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Public Groundwater Supplies in Stephenson County

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by Dorothy M. Woller, Karen L Kunz, and Ellis W. Sanderson

Introduction

This publication presents all available information on production wells used for public groundwater supplies in Stephenson 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 14 groundwater supplies furnishing water to 10 municipalities, 2 water companies, 1 utility district, and 1 state park in Stephenson 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.

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Groundwater Geology

The geology of Stephenson County is described generally in Illinois State Geological Survey Circular 207, *Groundwater in Northwestern Illinois,* and in Circular 490, *Glacial Drift Thickness in Illinois: Thickness and Character.* The following brief discussion of geologic conditions in the county is taken largely from these publications. More detailed information on the geology in this portion of the state is available from the State Geological Survey, which is located on the University of Illinois campus, Urbana-Champaign.

The unconsolidated materials forming most of the present-day land surface in Stephenson County vary in thickness and water-yielding character. Most of the county has less than 25 ft of glacial deposits with numerous bedrock exposures. Water-bearing sand and gravel generally do not occur with significant thickness or lateral distribution in the thin drift, but locally make up a significant portion of the fill in the preglacial bedrock valley system. Such a preglacial bedrock valley system (Pecatonica) is associated with the present Yellow Creek Valley west of Freeport and the Pecatonica River Valley north and east of Freeport. The valley system is filled with 50 to more than 100 ft of unconsolidated material including water-bearing sand and gravel deposits which are often suitable for development.

Beneath the glacial deposits, the upper bedrock formations consist principally of beds of dolomite (a limestone-like rock) and shale which dip about 10 to 50 ft per mile to the southwest. The rock formations underlying Stephenson County range in geologic age from Silurian to Precambrian (see the generalized stratigraphic sequence in figure 1).

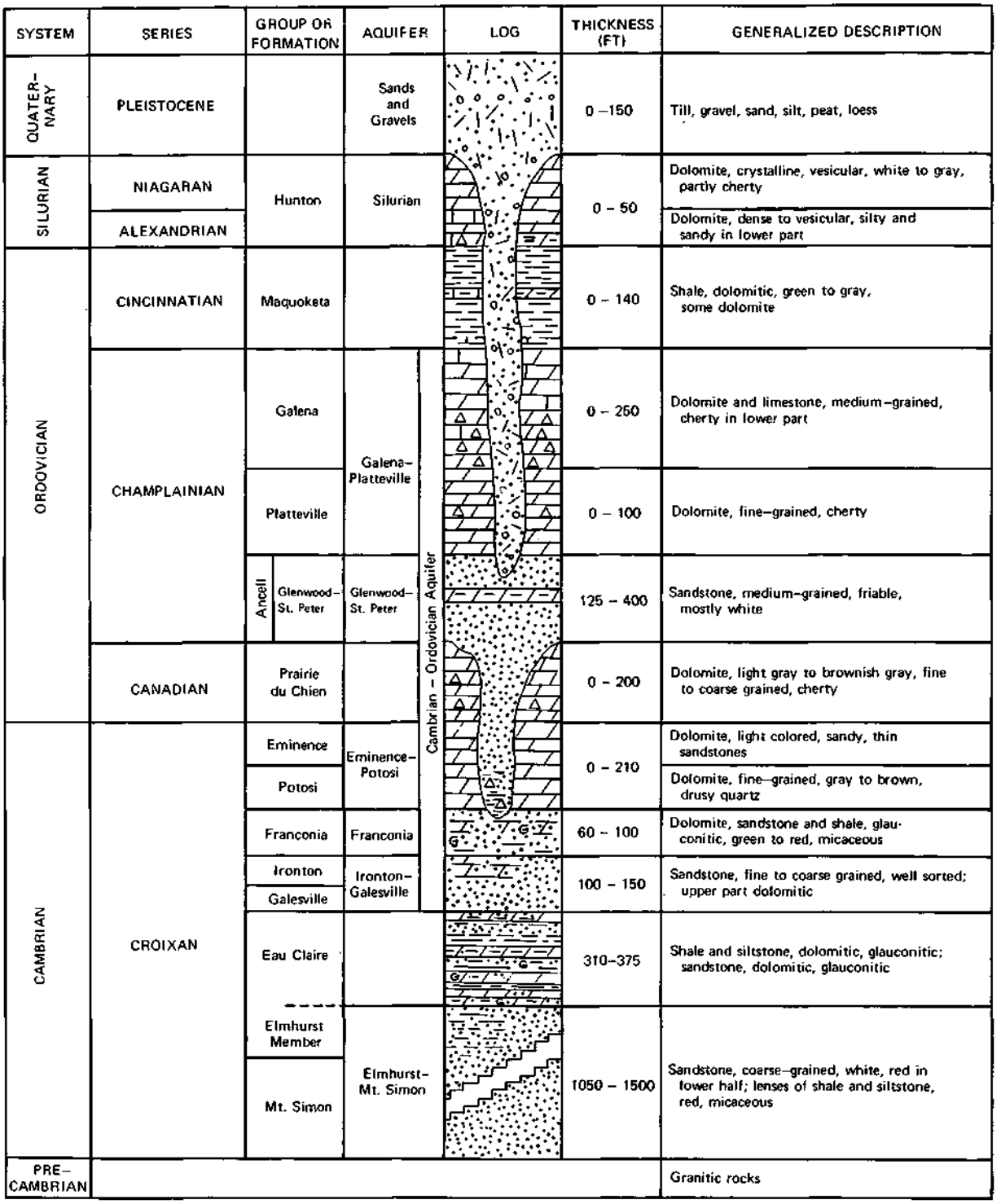

Figure 1. Generalized column of rock stratigraphic units and aquifers in Stephenson County

(Prepared by M. L. Sargent, Illinois State Geological Survey)

The Silurian dolomite occurs only in the southwest part of the county (see figure 2) where it underlies thin glacial drift and soils. This unit is part of the geohydrologic system referred to as the shallow dolomite aquifer. These rocks are encountered at land surface to depths of about 25 ft and range in thickness from a featheredge where they have been eroded down to the underlying Maquoketa Group, to about 50 ft in the southwestern part 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 penetrated by a well bore. Locally, the position of these rocks on high slopes allows large seasonal fluctuations of groundwater levels due to drainage to the valleys.

The Maquoketa Group (Ordovician age) underlies the Silurian dolomite in the southwestern part of the county and forms a ribbon-like area adjacent to the Silurian rocks. It is overlain by thin glacial drift where the Silurian rocks have been eroded. The Maquoketa units consist primarily of nonwater-bearing shales that separate the Silurian aquifer from deeper water-bearing units. These shales lie at or near land surface on the slopes, but may lie as much as 50 ft below land surface in the lowlands. The Maquoketa rocks are about 140 ft thick near the southwest corner of Stephenson County and thin to a featheredge to the northeast, exposing the underlying dolomites of the Galena-Platteville Groups. 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 this group.

Below the Maquoketa Group there is a thick sequence of hydrologically connected rocks called the Cambrian-Ordovician aquifer system. This aquifer system consists in downward order of the Galena and Platteville Groups, Glenwood-St. Peter Sandstone, Eminence-Potosi Dolomite, Franconia Formation, and Ironton-Galesville Sandstone. Where the Galena-Platteville is exposed at the surface, it is often included in the shallow dolomite aquifer system.

Dolomites of the Galena and Platteville Groups (Ordovician age) directly underlie the drift in most of Stephenson County and are present beneath the Maquoketa rocks in the southwest. The tops of these rocks lie at depths of less than 25 ft in most areas of the county to as much as 200 ft in the southwest. They are about 200 ft thick in the northeast, are absent in the Pecatonica River and Richland Creek Valleys, are about 100 ft thick near Freeport, and increase to a thickness of about 325 ft in the southwest areas where covered by the Maquoketa. Water from these dolomites is obtained from cracks and crevices, and where they lie directly beneath permeable sand and gravel deposits, their yield potential is enhanced.

The Glenwood-St. Peter Sandstone lies below the Galena and Platteville Groups except where erosion has exposed it in the valleys of the Pecatonica River and Richland Creek. This sandstone aquifer is encountered at depths from about 200 ft in the northeast to about 600 ft in the southwestern part of the county and generally ranges in thickness from about 300 to 400 ft. The Glenwood-St. Peter is one of the significant water-yielding units of the Cambrian-Ordovician aquifer.

Below the Glenwood-St. Peter lie the Eminence-Potosi Dolomite and the Franconia Formation (Cambrian age), which consists of interbedded sandstones, shales, and dolomites. These units are encountered at depths from about 425 ft in the northeast to more than 800 ft in the west, and have total thicknesses varying from about 200 to about 300 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.

The Ironton-Galesville Sandstone (Cambrian age) is the most consistently permeable and productive unit of the Cambrian-Ordovician aquifer system in northern Illinois. In Stephenson County it lies at depths from about 600 ft in the northeast to as much as 1200 ft in the southwest corner of the county, and varies in thickness from about 100 to 150 ft. The Ironton-Galesville is the principal water-yielding unit of the Cambrian-Ordovician aquifer system, probably contributing about 50 percent of the total yield.

The Eau Claire Formation lies below the Ironton-Galesville Sandstone. The upper and middle parts of the Eau Claire contain numerous beds of nonwater-bearing shales that separate the Cambrian-Ordovician aquifer system 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 Stephenson County this aquifer lies at depths of about 900 to 1500 ft, and ranges in thickness from about 1050 to 1500 ft. Water wells usually penetrate only a few hundred feet into this aquifer because the water quality deteriorates with depth due to increased mineral content.

Groundwater Development for Public Use

Groundwater is used as a source for 14 public water supplies serving Cedarville, Dakota, Davis, Freeport, German Valley, Lake Le-Aqua-Na State Park, Lena, Northern Hills Utility Co., Orangeville, Otter Creek Lake Utility District, Park Crest Water Co., Pearl City, Rock City, and Winslow. The locations of these supplies are shown in figure 3.

