0.96	Nitrate	NO_3	0.0	
Potassium	K	9	0.23	Chloride	Cl	8	0.23
Calcium	Ca	73.6	3.67	Sulfate	SO_4	50	1.04
Magnesium	Mg	20	1.64	Alkalinity (as $CaCO_3$)		260	5.20
Barium	Ba	0.0		Hardness (as $CaCO_3$)		254	
Copper	Cu	0.0		Total dissolved minerals		356	
Cadmium	Cd	0.00					
Chromium	Cr	0.0					
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	0.0005		Alpha *pc/l*	8		
Nickel	Ni	0.0		± deviation	2		
Silver	Ag	0.0		Beta *pc/l*	11		
Zinc	Zn	0.0		± deviation	3		

NEW CENTURY TOWN DEVELOPMENT

New Century Town Development, located 1 mile southeast of Mundelein, installed a public water supply in 1973. The water system is owned and operated by the Lake County Public Works Department. Two wells are in use. In 1974 there were 88 services; the average and maximum daily pumpages were 80,000 and 100,000 gpd, respectively. The water is not treated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Potosi and Franconia Dolomites, the Ironton-Galesville Sandstone, and the Elmhurst-Mt. Simon aquifer, was completed in June 1972 to a depth of 1912 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located 300 ft east of Butterfield Road and 660 ft north of Illinois Route 60, approximately 660 ft N and 1950 ft E of the SW corner of Section 32, T44N, R11E. The land surface elevation at the well is approximately 725 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	170	170
Lime	225	395
Shale some lime	180	575
Lime	280	855
Sand and lime	30	885
Sandy lime, sand, shale	90	975
Sand, lime	70	1045
Shale, dolomite	70	1115
Lime, shale	80	1195
Sand	130	1325
Shale, lime	160	1485
Sand	55	1540
Shale, lime	70	1610
Sand, shale, lime	120	1730
Shale	95	1825
Sand	87	1912

A 24-in. diameter hole was drilled to a depth of 168 ft, reduced to 19 in. between 168 and 1115 ft, reduced to 15 in. between 1115 and 1400 ft, and finished 12.2 in. in diameter from 1400 to 1912 ft. The well is cased with 20-in. OD steel pipe from 1 ft above land surface to a depth of 168 ft (cemented in) and 16-in. OD steel pipe from 2 ft above land surface to a depth of 1075 ft (cemented in).

A production test was conducted by the driller on August 3-4, 1972. After 24 hr of pumping at varying rates of 1175 to 1710 gpm, the final drawdown was 226 ft from a nonpumping water level of 426 ft below land surface.

The pumping equipment presently installed is a Peerless turbine pump set at 750 ft, rated at 1200 gpm, and powered by a 400-hp Ideal electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C008902) of a sample collected in June 1974, showed the water to have a hardness of 305 mg/1, total dissolved minerals of 464 mg/1, and an iron content of 0.5 mg/1.

WELL NO. 2, open to the Potosi and Franconia Dolomites, the Ironton-Galesville Sandstone, and Elmhurst-Mt. Simon aquifer, was completed in August 1972 to a depth of 1870 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located 562 ft north of Illinois Route 60, approximately 562 ft N and 2457 ft E of the SW corner of Section 33, T44N, R11E. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	150	150
Niagaran limestone	190	340
Maquoketa shale	150	490
Galena dolomite	320	810
St. Peter sandstone	175	985
Prairie du Chien shale (Potosi)	145	1130
Galesville sandstone	170	1300
Eau Claire dolomite — shale	250	1550
Mt. Simon sandstone	320	1870

A 30-in. diameter hole was drilled to a depth of 160 ft, reduced to 20 in. between 160 and 1055 ft, reduced to 15 in. between 1055 and 1387 ft, and finished 12.2 in. in diameter from 1387 to 1870 ft. The well is cased with 20-in. OD steel pipe from 2 ft above land surface to a depth of 160 ft

(cemented in) and 16-in. OD steel pipe from 2 ft above land surface to a depth of 1052 ft (cemented in).

A production test was conducted by the driller on September 25-26, 1972. After 18.5 hr of pumping at rates of 1250 to 1350 gpm, the final drawdown was 238 ft from a nonpumping water level of 35 3 ft below land surface.

The pumping equipment presently installed is a Peerless turbine pump set at 700 ft, rated at 1200 gpm, and powered by a 350-hp Ideal electric motor.

The following mineral analysis (Lab. No. 195664) is for a water sample from the well collected May 15, 1974, after 1 hr of pumping at 1200 gpm.

WELL NO. 2, LABORATORY NO. 195664

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.4		Silica	SiO_2	8.5	
Manganese	Mn	0.00		Fluoride	F	0.8	
Ammonium	NH_4	0.7	0.04	Boron	B	0.4	
Sodium	Na	29.2	1.27	Nitrate	NO_3	0.0	0.00
Potassium	K	16.0	0.41	Chloride	Cl	21	0.59
Calcium	Ca	86.4	4.31	Sulfate	SO_4	107.4	2.23
Magnesium	Mg	24.0	1.97	Alkalinity (as $CaCO_3$)		252	5.04
Strontium	Sr	4.99	0.11				
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		314	6.28
Copper	Cu	0.01					
Cadmium	Cd	0.00		Total dissolved minerals		448	
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity		1	
Lithium	Li	0.02		Color		0	
Nickel	Ni	<0.05		Odor		0	
Zinc	Zn	0.00		Temp.		66.0 F (reported)	

NORTH LIBERTYVILLE ESTATES SUBDIVISION

North Libertyville Estates Subdivision (est. 515), located 1 mile north of Libertyville, installed a public water supply in 1954. The water system is owned and operated by the Lake County Public Works Department. One well is in use. This supply is cross connected with the Countryside Manor Subdivision. In 1965 there were 140 services, all metered; the average daily pumpage in 1964 was 27,900 gpd. In 1974 there were 147 services, all metered; the average and maximum daily pumpages in 1972 were 43,800 and 65,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in August 1954 to a depth of 168 ft by the Henry Boysen Co., Libertyville. The well is located on Center St., 1 block south of Route 137, approximately 2400 ft N and 950 ft W of the SE corner of Section 9, T44N, R11E. The land surface elevation at the well is approximately 657 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	122	122
Limestone	46	168

An 18-in. diameter hole was drilled to a depth of 20 ft and finished 12 in. in diameter from 20 to 168 ft. The well is cased with 18-in. corrugated metal pipe from 1 ft above the pumphouse floor to a depth of 20 ft and a 12-in. steel pipe from 1 ft above the pumphouse floor to a depth of 122 ft. The annulus between the 18- and 12-in. casings is cement grouted.

On June 13, 1958, the well reportedly produced 115 gpm with a drawdown of 75 ft from a nonpumping water level of 14 ft.

Monthly measurements of the nonpumping water level during the period January 1963 to January 1975 ranged from about 36 to 65.5 ft below land surface.

The pumping equipment presently installed is an 8-in., 11-stage Byron Jackson oil-lubricated deep well turbine pump (Serial No. C-321706) set at 140 ft, rated at 140 gpm at about 255 ft TDH, and powered by a 15-hp 1800 rpm U. S. electric motor. The well is equipped with 150 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B37721) is for a water sample from the well collected March 22, 1976, after 2 hr of pumping.

WELL NO. 1, LABORATORY NO. B37721

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.2		Silica	SiO_2	15	
Manganese	Mn	0.00		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.54	0.03	Boron	B	0.6	
Sodium	Na	100	4.35	Nitrate	NO_3	0.0	
Potassium	K	1.3	0.03	Chloride	Cl	17	0.48
Calcium	Ca	56	2.79	Sulfate	SO_4	360	7.49
Magnesium	Mg	40	3.29	Alkalinity (as $CaCO_3$)		138	2.76
Arsenic	As	0.00					
Barium	Ba	0.00		Hardness (as $CaCO_3$)		304	6.08
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		720	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.8	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.0	
Silver	Ag	0.00		±deviation		1.9	
Cyanide	CN	0.00		Beta *pc/l*		2.5	
Zinc	Zn	0.0		±deviation		2.2	

PEKARA SUBDIVISION

Pekara Subdivision (est. 520), located 2 miles northeast of Buffalo Grove, installed a public water supply in 1955. The water system is owned and operated by the Lake County Public Works Department. One well (No. 2) is in use. In 1961 there were 97 services, all metered. In 1974 there were 148 services, all metered; the average and maximum daily pumpages were 32,611 and 48,000 gpd, respectively. The water is hypochlorinated and treated with polyphosphate to keep iron in solution.

WELL NO. 1, finished in Silurian dolomite, was completed in 1953 to a depth of 160 ft by Peter Snelten, Arlington Heights. This well was abandoned in 1961 and sealed prior to 1970. The well was located on Pekara Drive, 2.5 blocks west of Milwaukee Ave., approximately 1000 ft S and 425 ft E of the NW corner of Section 35, T43N, R11E. The land surface elevation at the well is approximately 644 ft.

The well was cased with 5-in. pipe to an unknown depth,.

Nonpumping water levels in October 1960 and September 1965 were reported to be 20 and 25 ft, respectively.

WELL NO. 2, finished in Silurian dolomite, was completed in June 1956 to a depth of 155 ft by Anthony Hoetzer, Half Day. The well is located near the west end of Pekara Drive, 4 blocks west of Milwaukee Ave., approximately 1025 ft S and 675 ft W of the NE corner of Section 34, T43N, R11E. The land surface elevation at the well is approximately 645 ft.

A 12-in. diameter hole was drilled to a depth of 155 ft. The well is cased with 12-in. pipe from 2 ft above the pumphouse floor to a depth of 127 ft.

In August 1961, the well reportedly produced 220 gpm with a drawdown of 85 ft from a nonpumping water level of 20 ft.

The pumping equipment presently installed is a 10-stage Deming turbine pump rated at 400 gpm, and powered by a 20-hp 1800 rpm U.S. electric motor.

A mineral analysis of a sample (Lab. No. 153520) collected October 14, 1960, after pumping for 20 min, showed the water to have a hardness of 380 mg/1, total dissolved minerals of 857 mg/1, and an iron content of 1.0 mg/1.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03585) is for a water sample from the well collected January 10, 1972, after 30 min of pumping at 140 gpm.

WELL NO. 2, LABORATORY NO. 03585

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	13	
Manganese	Mn	0.0		Fluoride	F	0.5	0.03
Ammonium	NH_4	0.8	0.04	Boron	B	0.7	
Sodium	Na	103	4.48	Nitrate	NO_3	0.0	
Potassium	K	1.9		Chloride	Cl	7	0.20
Calcium	Ca	75	3.74	Sulfate	SO_4	525	10.92
Magnesium	Mg	57	4.68	Alkalinity (as $CaCO_3$)		84	
				Hardness (as $CaCO_3$)		412	
Barium	Ba	0.0		Total dissolved minerals		970	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		7.7	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		2	
Mercury	Hg	<0.0005		± deviation		2	
Nickel	Ni	0.0		Beta *pc/l*		1	
Silver	Ag	0.0		± deviation		3	
Zinc	Zn	0.0					

RAND ESTATES SUBDIVISION

Rand Estates Subdivision (est. 122), located 0.2 mile southeast of Lake Zurich, installed a public water supply in 1955. One well is in use. In 1961 there were 17 services, none metered. In 1973 there were 35 services, none metered. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in 1954 to a depth of 365 ft. The well is located about 260 ft north of Grand Ave. and 20 ft west of Florence St., approximately 1850 ft N and 1850 ft W of the SE corner of Section 20, T43N, R10E. The land surface elevation at the well is approximately 885 ft.

The well is cased with 6-in. pipe from 0.3 ft above the pumphouse floor to an unknown depth.

The pumping equipment presently installed is a Reda submersible pump rated at 25 gpm, and powered by a 1 1/2-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B100697) is for a water sample from the well collected July 19, 1973.

WELL NO. 1, LABORATORY NO. B100697

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.50		Silica	SiO_2	15	
Manganese	Mn	0.00		Fluoride	F	0.6	0.03
Ammonium	NH_4	1.0	0.06	Boron	B	0.9	
Sodium	Na	112	4.87	Nitrate	NO_3	0.4	0.01
Potassium	K	3.0	0.08	Chloride	Cl	5	0.14
Calcium	Ca	160	7.98	Sulfate	SO_4	950	19.76
Magnesium	Mg	105	8.64	Alkalinity (as $CaCO_3$)		72	1.44
Arsenic	As	0.00		Hardness (as $CaCO_3$)		831	16.62
Barium	Ba	0.1					
Copper	Cu	0.00		Total dissolved minerals		1602	
Cadmium	Cd	0.01					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.7	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.1		Alpha *pc/l*		0.5	
Selenium	Se	0.00		± deviation		2.0	
Silver	Ag	0.00		Beta *pc/l*		9.3	
Zinc	Zn	0.03		± deviation		4.9	

RIVERWOODS COMMUNITY

Riverwoods Community (est. 85), located 1 mile west of Deerfield, installed a public water supply in 1957. The water system is owned by the village of Riverwoods and operated by the Lake County Public Works Department. One well is in use. In 1973 there were 26 services, all metered; the estimated average and maximum daily pumpages were 17,000 and 25,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, open to the Ironton-Galesville Sandstone, was completed in January 1962 to a depth of 1367 ft by the Milaeger Well and Pump Co., Milwaukee, Wis. The well is located next to the elevated tank at the Bannockburn Country Club, approximately 2400 ft S and 1150 ft E of the NW corner of Section 30, T43N, R12E. The land surface elevation at the well is approximately 677 ft.

A sample study summary log of Well No. 1 furnished by the State Geolpgical Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Soil	5	5
Till	40	45
Silt	5	50
Till	85	135
Gravel and sand	10	145
SILURIAN SYSTEM		
Niagaran Series		
Dolomite	175	320
Alexandrian Series		
Dolomite	85	405
ORDOVICIAN SYSTEM		
Cincinnatian Series		
Maquoketa Group		
Shale and dolomite	125	530
Champlainian Series		
Galena Group		
Dolomite	205	735
Platteville Group		
Dolomite	95	830
Ancell Group		
Glenwood Formation		
Sandstone	55	885
St. Peter Sandstone		
Sandstone, shale	175	1060
CAMBRIAN SYSTEM		
Croixan Series		
Potosi Dolomite		
Dolomite	85	1145
Franconia Formation		
Dolomite, sandstone	65	1210
Ironton-Galesville Sandstone		
Sandstone	155	1365
Eau Claire Formation		
Siltstone	5	1370

A 19-in. diameter hole was drilled to a depth of 565 ft, reduced to 15 in. between 565 and 1090 ft, reduced to 14 in. between 1090 and 1220 ft, and finished 10 in. in diameter from 1220 to 1367 ft. The well is cased with 20-in. drive pipe from 2.5 ft above the pumphouse floor to a depth of 157 ft and 10-in. pipe from 2.5 ft above the pumphouse floor to a depth of 1220 ft (cemented in).

A production test was conducted by the driller on January 3-4, 1962. After 24 hr of pumping at rates of 158 to 393 gpm, the maximum drawdown was 130 ft from a non-pumping water level of 333 ft below land surface. Ten min after pumping was stopped, the water level had recovered to 343 ft.

The pumping equipment presently installed is a Byron Jackson submersible pump set at 675 ft, rated at 400 gpm at about 800 ft TDH, and powered by a 100-hp Byron Jackson electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03583) is for a water sample from the well collected January 10, 1972, after 30 min of pumping at 370 gpm.

WELL NO. 1, LABORATORY NO. 03583

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.5	0.02	Silica	SiO_2	8	
Manganese	Mn.	0.0		Fluoride	F	1.3	0.07
Ammonium	NH_4	0.5	0.03	Boron	B	0.0	
Sodium	Na	24	1.04	Nitrate	NO_3	0.0	
Potassium	K	11.4	0.29	Chloride	Cl	8.5	0.24
Calcium	Ca	90	4.49	Sulfate	SO_4	107	2.23
Magnesium	Mg	20	1.64	Alkalinity (as $CaCO_3$)		252	5.04
				Hardness (as $CaCO_3$)		296	
				Total dissolved minerals		438	
Barium	Ba	0.0		pH (as rec'd)		7.6	
Copper	Cu	0.0		Radioactivity			
Cadmium	Cd	0.00		Alpha *pc/l*		9	
Chromium	Cr	0.0		± deviation		3	
Nickel	Ni	0.0		Beta *pc/l*		26	
Silver	Ag	0.0		± deviation		4	
Zinc	Zn	0.0					

ROUND LAKE

The village of Round Lake (1531) installed a public water supply in 1914. One well (No. 2) is in use and another well (No. 1) is available for emergency use. This supply was cross connected with Round Lake Park in October 1951, but water from Round Lake Park has not been used for several years. In 1949 there were 140 services, all metered; the average and maximum daily pumpages were 50,000 and 75,000 gpd, respectively. In 1973 there were 500 services, all metered; the average and maximum daily pumpages were 190,000 and 280,000 gpd, respectively. The water is chlorinated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in 1912 to a depth of 350 ft by Adam Titus, Liberty-

ville. This well is available for emergency use. The well is located in the rear of the village hall, about 110 ft south of the Chicago, Milwaukee, and St. Paul RR and 430 ft east of Cedar Lake Road, approximately 1550 ft S and 2400 ft W of the NE corner of Section 29, T45N, R10E. The land surface elevation at the well is approximately 798 ft.

A 6-in. diameter hole was drilled to a depth of 350 ft. The well is cased with 6-in. pipe from land surface to a depth of 230 ft.

Upon completion, water was pumped at a rate of 150 gpm for 24 hr. The water returned to its original level soon after the pump was stopped. In the summer of 1922 when the pump was pulled, the depth to water was 43 ft below the pump base.

In January 1945, the well reportedly produced 175 gpm for 1.5 hr with a drawdown of 10 ft from a nonpumping water level of 40 ft below the pump base.

The pumping equipment presently installed consists of a 10-hp 1750 rpm General Electric Induction motor (No. 5345661), a 6-in., 16-stage Cook turbine pump (Serial No. 1912) set at 150 ft, rated at 130 gpm, and has 150 ft of 4-in. OD column pipe. The well is equipped with 150 ft of airline without a gage.

A mineral analysis of a sample (Lab. No. 107669) collected September 10, 1946, after pumping for 4 hr at 125 gpm, showed the water to have a hardness of 165 mg/1, total dissolved minerals of 434 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 2, finished in Silurian dolomite, was completed in May 1945 to a depth of 359 ft by Henry Boysen, Jr., Liberty ville, and filled in to a 333-ft depth by the Aurora Pump Co. during the summer of 1963. The well is located in the rear of the village garage, about 360 ft north of the main track of the Chicago, Milwaukee, and St. Paul RR and 80 ft west of the center line of Cedar Lake Road, approximately 600 ft S and 2175 ft E of the NW corner of Section 29, T45N, R10E. The land surface elevation at the well is approximately 790 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Clay, glacial till and silt	169	169
Sand and gravel	2	171
Sand, silty	44	218
Sand and gravel	10	225
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite	89	314
ORDOVICIAN SYSTEM		
Maquoketa Group		
Dolomite, shale at top and base	45	359

A 10-in. diameter hole was drilled to a depth of 359 ft. The well is cased with 10-in. ID pipe from 2 ft above land surface to a depth of 226 ft.

A production test was conducted on May 19, 1945. The well reportedly produced from 280 to 295 gpm for 7.6 hr with a drawdown of 107 ft from a nonpumping water level of 51 ft below the top of the casing. Ten min after pumping was stopped, the water level had recovered to 56 ft.

In June 1963, this well was rejuvenated by the Aurora Pump Co. and the nonpumping water level was reported to be 85 ft above the bottom of the column pipe.

The pumping equipment presently installed is an 8-in., 10-stage Aurora turbine pump (Type DWT) set at 140 ft, rated at 250 gpm at about 275 ft TDH, and powered by a 25-hp 1800 rpm U.S. electric motor (Serial No. 586755). A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 140 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005278) is for a water sample from the well collected January 22, 1974, after 1 hr of pumping at 325 gpm.

WELL NO. 2, LABORATORY NO. C005278

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	14.0	
Manganese	Mn	0.00		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.77	0.04	Boron	B	0.7	
Sodium	Na	60	2.61	Nitrate	NO_3	0.3	0.00
Potassium	K	1.3	0.03	Chloride	Cl	3	0.08
Calcium	Ca	28	1.40	Sulfate	SO_4	122	2.54
Magnesium	Mg	18	1.48	Alkalinity (as $CaCO_3$)		158	3.16
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		144	2.88
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		326	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.2	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.1	
Silver	Ag	0.00		±deviation		0.8	
Cyanide	CN	0.00		Beta *pc/l*		1.7	
Zinc	Zn	0.01		±deviation		1.6	

WELL NO. 3, open to the Cambrian-Ordovician aquifer, was completed in August 1974 to a depth of 1241 ft by the Hoover Water Well Service, Zion. As of March 1976, this well was not in use. The well is located on Nippersink Road, approximately 2600 ft N and 1575 ft W of the SE corner of Section 30, T45N, R10E. The land surface elevation at the well is approximately 790 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	196	196
Silurian dolomite	169	365
Maquoketa shale	127	492
Galena-Platteville dolomite	248	740
Glenwood	114	854
St. Peter sandstone	104	958
Trempealeau	144	1102
Galesville sandstone	126	1228
Shale	13	1241

A 12-in. diameter hole was drilled to a depth of 588 ft, reduced to 10 in. between 588 and 1027 ft, and finished 8 in. in diameter from 1027 to 1241 ft. The well is cased with 12-in. pipe from land surface to a depth of 193 ft, 10-in. pipe from land surface to a depth of 588 ft (cemented in),

and an 8-in. liner from 759 ft to a depth of 1027 ft (slotted between 860 and 950 ft).

A production test was conducted by the driller on August 19-20, 1974. After 24.2 hr of pumping at a rate of 300 gpm, the final drawdown was 120 ft from a nonpumping water level of 377 ft.

The pumping equipment presently installed is a Johnston vertical turbine pump set at 660 ft, rated at 450 gpm at about 690 ft TDH, and powered by a 125-hp 1770 rpm electric motor.

A partial analysis of a sample (Lab. No. 196669) collected during the initial production test, showed the water to have a hardness of 232 mg/1, total dissolved minerals of 319mg/l, and an iron content of 0.5 mg/1.

ROUND LAKE BEACH

The village of Round Lake Beach (5717) installed a public water supply in 1947. Six wells are in use. In 1955 there were 513 services, all metered. In 1973 there were 3008 services, all metered; the average and maximum daily pumpages were 581,000 and 870,000 gpd, respectively. The water from Well Nos. 2, 3, 4, 5, and 6 is chlorinated and the water from Well Nos. 2, 5, and 6 is treated with polyphosphate to keep iron in solution. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1 (Indian Hill Well No. 1), finished in sand and gravel, was completed in August 1946 to a depth of 215 ft by Henry Boysen, Jr., Libertyville. The well is located on the west side of Tomahawk Drive opposite Warrior Drive, approximately 1550 ft S and 1200 ft W of the NE corner of Section 18, T45N, R10E. The land surface elevation at the well is approximately 780 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay, yellow	**22**	**22**
Clay, blue	**22**	**44**
Clay, sandy	**7**	**51**
Clay, blue	**39**	**90**
Clay, sandy	**28**	**118**
Quicksand	**53**	**171**
Clay, boulders, sand	**28**	**199**
Gravel	**16**	**215**

An 8-in. diameter hole was drilled to a depth of 215 ft. The well is cased with 8-in. steel pipe from 0.3 ft above the pumphouse floor to a depth of 209 ft followed by 6 ft of 8-in. No. 14 slot Cook brass screen. The well casing is cemented in an 18-in. steel pipe from 1.3 ft above the 8.5-ft deep pump pit floor to an unknown depth.

In February 1948, the well reportedly produced 75 gpm for 6 hr with a drawdown of 75 ft from a nonpumping water level of 50 ft below the top of the casing.

In September 1966, the nonpumping water level was reported to be 68 ft.

The pumping equipment presently installed consists of a 10-hp 1800 rpm U.S. electric motor (Serial No. 628079), a 6-in., 20-stage Cook turbine pump (No. 10135) set at 160 ft, rated at 100 gpm at about 250 ft TDH, and has 160 ft of 4-in. column pipe. A 10-ft section of 3.5-in. suction pipe is attached to the pump intake. The well is equipped with 160 ft of airline.

A mineral analysis of a sample (Lab. No. 144670) collected October 3, 1957, after pumping for 6 hr at 75 gpm, showed the water to have a hardness of 294 mg/1, total dissolved minerals of 453 mg/1, and an iron content of 1.2 mg/1.

WELL NO. 2 (Indian Hill Well No. 2), finished in sand and gravel, was completed in February 1948 to a depth of 174 ft by Henry Boysen, Jr., Libertyville. The well is located on Cedarwood Circle about 0.5 mile northeast of Well No. 1, approximately 575 ft S and 1200 ft E of the NW corner of Section 17, T45N, R10E. The land surface elevation at the well is approximately 780 ft.

A correlated drillers log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Sand and gravel	**154**	**154**
Sand, fine	**13**	**167**
Sand and gravel	**2**	**169**
Gravel, more fine sand	**5**	**174**

A 12-in. diameter hole was drilled to a depth of 174 ft. The well is cased with a 12-in. ID steel pipe from 0.9 ft above the pumphouse floor to a depth of 154.2 ft and equipped with 20.4 ft (overall length) of 12-in. Cook slotted brass screen. The slotted screen sections from top to bottom consist of 5 ft of No. 14 slot, 10 ft of No. 10 slot, and 3 ft of No. 20 slot. The well casing is cemented in an 18-in. corrugated metal pipe from the pumphouse floor to the bottom of the tank pit.

A production test was conducted on February 9-10, 1948, by representatives of the driller and the State Water Survey. After 21.8 hr of pumping at rates of 138 to 417 gpm, the drawdown was 43.5 ft from a nonpumping water level of 49.0 ft below the top of the casing. Pumping was then continued for 2.5 hr at a rate increased from 400 to 645 gpm with a final drawdown of 68.0 ft. One hr after pumping was stopped, the water level had recovered to 65.5 ft.

In September 1966, the nonpumping water level was reported to be 70 ft.

The pumping equipment presently installed consists of a 30-hp 1800 rpm U.S. electric motor (Serial No. 7563 38), a 6-in., 6-stage Cook turbine pump set at 130 ft, rated at 350 gpm at about 206 ft head, and has 130 ft of 6-in. column pipe.

A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 140 ft of airline.

The following mineral analysis (Lab. No. 195665) is for a water sample from the well collected May 13, 1974, after 10 min of pumping at 250 gpm.

WELL NO. 2, LABORATORY NO, 195665

		mg/l	*me/l*			*mg/l*	*me/l*
Iron (total)	Fe	0.7		Silica	SiO_2	25.7	
Manganese	Mn	0.00		Fluoride	F	0.9	
Ammonium	NH_4	0.6	0.03	Boron	B	0.3	
Sodium	Na	40.4	1.76	Nitrate	NO_3	0.0	0.00
Potassium	K	1.6	0.04	Chloride	Cl	0	0.00
Calcium	Ca	48.0	2.40	Sulfate	SO_4	155.5	3.23
Magnesium	Mg	52.5	4.32	Alkalinity (as $CaCO_3$)		262	5.24
Strontium	Sr	1.74	0.04	Hardness (as $CaCO_3$)		336	6.72
Barium	Ba	<0.1					
Copper	Cu	0.00		Total dissolved minerals		485	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity		1	
Lithium	Li	0.02		Color		5	
Nickel	Ni	<0.05		Odor		0	
Zinc	Zn	0.00		Temp.		52.5 F (reported)	

WELL NO. 3 (Shorewood Well No. 1), finished in Silurian dolomite, was completed in November 1947 to a depth of 342 ft by Henry Boysen, Jr., Libertyville. The well is located on the east side of East End Drive opposite Wildwood Drive, approximately 205 ft N and 2550 ft E of the SW corner of Section 16, T45N, R10E. The land surface elevation at the well is approximately 775 ft.

A correlated drillers log of Well No. 3 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Black earth	3	3
Clay, yellow	1	4
Sand and gravel	**12**	**16**
Clay, blue stony	**32**	48
Clay, blue	76	**124**
Quicksand	9	**133**
Sand, lake, fine	**35**	**168**
Clay, soft, sandy	**21**	**189**
Clay, blue stony	20	**209**
Clay, sandy	**29**	**238**
Quicksand	13	**251**
Sand and gravel	2	**253**
Boulder	1	**254**
Clay, gravel	6	**260**
Clay, red, sand and gravel	**28**	**288**
SILURIAN SYSTEM		
Niagaran Series		
Rock, shale, gray	44	**332**
Shale, red	**10**	**342**

A 12-in. diameter hole was drilled to a depth of 342 ft. The well is cased with a 12-in. ID wrought steel pipe from 0.9 ft above the pumphouse floor to a depth of 288 ft. The well casing is cemented in an 18-in. corrugated metal pipe from inside the tank pit to a depth of 10 ft below the floor of an 8-ft deep pit.

Following a preliminary pumping test conducted by the driller, which resulted in a yield of less than 80 gpm, the well was acidized by the Holland Well Co., Brookfield. A 1000-gal dose of 15 percent HC1 was pumped into the well but resulted in little, if any, yield improvement. Another 1000-gal dose of acid was applied and the well was then pumped for a total of approximately 66 hr. A production test was then conducted on January 8-9, 1948, by representatives of the driller, the State Water Survey, and the L. B. Harris Co., Inc. After 23.5 hr of pumping at rates of 54 to 112 gpm, the final drawdown was 156 ft from a nonpumping water level of 41 ft below the top of the casing. Thirty min after pumping was stopped, the water level had recovered to 44 ft.

In January and September 1966, nonpumping water levels were reported to be 63 and 78 ft, respectively.

The pumping equipment presently installed is a Red Jacket submersible pump set at 252 ft, rated at 190 gpm, and powered by a 20-hp U.S. electric motor.

A mineral analysis of a sample (Lab. No. 144671) collected October 3, 1957, after pumping for 22.5 hr at 100 gpm, showed the water to have a hardness of 199 mg/1, total dissolved minerals of 426 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 4 (Shorewood Well No. 2), finished in Silurian dolomite, was completed in December 1952 to a depth of 314 ft by Henry Boysen, Jr., Libertyville. The well is located on the northeast corner of Shorewood Drive and Leslie Blvd., approximately 75 ft N and 1590 ft W of the SE corner of Section 16, T45N, R10E. The land surface elevation at the well is approximately 775 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Till	1	1
Gravel	4	5
Blue clay	5	**10**
Sand and clay	7	**17**
Clay	67	**84**
Sandy clay	**20**	**104**
Fine sand	**48**	**152**
Clay	**28**	**180**
Gray clay	**37**	**217**
Blue clay	**16**	**233**
Lime	**81**	**314**

A 6-in. diameter hole was drilled to a depth of 314 ft. The well is cased with 6-in. black steel pipe from 1.4 ft above the pumphouse floor to a depth of 237.5 ft. The well casing is cemented in a 10-in. steel pipe from inside the tank pit to a depth of 12 ft.