Unconsolidated sand and gravel deposits associated with the Pecatonica preglacial bedrock valley are tapped as a partial source of water at Freeport. There are presently 2 municipal production wells finished in this aquifer at depths of 133 and 113.5 ft. Their reported yields range from 1123 to 3762 gpm. Their production in 1980 was estimated to be

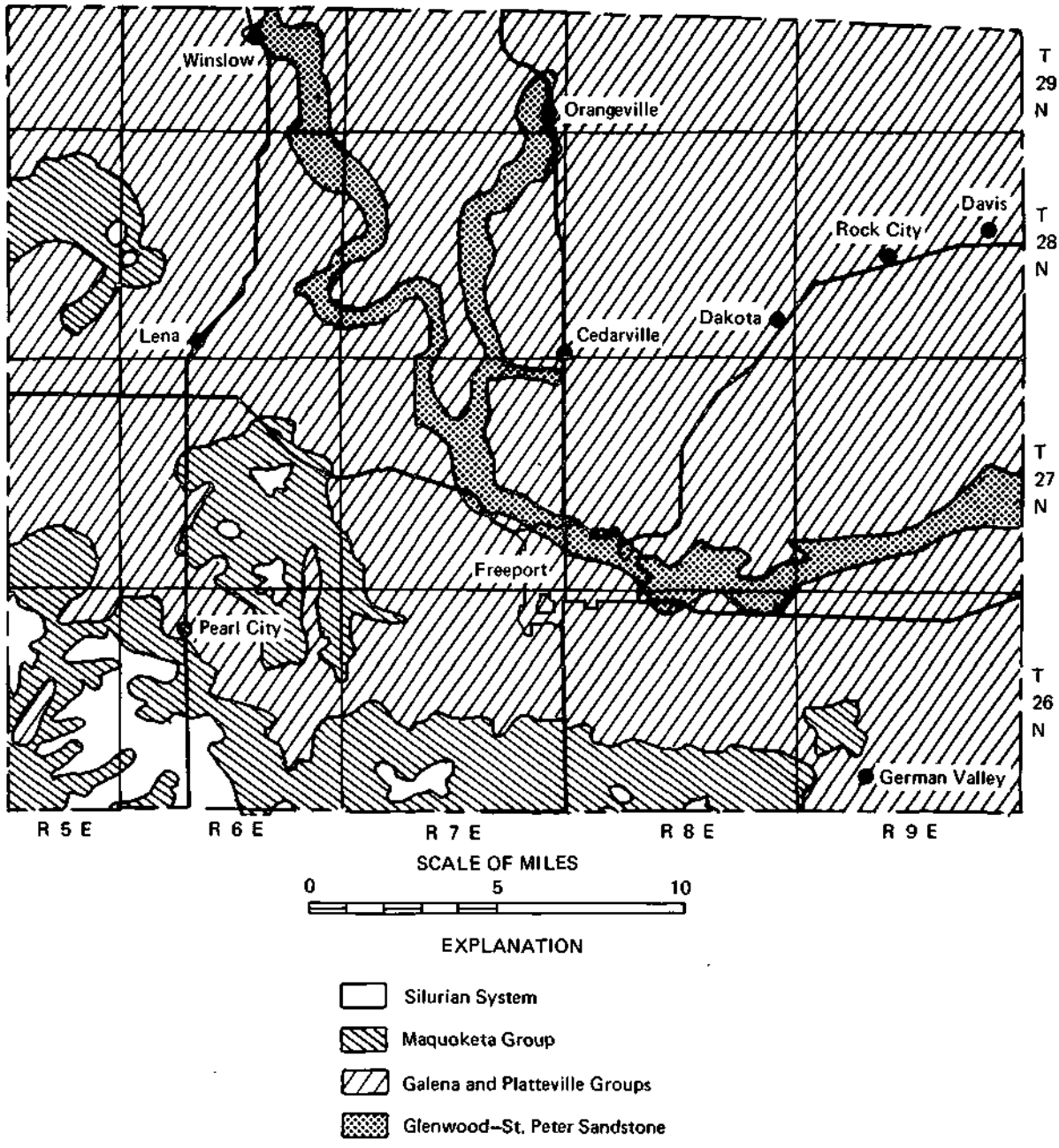

Figure 2. Areal geology of the bedrock surface
(Modified from Geologic Map of Illinois, Willman and others, 1967)

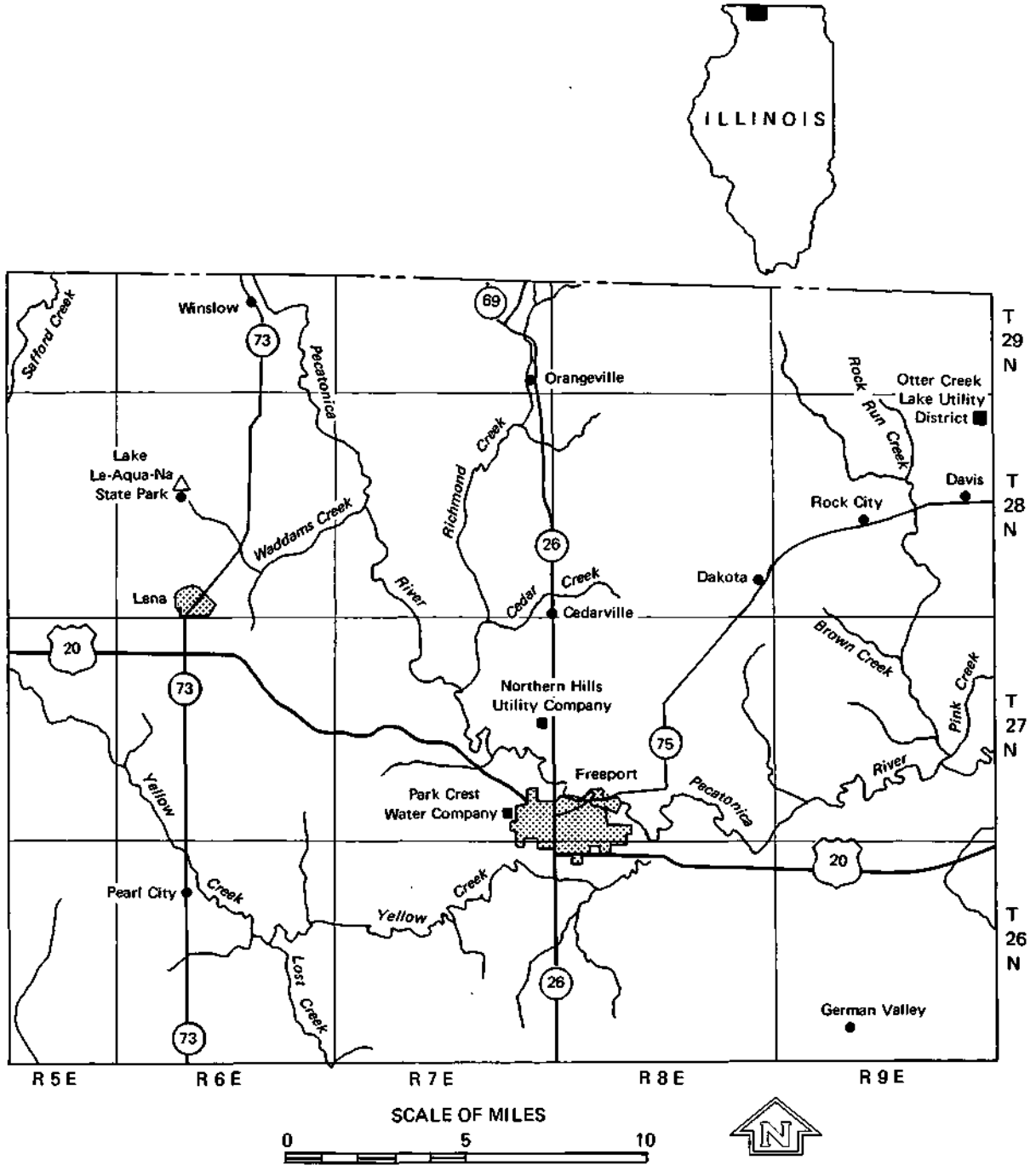

Figure 3. Locations of public groundwater supplies in Stephenson County

2,519,000 gpd. Analyses of water from these wells indicate that the iron content ranges from a trace to 4.0 mg/1, and the hardness from 370 to 5 32 mg/1. Water for Freeport is chlorinated, fluoridated, aerated, and filtered; in addition, the water from Well No. 5 is also treated with a polymer.

Wells tapping combinations of formations within the Cambrian-Ordovician aquifer system are used at all of the 14 public water supply systems. The Galena-Platteville dolomite, the uppermost unit of the Cambrian-Ordovician aquifer, is tapped at the Lake Le-Aqua-Na State Park as a source of all of their water supply. There are presently 6 production wells finished in this unit at depths ranging from 142 to 305 ft. Their reported yields range from 20 to 34 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 this unit in 1980 were estimated to be from 4000 to 9000 gpd. Analyses of water from wells tapping only the Galena-Platteville indicate that the iron content ranges from 0.0 to 0.7 mg/1, and the hardness from 319 to 472 mg/1. The water from Lake Le-Aqua-Na State Park Wells 2, 4, and 6 is chlorinated.

The Glenwood-St. Peter Sandstone and the overlying Galena-Platteville are tapped at Cedarville, Dakota, Davis, Lena, Northern Hills Utility Co., and Park Crest Water Co. as a source of all or a portion of their water supply. There are presently 7 production and standby wells for these 6 water systems finished in these formations at depths ranging from 284 to 604 ft. They are pumped at rates ranging from 50 to 492 gpm. Production from these wells in 1980 was estimated to be about 232,300 gpd. Analyses of water from these wells indicate that the iron content ranges from a trace to 2.9 mg/1, and the hardness from 286 to 576 mg/1. Water for Dakota, Northern Hills Utility Co., and Park Crest Water Co. is chlorinated and fluoridated; water for Davis is fluoridated; water for Cedarville is chlorinated, fluoridated, and treated with aquadene; and water for Lena is aerated, chlorinated, and fluoridated.