Upon completion, the well reportedly produced 200 gpm with a drawdown of 81 ft from a nonpumping water level of 45 ft.

In March 1953 and September 1966, nonpumping water levels were reported to be 46 ft below the top of the casing and 68 ft, respectively.

The pumping equipment presently installed is a Goulds submersible pump (Model No. UG66NL32) set at 168 ft, rated at 200 gpm at about 240 ft head, and powered by a 20-hp 3600 rpm electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004853) of a sample collected January 8, 1974, after pumping for 1 hr at 250 gpm, showed the water to have a hardness of 143 mg/1, total dissolved minerals of 362 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 5 (Hillwood Well No. 1), finished in Silurian dolomite, was completed in November 1956 to a depth of 300 ft (measured in February 1971 at 295 ft) by the Henry Boysen Co., Libertyville. The well is located in the southeast corner of the Hillwood Addition, north of Long Lake Drive, approximately 2500 ft S and 750 ft W of the NE corner of Section 19, T45N, R10E. The land surface elevation at the well is approximately 760 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Gravel and red clay	30	30
Gray clay	84	114
Sand	61	175
Muddy gravel	25	200
Lime, gray	40	240
Lime, brown	60	300

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C006058) is for a water sample from the well collected March 4, 1974, after 6 hr of pumping at 150 gpm.

WELL NO. 5, LABORATORY NO. C006058

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	17	
Manganese	Mn	0.00		Fluoride	F	1.0	0.05
Ammonium	NH_4	0.54	0.03	Boron	B	0.6	
Sodium	Na	59	2.57	Nitrate	NO_3	0.3	0.00
Potassium	K	1.4	0.04	Chloride	Cl	5	0.14
Calcium	Ca	29	1.45	Sulfate	SO_4	114	2.37
Magnesium	Mg	25	2.06	Alkalinity (as $CaCO_3$)		170	3.40
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		175	3.50
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		374	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.8	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.1	
Silver	Ag	0.00		±deviation		1.1	
Cyanide	CN	0.00		Beta *pc/l*		1.5	
Zinc	Zn	0.03		±deviation		1.6	

A 10-in. diameter hole was drilled to a depth of 300 ft. The well is cased with 10-in. ID pipe from 1.3 ft above the pumphouse floor to a depth of 212 ft.

Upon completion, the nonpumping water level was reported to be 44 ft. After 3 acid treatments, the well reportedly produced 250 gpm for 7.2 hr with a drawdown of 25 ft. Pumping was resumed on the following day at a rate of 250 gpm, and after 3.5 hr the drawdown was 25 ft.

In April 1966, after pumping for 1 hr at 500 gpm, the drawdown was 12 ft from a nonpumping water level of 75 ft.

In September 1966, the nonpumping water level was reported to be 90 ft.

In February 1971, the Hoover Water Well Service, Zion, cleaned out 25 ft of silt to a measured depth of 295 ft.

The pumping equipment presently installed is an 8-in., 8-stage Fairbanks-Morse turbine pump set at 150 ft, rated at 170 gpm at about 300 ft TDH, and p'owered by a 50-hp Fairbanks-Morse induction motor.

WELL NO. 6, open to the Potosi and Franconia Dolomites, Ironton-Galesville Sandstone, and Eau Claire Formation, was completed in April 1972 to a depth of 1287 ft by the Hoover Water Well Service, Zion. The well is located on Rollins Road at Route 83, approximately 2600 ft S and 1300 ft E of the NW corner of Section 15, T45N, R10E. The land surface elevation at the well is approximately 790 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	258	258
Silurian dolomite	140	398
Maquoketa shale	145	543
Galena-Platteville dolomite	287	830
Glenwood-St. Peter sandstone	-134	964
Prairie du Chien	96	1060
Trempealeau and Franconia	65	1125
Ironton-Galesville sandstone	125	1250
Eau Claire	37	1287

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B110116) is for a water sample from the well collected May 8, 1973, after pumping at 800 gpm. The iron content has been less on previous samples.

WELL NO.6, LABORATORY NO. B110116

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	3.5	0.12	Silica	SiO_2	7	
Manganese	Mn	0.04	0.00	Fluoride	F	1.3	0.07
Ammonium	NH_4	0.4	0.02	Boron	B	0.4	
Sodium	Na	36	1.57	Nitrate	NO_3	0.0	0.00
Potassium	K	11.2	0.29	Chloride	Cl	15	0.42
Calcium	Ca	64	3.19	Sulfate	SO_4	56	1.16
Magnesium	Mg	20	1.64	Alkalinity (as $CaCO_3$)		260	5.20
Arsenic	As	0.00					
Barium	Ba	0.00		Hardness (as $CaCO_3$)		242	4.84
Copper	Cu	0.05					
Cadmium	Cd	0.00		Total dissolved minerals		376	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.2	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		17.9	
Silver	Ag	0.00		±deviation		4.5	
Zinc	Zn	0.04		Beta *pc/l*		24.6	
				±deviation		3.0	

A 20-in. diameter hole was drilled to a depth of 601 ft, reduced to 16 in. between 601 and 1067 ft, and finished 12 in. in diameter from 1067 to 1287 ft. The well is cased with 20-in. OD pipe from land surface to a depth of 258 ft, 16-in. OD pipe from land surface to a depth of 601 ft (cemented in), and a 12-in. liner from 569 ft to a depth of 1067 ft.

A production test was conducted by the driller on April 7-8, 1972. After 23.8 hr of pumping at rates of 351 to 275 gpm, the final drawdown was 130 ft from a nonpumping water level of 355 ft below land surface. Forty-five min

after pumping was stopped, the water level had recovered to 367 ft.

After shooting the well twice with 200-lb charges of nitro-gel at 1190 and 1210 ft depths, a production test was conducted by the driller on May 15-16, 1972. After 23.3 hr of pumping at rates of 600 to 650 gpm, the final drawdown was 127 ft from a nonpumping water level of 358 ft. One hr after pumping was stopped, the water level had recovered to 387 ft.

The pumping equipment presently installed is a Byron Jackson pump set at 650 ft, rated at 800 gpm, and powered by a 200-hp General Electric motor.

ROUND LAKE PARK

The village of Round Lake Park (3148) installed a public water supply in 1939. Three wells are in use. A cross connection was made in October 1951 with the village of Round Lake for an emergency supply. In 1950 there were approximately 600 services; the average and maximum daily pumpages were 117,000 and 225,000 gpd, respectively. In 1973 there were 984 services, 3.9 percent metered; the average and maximum daily pumpages were 271,000 and 400,000 gpd, respectively. The water is not treated. The natural fluoride concentration in the water is adequate to satisfy state requirements.

WELL NO. 1, finished in Silurian dolomite, was completed in February 1939 to a depth of 279 ft by Henry Boysen, Jr., Libertyville. The well is located in block 155, lot 18, about 20 ft north of Locust Drive and 100 ft east of Bellevue Drive, approximately 618 ft S and 1450 ft E of the NW corner of Section 28, T45N, R10E. The land surface elevation at the well is approximately 800 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	**250**	**250**
Limestone	**29**	**279**

A 6-in. diameter hole was drilled to a depth of 279 ft. The well is cased with 6-in. black wrought steel pipe to a depth of 250 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 150 gpm for 6 hr with a drawdown of 26 ft from a nonpumping water level of 46 ft below land surface. After the well had been in service for 6 years, it was tested again for 6 hr by pumping at a rate of 150 gpm. No changes in pumping and nonpumping water levels were observed.

On January 12, 1972, the well reportedly produced 100 gpm with a drawdown of 9 ft from a nonpumping water level of 122 ft.

The pumping equipment presently installed is a 6-stage Red Jacket submersible pump(Model No. 2006R4-6KA6) rated at 175 gpm, and powered by a 20-hp Red Jacket electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004850) of a sample collected January 3, 1974, after pumping for 2 hr at 120 gpm, showed the water to have a hardness of 151 mg/1, total dissolved minerals of 396 mg/1, and an iron content of 0.0 mg/1.

A drilling attempt for another production well was made in the winter of 1943-1944. This well was reported to be a failure after reaching a depth of 362 ft and was abandoned. The test hole was located 25 ft north of Knollwood Drive and 120 ft west of Grandview Drive, approximately 550 ft N and 2300 ft E of the SW corner of Section 21, T45N, R10E. The land surface elevation at the hole is approximately 790 ft.

A drillers log of the hole follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Earth	**1**	**1**
Yellow clay	**37**	**38**
Blue clay	**70**	**108**
Sandy clay, very hard	**59**	**167**
Blue clay, sticky	**31**	**198**
Sandy clay	**30**	**228**
Blue clay, sticky	**21**	**249**
Blue clay, stony	**9**	**258**
Sand, stones and clay	**7**	**265**
Ledge of limestone	**1**	**266**
Sand, hard, packed and fine	**4**	**270**
Limestone, white, soft	**27**	**297**
Limestone, medium hard	**50**	**347**
Shale, red and sticky	**15**	**362**

A 10-in. diameter hole was drilled to a depth of 362 ft and cased with 10-in. black pipe from land surface to a depth of 269 ft.

WELL NO. 2, finished in Silurian dolomite, was completed in May 1944 to a depth of 313 ft by Henry Boysen, Jr., Libertyville. The well is located in block 155, lot 17, about 70 ft north of Locust Drive and 20 ft east of Bellevue Drive, 100 ft northwest of Well No. 1, approximately 568 ft S and 1350 ft E of the NW corner of Section 28, T45N, R10E. The land surface elevation at the well is approximately 800 ft.

A correlated drillers log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Black earth	**3**	**3**
Yellow clay, hard and stony	**15**	**18**
Blue clay, soft	**130**	**148**
Sandy clay, hard	**28**	**176**
Quicksand	**35**	**211**

Strata (continued)	Thickness (ft)	Depth (ft)
Gravel, clay and sand	25	236
Clay and some gravel	13	249
Gravel	9	258
SILURIAN SYSTEM		
Dolomite, blue, white, brown	10	268
Dolomite, gray	4	272
Dolomite, brownish gray	41	313

A 10-in. diameter hole was drilled to a depth of 313 ft. The well is cased with 10-in. black steel pipe to a depth of 260 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 100 gpm for 8 hr with a drawdown of 74 ft from a nonpumping water level of 46 ft below land surface.

On January 12, 1972, the nonpumping water level was reported to be 54 ft.

The pumping equipment presently installed is a Goulds submersible pump (Model No. UD66L-X32) set at 240 ft, and powered by a 10-hp Franklin Electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004852) of a sample collected January 8, 1974, after pumping for 1.2 hr at 160 gpm, showed the water to have a hardness of 204 mg/1, total dissolved minerals of 458 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 3, finished in Silurian dolomite, was completed in August 1958 to a depth of 330 ft by the Hoover Water Well Service, Zion. The well is located south of the Milwaukee RR tracks on Clifton Ave., approximately 1800 ft N and 600 ft E of the SW corner of Section 28, T45N, R10E. The land surface elevation at the well is approximately 795 ft.

A 12-in. diameter hole was drilled to a depth of 330 ft. The well is cased with 12-in. pipe from 1.5 ft above the pumphouse floor to a depth of 237 ft.

A production test was conducted by the driller on August 29, 1958. After 4 hr of pumping at a rate of 350 gpm, the drawdown was 10 ft from a nonpumping water level of 78 ft below land surface. Pumping was continued for an additional 8 hr at 500 gpm with a final drawdown of 20 ft.

On January 12, 1972, the well reportedly produced 470 gpm with a drawdown of 8 ft from a nonpumping water level of 81 ft.

The pumping equipment presently installed consists of a 40-hp 1800 rpm U.S. electric motor (Serial No. 1153698), a 10-in., 7-stage Johnston oil-lubricated turbine pump (Serial No. JN-4252) set at 200 ft, rated at 350 gpm at about 375 ft head, and has 200 ft of 6-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 200 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02422) is for a water sample from the well collected October 26, 1971, after 30 min of pumping at 470 gpm.

WELL NO. 3, LABORATORY NO. 02422

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	14	
Manganese	Mn	0.0		Fluoride	F	1.02	0.05
Ammonium	NH_4	0.46	0.02	Boron	B	0.6	
Sodium	Na	66.0	2.87	Nitrate	NO_3	0	
Potassium	K	0.7	0.02	Chloride	Cl	4.0	0.11
Calcium	Ca	32.8	1.64	Sulfate	SO_4	163	3.38
Magnesium	Mg	21.0	1.73	Alkalinity (as $CaCO_3$)		128	2.56
				Hardness (as $CaCO_3$)		160	
Barium	Ba	0.0		Total dissolved minerals		380	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)	8.0		
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*	0		
Mercury	Hg	<0.0005		± deviation	0		
Nickel	Ni	0.05		Beta *pc/l*	0		
Silver	Ag	0.0		± deviation	1		
Zinc	Zn	0.0					

STRAWBERRY 1 CONDOMINIUM DEVELOPMENT

Strawberry 1 Condominium Development (est. 126), located 1 mile southwest of North Chicago, installed a public water supply in 1973. The water system is owned and operated by the Strawberry 1 North Chicago Association. Two wells are in use. In 1974 there were 90 services, all metered; the average and maximum daily pumpages were 7600 and 11,400 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1, finished in Silurian dolomite, was completed in September 1972 to a depth of 215 ft by the Henry Boysen Co., Libertyville. The well is located about 25 ft from the pump control and treatment building, approximately 2000 ft S and 1600 ft E of the NW corner of Section 7, T44N, R12E. The land surface elevation at the well is approximately 685 ft.

A 6-in. diameter hole was drilled to a depth of 215 ft. The well is cased with 6-in. galvanized pipe from land surface to a depth of 215 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 20 gpm with very little drawdown from a nonpumping water level of *99* ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump set at 168 ft, rated at 50 gpm, and powered by a 5-hp Red Jacket electric motor.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Backfill and red clay	10	10
Sand	4	14
Gray sandy clay	9	23

Strata (continued)	Thickness (ft)	Depth (ft)
Sand	5	28
Gray clay	45	73
Sand	6	79
Gray clay	11	90
Sand	10	100
Hardpan clay	73	173
Limestone	42	215

The following mineral analysis (Lab. No. 195672) is for a water sample from the well collected May 21, 1974.

WELL NO. 1, LABORATORY NO. 195672

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	1.5		Silica	SiO_2	10.0	
Manganese	Mn	0.01		Fluoride	F	0.6	
Ammonium	NH_4	0.2	0.01	Boron	B	0.7	
Sodium	Na	103	4.48	Nitrate	NO_3	0.3	Tr
Potassium	K	1.5	0.04	Chloride	Cl	14	0.39
Calcium	Ca	36.0	1.80	Sulfate	SO_4	255.5	5.31
Magnesium	Mg	18.5	1.52	Alkalinity (as $CaCO_3$)		102	2.04
Strontium	Sr	1.36	0.03				
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		166	3.32
Copper	Cu	0.00		Total dissolved minerals		498	
Cadmium	Cd	0.00					
Chromium	Cr	0.00		Turbidity		13	
Lead	Pb	<0.05		Color		0	
Lithium	Li	0.01		Odor		0	
Nickel	Ni	<0.05		Temp.		51.5 F (reported)	
Zinc	Zn	0.17					

WELL NO. 2, finished in Silurian dolomite, was completed in October 1972 to a depth of 295 ft by the Henry Boysen Co., Libertyville. The well is located about 500 ft southwest of Well No. 1, approximately 2500 ft S and 1400 ft E of the NW corner of Section 7, T44N, R12E. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Backfill and clay, red	10	10
Sand	4	14
Gray clay	17	31
Sand	8	39
Gray hard clay, sandy	46	85
Sand	10	95
Hardpan clay	81	176
Limestone	94	270
Shale	25	295

A 6-in. diameter hole was drilled to a depth of 295 ft. The well is cased with 6-in. galvanized pipe from land surface to a depth of 295 ft. The top of the well casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 20 gpm with very little drawdown from a nonpumping water level of 99 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump set at 189 ft, rated at 50 gpm, and powered by a 5-hp Red Jacket electric motor.

STURM SUBDIVISION

Sturm Subdivision (est. 63), located about 2 miles southeast of Lake Zurich, installed a public water supply in 1957. One well is in use. In 1973 there were 18 services, none metered; the estimated average and maximum daily pumpages were 3780 and 5700 gpm, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in October 1957 to a depth of 295 ft by the Hoover Water Well Service, Zion. The well is located at the end of Sturm St. in a turnaround circle, approximately 300 ft S and 2590 ft W of the NE corner of Section 33, T43N, R10E. The land surface elevation at the well is approximately 830 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	1	1
Yellow clay	14	15
Blue clay	115	130
Blue hardpan	50	180
Sandy blue clay, some gravel	40	220
Mixed clay and gravel	17	237
Soft Niagra lime	1	238
Light brownish lime	57	295

A 10-in. diameter hole was drilled to a depth of 238 ft and finished 8 in. in diameter from .238 to 295 ft. The well is cased with 8-in. pipe from 1.7 ft above the pumphouse floor to a depth of 238 ft.

A production test was conducted by the driller on October 7, 1957. After 12 hr of pumping at rates of 301 to 496 gpm, the final drawdown was 71 ft from a nonpumping water level of 89 ft.

The pumping equipment presently installed consists of a 1-hp Franklin electric motor, a 4-in., Fairbanks-Morse submersible pump (Model No. 100S22) set at 126 ft, rated at 15 gpm, and has 126 ft of 1-in. column pipe.

The following mineral analysis (Lab. No. 195670) is for a water sample from the well collected May 14, 1974.

WELL NO. 1, LABORATORY NO. 195670

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.3		Silica	SiO_2	18.3	
Manganese	Mn	0.01		Fluoride	F	0.7	
Ammonium	NH_4	0.0	0.00	Boron	B	0.5	
Sodium	Na	71.2	3.10	Nitrate	NO_3	2.9	0.05
Potassium	K	2.3	0.06	Chloride	Cl	1	0.03
Calcium	Ca	86.4	4.31	Sulfate	SO_4	423.9	8.82
Magnesium	Mg	52.2	4.29	Alkalinity (as $CaCO_3$)		136	2.72
Strontium	Sr	2.09	0.05				
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		430	8.60
Copper	Cu	0.02		Total dissolved minerals		772	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity		1	
Lithium	Li	0.01		Color		0	
Nickel	Ni	<0.05		Odor		0	
Zinc	Zn	0.03		Temp.		53.5 F (reported)	

SYLVAN LAKE 1st SUBDIVISION

Sylvan Lake 1st Subdivision (est. 263), located 2.5 miles southwest of Mundelein, installed a public water supply in 1940. The water system is owned and operated by the Sylvan Lake 1st Homeowners' Association. One well is in use. In 1953 there were 50 services. In 1975 there were 75 services, none metered; the estimated average and maximum daily pumpages were 21,000 and 30,000 gpd, respectively. The water is not treated.

WELL NO. 1, finished in sand and gravel, was completed in 1941 to a depth of 286 ft by Fred Kiene & Son, Mundelein. The well is located in a small park by Crescent and West Sylvan Drives, approximately 1050 ft N and 2450 ft W of the SE corner of Section 34, T44N, R10E. The land surface elevation at the well is approximately 820 ft.

An 8-in. diameter hole was drilled to a depth of 286 ft. The well is cased with 8-in. pipe from 2 ft above the roof of an 8-ft deep pit to a depth of .286 ft. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Sta-Rite submersible pump rated at 60 gpm, and powered by a 7 1/2-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B0018176) is for a water sample from the well collected May 8, 1972, after 30 min of pumping at 50 gpm.

WELL NO. 1, LABORATORY NO. B0018176

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	18.4	
Manganese	Mn	0.0		Fluoride	F	0.7	0.04
Ammonium	NH_4	1.0	0.06	Boron	B	0.63	
Sodium	Na	69	3.00	Nitrate	NO_3	0.0	
Potassium	K	2.7	0.07	Chloride	Cl	3.0	0.08
Calcium	Ca	80	3.99	Sulfate	SO_4	430	8.94
Magnesium	Mg	61	5.01	Alkalinity (as $CaCO_3$)		140	2.80
Barium	Ba	0.0		Hardness (as $CaCO_3$)		458	
Copper	Cu	0.0		Total dissolved minerals		770	
Cadmium	Cd	0.00		pH (as rec'd)		7.7	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		2.6	
Mercury	Hg	<0.0005		±deviation		2.3	
Nickel	Ni	0.0		Beta *pc/l*		0.3	
Silver	Ag	0.0		±deviation		2.0	
Zinc	Zn	0.03					

SYLVAN LAKE 2nd AND 3rd SUBDIVISION

Sylvan Lake 2nd and 3rd Subdivision (est. 294), located 2.5 miles southwest of Mundelein, installed a public water supply in 1940. The water system is owned and operated by the Sylvan Lake 2nd and 3rd Homeowners' Association. Two wells are in use. In 1953 there were 63 services. In 1975 there were 84 services, none metered; the estimated average and maximum daily pumpages were 17,700 and 26,600 gpd, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was originally drilled in 1937 by Fred Kiene & Son, Mundelein, and then deepened in 1951 to a depth of 300 ft by the Henry Boysen Co., Libertyville. The well is located near the intersection of Sylvan and Bittersweet Drives on the north side of the lake, approximately 700 ft N and 400 ft W of the SE corner of Section 34, T44N, R10E. The land surface elevation at the well is approximately 809 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	140	140
Sand and clay	90	230
Dirty sand	55	285
Clean gravel	5	290
Rock	10	300

An 8-in. diameter hole was drilled to a depth of 300 ft. The well is cased with 8-in. pipe from the roof of an 8-ft deep pit to an unknown depth. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 126 ft, rated at 60 gpm, and powered by a 7 1/2-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004953) is for a water sample from the well collected January 14, 1974, after 30 min of pumping at 60 gpm.

WELL NO. 1, LABORATORY NO. C004953

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	24	
Manganese	Mn	0.00		Fluoride	F	0.8	0.04
Ammonium	NH_4	1.2	0.07	Boron	B	0.5	
Sodium	Na	57	2.48	Nitrate	NO_3	0.1	0.00
Potassium	K	1.6	0.04	Chloride	Cl	3	0.08
Calcium	Ca	59.5	2.97	Sulfate	SO_4	267	5.55
Magnesium	Mg	45	3.70	Alkalinity (as $CaCO_3$)		180	3.60
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		334	6.68
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		574	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		0.8	
Silver	Ag	0.00		±deviation		2.4	
Cyanide	CN	0.00		Beta *pc/l*		4.4	
Zinc	Zn	0.02		±deviation		2.6	

WELL NO. 2, finished in sand and gravel, was completed in 1940 to a depth of 292 ft by Fred Kiene & Son, Mundelein. The well is located near the intersection of Highland and Marion Drives on the northeast side of the lake, approximately 1600 ft N and 1300 ft W of the SE corner of Section 34, T44N, R10E. The land surface elevation at the well is approximately 805 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	110	110
Silt	30	140
Clay	40	180
Sand and clay	100	280
Gravel	12	292

A 6-in. diameter hole was drilled to a depth of 292 ft. The well is cased with 6-in. pipe from 1.8 ft above the roof of an 8-ft deep pit to an unknown depth. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Goulds submersible pump set at 126 ft, rated at 90 gpm, and powered by a 7 1/2-hp electric motor.

TOWER LAKES

The village of Tower Lakes (863) installed a public water supply in 1929. The water system is owned and operated by the Tower Lakes Water Co. Two wells are in use. In 1964 there were 168 services, all metered; the average daily pumpage was 27,150 gpd. In 1973 there were 260 services, all metered; the estimated average and maximum daily pumpages were 57,956 and 87,000 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1, finished in sand and gravel, was completed in August 1929 to a depth of 180 ft (reported to be 165 ft deep in 1958) by the Rieke Well Drilling Co., Barrington. The well is located on Oxford Drive near Tower Lakes Drive, approximately 1600 ft N and 2450 ft E of the SW corner of Section 2, T43N, R9E. The land surface elevation at the well is approximately 800 ft.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B101622) is for a water sample from the well collected August 16, 1973, after 1.4 hr of pumping at 200 gpm.

WELL NO. 1, LABORATORY NO. B101622

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.55		Silica	SiO_2	33	
Manganese	Mn	0.00		Fluoride	F	0.6	0.03
Ammonium	NH_4	0.4	0.02	Boron	B	0.4	
Sodium	Na	17	0.74	Nitrate	NO_3	0.0	0.00
Potassium	K	1.8	0.05	Chloride	Cl	14	0.40
Calcium	Ca	68	3.39	Sulfate	SO_4	50	1.04
Magnesium	Mg	56	4.61	Alkalinity (as $CaCO_3$)		380	7.60
Arsenic	As	0.00		Hardness (as $CaCO_3$)		400	8.00
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		513	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.6	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		0.4	
Selenium	Se	0.00		±deviation		1.0	
Silver	Ag	0.00		Beta *pc/l*		1.5	
Zinc	Zn	0.00		±deviation		1.6	

The well is cased with 8-in. galvanized pipe from above land surface to an unknown depth. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Sta-Rite submersible pump rated at 200 gpm, and powered by a 15-hp electric motor.

WELL NO. 2, finished in sand and gravel, was completed in October 1933 to a depth of 67 ft by the Rieke Well Drilling Co., Barrington. The well is located on West Lakeshore Drive, about 100 ft south of the west bank of North Bay-of Tower Lake, approximately 2100 ft N and 300 ft E of the SW corner of Section 2, T43N, R9E. The land surface elevation at the well is approximately 770 ft.

The well is cased with 6-in. galvanized pipe to an unknown depth. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Fairbanks-Morse submersible pump (No. SA2098) set at 45 ft, rated at 115 gpm, and powered by a 7 1/2-hp General Electric motor (Serial No. 5K6214A7).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02916) is for a water sample from the well collected November 22, 1971, after 5.6 days of pumping at 115 gpm.

WELL NO. 2, LABORATORY NO. 02916

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.15	0.01	Silica	SiO_2	25	
Manganese	Mn	0.0		Fluoride	F	0.5	0.03
Ammonium	NH_4	0.5	0.03	Boron	B	0.0	
Sodium	Na	40	1.74	Nitrate	NO_3	0.4	0.01
Potassium	K	2	0.05	Chloride	Cl	108	3.05
Calcium	Ca	110	5.49	Sulfate	SO_4	76	1.58
Magnesium	Mg	77	6.33	Alkalinity (as $CaCO_3$)		428	8.56
Barium	Ba	0.0		Hardness (as $CaCO_3$)		580	
Copper	Cu	0.0		Total dissolved minerals		728	
Cadmium	Cd	0.00					
Chromium	Cr	0.0		pH (as rec'd)		7.8	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	<0.0005		Alpha *pc/l*		2	
Nickel	Ni	0.0		±deviation		2	
Silver	Ag	0.0		Beta *pc/l*		3	
Zinc	Zn	0.0		±deviation		3	

TOWNER SUBDIVISION

Towner Subdivision (est. 228), located 1 mile south of Mundelein, installed a public water supply in 1910. The water system is owned and operated by the Towner Subdivision Water Association. Two wells (Nos. 2 and 3) are in use. In 1953 there were 10 services, none metered. In 1974 there were 66 services, none metered; the average and maximum daily pumpages were 24,073 and 36,000 gpd, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in 1910 to a depth of 265 ft by H. Luebbe, Mundelein. This well was abandoned and sealed with concrete in 1957. The well was located west of Willow Springs Road, approximately 860 ft S and 900 ft E of the NW corner of Section 6, T43N, R11E. The land surface elevation at the well is approximately 755 ft.

The well was cased with 4-in. pipe from 0.7 ft above the pumphouse floor to an unknown depth followed by a 2-in. pipe to an unknown depth.

WELL NO. 2, finished at the top of the Silurian dolomite, was completed in 1950 to a depth of 180 ft by Fred Kiene, Mundelein. The well is located north of Osage Road and 1 block west of Route 83, about 0.5 mile southeast of Well No. 1, approximately 2125 ft S and 2900 ft W of the NE corner of Section 6, T43N, R11E. The land surface elevation at the well is approximately 728 ft.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C005343) is for a water sample from the well collected January 29, 1974, after 30 min of pumping.

WELL NO. 2, LABORATORY NO. C005343

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	16.0	
Manganese	Mn	0.00		Fluoride	F	0.6	0.03
Ammonium	NH_4	1.1	0.06	Boron	B	0.7	
Sodium	Na	110	4.78	Nitrate	NO_3	0.6	0.01
Potassium	K	1.2	0.03	Chloride	Cl	6	0.17
Calcium	Ca	96	4.79	Sulfate	SO_4	625	13.00
Magnesium	Mg	59	4.86	Alkalinity (as $CaCO_3$)		86	1.72
Arsenic	As	0.00		Hardness (as $CaCO_3$)		482	9.64
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		1022	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.5	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.7	
Silver	Ag	0.00		±deviation		2.2	
Cyanide	CN	0.00		Beta *pc/l*		3.8	
Zinc	Zn	0.00		±deviation		2.4	

An 8-in. diameter hole was drilled to a depth of 180 ft. The well is cased with 8-in. pipe from 0.3 ft above the concrete pedestal to a depth of 180 ft.

In December 1959, the nonpumping water level was reported to be 67 ft and in 1965, it was reported to be 75 ft.

The pumping equipment presently installed is a Red Jacket submersible pump set at 126 ft, rated at 100 gpm, and powered by a 10-hp Franklin electric motor.

WELL NO. 3, finished in Silurian dolomite, was completed in April 1957 to a depth of 280 ft by Henry Boysen, Libertyville. The well is located approximately 650 ft S and 750 ft E of the NW corner of Section 6, T43N, R11E. The land surface elevation at the well is approximately 760 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	197	197
Clay and gravel	38	235
Limestone	45	280

A 6-in. diameter hole was drilled to a depth of 280 ft. The well is cased with 6-in. pipe from 1 ft above the pumphouse floor to a depth of 241 ft.

Upon completion, the well reportedly produced 50 gpm with a drawdown of 75 ft from a nonpumping water level of 85 ft below land surface.

The pumping equipment presently installed consists of a 3-hp electric motor, a Red Jacket submersible pump (Serial No. BPKP376) set at 168 ft, rated at 45 gpm, and has 168 ft of 2-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03538) is for a water sample from the well collected December 27, 1971, after 30 min of pumping at 45 gpm.