At 8 water systems there are presently 15 production and standby wells, ranging in depth from 190 to 668 ft, finished only in the Glenwood-St. Peter Sandstone of the Cambrian-Ordovician aquifer system. These wells are pumped at rates of 56 to 1850 gpm. Production from these wells in 1980 was estimated to be 3,029,000 gpd. Analyses of water from these wells indicate that the iron content ranges from a trace to 2.8 mg/1, and the hardness from 266 to 504 mg/1. The barium content of water from 1 well ranged from 4.4 to 5.6 mg/1. Hydrogen sulfide gas also was noted in water from 1 well. Water for Otter Creek Lake Utility District and Pearl City is chlorinated and fluoridated; water for Orangeville is fluoridated; and the water for German Valley is aerated, chlorinated, fluoridated, filtered, and zeolite-softened.

Rock City Well No. 1 penetrates the Glenwood-St. Peter Sandstone and is also open to the Eminence-Potosi Dolomite. This well is 430 ft deep and reportedly yields from 155 to 318 gpm. The estimated production from this well was 21,000 gpd in 1980. The analyses of water from this well show the iron content to range from a trace to 0.2 mg/l, and the hardness from 248 to 276 mg/1. The water from this well is chlorinated and fluoridated.

Winslow Well No. 2 also penetrates the Glenwood-St. Peter Sandstone and is also open to the Oneota Dolomite. This well is 355 ft deep and reportedly flows at rates of 200 to 500 gpm. The estimated production from this well was 28,900 gpd in 1980. Analyses of water from this well indicate that the iron content ranges from a trace to 0.5 mg/1, and the hardness from 296 to 332 mg/1. Hydrogen sulfide gas was also noted in the water from this well. Water for Winslow is fluoridated and chlorinated.

All the units of the Cambrian-Ordovician aquifer are tapped by Lena Well No. 2. This well is 998 ft deep and reportedly yields from 100 to 330 gpm. The estimated production from this well was 112,700 gpd in 1980. Analyses of water from this well indicate that the iron content ranges from a trace to 0.5 mg/1, and the hardness from 400 to 472 mg/1.

The total public water supply pumpage in Stephenson County for 1980 was about 5,949,000 gpd. Of this total approximately 42.3 percent (2,519,000 gpd) was obtained from sand and gravel aquifers, and 57.7 percent (3,430,000 gpd) from formations of the Cambrian-Ordovician aquifer.

Format

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

At the beginning of each description the population (as determined by the 1970 U.S. Census) 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 re-

ported by drillers usually are calciferous 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. 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.

Abbreviations Used

est.	estimated
ft.	foot (feet)
gpd.	gallons per day
gpm.	gallons per minute
hp.	horsepower
hr.	hour(s)
ID.	inside diameter
in.	inch(es)
Lab.	laboratory
me/1.	milliequivalents per liter
mg/1.	milligrams per liter
min.	minute(s)
No.(s).	number(s)
OD.	outside diameter
pc/1.	picocuries per liter
R.	range
rpm.	revolutions per minute
T.	township
TDH.	total dynamic head

CEDARVILLE

The village of Cedarville (578) installed a public water supply in 1949. One well (No. 2) is in use and another well (No. 1) is available for emergency use. In 1950 there were 71 services, none metered; the average and maximum pumpages were 4000 and 5000 gpd, respectively. In 1980 there were 290 services, *99* percent metered; the average pumpage was 50,374 gpd. The water is chlorinated, fluoridated, and treated with aquadene.

WELL NO. 1, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in April 1949 to a depth of 401.5 ft by E. L. Niffenegger, Monroe, Wis. This well is available for emergency use. The well is located on the west side of Harrison St. between Oak and Cherry Sts., approximately 850 ft N and 475 ft W of the SE corner of Section 36, T28N, R7E. The land surface elevation at the well is approximately 870 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil and red clay	5	5
Red clay	5	10
Red clay, some gravel	15	25
Blue clay	43	68
Limestone-buff	42	110
Limestone-buff (layer of soft rock or clay at 112 to 113 ft)	5	115
Limestone-buff	17	132
Gray limestone	18	150
Buff limestone	5	155
Gray limestone	40	195
Sandy limestone-some shale	15	210
Sandstone-white	165	375
Sandstone-pink	15	390
Sandstone-brown	11.5	401.5

A 16-in. diameter hole was drilled to a depth of 110 ft, reduced to 12 in. between 110 and 200 ft, and finished 8 in. in diameter from 200 to 401.5 ft. The well is cased with 8-in. ID pipe from 2 ft above land surface to a depth of 138 ft (cemented in).

A production test was conducted on April 26, 1949, by representatives of the driller, the State Water Survey, and Baxter, Nelson and Woodman, Consulting Engineers. After 5.8 hr of intermittent pumping at rates of 68 to 310 gpm, the drawdown was 51.5 ft from a nonpumping water level of 71.5 ft below land surface. Intermittent pumping was continued for 6.3 hr at rates ranging from 255 to 203 gpm with a final drawdown of 39.5 ft. Eleven min after pumping was stopped, the water level had recovered to 81.5 ft.

On December 23, 1971, the well reportedly produced 200 gpm with a drawdown of 25 ft from a nonpumping water level of 68 ft.

The pumping equipment presently installed is a 7.5-in., 11-stage Aurora turbine pump (Serial No. 4185 3) set at 135 ft, rated at 200 gpm at about 240 ft head, and powered by a 20-hp 1800 rpm U.S. electric motor (Serial No. 774839).

A mineral analysis of a sample (Lab. No. 117974) collected during the initial production test, after pumping for 8.8 hr at rates of 68 to 310 gpm, showed the water to have a hardness of 576 mg/1, total dissolved minerals of 628 mg/1, and an iron content of 2.9 mg/1.

WELL NO. 2, open to the Glenwood-St. Peter Sandstone, was completed in December 1971 to a depth of 243 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located near the Village Community Center at the west end of Second St. west of Mill St., approximately 1830 ft N and 1700 ft W of the SE corner of Section 36, T28N, R7E. The land surface elevation at the well is approximately 840 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	3	3
Lime	178	181
Sandstone	62	243

A 36-in. diameter hole was drilled to a depth of 11 ft, reduced to 25 in. between 11 and 196 ft, and finished 17 ia in diameter from 196 to 243 ft. The well is cased with 36-in. pipe from land surface to a depth of 11 ft, and 18-in. steel pipe from land surface to a depth of 196 ft (cemented in).

On December 22-23, 1971, the well reportedly produced 236 gpm for 24 hr with a drawdown of 50 ft from a nonpumping water level of 64 ft.

The pumping equipment presently installed is an 11-stage Peerless vertical turbine pump (Serial No. 226824) set at 150 ft, rated at 250 gpm at about 333 ft TDH, and powered by a 30-hp 1750 rpm U.S. Holloshaft electric motor (Serial No. R-2937-02-D-922, R2054626).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B16577) is for a water sample from the well collected October 17, 1977, after 45 min of pumping at 290 gpm.

WELL NO. 2, LABORATORY NO. B16577

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.4		Silica	SiO_2	**11**	
Manganese	Mn	0.01		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	5	0.22	Cyanide	CN	0.00	
Potassium	K	0.7	0.02	Nitrate	NO_3	0.0	**O.00**
Calcium	Ca	62	3.09	Chloride	Cl	0.6	0.02
Magnesium	Mg	29	2.39	Sulfate	$S0_4$	19	**0.40**
				Alkalinlty(as$CaCO_3$)		260	5.20
Arsenic	As	0.00					
Barium	Ba	0.0					
Cadmium	Cd	0.00		Hardness	(as$CaCO_3$)	285	5.70
Chromium	Cr	0.00					
Copper	Cu	**0.01**		Total dissolved			
Lead	Pb	0.00		minerals		297	
Mercury	Hg	**0.0000**					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rac'd)		7.6	

DAKOTA

The town of Dakota (440) installed a public water supply in 1958. One well (No. 2) is in use and another well (No. 1) is available for emergency use. In 1958 there were 97 services, none metered; the average pumpage was 13,500 gpd. In 1980 there were 219 services, none metered; the average pumpage was 54,177 gpd. The water is fluoridated and chlorinated.

WELL NO. 1, open to the Glenwood-St. Peter Sandstone, was completed in July 1957 to a depth of 516 ft by the Peerless Service Co., Orion. This well is available for emergency use. The well is located about 1 block south of the elevated tank at the northeast corner of South Oak and West Davis Sts., approximately 335 ft S and 2515 ft E of the NW corner of Section 36, T28N, R8E. The land surface elevation at the well is approximately 940 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
"Red clay"	12	12
No sample	2	14
ORDOVICIAN SYSTEM		
Galena Group		
Dolomite, cherty light gray to buff, fine to very fine, crystalline	84	98
Dolomite, light gray to buff, very fine to fine, crystalline	35	133
Platteville Group		
Dolomite, buff to gray, very fine to fine, crystalline	87	220
Ancell Group		
Glenwood Formation		
Dolomite, very silty, argillaceous sandy, white to greenish gray	5	225
Dolomite, very sandy, silty, gray, extra fine, sandstone, very dolomitic, silty, gray, fine to coarse	22	247
Sandstone, white, fine to coarse rounded, frosted incoherent	8	255
St. Peter Sandstone		
Sandstone, slightly silty, light gray to white, very fine to medium, incoherent	245	500
"Red sandstone"	10	510
Sandstone, light purplish-gray, fine to coarse, incoherent	6	516

A 15-in. diameter hole was drilled to a depth of 249 ft and finished 10 in. in diameter from 249 to 516 ft. The well is cased with 10-in. pipe from 0.7 ft above land surface to a depth of 249 ft (cemented in).

A production test was conducted on September 4-5, 1957, by representatives of the driller, the town, the State Water Survey, and DeJong, Middaugh & Associates, Consulting Engineers. After 23.5 hr of pumping at rates ranging from 190 to 482 gpm, the drawdown was 63.5 ft from a nonpumping water level of 138.0 ft below the top of the casing. Pumping was continued for 1 hr at rates of 261 to 264 gpm with a final drawdown of 38.0 ft. Twenty-two min after pumping was stopped, the water level had recovered to 143.0 ft.

The pumping equipment presently installed is a Fairbanks-Morse Pomona turbine pump set at 200 ft, rated at 215 gpm, and powered by a 20-hp 1750 rpm Fairbanks-Morse electric motor (Model No. KZKV, Serial No. F310212).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B16842) of a sample collected October 20, 1975, after pumping for 30 min at 215 gpm, showed the water to have a hardness of 294 mg/1, total dissolved minerals of 279 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 2, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in October 1975 to a depth of 480 ft by the Allabaugh Well Co., Rockford. The well is located at the southeast corner of West Davis and South Clark Sts. about 1200 ft west of Well No. 1, approximately 375 ft S and 1325 ft E of the NW corner of Section 36, T28N, R8E. The land surface elevation at the well is approximately 930 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay, brown	12	12
Lime, buff	136	148
Lime, gray	80	228
Sandstone, white to 400 ft, brownish to buff to 480 ft	252	480

An 18-in. diameter hole was drilled to a depth of 150 ft and finished 9.9 in. in diameter from 150 to 480 ft. The well is cased with 18-in. steel pipe from land surface to a depth of 16 ft, and 12-in. steel pipe from 1.5 ft above land surface to a depth of 150 ft (cemented in).

Upon completion, the well reportedly produced 492 gpm for 8 hr with a drawdown of 47.0 ft from a nonpumping water level of 124.5 ft below land surface.

The pumping equipment presently installed is a Deming turbine pump set at 305 ft, rated at 340 gpm, and powered by a 50-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B26163) is for a water sample from the well collected December 19, 1977, after 30 min of pumping at 305 gpm.

WELL NO. 2, LABORATORY NO. B26163

		mg/l	*mell*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	11	
Manganese	Mn	0.01		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	5	0.22	Cyanide	CN	0.00	
Potassium	K	1.3	0.03	Nitrate	NO_3	0.0	0.00
Calcium	Ca	54	2.70	Chloride	Cl	1.5	0.04
Magnesium	Mg	36	2.96	Sulfate	$S0_4$	18	0.37
				Alkalinrty(as$CaCO_3$)		276	5.52
Arsenic	As	0.00					
Barium	Be	0.0					
Cedmium	Cd	0.00		Hardness	(as$CaCO_3$)	289	5.78
Chromium	Cr	0.00					
Copper	Cu	0.00		Total dissolved			
Lead	Pb	0.00		minerals		298	
Mercury	Hg	0.0001					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		PH {as rec'd)		7.6	

DAVIS

The village of Davis (525) installed a public water supply in 1955. One well (No. 1) is in use and another well (No. 2) is available for emergency use. In 1955 there were 100 services. In 1977 there were 194 services, none metered; the average and maximum pumpages were 39,740 and 110,000 gpd, respectively. The water is fluoridated.

WELL NO. 1, open to the Glenwood-St Peter Sandstone, was completed in February 1955 to a depth of 430 ft by the Allabaugh Well Co., Rockford. The well is located near the elevated tank on the west side of North Stanton St. south of East Carnifix St. and north of the Chicago, Milwaukee, St. Paul and Pacific RR, approximately 1950 ft N and 1200 ft E of the SW corner of Section 13, T28N, R9E. The land surface elevation at the well is approximately 900 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
No sample	5	5
ORDOVICIAN SYSTEM		
Galena Group		
Dolomite, yellow to buff, fine to medium, cherty near base	35	40
Dolomite, gray to buff, fine to medium, dark gray and red speckled, pyritic	12	52
Platteville Group		
Dolomite, gray to buff, fine to coarse, pyritic, some dark gray shale partings	90	142
Ancell Group		
Glenwood-St. Peter Sandstone		
Siltstone, light green, dolomitic, sandy	3	145
Sandstone, white to yellow brown, fine to coarse, dolomitic	7	152
Dolomite, yellow brown, sandy	3	155
Sandstone, white, fine to coarse, rounded to subrounded, frosted, incoherent	150	305
Sandstone, white, fine to medium, rounded to subrounded, frosted, mostly incoherent, some compacted with red to yellow shaly cement	25	330
Sandstone, white, fine to medium, rounded to subrounded, frosted, incoherent	25	355
Sandstone, white to pink, fine to coarse, rounded to subrounded, incoherent to compacted with red shaly cement	10	365
Shale, red to yellow brown, sandy	10	375
Sandstone, light pink to red, fine to coarse, incoherent to compact, shaly, some chert fragments	15	390
Chert, white to red, oolitic; siltstone, dark red shaly; sandstone as above	20	410
Sandstone, white, fine to coarse, rounded to subangular, incoherent to compact; some chert, white	10	420
Strata (continued)	*Thickness (ft)*	*Depth (ft)*
CAMBRIAN SYSTEM		
Potosi Dolomite		
Dolomite, light gray to pink, fine, sandy, silty, glauconitic	10	430

A 14-in. diameter hole was drilled to a depth of 37 ft, reduced to 13.2 in. between 37 and 200 ft, and finished 10 in. in diameter from 200 to 430 ft. The well is cased with 13.2-in. steel pipe from 2 ft above land surface to a depth of 37 ft, and 10-in. steel pipe from 2 ft above land surface to a depth of 200 ft (cemented in).

A production test was conducted on February 24-25, 1955, by representatives of the driller and the State Water Survey. After 5.1 hr of pumping at rates of 158 to 360 gpm, the drawdown was 43.67 ft from a nonpumping water level of 88.33 ft below the top of the casing. Pumping was continued for 19 hr at rates of 400 to 385 gpm with a drawdown of 52.50 ft. After a 36-min idle period, pumping was continued for 22 min at a rate of 540 gpm with a final drawdown of 66.67 ft. Thirty-seven min after pumping was stopped, the water level had recovered to 94.50 ft.

The pumping equipment presently installed consists of a 20-hp 1755 rpm Fairbanks-Morse electric motor (Serial No. 255782), and an 8-in., 10-stage Fairbanks-Morse Pomona turbine pump which is set at 140 ft, and rated at 250 gpm, and which has 140 ft of 5-in. column pipe. A 20-ft section of 5-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. B15550) is for a water sample from the well collected October 8, 1975, after 40 min of pumping at 175 gpm.

WELL NO. 1, LABORATORY NO. B15550

		mg/l	*me/I*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	12	
Manganese	Mn	0.00		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.3	0.02	Boron	B	0.3	
Sodium	Na	2.3	0.10	Cyanide	CN	0.00	
Potassium	K	0.9	0.02	Nitrate	NO_3	4.8	0.08
Calcium	Ca	61	3.04	Chloride	Cl	1	0.03
Magnesium	Mg	34	2.80	Sulfate	SO_4	9	0.19
				Alkalinity(as$CaCO_3$)		292	5.84
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as$CaCO_3$)		292	5.84
Cadmium	Cd	0.00					
Chromium	Cr	0.00		Total dissolved			
Copper	Cu	0.00		minerals		305	
Lead	Pb	0.00		pH (as rec'd)		8.0	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		4.9	
Selenium	Se	0.00		± deviation		2.1	
Silver	Ag	0.00		Beta *pc/l*		5.7	
Zinc	Zn	0.0		± deviation		1.8	

WELL NO. 2, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in June 1972 to a depth of 284 ft by the Lyons Well Drilling Co., Stockton. This well is available for emergency use. The well is located about 100 ft northwest of Well No. 1, approximately 1980 ft N and 1100 ft E of the SW corner of Section 13, T28N, R9E. The land surface elevation at the well is approximately 910 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	**20**	**20**
Limestone	**83**	**103**
Galena limestone	**112**	**215**
St. Peter sandstone	**69**	**284**

An 8-in. diameter hole was drilled to a depth of 104 ft and finished 6 in. in diameter from 104 to 284 ft. The well is cased with 6-in. steel pipe from 1 ft above land surface to a depth of 104 ft (cemented in).

Upon completion, the well reportedly produced 50 gpm for 2 hr with a drawdown of 8 ft from a nonpumping water level of 95 ft below land surface.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 189 ft, rated at 60 gpm, and powered by a 5-hp Sta-Rite electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B26350) is for a water sample from the well collected December 20, 1977, after 30 min of pumping at 60 gpm.

WELL NO. 2, LABORATORY NO. B26350

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.1		Silica	SiO_2	13	
Manganese	Mn	0.00		Fluoride	F	0.4	0.02
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	12	0.52	Cyanide	CN	0.00	
Potassium	K	2.9	0.07	Nitrate	NO_3	40	0.64
Calcium	Ca	74	3.69	Chloride	Cl	15	0.42
Magnesium	Mg	51	4.20	Sulfate	SO_4	43	0.89
				Alkalinity(as $CaCO_3$)		320	6.40
Arsenic	As	0.00					
Barium	Ba	0.0					
Cadmium	Cd	0.00		Hardness (as $CaCO_3$)		409	8.18
Chromium	Cr	0.00					
Copper	Cu	0.06		Total dissolved			
Lead	Pb	0.02		minerals		447	
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.6		pH (as rec'd)		7.3	

FREEPORT

The city of Freeport (27,736) installed a public water supply in 1882. The system was originally installed and owned by the Freeport Water Co. from 1882 to 1937. Six wells (Nos. 2, 3, 4, 5, 6, and 7) are in use. In 1951 there were 7226 services, 97 percent metered; the estimated average and maximum pumpages were 1,970,000 and 2,701,000 gpd, respectively. In 1980 there were 8657 services, all metered; the average pumpage was 5,215,373 gpd. The water is chlorinated, aerated, filtered, and fluoridated; in addition, the water from Well No. 5 is treated with a polymer.

Initially, water was obtained from a spring flowing from a bluff near the river on the north side of the city. When this supply became inadequate, it was supplemented for a period of about 3 to 4 years by water pumped directly from the Pecatonica River.

About twenty-five wells were drilled between 1890 and 1915 ranging in depth from 35 to 45 ft and 2.5 to 8 in. in diameter. All of these wells were abandoned and plugged by 1931. These wells were located in a line north of the filter house and extending westward about 300 ft. The filter house and pumping station are located north of the Illinois Central RR and near the end of Brick St., approximately 950 ft N and 1300 ft E of the SW corner of Section 30, T27N, R8E. The wells were all connected to a 16-in. suction pipe leading to a pump.