WELL NO. 3, LABORATORY NO. 03538

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	19	
Manganese	Mn	0.0		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.0		Boron	B	0.7	
Sodium	Na	85	3.70	Nitrate	NO_3	3.5	0.06
Potassium	K	1.4	0.04	Chloride	Cl	5.0	0.14
Calcium	Ca	36	1.80	Sulfate	SO_4	262	5.45
Magnesium	Mg	35	2.88	Alkalinity (as $CaCO_3$)		116	2.32
Barium	Ba	0.0		Hardness (as $CaCO_3$)		240	
Copper	Cu	0.0		Total dissolved minerals		547	
Cadmium	Cd	0.00					
Chromium	Cr	0.0		pH (as rec'd)		7.9	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	<0.0005		Alpha *pc/l*		0	
Nickel	Ni	0.0		±deviation		1	
Silver	Ag	0.0		Beta *pc/l*		1	
Zinc	Zn	0.35		±deviation		3	

VALENTINE MANOR SUBDIVISION

Valentine Manor Subdivision (est. 110), located 1.5 miles north of Lake Zurich, installed a public water supply in 1958. The water system is owned and operated by the Valentine Water Service of Utilities, Inc. One well is in use. In 1972 there were 32 services, all metered; the average daily pumpage was 6000 gpd. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in May 1958 to a depth of 330 ft by the Hoover Water Well Service, Zion, and the Henry Boysen Co., Libertyville. The well is located on lot 49 in the southeast part of the subdivision, approximately 100 ft N and 1200 ft W of the SE corner of Section 6, T43N, R10E. The land surface elevation at the well is approximately 875 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Gravel	20	20
Blue clay and gravel	266	286
Limestone	44	330

A 6-in. diameter hole was drilled to a depth of 330 ft. The well is cased with 6-in. pipe from 1 ft above the pumphouse floor to a depth of 287 ft.

Upon completion, the well reportedly produced 240 gpm for 8 hr with a drawdown of 3 5 ft from a nonpumping water level of 135 ft below land surface.

The pumping equipment presently installed is a 7-stage Fairbanks-Morse (Type 6-B-415) oil-lubricated turbine pump (Serial No. 49177-25832) set at 200 ft, rated at 75 gpm, and powered by a 10-hp 3480 rpm General Electric motor (Model No. 12F6276, Serial No. YDJ6759137).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 03954) is for a water sample from the well collected January 5, 1972, after 30 min of pumping at 75 gpm.

WELL NO. 1, LABORATORY NO. 03954

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	39.0	
Manganese	Mn	0.0		Fluoride	F	1.0	0.05
Ammonium	NH_4	0.06	0.00	Boron	B	0.2	
Sodium	Na	16.0	0.70	Nitrate	NO_3	0	0
Potassium	K	2.1	0.05	Chloride	Cl	1.0	0.03
Calcium	Ca	64	3.19	Sulfate	SO_4	67	1.39
Magnesium	Mg	54	4.44	Alkalinity (as $CaCO_3$)		314	6.28
				Hardness (as $CaCO_3$)		380	
Barium	Ba	0.0		Total dissolved minerals		369	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)	7.7		
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*	0		
Mercury	Hg	<0.0005		±deviation	1		
Nickel	Ni	0.0		Beta *pc/l*	0		
Silver-	Ag	0.0		±deviation	1		
Zinc	Zn	0.0					

VERNON HILLS

The village of Vernon Hills (1056) installed a public water supply in 1962. Two wells (Nos. 4 and 5) are in use and another well (No. 3) is available for emergency use. Since April 1966, the water system has been owned and operated by the Lake County Public Works Department. In 1965 there were 193 services, all metered; the average and maximum daily pumpages were 54,030 and 106,600 gpd, respectively. In 1973 the average and maximum daily pumpages were 96,000 and 145,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution.

WELL NO. 1 (Village Well No. 2), finished in sand and gravel, was completed in 1957 to a depth of 140 ft by the Henry Boysen Co., Libertyville. This well was disconnected from the system prior to 1962 and efforts are being made to have it abandoned and sealed. The well is located at the west end of Forest Court on lot 11, approximately 2200 ft S and 2300 ft W of the NE corner of Section 8, T43N, R11E. The land surface elevation at the well is approximately 700 ft.

The well is cased with 5-in. pipe from 1 ft above the concrete floor of a 5-ft deep pit to an unknown depth. The well is reportedly gravel packed.

In 1957, the nonpumping water level was reported to be 40 ft.

WELL NO. 2 (Village Well No. 4), finished in sand and gravel, was completed in 1957 to a depth of 148 ft by the Henry Boysen Co., Libertyville. This well was disconnected from the system prior to 1962 and efforts are being made to have it abandoned and sealed. The well is located at the west end of Forest Court on lot 23 across the street from No. 1, approximately 2200 ft S and 2100 ft W of the NE corner of Section 8, T43N, R11E. The land surface elevation at the well is approximately 695 ft.

The well is cased with 5-in. pipe from 1.2 ft above the concrete floor of a 5-ft deep pit to an unknown depth. The well is reportedly gravel packed.

In 1957, the nonpumping water level was reported to be 32 ft.

WELL NO. 3 (Village Well No. 3), finished in sand and gravel, was completed in April 1959 to a depth fo 149.5 ft by the Layne-Western Co., Aurora. This well is available for emergency use. The well is located near the intersection of Oak Forest and Forest Way Drives, approximately 1650 ft S and 1550 ft W of the NE corner of Section 8, T43N, R11E. The land surface elevation at the well is approximately 710 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	1	1
Yellow clay	10	11
Gray clay, stones embedded	18	29
Fine to coarse gray sand and gravel	7	36
Hard gray clay, stones embedded	13	49
Soft gray clay with streaks of fine sand	4	53
Fine gray dirty sand	3	56
Gray sandy clay with boulders	11	67
Fine gray sand	2	69
Gray sandy clay — lime ledges	38	107
Gray sand fine with gravel	2	109
Hard gray clay with lime ledges	10	119
Lime ledge	4	123
Hard gray clay with lime ledges	15	138
Cemented sand and gravel with lime ledges — some clay	14	152
Broken lime	5	157
Solid limestone	6	163

A 28-in. diameter hole was drilled to a depth of 149.5 ft. The well is cased with 10-in. pipe from 0.8 ft above the pump-house floor to a depth of 29.5 ft and from 34.5 ft to a depth of 134.5 ft. Two sections of 10-in. No. 7 (0.055 in.) Layne shutter screen are installed from 29.5 to 34.5 and 134.5 to 149.5 ft, respectively. Thirty ft of gravel was placed in the annulus opposite the lower screen and 10 ft of gravel was placed opposite the upper screen.

Upon completion, the well was reportedly pumped at a rate of 200 gpm with both screens open. However, the lower screen was then plugged to eliminate hydrogen sulfide. After the lower screen was plugged, the well reportedly produced 75 gpm for 24 hr with a drawdown of 20 ft from a nonpumping water level of 7 ft.

In February 1972, after the well was acidized by the Henry Boysen Co., Libertyville, it reportedly yielded 30 gpm.

The pumping equipment presently installed consists of a 6-in., 13-stage Layne turbine pump (Serial No. 40131) set at 80 ft, rated at 75 gpm at about 170 ft TDH, and powered by a 5-hp 1800 rpm U.S. electric motor (Serial No. 2808837). A 10-ft section of 4-in. suction pipe is attached to the pump intake. The well is equipped with 80 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B12485) is for a water sample from the well collected September 11, 1972, after 24 hr of pumping at 30 gpm.

WELL NO. 3, LABORATORY NO. B12485

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.55	0.06	Silica	SiO_2	8.0	
Manganese	Mn	0.00		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.06	0.00	Boron	B	0.25	
Sodium	Na	20.6	0.90	Nitrate	NO_3	0.0	
Potassium	K	1.94	0.05	Chloride	Cl	52	1.47
Calcium	Ca	94	4.69	Sulfate	SO_4	145	3.02
Magnesium	Mg	56	4.60	Alkalinity (as $CaCO_3$)		276	5.52
Arsenic	As	0.00		Hardness (as $CaCO_3$)		465	
Barium	Ba	0.00					
Copper	Cu	0.00		Total dissolved minerals		633	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.5	
Mercury	Hg	0.0004		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		1.9	
Selenium	Se	0.00		±deviation		2.2	
Silver	Ag	0.00		Beta *pc/l*		5.8	
Zinc	Zn	0.00		±deviation		2.4	

WELL NO. 4 (Village Well No. 1), finished in Silurian dolomite, was completed in March 1961 to a depth of 190 ft by the Henry Boysen Co., Libertyville. The well is located in the northwest corner of the village on the east side of Oakwood Road, approximately 1700 ft S and 1750 ft E of the NW corner of Section 8, T43N, R11E. The land surface elevation at the well is approximately 730 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Black soil	2	2
Yellow clay	16	18
Blue stoney clay	62	80
Gritty stoney clay	33.5	113.5
Sand and gravel	3	116.5
Stoney clay	34	150.5
Sand and gravel	8.5	159
Dry gravel	14	173
Rock	17	190

A 6-in. diameter hole was drilled to a depth of 190 ft. The well is cased with 6-in. pipe from 1.2 ft above the pump-house floor to a depth of 173 ft.

On March 17-18, 1971, the well reportedly produced 50 gpm for 24 hr with a drawdown of 38 ft from a nonpumping water level of 74 ft.

The pumping equipment presently installed is a Red Jacket submersible pump (Model No. 756U48L6, Serial No. MACP67) set at 147 ft, rated at 70 gpm at about 250 ft TDH, and powered by a 7 1/2-hp 1500 rpm U.S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02690) is for a water sample from the well collected November 9, 1971, after 30 min of pumping at 50 gpm.

WELL NO. 4, LABORATORY NO. 02690

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	15	
Manganese	Mn	0.0		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.8	0.04	Boron	B	0.9	
Sodium	Na	135	5.87	Nitrate	NO_3	0	
Potassium	K	2.0	0.05	Chloride	Cl	10	0.28
Calcium	Ca	60	2.99	Sulfate	SO_4	500	10.40
Magnesium	Mg	52	4.27	Alkalinity (as $CaCO_3$)		116	2.32
				Hardness (as $CaCO_3$)		368	
Barium	Ba	0.4					
Copper	Cu	0.0		Total dissolved minerals		946	
Cadmium	Cd	0.00					
Chromium	Cr	0.0		pH (as rec'd)		7.8	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	<0.0005		Alpha *pc/l*		0	
Nickel	Ni	0.0		±deviation		0	
Silver	Ag	0.0		Beta *pc/l*		1	
Zinc	Zn	0.0		±deviation		2	

WELL NO. 5 (Village Well No. 5), finished in Silurian dolomite, was completed in August 1961 to a depth of 203 ft by the Henry Boysen Co., Libertyville. The well is located 100 ft south and 70 ft west of Well No. 4 by the elevated tank on Oakwood Road, approximately 1800ft S and 1820 ft E of the NW corner of Section 8, T43N, R11E. The land surface elevation at the well is approximately 727 ft.

A drillers log of Well No. 5 follows:

Strata	Thickness (ft)	Depth (ft)
Soil	2	2
Clay	113	115
Sand and gravel	5	120
Clay	72	192
Rock	11	203

A 6-in. diameter hole was drilled to a depth of 203 ft. The well is cased with 6-in. galvanized pipe from 1 ft above land surface to a depth of 172 ft.

On August 25-26, 1961, the well reportedly produced 60 gpm for 36 hr with a drawdown of 25 ft from a nonpumping water level of 70 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump (Model No. 40P6K3) set at 147 ft, rated at 55 gpm, and powered by a 7 1/2-hp Sta-Rite electric motor.

A partial analysis of a sample (Lab. No. 165599) collected April 8, 1965, after pumping for 9 days at 63 gpm, showed the water to have a hardness of 436 mg/1, total dissolved minerals of 982 mg/1, and an iron content of 0.1 mg/1. Hydrogen sulfide also was apparent when this sample was collected.

WAUCONDA

The village of Wauconda (5460) installed a public water supply in 1920. Two wells (Nos. 3 and 4) are in use and two other wells (Nos. 1 and 2) are available for emergency use. In 1949 there were 370 services; the average and maximum daily pumpages were 60,000 and 200,000 gpd, respectively. In 1972 there were 1490+ services, 1283 metered; the average daily pumpage was 385,000 gpd. The water is fluoridated.

WELL NO. 1, originally finished in sand and gravel, was constructed in 1920 to a depth of 132 ft by A. B. Bell, St. Charles. In 1939, the well was deepened into the Silurian dolomite and finished at a depth of 230 ft by W. R. Boetsch, Crystal Lake. This well is available for emergency use. The well is located in the police garage in the east end of the village hall at 100 Main St., approximately 1700 ft N and 250 ft W of the SE corner of Section 26, T44N, R9E. The land surface elevation at the well is approximately 790 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Glacial till	105	105
Sand and gravel	105	210
Niagaran-Alexandrian dolomite	20	230

Originally a 10-in. diameter hole was drilled to a depth of 1 32 ft. The well was cased with 10-in. pipe to a depth of 110 ft followed by 22 ft of No. 10 slot Johnson brass screen. In 1932 the screen was removed and an 8-in. hole was constructed from 110 to 230 ft. The well was then cased with 12-in. pipe from land surface to a depth of 30 ft, 10-in. pipe from 30 to 110 ft, and 8-in. pipe from 105 to 220 ft.

Upon completion when the well was 132 ft deep, it reportedly was pumped at a rate of 200 gpm with little drawdown from a nonpumping water level of about 38 ft below land surface.

The pumping equipment presently installed consists of a 10-hp 1000 rpm U.S. electric motor, a 7-in., 9-stage American Well Works turbine pump (Shop No. 63221) set at 100 ft, rated at 100 gpm at about 215 ft head, and has 100 ft of 4.5-in. column pipe. A 10-ft section of 5-in. suction pipe and strainer is attached to the pump intake. The well is equipped with 100 ft of airline.

A mineral analysis of a sample (Lab. No. 107499) collected August 26, 1946, after pumping for 25 min at 165 gpm, showed the water to have a hardness of 369 mg/1, total dissolved minerals of 382 mg/1, and an iron content of 1.3 mg/1. Hydrogen sulfide was apparent when a previous sample was collected.

Prior to the construction of Well No. 2, a test well was constructed during 1937 to a depth of 187 ft by Henry Boysen, Jr., Libertyville. The test well was located on lot 9, block 6, about 30 ft northeast of Maple Ave., approximately 1 350 ft N and 450 ft W of the SE corner of Section 26, T44N, R9E. It was equipped with a 5-ft length of 4-in. No. 60 gauze (0.010 in.) well point. In a production test on March 10, 1937, it reportedly produced from 21 to 32 gpm for 3 hr with a drawdown of 123 ft from a nonpumping water level of 30 ft below land surface.

WELL NO. 2, finished in Silurian dolomite, was completed in March 1939 to a depth of 257 ft by W. R. Boetsch, Crystal Lake. This well is available for emergency use. The well is located about 10 ft east of Well No. 1, approximately 1700 ft N and 240 ft W of the SE corner of Section 26, T44N, R9E. The land surface elevation at the well is approximately 790 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SYSTEM		
Glacial till	105	105
Gravel, sand and some clay	10	115
Sand and fine gravel, clean	80	195
Till	10	205
Sand, shaley	5	210
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite, clayey at base	47	257

A 12-in. diameter hole was drilled to a depth of 257 ft. The well is cased with 12-in. Byers wrought iron pipe from land surface to a depth of 226.5 ft.

A production test was conducted by the State Water Sur-

vey on March 28-29, 1939. After 4 hr of pumping at a rate of 203 gpm, the drawdown was 22.5 ft from a nonpumping water level of 36.0 ft below the top of the casing. The rate of pumping was then increased to 318 gpm, and after 15.5 hr of additional pumping the drawdown was 44.5 ft. When the rate was increased to 400 gpm, the drawdown was 67.5 ft after another 4.2 hr of pumping. Ten min after pumping was stopped, the water level had recovered to 45.5 ft.

On December 13, 1939, Wells No. 1 and 2 were tested simultaneously while pumping at 100 and 280 gpm, respectively, for a period of 5.4 hr. The drawdowns were reportedly 41.5 and 41.0 ft below nonpumping water levels of 39.0 and 38.5 ft below the pump bases. At the end of 5.4 hr, Well No. 2 was turned off and Well No. 1 continued pumping for an additional 2.2 hr. Fifteen min after pumping in Well No. 2 was stopped, its water level recovered to 50.0 ft. After 2.2 hr of continued pumping, the pumping water level in Well No. 1 was 48.5 ft.