WELL NO. 1, open to the St. Peter Sandstone, was completed in 1900 to a depth of 265 ft. This well was abandoned in 1931 and sealed by December 1948. The well was located about 50 ft northeast of the pumping station, approximately 1050 ft N and 1330 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

The well was cased with 8-in. pipe to a depth of 150 ft. The hole was finished 6 in. in diameter at the bottom.

A mineral analysis of a sample (Lab. No. 19439) collected in July 1909 showed the water to have a hardness of 394 mg/l, total dissolved minerals of 414 mg/l, and an iron content of 0.7 mg/l.

WELL NO. 2, open to the St. Peter Sandstone, was constructed in 1914 to a depth of 303 ft by P. E. Millis, Byron, and deepened in 1962 to a reported depth of 415 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located west of the pumping station, approximately 1000 ft N and 600 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 763 ft.

Originally, the well was cased with 16-in. OD galvanized pipe from land surface to a depth of about 35 ft. After deepening in 1962, the hole was reported to be 16 in. in diameter to a depth of 150 ft, and 15 in. from 150 to 415 ft. The well was then cased with 14-in. pipe from 2 ft above land surface to a depth of 150 ft (cemented in).

In 1931, the well reportedly produced 1500 gpm with a drawdown of 12 ft from a nonpumping water level of 30 ft below land surface.

In 1934, after 18 hr of pumping at a rate of 1200 gpm, the drawdown was 8 ft from a nonpumping water level of 46 ft.

On November 14, 1947, the well reportedly produced 1130 gpm for 1 hr with a drawdown of 18 ft from a nonpumping water level of 25 ft below the top of the casing.

In January 1951, the nonpumping water level was reported to be 17 ft.

In 1962, this well was deepened and rehabilitated by the J. P. Miller Artesian Well Co., and new casing was installed. On July 24, 1963, the nonpumping v/ater level was reported to be 30 ft.

Nonpumping water levels reportedly ranged from 38 to 28 ft from January 3, 1964, to June 11, 1965.

On April 20, 1969, the well reportedly produced 1818 gpm for several hours with a drawdown of 140 ft from a nonpumping water level of 30 ft.

The pumping equipment presently installed is a Layne & Bowler turbine pump (Serial No. 44519) set at 200 ft, rated at 1620 gpm, and powered by a 100-hp 1770 rpm Westinghouse electric motor (Serial No. 1-5V1046).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B31545) of a sample collected February 6, 1977, after pumping for 1 hr at 1445 gpm, showed the water to have a hardness of 374 mg/1, total dissolved minerals of 430 mg/1, and an iron content of 0.4 mg/1.

WELL NO. 3, open to the St. Peter Sandstone, was completed in 1921 to a depth of 503 ft (reported to be 360 ft deep in 1940, 502 ft deep after rehabilitation in 1948, 500 ft deep in 1949, and cleaned to 400 ft in 1977) by P. E. Millis, Byron. The well is located about 40 ft east of the pumping station, approximately 1000 ft N and 1370 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Silt	34	34
ORDOVICIAN SYSTEM		
Galena and Platteville Groups, dolomites	96	130
Ancell Group		
Glenwood dolomite and sandstone	18	148
St. Peter Sandstone		
Sandstone, incoherent	262	410
Sandstone, partly incoherent, and chert	90	500
CAMBRIAN SYSTEM		
Potosi Dolomite	3	503

Originally, a 16-in. diameter hole was drilled to a depth of 400 ft and finished 8 in. in diameter from 400 to 503 ft. The well was originally cased with 16-in. galvanized pipe from land surface to a depth of 60 ft. After rehabilitation in 1948, the hole was reported to be 24 in. in diameter to a depth of 150 ft, and 15.2 in. from 150 to 502 ft. The well was then cased with 24-in. pipe from land surface to a depth of 60 ft, and 16-in. pipe from 2 ft above land surface to a depth of 150 ft (cemented in).

In 1921, the well reportedly produced 1500 gpm with a drawdown of 92 ft from a nonpumping water level of 20 ft.

In 1934, after 18 hr of pumping at a rate of 1200 gpm, the drawdown was 83 ft from a nonpumping water level of 26 ft.

About 1940, this well was shot to close the 8-in. hole and the well was then reported to be 360 ft deep.

In 1947, after pumping at a rate of 1750 gpm, the drawdown was 15 ft from a nonpumping water level of 25 ft.

In 1948, this well was rehabilitated by the J. P. Miller Artesian Well Co., Brookfield. The hole was reamed out and new casing was installed. The depth was then reported to be 502 ft.

A production test using one observation well was conducted by the J. P. Miller Artesian Well Co. on January 17-18, 1949. After 21 hr of pumping at rates ranging from 800 to 1200 gpm, the drawdown was 141 ft from a nonpumping water level of 32 ft. Pumping was continued for 4 hr at a rate of 1000 gpm with a final drawdown of 119 ft.

Nonpumping water levels were reported to be 16 ft in January 1951; 30 ft on July 24, 1963; 32 ft below land surface on September 1, 1963; and 34 ft below land surface on June 15, 1965.

On April 20, 1969, the well reportedly produced 1470 gpm for several hours with a drawdown of 147 ft from a nonpumping water level of 130 ft.

Monthly measurements of the nonpumping water level during the period January 1949 to April 1976 ranged from about 15 to 55 ft below land surface.

In November 1977, this well was cleaned out to 400 ft.

The pumping equipment presently installed consists of a 100-hp 1765 rpm General Electric motor (Model No. 12E4518, Serial No. PEJ6790744), and a 14-in., 3-stage Peerless turbine pump (Serial No. 50489) which is set at 200 ft and rated at 1600 gpm, and which has 200 ft of column pipe. The well is equipped with 200 ft of airline.

A mineral analysis of a sample (Lab. No. 185658) collected May 4, 1971, showed the water to have a hardness of 456 mg/1, total dissolved minerals of 508 mg/1, and an iron content of 0.6 mg/1.

WELL NO. 4, open to the St. Peter Sandstone, was constructed in June 1929 to a depth of 101 ft by the Ohio Well Drilling Co., Massillon, Ohio, and deepened in November 1947 to a depth of 446 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located near the northwest corner of the pumping station, approximately 950 ft N and 1050 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

A summary sample study log of Well No. 4 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY AND ORDOVICIAN SYSTEMS		
No record	100	100
No samples	15	115
ORDOVICIAN SYSTEM		
Platteville Group		
Dolomite, buff, gray, mottled, fine, few gray shale partings	15	130
Dolomite, sandy, buff, very fine	2	132
Ancell Group		
Glenwood Formation		
Dolomite, very sandy (very fine), argillaceous, white to light gray, lithographic, grading to sandstone, dolomitic, very fine, incoherent, compact, trace shale, sandy green	13	145
St. Peter Sandstone		
Sandstone, white, fine to coarse, incoherent, partly pyritic, compact	15	160
Sandstone, white, fine to medium, incoherent	10	170
Sandstone, white, fine to coarse, incoherent, pyritic at top	35	205
Sandstone, pink, fine to coarse, incoherent, few pyritic	35	240
Sandstone, white, fine to coarse, incoherent	60	300
Sandstone, white, fine to medium, incoherent	20	320
Sandstone, pink, fine to medium, incoherent	10	330
Sandstone, pink, red, fine to coarse, incoherent, few compact	30	360
Sandstone, pink, fine to medium, incoherent	10	370
Same, fine to coarse	10	380
Sandstone, yellow, medium to coarse, incoherent	15	395
Sandstone, light pink, fine to medium, incoherent	10	405
Sandstone, yellow, medium to coarse, incoherent	22	427
Sandstone, white, fine to coarse, incoherent, partly siliceous, red and yellow mottled, compact	19	446

The well was originally cased with 24-in. pipe from land surface to a depth of 80 ft and 20-in. pipe from 67.7 ft to a depth of 87.7 ft. The hole was finished 20 in. in diameter from 87.7 to 101 ft. In 1947 after the 20-in. pipe was removed and the well was deepened to 446 ft, the hole was reported to be 24 in. in diameter to a depth of 80 ft, 23 in. from 80 to 160 ft, and 15.2 in. from 160 to 425 ft. The casing was reported to be 24-in. pipe from land surface to a depth of 80 ft and 16-in. pipe from 2 ft above land surface to a depth of 160 ft (cemented in).

In 1934, the well reportedly produced 1000 gpm for 18 hr with a drawdown of 1 3 ft from a nonpumping water level of 37 ft.

In 1947, the J. P. Miller Artesian Well Co. removed the 20-in. pipe, deepened the well to a depth of 446 ft, and installed new 16-in. pipe. In November 1947, the nonpumping water level was reported to be 27 ft below the pump base.

Nonpumping water levels were reported to be 16 ft in January 1951 and 32 ft on July 24, 1963.

On April 18, 1969, after several hours of pumping at a rate of 1500 gpm, the drawdown was 114 ft from a nonpumping water level of 32 ft.

Monthly measurements of the nonpumping water level during the period January 1976 to March 1981 ranged from about 32 to 46 ft below land surface.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 34930) set at 164 ft, rated at 1680 gpm, and powered by a 100-hp 1800 rpm U. S. electric motor (Serial No. 84295 3).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B16076) of a sample collected October 14, 1975, after pumping for 7.5 hr at 1480 gpm, showed the water to have a hardness of 474 mg/1, total dissolved minerals of 533 mg/1, and an iron content of 0.8 mg/1.

A test well was constructed in 1950 to a depth of 133 ft by the J. P. Miller Artesian Well Co., Brookfield. The test well was located approximately 2200 ft N and 800 ft E of the SW corner of Section 30, T27N, R8E.

WELL NO. 5, finished in sand and gravel, was completed in January 1954 to a depth of 133 ft (effective depth) by the J. P. Miller Artesian Well Co., Brookfield. The well is located at the test well site about 1300 ft north of the filtration plant, approximately 2200 ft N and 850 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

A drillers log of Well No. 5 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay and river mud	29	29
Fine to medium sand, some limestone boulders larger than 6 in.	33	62
Fine sand and till	4	66
Fine to medium sand, streaks of till	39	105
Clean sand and gravel	28	133
St. Peter sandstone	4	137

A 42-in. diameter hole was drilled to a depth of 137 ft.