The pumping equipment presently installed consists of a 25-hp 1800 rpm U.S. electric motor, an 8-in., 8-stage American Well Works turbine pump set at 100 ft, rated at 300 gpm at about 200 ft head, and has 100 ft of 5-in. column pipe. A 10-ft section of 5-in. suction pipe and strainer is attached to the pump intake. The well is equipped with 100 ft of airline.

A mineral analysis of a sample (Lab. No. 107500) collected August 26, 1946, after pumping for 6 min at 365 gpm, showed the water to have a hardness of 364 mg/1, total dissolved minerals of 379 mg/1, and an iron content of 0.7 mg/1.

WELL NO. 3, finished in Silurian dolomite, was completed in March 1957 to a depth of 325 ft by the Hoover Water Well Service, Zion. This well is operated only during periods of peak demand. The well is located on Osage St. at West Church St., approximately 1000 ft N and 1600 ft W of the SE corner of Section 26, T44N, R9E. The land surface elevation at the well is approximately 780 ft.

A drillers log of Well No. 3 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black top soil	1	1
Yellow sandy clay	19	20
Soft blue clay.	70	90
Silty fine sand and clay, reddish	58	148
Mixed sand, clay, and gravel	6	154
Fine muddy sand	11	165
Red hardpan	15	180
Brown hardpan	10	190
Brown limestone (hard)	30	220
Gray limestone (very hard)	5	225
Limestone with shale	10	235
Limestone with shale (bluish)	5	240
Gray limestone	35	275
Grayish blue limestone	15	290
Mixed limestone and shale	35	325
Blue Maquoketa shale		

A 12-in. diameter hole was drilled to a depth of 325 ft. The well is cased with 12-in. steel pipe from 1.7 ft above the well house floor to a depth of 194 ft.

A production test using one observation well was conducted on March 18-19, 1957, by representatives of the driller, the State Water Survey, and Baxter and Woodman, Consulting Engineers. After 24 hr of pumping at rates from 242 to 339 gpm, the drawdown was 155 ft from a nonpumping water level of 25 ft below the top of the casing. Ten min after pumping was stopped, the water level had recovered to 40 ft.

In November 1958, the nonpumping water level was reported to be 28 ft below the pump base.

The pumping equipment presently installed consists of a 50-hp 1750 rpm Westinghouse electric motor (No. 254-3V712), a 10-in., 10-stage Layne turbine pump (No. 38442) set at 250 ft, rated at 400 gpm at about 360 ft TDH, and has 250 ft of 6-in. column pipe. The well is equipped with 250 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02717) is for a water sample from the well collected November 9, 1971, after 1 hr of pumping at 500 gpm.

WELL NO. 3, LABORATORY NO. 02717

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2	0.01	Silica	SiO_2	33	
Manganese	Mn	0.0		Fluoride	F	0.9	0.05
Ammonium	NH_4	0.5	0.03	Boron	B	0.7	
Sodium	Na	6.0	0.26	Nitrate	NO_3	0.0	
Potassium	K	1.0	0.03	Chloride	Cl	3	0.08
Calcium	Ca	71	3.54	Sulfate	SO_4	17	0.35
Magnesium	Mg	51	4.19	Alkalinity (as $CaCO_3$)		356	7.12
				Hardness (as $CaCO_3$)		388	
Barium	Ba	0.4		Total dissolved minerals		413	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)	7.6		
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*	0		
Mercury	Hg	<0.0005		± deviation	0		
Nickel	Ni	0.0		Beta *pc/l*	4		
Silver	Ag	0.0		± deviation	2		
Zinc	Zn	0.0					

WELL NO. 4, open to the Cambrian-Ordovician aquifer, was originally constructed in May 1972 to a depth of 312 ft and reportedly deepened in September 1973 to a depth of 1264 ft by the Henry Boysen Co., Libertyville. The well is located at Bonner and Barbara Aves., approximately 2560 ft N and 2100 ft E of the SW corner of Section 24, T44N, R9E. The land surface elevation at the well is approximately 792 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Sand and gravel	58	58
Sand, blue clay	18	76
Blue clay	47	123
Sand and clay	9	132
Gravel sand and clay	10	142
Large gravel	7	149
Large boulders	4	153
Gravel (some water)	28	181
Limestone	5	186
Blue shale and limestone	5	191
Limestone	102	293
Blue shale	12	305
Lime and shale	7	312
Lime, little shale	39	351
Gray and red shale	45	396
Limestone	34	430

Strata (continued)	Thickness (ft)	Depth (ft)
Brown shale	49	479
Lime, Galena-Platteville	224	703
Lime, brown, hard	71	774
Sand and lime shells	54	828
Sandstone, St. Peter	146	974
Red shale	35	1009
Limestone	35	1044
Sandstone, dark brown	52	1096
Galesville sandstone	152	1248
Shale and limestone	16	1264

A 24-in. diameter hole was drilled to a depth of 51 ft, reduced to 18 in. between 51 and 171 ft, reduced to 17.2 in. between 171 and 540 ft, reduced to 13.2 in. between 540 and 1027 ft, and finished 10 in. in diameter from 1027 to 1264 ft. The well is cased with 24-in. pipe from land surface to a depth of 51 ft, 18-in. drive pipe from land surface to a depth of 182 ft, 14-in. pipe from land surface to a depth of 537 ft (cemented in), and a 10-in. liner from 966 ft to a depth of 1027 ft.

On October 17, 1972, before deepening, the well reportedly produced 266 gpm for 8 hr with a drawdown of 149 ft from a nonpumping water level of 35 ft below the top of the casing.

After deepening, a production test was conducted by the driller on August 30, 1973. After 5.9 hr of pumping at rates of 825 to 779 gpm, the drawdown was 255 ft from a nonpumping water level of 398 ft below land surface.

The pumping equipment presently installed is a Worthington turbine pump rated at 800 gpm, and powered by a 250-hp Westinghouse electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C006451) is for a water sample from the well collected February 24, 1976, after 2 hr of pumping at 900 gpm.

WELL NO.4, LABORATORY NO. C006451

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.3		Silica	SiO_2	7.5	
Manganese	Mn	0.01		Fluoride	F	1.2	0.06
Ammonium	NH_4	0.54	0.03	Boron	B	0.2	
Sodium	Na	36	1.57	Nitrate	NO_3	0.2	0.00
Potassium	K	10.9	0.28	Chloride	Cl	16	0.45
Calcium	Ca	59	2.94	Sulfate	SO_4	16	0.33
Magnesium	Mg	18	1.48	Alkalinity (as $CaCO_3$)		286	5.72
Arsenic	As	0.000					
Barium	Ba	0.9		Hardness (as $CaCO_3$)		222	4.44
Copper	Cu	0.02					
Cadmium	Cd	0.00		Total dissolved minerals		345	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		7.7	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		19.3	
Silver	Ag	0.00		±deviation		3.6	
Cyanide	CN	0.00		Beta *pc/l*		23.3	
Zinc	Zn	0.01		±deviation		2.7	

WEST SHORELAND SUBDIVISION

West Shoreland Subdivision, formerly known as the Rumpf Subdivision (est. 157), located 0.5 mile southwest of Mundelein, installed a public water supply in 1953. The water system is owned and operated by the West Shoreland Corporation. One well is in use. In 1975 there were 45 services, none metered; the estimated average and maximum daily pumpages were 13,270 and 20,000 gpd, respectively. The water is not treated.

WELL NO. 1, finished in Silurian dolomite, was completed in 1953 to a depth of 210 ft by Lloyd Kiene, Mundelein. The well is located on Trinity Drive north of Route 60 and east of the junction of Route 60 and Midlothian Road, approximately 550 ft S and 1600 ft E of the NW corner of Section 36, T44N, R10E. The land surface elevation at the well is approximately 765 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	100	100
Clay and sand	25	125
Dirty sand	30	155
Clay	15	170
Sand and silt	20	190
Sand	10	200
Lime rock	10	210

The well is cased with 10-in. pipe from 2 ft above land surface to a depth of 200 ft.

On July 30, 1968, the nonpumping water level was reported to be 72.45 ft below land surface.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 168 ft, rated at 50 gpm, and powered by a 3-hp Sta-Rite electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C004851) is for a water sample from the well collected January 8, 1974, after 30 min of pumping at 50 gpm.

WELL NO. 1, LABORATORY NO. C004851

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	16	
Manganese	Mn	0.00		Fluoride	F	0.5	0.03
Ammonium	NH_4	0.96	0.05	Boron	B	0.7	
Sodium	Na	85	3.70	Nitrate	NO_3	0.5	0.01
Potassium	K	1.2	0.03	Chloride	Cl	5	0.14
Calcium	Ca	59.5	2.97	Sulfate	SO_4	390	8.11
Magnesium	Mg	44	3.62	Alkalinity (as $CaCO_3$)		102	2.04
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		329	6.58
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		742	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.1	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		1.5	
Silver	Ag	0.00		±deviation		1.5	
Cyanide	CN	0.00		Beta *pc/l*		0.3	
Zinc	Zn	0.02		±deviation		1.8	

WEST SHORE PARK SUBDIVISION

West Shore Park Subdivision (est. 385), located on the southwest edge of Mundelein, installed a public water supply prior to 1972. The water system is owned and operated by the West Shore Park Corporation. Finished water for this supply is obtained from the village of Mundelein. In 1975 there were 110 services, none metered; the average and maximum daily consumptions were 31,800 and 47,000 gpd, respectively.

WILDWOOD SUBDIVISION

Wildwood Subdivision (est. 4690), located on Gages Lake about 2 miles east of Grayslake, installed a public water supply in 1951. The water system is owned and operated by the Lake County Public Works Department. Three wells (Nos. 2, 3, and 4) are in use and another well (No. 1) is available for emergency use. In 1955 there were 506 services, 250 metered; the estimated average daily pumpage was 40,000 gpd. In 1974 there were 1340 services, all metered; the average and maximum daily pumpages were 196,000 and 294,000 gpd, respectively. The water is chlorinated and treated with polyphosphate to keep iron in solution.

Prior to the installation of a public water supply, about 12 test holes were drilled by Henry Boysen, Libertyville. Seven of these test holes were finished in sand and gravel over 150 ft in depth.

WELL NO. 1, finished in sand and gravel, was completed in April 1950 to a depth of 145 ft by the Henry Boysen Co., Libertyville. This well is available for emergency use. The well is located on the west side of Sears Blvd. between Old Plank Road and Country Lane, approximately 470 ft S and 1750 ft E of the NW corner of Section 31, T45N, R11E. The land surface elevation at the well is approximately 814 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Blue clay	130	130
Blue hardpan	3	133
Coarse and fine sand and gravel	12	145

A 6-in. diameter hole was drilled to a depth of 145 ft. The well is cased with 6-in. pipe from 0.8 ft above the pumphouse floor to a depth of 134 ft followed by 11 ft of 6-in. No. 14 slot Cook red brass screen.

In October 1950, the well reportedly produced 53 gpm with a drawdown of 23 ft from a nonpumping water level of 95 ft below the pump base.

On March 10, 1966, after acidizing, the well was pumped for 20 hr at a rate of 40 gpm with a drawdown of 16 ft from a nonpumping water level of 115 ft.

The pumping equipment presently installed is a Fairbanks-Morse submersible pump set at 131 ft, rated at 40 gpm, and powered by a 5-hp Fairbanks-Morse electric motor.

A partial analysis of a sample (Lab. No. 123192) collected October 4, 1950, showed the water to have a hardness of 134 mg/1, total dissolved minerals of 272 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 2, open to the Cambrian-Ordovician and Elmhurst-Mt. Simon aquifers, was constructed in July 1951 to a depth of 1311 ft, and reportedly deepened in May 1952 to 1570 ft, and in October 1959 to a depth of 1845 ft by the Henry Boysen Co., Libertyville. The well is located on Mill Road between Twin Lakes Blvd. and Big Oaks Road, approximately 600 ft N and 125 ft W of the SE corner of Section 30, T45N, R11E. The land surface elevation at the well is approximately 780 ft.

A summary sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SERIES		
Till, silty, gray, light brown, gravelly near base	212	212
SILURIAN SYSTEM		
Dolomite, white, light brown, little pink, green, fine to medium; little shale	158	370
PRDOVICIAN SYSTEM		
Maquoketa Group		
Shale, reddish to greenish gray and light gray, weak; some dolomite, light to dark gray, fine to medium	205	575
Galena-Platteville Group		
Dolomite, little sandy, yellowish brown to light gray, medium to coarse, little fine	290	865
Ancell Group		
Glenwood Formation		
Sandstone, silty, partly dolomitic, mostly fine to coarse, white; little dolomite, sandy, white to pale green, fine	60	925
St. Peter Sandstone		
Sandstone, little silty, mostly white, very fine to medium, some coarse; shale, red and green, weak, and chert at base	145	1070
Shale, sandy, red, gray, green, weak; dolomite, gray, green, fine to medium	20	1090
CAMBRIAN SYSTEM		
Franconia Formation		
Sandstone, glauconitic, dolomitic, reddish to yellowish brown, fine to medium; shale, reddish, greenish, weak; sandstone, silty, glauconitic, very fine, fine to coarse, incoherent, reddish gray	70	1160
Ironton-Galesville Sandstone		
Sandstone, partly dolomitic, white to pink, very fine to medium, some coarse to very coarse, mostly incoherent	130	1290
Eau Claire Formation		
Shale, partly sandy, slightly glauconitic, slightly dolomitic, greenish gray to gray, little buff, weak	130	1420
Sandstone, silty, dolomitic, white to light		

Strata (continued)	Thickness (ft)	Depth (ft)
buff, very fine to coarse, little sooty; little shale and dolomite	85	1505
Dolomite, sandy, very silty, buff to gray very fine to fine, crystalline; little sandstone	65	1570
Sandstone, slightly dolomitic, slightly glauconitic, silty, gray to white, little sooty, fine to medium, little coarse to very coarse, incoherent to compact, rounded to subrounded, little subangular	230	1800
Mt. Simon Sandstone (?)		
Sandstone, silty, white to gray, medium to coarse, little very fine to fine, some very coarse and granules, rounded to subangular, little very sooty, little dolomite, glauconite; little shale, buff to gray, brittle, micaceous	45	1845

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007065) is for a water sample from the well collected March 17, 1976.

WELL NO. 2, LABORATORY NO. C007065

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.0		Silica	SiO_2	8	
Manganese	Mn	0.02		Fluoride	F	0.7	0.04
Ammonium	NH_4	0.58	0.03	Boron	B	0.2	
Sodium	Na	15	0.65	Nitrate	NO_3	0.6	0.01
Potassium	K	11.8	0.30	Chloride	Cl	5	0.14
Calcium	Ca	64	3.19	Sulfate	SO_4	65	1.35
Magnesium	Mg	26	2.14	Alkalinity (as $CaCO_3$)		256	5.12
Arsenic	As	0.000					
Barium	Ba	0.0		Hardness (as $CaCO_3$)		268	5.36
Copper	Cu	0.03					
Cadmium	Cd	0.00		Total dissolved minerals		354	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)		8.3	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*		39.1	
Silver	Ag	0.00		±deviation		5.3	
Cyanide	CN	0.00		Beta *pc/l*		34.3	
Zinc	Zn	0.04		±deviation		2.8	

A 14-in. diameter hole was drilled to a depth of 583 ft and finished 10 in. in diameter from 583 to 1845 ft. The well is cased with 14-in. OD pipe from 1.2 ft above the pumphouse floor to a depth of 185 ft and 10-in. ID pipe from 1.2 ft above the pumphouse floor to a depth of 583 ft (cemented in).