The well is cased with 20-in. pipe from land surface to a depth of 103 ft, followed by 30 ft of 20-in. Cater stainless steel screen. The annulus between the bore hole and the casing-screen assembly is filled with cement from 0 to 25 ft, with torpedo sand from 25 to 50 ft, and with gravel from 50 to 137 ft.

A production test was conducted by the Stannard Power & Equipment Co. on January 27-29, 1954. After 48 hr of intermittent pumping at rates ranging from 1123 to 3762 gpm, the final drawdown was 12.5 ft from a nonpumping water level of 25.0 ft. Fifty min after pumping was stopped, the water level had recovered to 26.8 ft.

On July 24, 1963, the nonpumping water level was reported to be 30 ft.

On April 21, 1969, after pumping at a rate of 3280 gpm for several hours, the drawdown was 10 ft from a nonpumping water level of 16 ft.

The pumping equipment presently installed is a Fairbanks-Morse Pomona turbine pump (Serial No. AS3606) set at 60 ft, rated at 3100 gpm, and powered by a 60-hp 1765 rpm Westinghouse electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B16568) is for a water sample from the well collected October 17, 1977, after 30 min of pumping at 3087 gpm.

WELL NO. 5, LABORATORY NO. B16568

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	2.8		Silica	SiO_2	16	
Manganese	Mn	0.32		Fluoride	F	0.2	O.01
Ammonium	NH_4	0.9	0.05	Boron	B	0.1	
Sodium	Na	18	0.78	Cyanide	CN	0.00	
Potassium	K	1.6	0.04	Nitrate	NO_3	0.0	0.00
Calcium	Ca	101	5.04	Chloride	Cl	46	1.30
Magnesium	Mg	44	3.62	Sulfate	SO_4	69	1.44
				Alkalinity(as $CaCO_3$)		335	6.70
Arsenic	As	0.00					
Barium	Ba	0.1					
Cadmium	Cd	0.00		Hardness (as $CaCO_3$)		452	9.04
Chromium	Cr	0.00					
Copper	Cu	0.01					
Lead	Pb	0.00		Total dissolved minerals		516	
Mercury	Hg	0.0001					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.4	

WELL NO. 6, open to the St. Peter Sandstone, was completed in June 1964 to a depth of 472 ft by the Wehling Well Works, Beecher. The well is located about 50 ft west of Well No. 5, approximately 2200 ft N and 800 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	20	20
Sand	20	40
Strata (continued)		
Sand and gravel	96	136
Sandstone	134	270
Sandstone, gray and white	45	315
Sandstone, red and pink	90	405
Sandstone, light brown	15	420
Sandstone, red	40	460
Limestone	12	472

A 20-in. diameter hole was drilled to a depth of 134 ft, reduced to 19 in. between 134 and 176 ft, and finished 15.2 in. in diameter from 176 to 472 ft. The well is cased with 20-in. pipe from land surface to a depth of 134 ft, and 16-in. pipe from 1.2 ft above land surface to a depth of 176 ft (cemented in).

A production test was conducted by the driller on June 30, 1964. After 7.4 hr of pumping at rates ranging from 1130 to 1850 gpm, the maximum drawdown was 160 ft from a nonpumping water level of 24 ft below the top of the casing. During this test, Wells 2, 3, and 5 were pumping intermittently.

In August 1965, the nonpumping water level was reported to be 34 ft.

On June 23, 1969, the well reportedly produced 1810 gpm with a drawdown of 140 ft from a nonpumping water level of 37 ft.

The pumping equipment presently installed is a 3-stage Byron Jackson turbine pump (Serial No. 721456) set at 200 ft, rated at 1700 gpm at about 192 ft TDH, and powered by a 100-hp 1800 rpm U. S. Holloshaft electric motor (Serial No. 1351740). The well is equipped with 200 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B16575) is for a water sample from the well collected October 17, 1977, after 3 hr of pumping at 1559 gpm.

WELL NO. 6, LABORATORY NO. B16575

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.6		Silica	SiO_2	12	
Manganese	Mn	0.05		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.2	0.01	Boron	B	0.1	
Sodium	Na	7	0.30	Cyanide	CN	0.00	
Potassium	K	1.4	0.04	Nitrate	NO_3	0.0	0.00
Calcium	Ca	86	4.29	Chloride	Cl	15	0.42
Magnesium	Mg	41	3.37	Sulfate	SO_4	47	0.98
				Alkalinity(as $CaCO_3$)		325	6.50
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		392	7.84
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Copper	Cu	0.01		Total dissolved minerals		416	
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.6	

WELL NO. 7, finished in sand and gravel, was completed in August 1979 to a depth of 113.5 ft by the Varner Well and Pump Co., Dubuque, Iowa. The well is located approximately 2175 ft N and 875 ft E of the SW corner of Section 30, T27N, R8E. The land surface elevation at the well is approximately 764 ft.

A drillers log of Well No. 7 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Clay	20	20
Fine sand	25	45
Sand, gravel and boulders to 115 ft	70	115
Clay	15	130
Limestone	1	131

A 42-in. diameter hole was drilled to a depth of 115 ft. The well is cased with 24-in. steel pipe from about 12 ft above land surface to a depth of 68.5 ft, followed by 45 ft of 24-in. No. 125 slot screen. The annulus between the bore hole and casing-screen assembly is filled with cement from 0 to 25 ft, with clay fill from 25 to 43 ft, and with gravel from 43 to 115 ft.

A production test was conducted by the driller on August 1, 1979. After 4 hr of pumping at rates of 3050 to 3000 gpm, the final drawdown was 18.9 ft from a nonpumping water level of 22.1 ft below the top of the casing. The water level recovered to 22.8 ft after pumping had been stopped for 1.5 hr.

A production test was conducted by the driller on May 15, 1980. After pumping at rates ranging from 2658 to 3538 gpm, the final drawdown was 15.5 ft from a nonpumping water level of 26.5 ft.

The pumping equipment presently installed consists of a 60-hp 1200 rpm vertical Holloshaft motor and a 19-in., 1-stage Layne turbine pump (Serial No. 92480) which is rated at 3000 gpm at about 61 ft TDH and has 65 ft of 12-in. column pipe. The well is equipped with 65 ft of airline.

A partial analysis of a sample (Lab. No. 211596) collected during the initial production test, after pumping for 3 hr at rates of 3050 to 3000 gpm, showed the water to have a hardness of 486 mg/1, total dissolved minerals of 600 mg/1, and an iron content of 1.1 mg/1.

GERMAN VALLEY

The village of German Valley (206) installed a public water supply in 1972. One well (No. 1) is in use and another well (No. 2) is available for emergency use. In 1973 there were 15 services, none metered; the average and maximum pumpages were 7000 and 10,000 gpd, respectively. In 1980 there were 141 services, all metered; the average pumpage was 24,932 gpd. The water is chlorinated, aerated, filtered, zeolite-softened, and fluoridated.

WELL NO. 1, open to the St. Peter Sandstone, was completed in October 1971 to a depth of 560 ft by the Allabaugh Well Co., Rockford. The well is located about 50 ft south of Fairview St. and 300 ft east of Bunker Hill Road, approximately 700 ft S and 380 ft E of the NW corner of Section 32, T26N, R9E. The land surface elevation at the well is approximately 900 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Hard clay	10	10
Sand, brown	5	15
Pea gravel and large stone to size 1 in.	7	22
Sand, brown	8	30
Limestone, brown	45	75
Limestone, gray	160	235
Dark brown lime	2	237
Limestone, gray, hard	114	351
Sandstone, white to gray	64	415
Sandstone, red	5	420
Sandstone, reddish	120	540
No record	20	560

A 15.2-in. diameter hole was drilled to a depth of 382 ft and finished 10 in. in diameter from 382 to 560 ft. The well is cased with 16-in. pipe from land surface to a depth of 30 ft, and 10-in. pipe from land surface to a depth of 382 ft (cemented in).

A production test was conducted by the driller on October 18-19, 1971. After 24.2 hr of pumping at a rate of 300 gpm, the final drawdown was 99 ft from a nonpumping water level of 170 ft. Twenty min after pumping was stopped, the water level had recovered to 190 ft.

The pumping equipment presently installed is a 6-in., 12-stage Peerless vertical turbine pump (Serial No. 220358) rated at 100 gpm at about 80 ft head, and powered by a 15-hp 1750 rpm General Electric motor (Model No. 5K-6228XH5A, Serial No. MGJ1222314).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B15548) is for a water sample from the well collected October 9, 1975, after 45 min of pumping at 112 gpm. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 1, LABORATORY NO. B15548

		mg/l	me/l			mg/l	me/I
Iron	Fe	0.9		Silica	SiO_2	10	
Manganese	Mn	0.00		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.7	0.04	Boron	B	0.3	
Sodium	Na	5.2	0.23	Cyanide	CN	0.00	
Potassium	K	2.8	0.07	Nitrate	NO_3	0.0	0.00
Calcium	Ca	64	3.19	Chloride	Cl	1	0.03
Magnesium	Mg	35	2.88	Sulfate	SO_4	5	0.10
				Alkalinity(as$CaCO_3$)		320	6.40
Arsenic	As	0.00					
Barium	Ba	5.0		Hardness (as$CaCO_3$)		304	6.08
Cadmium	Cd	0.00		Total dissolved minerals		322	
Chromium	Cr	0.00					
Copper	Cu	0.00					
Lead	Pb	0.00		pH (as rec'd)		8.1	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha pc//		6.9	
Selenium	Se	0.00		±deviation		1.9	
Silver	Ag	0.00		Beta pc//		9.1	
Zinc	Zn	0.0		± deviation		1.6	

WELL NO. 2 (former German Valley Cheese Co. well), open to the St. Peter Sandstone, was completed in 1957 to a depth of 429 ft by the Lyons Well Drilling Co., Stockton. This well is available for emergency use. The well is located at the northeast corner of Rock City and Church Roads, approximately 50 ft N and 150 ft E of the SW corner of Section 28, T26N, R9E. The land surface elevation at the well is approximately 820 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness {ft)*	*Depth (ft)*
Pit	3	3
Limestone	15	18
Black rock	22	40
Limestone	25	65
Galena lime	125	190
Platteville lime	100	290
Hard blue rock	14	304
St. Peter sand - blue	20	324
St. Peter sand - white	105	429

An 8-in. diameter hole was drilled to a depth of 330 ft and finished 6 in. in diameter from 330 to 429 ft. The well is cased with 6-in. ID pipe from land surface to a depth of 3 30 ft (cemented in).