At the initial depth of 1311 ft, a production test was conducted by the driller on July 18, 1951. After 6 hr of pumping at rates of 76 to 141 gpm, the drawdown was 104 ft from a nonpumping water level of 216 ft below land surface.

. After the well was deepened from 1311 to 1570 ft, a production test was conducted by the driller on May 15, 1952. After 6.5 hr of pumping at rates of 138 to 297 gpm, the final drawdown was 136 ft from a nonpumping water level of 207 ft below land surface.

The McCullough Tool Co. reportedly logged and shot the well in January 1959 at four levels. Two hundred and fifty shots were set off at two per ft as follows: 1790-1760 ft, 1734-1714 ft, 1684-1674 ft, and 1480-1415 ft.

In March 1959 at the final depth, the well reportedly produced 590 gpm for 7 hr from a nonpumping water level of 247 ft below land surface.

The pumping equipment presently installed is a Layne turbine pump set at 550 ft, rated at 500 gpm at about 650 ft TDH, and powered by a 100-hp 1800 rpm Fairbanks-Morse electric motor.

WELL NO. 3, finished in sand and gravel, was completed in March 1952 to a depth of 173 ft by the Henry Boysen Co., Libertyville. The well is located at John Mogg Road near Route 120, approximately 800 ft S and 2750 ft W of the NE corner of Section 31, T45N, R11E. The land surface elevation at the well is approximately 815 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	140	140
Clean gravel	32	172
Clay	1	173

A 6-in. diameter hole was drilled to a depth of 173 ft. The well is cased with 6-in. pipe from 1.5 ft above the pumphouse floor to a depth of 160 ft followed by 13 ft of 6-in. Cook screen. The screened section consists of 6.5 ft of No. 14 slot followed by 6.5 ft of No. 16 slot. The well casing is cemented in a 10-in. steel pipe to a depth of 15 ft.

Upon completion, during pumping at a rate of 162 gpm, the drawdown was 7.5 ft from a nonpumping water level of 97.0 ft below land surface.

On December 17, 1952, the driller reported pumping at a rate of 201 gpm with a drawdown of 6 ft from a nonpumping water level of 108 ft below the pump base.

On December 9, 1963, the nonpumping water level was reported to be 128 ft.

The pumping equipment presently installed consists of a 20-hp 1800 rpm U.S. electric motor (Serial No. 2199948), a 6-in., 24-stage Cook turbine pump (No. C272377LAW) set at 150 ft, rated at 325 gpm, and has 150 ft of 4-in. column pipe. The well is equipped with 150 ft of airline.

The following mineral analysis (Lab. No. 195909) is for a water sample from the well collected June 12, 1974, after 15 min of pumping.

WELL NO. 3, LABORATORY NO. 195909

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.2		Silica	SiO_2	16.1	
Manganese	Mn	0.00		Fluoride	F	1.1	
Ammonium	NH_4	0.4	0.02	Boron	B	0.5	
Sodium	Na	53.7	2.34	Nitrate	NO_3	0.1	0.00
Potassium	K	1.1	0.03	Chloride	Cl	2	0.06
Calcium	Ca	29.2	1.46	Sulfate	SO_4	131.0	2.72
Magnesium	Mg	19.2	1.58	Alkalinity (as $CaCO_3$)		134	2.68
Strontium	Sr	1.04	0.02				
Barium	Ba	<0.1		Hardness (as $CaCO_3$)		152	3.04
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		337	
Chromium	Cr	0.00					
Lead	Pb	<0.05		Turbidity		0	
Lithium	Li	0.01		Color		0	
Nickel	Ni	<0.05		Odor		0	
Zinc	Zn	0.00		Temp.		53 F (reported)	

WELL NO. 4 (Idlewild Well No. 1), open to the Cambrian-Ordovician aquifer, was completed in July 1970 to a depth of 1320 ft by the Hoover Water Well Service, Zion. The well is located on Gages Lake Road, approximately 750 ft S and 2550 ft W of the NE corner of Section 30, T45N, R11E. The land surface elevation at the well is approximately 795 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	278	278
Silurian dolomite	105	383
Maquoketa shale	204	587
Galena-Platteville dolomite	289	876
St. Peter Sandstone	186	1062
Trempealeau dolomite	46	1108
Franconia sandstone	70	1178
Ironton-Galesville sandstone	132	1310
Eau Claire shale	10	1320

A 20-in. diameter hole was drilled to a depth of 640 ft, reduced to 16 in. between 640 and 1055 ft, reduced to 12 in. between 1055 and 1085 ft, and finished 10 in. in diameter from 1085 to 1 320 ft. The well is cased with 20-in. OD pipe from 2 ft above land surface to a depth of 279 ft, 16-in. OD pipe from 2 ft above land surface to a depth of 640 ft (cemented in), a 12-in. ID liner from 846 ft to a depth of 1055 ft, and a 10-in. ID liner from 1035 ft to a depth of 1085 ft. The well was shot and developed with 100 lb of 100 percent Fast-Gel.

A production test was conducted by the driller on July 13-14, 1970. After 24 hr of pumping at rates of 150 to 550 gpm, the final drawdown was 116.3 ft from a nonpumping water level of 377.2 ft below land surface. One hr after pumping was stopped, the water level had recovered to 392.8 ft.

The pumping equipment presently installed is a Layne turbine pump set at 485 ft, rated at 650 gpm, and powered by a 125-hp U.S. electric motor or a 6-cylinder natural gas engine.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B105639) is for a water sample from the well collected November 27, 1973, after pumping at 530 gpm. The iron content on a previous sample was 0.2 mg/1.

WELL NO.4, LABORATORY NO. B105639

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	1.0		Silica	SiO_2	9	
Manganese	Mn	0.00		Fluoride	F	1.4	0.07
Ammonium	NH_4	0.3	0.02	Boron	B	0.6	
Sodium	Na	20	0.87	Nitrate	NO_3	0.0	0.00
Potassium	K	3.4	0.09	Chloride	Cl	7	0.20
Calcium	Ca	70	3.49	Sulfate	SO_4	52	1.08
Magnesium	Mg	20	1.65	Alkalinity (as $CaCO_3$)		252	5.04
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		258	5.16
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved minerals		355	
Chromium	Cr	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000		pH (as rec'd)	7.7		
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha *pc/l*	7.3		
Silver	Ag	0.00		±deviation	2.4		
Cyanide	CN	0.00		Beta *pc/l*	17.5		
Zinc	Zn	0.00		±deviation	2.4		

WIIMTHROP HARBOR

The village of Winthrop Harbor (4794) installed a public water supply in 1902. One well (No. 6) is in use and two other wells (Nos. 4 and 5) are available for emergency use. In 1958, the groundwater supply was supplemented with water from the Zion-Benton Treatment Plant of the Lake County Public Water District. This supply is cross connected with the city of Zion. In 1949 there were 300 services, all but 6 metered; the average daily pumpage was 200,000 gpd. In 1972 there were 932 services, all metered; the combined average daily pumpage was 235,616 gpd. The water from Well No. 6 is chlorinated and treated with polyphosphate to keep iron in solution. The natural fluoride concentration of the water from this well is adequate to satisfy state requirements.

Water was first obtained from a well drilled in 1908 to a depth of 200 ft and cased to rock with 3-in. diameter pipe. The well flowed when it was drilled. Nonpumping water levels were reported to be 12 ft in 1912 and 22 ft in 1922. This well was abandoned about 1912.

WELL NO. 1, finished in Silurian dolomite, was completed in 1912 to a depth of 159 ft. This well was abandoned and capped prior to 1956. The well was located about 120 ft north of Main St. and 150 ft west of Sheridan Road, approximately 1135 ft S and 480 ft E of the NW corner of Section 10, T46N, R12E. The land surface elevation at the well is approximately 640 ft.

The well was cased with 6-in. pipe from 0.1 ft above the pumphouse floor to a depth of 90 ft.

Upon completion, the nonpumping water level was reported to be 12 ft.

A mineral analysis of a sample (Lab. No. 107585) collected September 4, 1946, after pumping for 5 hr at 40 gpm, showed the water to have a hardness of 95 mg/1, total dissolved minerals of 262 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 2, open to the Silurian dolomite, Galena-Platteville Dolomite, and Glenwood-St. Peter Sandstone, was completed in September 1926 to a depth of 957 ft by the W. L. Thorne Co., DesPlaines. This well was abandoned and capped prior to 1949. The well was located 250 ft south of Main St. on the east side of Kirkwood Ave., approxi-

mately 1500 ft S and 250 ft W of the NE corner of Section 9, T46N, R12E. The land surface elevation at the well is approximately 650 ft.

A 12-in. diameter hole was drilled to a depth of 632 ft and finished 10 in. in diameter from 632 to 957 ft. The well was cased with 12-in. pipe from land surface to a depth of 152.8 ft and a 10-in. liner from 278 ft to a depth of 632 ft.

Upon completion, the well reportedly produced 75 gpm with a drawdown of 186 ft from a nonpumping water level of 39 ft below land surface.

A mineral analysis of a sample (Lab. No. 107586) collected September 4, 1946, showed the water to have a hardness of 123 mg/1, total dissolved minerals of 354 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 3, open to the Silurian dolomite, Galena-Platteville Dolomite, and Glenwood-St. Peter Sandstone, was completed in 1943 to a depth of 1015 ft by the W. J. Fulton Engineering Co., Waukegan. This well was abandoned and capped in 1957. The well was located about 160 ft north of Main St. and 275 ft east of Sheridan Road, approximately 1100 ft S and 900 ft E of the NW corner of Section 10, T46N, R12E. The land surface elevation at the well is approximately 630 ft.

An 8-in. diameter hole was drilled to a depth of 680 ft and finished 6 in. in diameter from 680 to 1015 ft. The well was cased with 8-in. steel pipe from 1.5 ft above the pumphouse floor to a depth of 118 ft and a 6-in. liner from 365 ft to a depth of 680 ft.

Upon completion, the well reportedly produced 60 gpm for 8 hr with a drawdown of 174 ft from a nonpumping water level of 36 ft below the pump base.

A mineral analysis of a sample (Lab. No. 107587) collected September 5, 1946, after pumping for 22.5 hr at 100 gpm, showed the water to have a hardness of 254 mg/1, total dissolved minerals of 439 mg/1, and an iron content of 0.8 mg/1.

WELL NO. 4, finished in sand and gravel, was completed in 1948 to a depth of 138 ft by Ausherman & Clark, Zion. This well is maintained for emergency use. The well is located just northeast of the intersection of Sixth and College Sts., approximately 300 ft S and 300 ft W of the NE corner of Section 9, T46N, R12E. The land surface elevation at the well is approximately 648 ft.

An 8-in. diameter hole was drilled to a depth of 138 ft. The well is cased with 8-in. pipe from 2 ft above the pumphouse floor to an approximate depth of 128 ft followed by about 10 ft of screen.

In 1953, the nonpumping water level was reported to be 20 ft.

A production test using five observation wells was conducted by the Hoover Water Well Service, Zion, on June 29-30, 1967. After 24 hr of pumping at a rate of 150 gpm, the drawdown was 60.98 ft from a nonpumping water level of 26.00 ft. Five hr after pumping was stopped, the water level had recovered to 34.67 ft.

The pumping equipment presently installed is a Johnston submersible pump set at 131 ft, rated at 150 gpm, and powered by a 15-hp U.S. electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B26605) of a sample collected January 5, 1976, after pumping for 1 hr at 150 gpm, showed the water to have a hardness of 145 mg/1, total dissolved minerals of 331 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 5, finished in Silurian dolomite, was completed in 1953 to a depth of 130 ft by Ausherman & Clark, Zion. This well is maintained for emergency use. The well is located close to the lake shore about 0.5 mile southeast of Well No. 4, approximately 2000 ft N and 2000 ft E of the SW corner of Section 10, T46N, R12E. The land surface elevation at the well is approximately 600 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	95	95
Limestone	35	130

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 02424) is for a water sample from the well collected October 25, 1971, after 1 hr of pumping at 150 gpm.

WELL NO. 5, LABORATORY NO. 02424

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	17	
Manganese	Mn	0.0		Fluoride	F	1.1	0.06
Ammonium	NH_4	0.35	0.02	Boron	B	0.6	
Sodium	Na	48	2.09	Nitrate	NO_3	0	
Potassium	K	0.5	0.01	Chloride	Cl	6.6	0.19
Calcium	Ca	22.4	1.12	Sulfate	SO_4	39	0.81
Magnesium	Mg	13	1.07	Alkalinity (as $CaCO_3$)		152	3.04
				Hardness (as $CaCO_3$)		104	
Barium	Ba	0.0		Total dissolved minerals		230	
Copper	Cu	0.0					
Cadmium	Cd	0.00		pH (as rec'd)		8.0	
Chromium	Cr	0.0		Radioactivity			
Lead	Pb	0.00		Alpha *pc/l*		0	
Mercury	Hg	<0.0005		±deviation		1	
Nickel	Ni	0.0		Beta *pc/l*		0	
Silver	Ag	0.0		±deviation		1	
Zinc	Zn	0.0					

An 8-in. diameter hole was drilled to a depth of 95 ft and finished 6 in. in diameter from 95 to 130 ft. The well is cased with 8-in. pipe from 1 ft above land surface to a depth of 95 ft.

In 1959, the well reportedly produced 250 gpm with a drawdown of 50 ft from a nonpumping water level of 10 ft below the top of the casing.

A production test was conducted by the Hoover Water Well Service, Zion, on April 12, 1966. After 5.8 hr of pumping at a rate of 156 gpm, the drawdown was 66.3 ft from a nonpumping water level of 1.7 ft. After this test the well was acidized and tested again on June 7, 1966. After 8 hr of pumping at a rate of 200 gpm, the drawdown was 92.58 ft from a nonpumping water level of 6.58 ft.

The pumping equipment presently installed consists of a 15-hp Sta-Rite electric motor, a Sta-Rite submersible pump set at 108 ft, rated at 90 gpm, and has 108 ft of 3-in. column pipe.

WELL NO. 6, open to the Cambrian-Ordovician aquifer and Eau Claire Formation, was completed in September 1969 to a depth of 1500 ft by the Hoover Water Well Service, Zion. This well was placed in service in November 1971. The well is located just south of Ninth St. on West Broadway in the south end of the Public Works garage, approximately 2100 ft N and 300 ft W of the SE corner of Section 8, T46N, R12E. The land surface elevation at the well is approximately 690 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Glacial drift	136	136
Silurian limestone	211	347
Maquoketa shale	234	581
Galena-Platteville	299	880
Glenwood	40	920
St. Peter sandstone	80	1000
Trempealeau	92	1092
Franconia	92	1184
Ironton-Galesville sandstone	92	1276
Eau Claire	224	1500

A 20-in. diameter hole was drilled to a depth of 136 ft, reduced to 19 in. between 136 and 644 ft, reduced to 15 in. between 644 and 1085 ft, and finished 10 in. in diameter from 1085 to 1500 ft. The well is cased with 20-in. outer pipe from land surface to a depth of 136 ft, 16-in. inner pipe from land surface to a depth of 644 ft (cemented in), and 12-in. liner pipe from 884 ft to a depth of 1085 ft. The 12-in. liner pipe is slotted with 6- by 1/4-in. slots between 924 and 1004 ft.

A production test was conducted by the driller on September 25-26, 1969. After the well was pumped for three successive periods of 15 min each at rates of 150, 250, and 350 gpm, the drawdown was 124.5 ft. Pumping was continued for an additional 22.4 hr at a rate of 450 gpm with a final drawdown of 180.0 ft from a nonpumping water level of 202.0 ft below land surface. The water level recovered to 215.0 ft after pumping was stopped 1.2 hr. After this test the well was developed with 100 lb of 100 percent nitro gel. On January 5-6, 1970, after the well was pumped for four successive periods of 15 min each at rates of 300, 400, 500, and 600 gpm, the drawdown was 65.7 ft. Pumping was continued for an additional 22.3 hr at a rate of 700 gpm with a final drawdown of 96.3 ft from a nonpumping water level of 208.0 ft below land surface.