Upon completion, the well reportedly produced 56 gpm for 5 min with very little drawdown from a nonpumping water level of 36 ft.

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

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B33248) of a sample collected February 23, 1976, after pumping for 5 hr at 50 gpm, showed the water to have a hardness of 309 mg/1, total dissolved minerals of 313 mg/1, and an iron content of 1.6 mg/1. Hydrogen sulfide was also apparent when this sample was collected.

LAKE LE-AQUA-NA STATE PARK

Lake Le-Aqua-Na State Park, located about 2 miles north of Lena, installed a public water supply in 1956. Six wells are in use. The average pumpage during the summer months is estimated to be from 4000 to 9000 gpd. The water from Wells 2, 4, and 6 is chlorinated.

WELL NO. 1, open to the Galena-Platteville dolomite, was completed in 1946 to a reported depth of 205 ft. This well serves a hydrant and the site superintendent's residence. The well is located on the west side of North Lake Road southwest of the site superintendent's residence, approximately 2700 ft N and 1130 ft E of the SW corner of Section 16, T28N, R6E. The land surface elevation at the well is approximately 945 ft.

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

The pumping equipment presently installed is a Mark submersible pump set at 150 ft, and powered by a l½-hp electric motor (No. 471501).

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B17005) of a sample collected October 18, 1977, after pumping for 30 min, showed the water to have a hardness of 472 mg/1, total dissolved minerals of 480 mg/1, and an iron content of 0.0 mg/1.

WELL NO. 2, open to the Galena-Platteville dolomite, was completed in 195 3 to a reported depth of 260 ft. This well serves the pavilion, drinking fountain, concession stand, and 3 hydrants in the Pine Ridge camping area. The well is located near the pavilion on the north side of the lake east of the boat dock, approximately 2350 ft N and 120 ft E of the SW corner of Section 16, T28N, R6E. The land surface elevation at the well is approximately 900 ft.

The well is cased with 6-in. pipe from about 0.5 ft above land surface to a depth of 185 ft.

On June 11, 1973, the nonpumping water level was reported to be 84 ft below land surface.

The pumping equipment presently installed is a Goulds submersible pump powered by a 2-hp 3450 rpm Franklin electric motor (No. 2821011301).

A partial analysis of a sample (Lab. No. 202854) collected August 4, 1976, showed the water to have a hardness of 328 mg/1, total dissolved minerals of 330 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 3, open to the Galena-Platteville dolomite, was completed about 1958 to a reported depth of 165 ft. This well serves a camping area. The well is located at the entrance to the trailer camping area on the north side of the lake west of the boat dock, approximately 3000 ft N and 2350 ft W of the SE corner of Section 17, T28N, R6E. The land surface elevation at the well is approximately 915 ft.

The well is cased with 2-in. pipe from about 0.5 ft above land surface to an unknown depth.

A hand pump is presently installed.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B15553) of a sample collected October 8, 1975, after pumping for 30 min, showed the water to have a hardness of 345 mg/1, total dissolved minerals of 351 mg/1, and an iron content of 0.3 mg/1.

WELL NO. 4, open to the Galena-Platteville dolomite, was completed in September 1971 to a depth of 305 ft by Jonas W. Martin, Oregon. This well serves a shower house and 6 hydrants in the trailer camping area. The well is located across the road from the shower house, approximately 3600 ft N and 2700 ft W of the SE corner of Section 17, T28N, R6E. The land surface elevation at the well is approximately 942 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Soil	1	1
Yellow limestone	47	48
Gray limestone	257	305

A 10-in diameter hole was drilled to a depth of 42 ft and finished 6 in. in diameter from 42 to 305 ft. The well is cased with 6-in. pipe from about 2 ft above land surface to a depth of 43 ft (cemented in). The top of the casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Goulds submersible pump set at 168 ft, and powered by a 3-hp 3480 rpm Franklin electric motor (No. 282-3021-301).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B13589) is for a water sample from the well collected September 18, 1978.

WELL NO. 4, LABORATORY NO. B13589

		mg/1	*me/1*			*mg/l*	*me/l*
Iron	Fe	0.70		Silica	SiO_2	17	
Manganese	Mn	0.01		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.4	0.02	Boron	B	0.1	
Sodium	Na	6	0.26	Cyanide	CN	0.00	
Potassium	K	0.6	0.02	Nitrate	NO_3	0.0	0.00
Calcium	Ca	78	3.89	Chloride	Cl	0.0	0.00
Magnesium	Mg	39	3.21	Sulfate	SO_4	1	0.02
				Alkalinity(as$CaCO_3$)		355	7.10
Arsenic	As	0.018					
Barium	Ba	0.3					
Cadmium	Cd	0.00		Hardness (as$CaCO_3$)		352	7.04
Chromium	Cr	0.00					
Copper	Cu	0.02		Total dissolved			
Lead	Pb	0.005		minerals		350	
Mercury	Hg	<0.00002					
Nickel	Ni	0.0					
Selenium	Se	<0.001					
Silver	Ag	0.00					
Zinc	Zn	0.03		pH (as rec'd)		7.2	

WELL NO. 5, open to the Galena-Platteville dolomite, was completed in 1947 to a depth of 142 ft by George A. Lyons, Stockton. This well serves the assistant ranger's residence. The well is located east of North Five Corners Road in the southwest corner of the park, approximately 100 ft N and 700 ft E of the SW corner of Section 17, T28N, R6E. The land surface elevation at the well is approximately 965 ft.

A summary sample study log of Well No. 5 furnished by the State Geological Survey follows:

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Soil	5	5
Silt, yellowish brown, noncalcareous	25	30
ORDOVICIAN SYSTEM		
Galena Group		
Dolomite, slightly cherty, light brownish gray, medium to coarse, few red specks, some porous	112	142

A 6-in. diameter hole was drilled to a depth of 142 ft. The well is cased with 6.2-in. pipe from about 5 ft below land surface to a depth of 22 ft.

Upon completion, the well reportedly produced 20 gpm for 10 min with a drawdown of 58 ft from a nonpumping water level of 20 ft below land surface.

The pumping equipment presently installed is a Dayton centrifugal pump powered by a 1-hp 3450 rpm Dayton electric motor (No. 5S55CXPB620).

A partial analysis of a sample (Lab. No. 202857) collected August 4, 1976, showed the water to have a hardness of 432 mg/1, total dissolved minerals of 496 mg/1, and an iron content of 0.1 mg/1.

WELL NO. 6, open to the Galena-Platteville dolomite, was completed in May 1974 to a depth of 216 ft by Jonas W. Martin, Oregon. This well serves the park office. The well is located about 25 ft east of the park office and 300 ft north of Well No. 1, approximately 3000 ft N and 1150 ft E of the SW corner of Section 16, T28N, R6E. The land surface elevation at the well is approximately 950 ft.

A drillers log of Well No. 6 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil	3	3
Yellow clay	15	18
Yellow limestone (broken)	5	23
Yellow limestone (solid)	62	85
Gray limestone	131	216

A 10-in. diameter hole was drilled to a depth of 50 ft and finished 6 in. in diameter from 50 to 216 ft. The well is cased with 6-in. pipe from 1 ft above land surface to a depth of 54.1 ft (cemented in to 50 ft). The top of the casing is equipped with a pitless adapter.

Upon completion, the well reportedly produced 34 gpm for 4 hr with a drawdown of 62 ft from a nonpumping water level of 72 ft below land surface.

The pumping equipment presently installed is a Red Jacket submersible pump set at 175 ft, rated at 18 gpm, and powered by a 1½-hp Franklin electric motor.

A partial analysis of a sample (Lab. No. 202858) collected August 4, 1976, showed the water to have a hardness of 462 mg/1, total dissolved minerals of 524 mg/1, and an iron content of 0.1 mg/1.

LENA

The village of Lena (1722) installed a public water supply in 1895. This supply was operated until 1911, and then the local electric light and power company operated it until 1920 when the village again acquired the system. Two wells (Nos. 1 and 2) are in use. This supply is also cross connected with the Kolb Lena Cheese Co. well. In 1949 there were 417 services, over 95 percent metered; the estimated average and maximum pumpages were 60,000 and 75,000 gpd, respectively. In 1980 there were 907 services, all metered; the average pumpage was 189,690 gpd. The water is aerated, fluoridated, and chlorinated.

WELL NO. 1, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in 1895 to a depth of 604 ft. The well is located in a triangular plot bounded by Vernon, Freedom, and Main Sts., approximately 3085 ft N and 150 ft E of the SW corner of Section 33, T28N, R6E. The land surface elevation at the well is approximately 965 ft.

A 10-in. diameter hole was drilled to a depth of 300 ft and finished 6 in. in diameter from 300 to 604 ft. The well is cased with 10-in. pipe from about 0.8 ft above land surface to a depth of 150 ft.

In 1913, the nonpumping water level was reported to be 127 ft below land surface.

In 1923, the well reportedly produced 100 gpm with a drawdown of 64 ft from a nonpumping water level of 70 ft below land surface.

On November 12, 1947, after 25 min of pumping at a rate of 200 gpm, the drawdown was 110 ft from a nonpumping water level of 180 ft below the pump base.

In August 1962, the nonpumping water level was reported to be 184 ft. Well No. 2 was then pumped at a rate of about 285 gpm and the interference drawdown in Well No. 1 was 6 ft after 11 min. Pumping was stopped in Well No. 2 for 14 min, and then both wells were operated for 4 min at rates of about 76 (No. 1) and 285 (No. 2) gpm and the drawdown in Well No. 1 was 116 ft.