The pumping equipment presently installed consists of a 125-hp 1775 rpm U.S. Holloshaft electric motor, a 12-in., 7-stage Johnston vertical turbine pump set at 500 ft, rated at 700 gpm at about 410 ft TDH, and has 500 ft of 8-in. column pipe. A 10-ft section of 8-in. suction pipe is attached to the pump intake.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B108570) is for a water sample from the well collected March 19, 1973, after 2 hr of pumping at 825 gpm.

WELL NO. 6, LABORATORY NO. B108570

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.88	0.03	Silica	SiO_2	8	
Manganese	Mn	0.01	0.00	Fluoride	F	1.4	0.07
Ammonium	NH_4	0.3	0.02	Boron	B	0.30	
Sodium	Na	25.6	1.11	Nitrate	NO_3	0.0	0.0
Potassium	K	15	0.38	Chloride	Cl	8	0.23
Calcium	Ca	134	6.69	Sulfate	SO_4	205	4.26
Magnesium	Mg	16	1.32	Alkalinity (as $CaCO_3$)		258	5.16
Arsenic	As	0.00		Hardness (as $CaCO_3$)		400	8.00
Barium	Ba	0.0					
Copper	Cu	0.00		Total dissolved minerals		575	
Cadmium	Cd	0.00					
Chromium	Cr	0.00		pH (as rec'd)		7.5	
Lead	Pb	0.00		Radioactivity			
Mercury	Hg	0.0000		Alpha *pc/l*		33.2	
Nickel	Ni	0.00		± deviation		6.9	
Selenium	Se	0.00		Beta *pc/l*		34.6	
Silver	Ag	0.00		± deviation		4.2	
Zinc	Zn	0.00					

ZION

The city of Zion (17,268) installed a public water supply in 1928. A total of three production wells were utilized as a source of water supply until 1957 when the city began purchasing water from the Zion-Benton Treatment Plant (Lake County Public Water District). One well (No. 1) is maintained for emergency use. This supply is cross connected with Winthrop Harbor. In 1951 there were 1600 services, all metered; the average and maximum daily groundwater pumpages were 360,000 and 600,000 gpd, respectively. In 1973 there were 3815 services, all metered; the estimated average and maximum daily pumpages from the Water District were 1,624,000 and 2,400,000 gpd, respectively.

WELL NO. 1, open to sand and gravel, Silurian dolomite, Galena-Platteville Dolomite, and Glenwood-St. Peter Sandstone, was constructed in July 1926 to a depth of 1025 ft by Layne & Bowler, Chicago, and reportedly deepened in Janaury 1944 to a depth of 1100 ft by the Varner Well and Pump Co., Dubuque, Iowa. This well is available for emergency use. The well is located about 100 ft south of 27th St. and 100 ft west of Elisha Ave., approximately 1120 ft N and 510 ft W of the SE corner of Section 21, T46N, R12E. The land surface elevation at the well is approximately 633 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Surface	105	105
Gravel	25	130
Clay (surface)	33	163
Lime, white, soft	162	325
Shale, green	3	328
Shale, red, caves	2	330
Lime, gray	5	335
Lime, gray, hard	20	355
Lime, gray, soft	17	372
Shale, green	48	420
Lime, gray, hard	54	474
Shale, green	73	547
Lime, sandy, hard	18	565
Lime, sandy, soft	170	735
Lime, sandy, hard	20	755
Lime, sandy, soft	85	840
Sandstone	24	864
Lime	32	896
Sandstone, soft	127	1023
Shale, red	2	1025
Limestone	2	1027
Gray dolomite	8	1035
Brown lime rock and red shale	5	1040
Brown shale and sand	4	1044
Brown sand	21	1065
Brown limestone	15	1080
Brown sandstone	6	1086
Sandstone	7	1093
No record	7	1100

A 16-in. diameter hole was drilled to a depth of 163 ft, reduced to 15 in. between 163 and 575.5 ft, and finished 12 in. in diameter from 575.5 to 1100 ft. The well is cased with 16-in. OD pipe from land surface to a depth of 163 ft and 12-in. pipe from 313 ft to a depth of 575.5 ft. The 16-in. casing was slotted between 105 and 130 ft. When the hole was extended to 1100 ft, a section of 16-in. OD casing was welded to the top which brings the top of the casing 1.1 ft above the floor. In March 1954 a 10-in. liner was set from 307 ft to a depth of 376 ft.

Upon completion of the well at 1025 ft, the well was pumped for 4.4 hr at an average rate of 414 gpm. During a 48-hr test, a turbine pump set at a depth of 250 ft broke suction when pumping at 250 gpm. The nonpumping water level at this time was 31 ft below the top of the casing.

In September 1943 before deepening, the nonpumping water level was reported to be 90 ft below the top of the casing.

This well was deepened in 1944 and shot at depths of 925, 950, and 985 ft. After pumping for 18 hr at rates from 670 to 412 gpm, the final drawdown was 285 ft from a nonpumping water level of 65 ft below the pumphouse floor.

On April 15, 1948, the well reportedly produced 380 gpm for 2 hr with a drawdown of 229 ft from a nonpumping water level of 96 ft below the floor of the building.

Nonpumping water levels were reported as follows: 140 ft on January 19,1954; 160 ft on August 16, 1955; 132 ft on September 30, 1958; and 108.44 ft on October 31, 1962.

Monthly measurements of the nonpumping water levels during the period January 1963 to January 1975 ranged from about 110 to 215 ft, respectively below land surface.

The pumping equipment presently installed is a Johnston submersible turbine pump set at 420 ft, rated at about 325 gpm, and powered by a 50-hp 1800 rpm electric motor. The well is equipped with 420 ft of airline.

The following mineral analysis (Lab. No. 107588) is for a water sample from the well collected September 5, 1946, after 4.5 hr of pumping at 400 gpm.

WELL NO. 1, LABORATORY NO. 107588

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.9		Silica	SiO_2	11.6	
Manganese	Mn	0.0		Fluoride	F	1.6	
Calcium	Ca	92.0	4.60	Chloride	Cl	23.0	0.65
Magnesium	Mg	21.7	1.79	Nitrate	NO_3	0.5	0.01
Ammonium	NH_4	0.1	0.01	Sulfate	SO_4	151.0	3.14
Sodium	Na	56.1	2.44	Alkalinity (as $CaCO_3$)		252	5.04
				Hardness (as $CaCO_3$)		320	6.39
Turbidity	10			Total dissolved minerals		520	
Color	Tr						
Odor	0			Free CO_2		39 (calc.)	
Temp.	59.4 F (reported)			pH		7.2	

WELL NO. 2, finished in Silurian dolomite, was completed in 1932 to a depth of 220 ft. This well was abandoned and filled with concrete about 1968-1969. The well was located about 195 ft south of 27th St. at the southwest corner of Lebanon and Gabriel Sts., approximately 1150 ft N and 1800 ft E of the SW corner of Section 21, T46N, R12E. The land surface elevation at the well is approximately 655 ft.

A 10-in. diameter hole was drilled to a depth of 160 ft and finished 8 in. in diameter from 160 to 220 ft. The well was cased with 10-in. pipe from land surface to a depth of 160 ft.

A 24-hr production test was conducted on September 5, 1932. After 1.5 hr of pumping at a rate of 80 gpm, the pump broke suction. The pumping rate was decreased to 50 gpm for the remainder of the test and the final drawdown was 105 ft below a nonpumping water level of 12 ft below the pump base.

In May 1944 after acidizing, the well reportedly produced 50 gpm and had a nonpumping water level of 18 ft below the pump base.

The following mineral analysis (Lab. No. 107589) is for a water sample from the well collected September 5, 1946, after continuous pumping at 40 gpm.

WELL NO. 2, LABORATORY NO. 107589

		mg/l	me/l			mg/l	me/l
Iron (total)	Fe	0.1		Silica	SiO_2	17.4	
Manganese	Mn	0.0		Fluoride	F	1.0	
Calcium	Ca	15.0	0.75	Chloride	Cl	30.0	0.85
Magnesium	Mg	9.2	0.75	Nitrate	NO_3	0.1	Tr
Ammonium	NH_4	0.2	0.01	Sulfate	SO_4	112.3	2.34
Sodium	Na	93.8	4.08	Alkalinity (as $CaCO_3$)		120	2.40
				Hardness (as $CaCO_3$)		75	1.50
Turbidity	Tr			Total dissolved minerals		354	
Color	0						
Odor	M			Free CO_2		2 (calc.)	
Temp.	51.2 F (reported)			pH		8.2	

WELL NO. 3, open to the Silurian dolomite, Galena-Platteville Dolomite, and Glenwood-St. Peter Sandstone, was constructed in May 1935 to a depth of 995 ft by the J. P. Miller Artesian Well Co., Brookfield, and reportedly

deepened in December 1942 to a depth of 1023 ft by the Varner Well and Pump Co., Dubuque, Iowa. This well was filled and capped in 1958 by the J. P. Miller Artesian Well Co. The well was located on city-owned property at the northwest corner of Sheridan Road and 29th St., approximately 78 ft N and 137 ft W of the SE corner of Section 21, T46N, R12E. The land surface elevation at the well is approximately 629 ft.

A sample study log of Well No. 3 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
PLEISTOCENE SYSTEM		
Glacial till	125	125
"Sand and gravel, very little water"	5	130
Till	16	146
"Sand"	1	147
SILURIAN SYSTEM		
Niagaran-Alexandrian Series		
Dolomite	183	330
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale, some dolomite	230	560
Galena-Platteville Group		
Dolomite	303	863
Glenwood Formation		
Dolomite and sandstone, thin bed of shale	37	900
St. Peter Sandstone		
Sandstone	80	980
Conglomerate of chert and sand, shale at base	15	995
No record	28	1023

A 12.2-in. diameter hole was drilled to a depth of 564 ft, reduced to 10 in. in diameter from 564 and 995 ft, and finished *9.6* in. in diameter from 995 to 1023 ft. The well was cased with 12.2-in. ID pipe from land surface to a depth of 148.2 ft and a 10-in. liner from 309.7 ft to a depth of 564 ft.

It was reported that the well was originally shot in the St. Peter Sandstone at depths of 997, 960, and 925 ft.

A production test was conducted by the State Water Survey on May 15-16, 1935. After 24 hr of pumping at rates of 200 to 125 gpm, the final drawdown was 182 ft from a nonpumping water level of 33 ft below land surface.

After deepening, the well was shot at depths of 915, 945, and 980 ft, cleaned out, and a production test was conducted on December 15-16, 1942. The well was pumped at rates of 360 to 268 gpm for 18.1 hr and had a final drawdown of 235 ft from a nonpumping water level of 57 ft below the pump base.

On August 10, 1944, the well reportedly produced 350 gpm for 2 hr with a drawdown of 201.6 ft from a nonpumping water level of 75.4 ft below the top of the casing.

A mineral analysis of a sample (Lab. No. 100977) collected August 10, 1944, after pumping for 2 hr at 350 gpm, showed the water to have a hardness of 325 mg/1, total dissolved minerals of 573 mg/1, and an iron content of 0.5 mg/1.

ZION BENTON TREATMENT PLANT

The Zion Benton Treatment Plant (Lake County Public Water District) (est. 25,000) installed a public water supply in 1955. A total of two Ranney Collectors (now owned by the Commonwealth-Edison Co.) were utilized as a source of water supply from July 1957 through 1970. Since June 24, 1970, the Plant has obtained water from Lake Michigan. In 1962 the average daily pumpage from the collectors was 977,742 gpd. In 1973 there were 3 metered services which supply Zion and the Illinois Beach State Park full-time and Winthrop Harbor on a standby basis; the average and maximum daily pumpages from Lake Michigan were 1,750,000 and 2,630,000 gpd, respectively.

COLLECTOR WELL NO. 1, finished in lake sand, was constructed in November 1952 by the Ranney Water Supplies, Inc., Columbus, Ohio, and reconditioned in 1957 when one 8-in. lateral and two 12-in. laterals were added to the original installation. This collector well was phased out in 1970 and sold to the Commonwealth-Edison Co. and they have abandoned it. The collector well is located southeast of Zion, near the shore of Lake Michigan at the foot of Twenty-fifth St., approximately 2450 ft S and 1500 ft E of the NW corner of Section 23, T46N, R12E. The land surface elevation at the well is 584.0 ft.

The reinforced concrete caisson (13 ft ID by 16 ft OD) was constructed from 7.3 ft above land surface to an inside depth of 33 ft and set on an 0.8-ft thick concrete plug at the bottom. Two tiers of perforated (1-in. by 0.2-in. openings) steel pipe laterals were jacked out at depths of 19.7 and 22.7 ft below land surface. The diameters and lengths of the laterals are as follows:

A Tier - 22.7 ft deep

Lateral	*Diameter (in.)*	*Length (ft)*
A-1	8	200
A-2	8	72
A-3	8	80
A-4	8	80
A-5	8	184

B Tier - 19.7 ft deep

Lateral	*Diameter (in.)*	*Length (ft)*
B-1	12	47
B-2	12	76
B-3	12	104
B-4	8	264
B-5	8	96

On November 20, 1958, after 1 hr of pumping at a rate of 700 gpm, the drawdown was 7 ft from a nonpumping water

level of 15 ft below the pump base.

The following mineral analysis (Lab. No. 148254) is for a water sample from the well collected November 20, 1958, after pumping for 1 hr at 700 gpm.

COLLECTOR WELL NO. 1, LABORATORY NO. 148254

		mg/l	*me/l*			*mg/l*	*me/l*
Iron (total)	Fe	0.6		Silica	SiO_2	5.9	
Manganese	Mn	0.0		Fluoride	F	0.1	
Calcium	Ca	48.7	2.44	Boron	B	0.0	
Magnesium	Mg	17.5	1.44	Chloride	Cl	9	0.25
Ammonium	NH_4	Tr	Tr	Nitrate	NO_3	1.2	0.02
Sodium	Na	7	0.31	Sulfate	SO_4	36.4	0.76
				Alkalinity (as $CaCO_3$)		158	3.16
Turbidity		2		Hardness (as $CaCO_3$)		194	3.88
Color		0		Total dissolved minerals		224	
Odor		0					

COLLECTOR WELL NO. 2, finished in lake sand, was constructed in March-July 1959 by the Ranney Water Supplies, Inc., Columbus, Ohio. This collector well was phased out in 1970 and sold to the Commonwealth-Edison Co. and they have abandoned it. The collector well is located about 500 ft south and 60 ft east of Well No. 1, approximately 2950 ft S and 1560 ft E of the NW corner of Section 23, T46N, R12E. The land surface elevation at the well is approximately 585 ft.

The reinforced concrete caisson (13 ft ID by 16 ft OD) was constructed from above land surface to an inside depth of 23 ft and set on an 0.8-ft thick concrete plug at the bottom. One tier of perforated (1-in. by 0.2-in. openings) steel pipe laterals were jacked out at a depth of 15 ft below the top of the caisson. The diameters and lengths of the laterals are as follows:

A Tier — 15 ft deep

Lateral	*Diameter (in.)*	*Length (ft)*
A-1	12	120
A-2	12	144(24 ft blank)
A-3	12	88
A-4	12	204(100 ft blank)

Upon completion, the driller reported pumping for 36 hr at a rate of 700 gpm.

A partial analysis of a sample (Lab. No. 150131) made in August 1959, after pumping for 36 hr at 700 gpm, showed the water to have a hardness of 152 mg/1, total dissolved minerals of 182 mg/1, and an iron content of 0.6 mg/1.

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