In December 1975, the well reportedly produced 155 gpm with a drawdown of 110 ft from a nonpumping water level of 175 ft.

The pumping equipment presently installed is a Fairbanks-Morse Peerless vertical turbine pump (Serial No. 318769) set at 300 ft, rated at 85 gpm, and powered by a 20-hp 1760 rpm Westinghouse induction motor (Serial No. 2340). The well is equipped with 300 ft of airline.

A mineral analysis of a sample (Lab. No. 112583) collected November 12, 1947, after pumping for 25 min at 200 gpm, showed the water to have a hardness of 482 mg/1, total dissolved minerals of 518 mg/1, and an iron content of 0.2 mg/1.

WELL NO. 2, open to the Cambrian-Ordovician aquifer, was completed in June 1931 to a depth of 998 ft by C. W. Varner, Dubuque, Iowa. The well is located about 25 ft north of Well No. 1, approximately 3110 ft N and 150 ft E of the SW corner of Section 33, T28N, R6E. The land surface elevation at the well is approximately 965 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Soil and silt	20	20

Strata (continued)	Thickness (ft)	Depth (ft)
ORDOVICIAN SYSTEM		
Galena and Platteville Groups, dolomites	315	335
Ancell Group		
Glenwood Formation, sandstone and shale	10	345
St. Peter Sandstone		
Sandstone, incoherent	305	650
Sandstone, shale, and chert	80	730
CAMBRIAN SYSTEM		
Potosi Dolomite	40	770
Franconia Formation, siltstone, sandstone and shale	95	865
Ironton-Galesville Sandstone		
Sandstone, incoherent	45	910
Sandstone, partly dolomitic	10	920
Sandstone, incoherent	60	980

A 16-in. diameter hole was drilled to a depth of 24 ft, reduced to 15.2 in. between 24 and 106.5 ft, and finished 12.2 in. in diameter from 106.5 to 998.5 ft. The well is cased with 16-in. OD wrought iron pipe from about 1.2 ft above land surface to a depth of 24 ft, and 12.5-in. wrought iron pipe from about 1.2 ft above land surface to a depth of 106.5 ft (cemented in).

Upon completion, after 10 hr of pumping at a rate of 3 30 gpm, the drawdown was 36 ft from a nonpumping water level of 179 ft.

In 1934, the well reportedly produced 200 gpm for 10 hr with a drawdown of 30 ft from a nonpumping water level of 185 ft.

In 1937, after pumping at rates between 250 and 300 gpm, the drawdown was about 35 ft from a nonpumping water level of 195 ft.

In 1945, the well reportedly produced 250 gpm for 30 min with a drawdown of 115 ft from a nonpumping water level of 185 ft below the pump base.

On November 12, 1947, the nonpumping water level was reported to be 180 ft below the pump base (Wells 1 and 2 had been idle for 2 hr). Well No. 1 was then operated for 5 min and the drawdown in Well No. 2 was negligible. Pumping was stopped in Well No. 1 and then Well No. 2 was operated at rates of 250 to 300 gpm for 4 min with a drawdown of 105 ft. Both wells were then operated simultaneously for 21 min with a drawdown in Well No. 2 of 113 ft.

In May 1949, the nonpumping water level was reported to be 196 ft.

In 1962, this well was cleaned out and a new pump installed by the Lyons Well Drilling Co., Stockton. A production test was then conducted on May 10, 1962. After 3.8 hr of pumping at rates of 100 to 280 gpm, the drawdown was 235 ft from a nonpumping water level of 150 ft.

In 1964, after pumping at a rate of 260 gpm, the drawdown was 250 ft from a nonpumping water level of 150 ft.

In December 1975, the well reportedly produced 300 gpm with a drawdown of 115 ft from a nonpumping water level of 175 ft.

The pumping equipment presently installed is a 10-in., 8-stage Peerless vertical turbine pump (Serial No. 218765) set at 400 ft, rated at 335 gpm at about 375 ft TDH, and powered by a 40-hp 1760 rpm General Electric motor (Model No. 5K6247XH10A, Serial No. JDJ904365).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. Bl11090) is for a water sample from the well collected June 4, 1973, after 4 hr of pumping.

WELL NO. 2, LABORATORY NO. B111090

		mg/l	me/l		mg/l	me/l
Iron	Fe	0.36	0.01	Silica	SiO_2	11	
Manganese	Mn	0.01		Fluoride	F	0.2	0.01
Ammonium	NH_4	0		Boron	B	0.4	
Sodium	Na	6.4	0.28	Nitrate	NO_3	0	
Potassium	K	1.5	0.04	Chloride	Cl	7.0	0.20
Calcium	Ca	94	4.69	Sulfate	SO_4	32	0.66
Magnesium	Mg	46	3.78	Alkalinity (as $CaCO_3$)		386	7.72
Arsenic	As	0.00		Hardness (as $CaCO_3$)		424	8.47
Barium	Ba	0.4					
				Total dissolved			
Cadmium	Cd	0.00		minera s		454	
Chromium	Cr	0.00					
Copper	Cu	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.4	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha pc//		3.2	
Selenium	Se	0.00		± deviation		2.2	
Silver	Ag	0.00		Beta *pc/l*		4.8	
Zinc	Zn	0.00		± deviation		2.2	

WELL NO. 3, open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite, was completed in September 1981 to a depth of 1000 ft by the Wehling Well Works, Beecher. As of November 1981, this well was not in use. The well is located approximately 800 ft N and 1550 ft E of the SW corner of Section 33, T28N, R6E. The land surface elevation at the well is approximately 955 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	28	28
Lime	305	333
Shale and lime	25	358
Shale and sand	3	361
St. Peter sandstone	69	430
St. Peter and red sand	200	630
Red rock and lime	263	893
Sand and streaks of rock	80	973
Sandstone	27	1000

A 16-in. diameter hole was drilled to a depth of 350 ft and finished 11.2 in. in diameter from 350 to 1000 ft. The well is cased with 12-in. black pipe from land surface to a depth of 368 ft (cemented in).

Upon completion, the well reportedly produced 426 gpm for 24 hr with a drawdown of 62 ft from a nonpumping water level of 207 ft.

The permanent pumping equipment is not yet installed.

NORTHERN HILLS UTILITY CO.

Northern Hills Utility Co. (est. 280), located about 2.2 miles north of Freeport, installed a public water supply in 1976. One well is in use. In 1980 there were 145 services; the average pumpage was 28,044 gpd. The water is chlorinated and fluoridated.

WELL NO. 1, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in June 1974 to a depth of 310 ft by Floyd M. Coad, Apple River. The well is located north of Fairview Road about 2100 ft west of Route 26, approximately 125 ft N and 2094 ft W of the SE corner of Section 13, T27N, R7E. The land surface elevation at the well is approximately 787 ft

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black top soil	1	1
Yellow clay	6	7
Sand and gravel	23	30
Dolomite	115	145
Sandstone	165	310

A 12-in. diameter hole was drilled to a depth of 100 ft and finished 8 in. in diameter from 100 to 310 ft. The well is cased with 8-in. black pipe from land surface to a depth of 100 ft (cemented in).

Upon completion, the well reportedly produced 100 gpm for 2 hr with a drawdown of 28 ft from a nonpumping water level of 31 ft below land surface.

The pumping equipment presently installed is a 6-in. Red Jacket submersible pump set at 105 ft, rated at 100 gpm, and powered by a 20-hp 3450 rpm Jacuzzi electric motor (Model No. 2056X4-T).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B26529) is for a water sample from the well collected December 22, 1977, after 30 min of pumping at 75 gpm.

WELL NO. 1, LABORATORY NO. B26529

		mg/l	*me/l*			*mg/l*	*me/1*
Iron	Fe	0.5		Silica	SiO_2	10	
Manganese	Mn	0.01		Fluoride	F	0.1	0.00
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	4.0	0.17	Cyanide	CN	0.00	
Potassium	K	1.7	0.04	Nitrate	NO_3	0.0	0.00
Calcium	Ca	59	2.94	Chloride	Cl	1.4	0.04
Magnesium	Mg	37	3.04	Sulfate	SO_4	17	0.35
				Alkalinity(as$CaCO_3$)		284	5.68
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as$CaCO_3$)		300	6.00
Cadmium	Cd	0.00					
Chromium	Cr	0.00		Total dissolved			
Copper	Cu	0.00		minerals		298	
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.4	

ORANGEVILLE

The village of Orangeville (5 38) installed a public water supply in 1897. Two wells are in use. In 1950 there were 152 services, all metered; the estimated average and maximum pumpages were 30,000 and 40,000 gpd, respectively. In 1980 there were 240 services, all metered; the average pumpage was 69,046 gpd. The water is fluoridated.

Initially, water was obtained from an 8-in. diameter well completed in 1896 to a depth of 142 ft by E. Wareham, Freeport. This well was abandoned prior to 1947. The well was located about one-half block north of High St. and 20 ft west of Church St., approximately 2180 ft S and 2550 ft E of the NW corner of Section 36, T29N, R7E.

A second well, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in 1904 to a depth of 300 ft by P. E. Millis, Byron. This well was abandoned and sealed in 1956. The well was located about 10 ft west of the first well on the west side of Route 26 and one-half block north of High St., approximately 2180 ft S and 2540 ft E of the NW corner of Section 36, T29N, R7E. A 12-in. diameter hole was drilled to a depth of 300 ft. The well was cased with 12-in. pipe from land surface to a depth of 18 ft. In November 1947, the well reportedly produced 284 gpm for 1 hr with a drawdown of 6 ft from a nonpumping water level of 21 ft below land surface

WELL NO. 1, open to the St. Peter Sandstone, was completed in July 195 3 to a depth of 304 ft by E. L. Niffenegger, Monroe, Wis. The well is located north of School St. and west of Tower St. southeast of the water tower, approximately 2675 ft N and 1400 ft W of the SE corner of Section 36, T29N, R7E. The land surface elevation at the well is approximately 874 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	**11**	**11**
Limestone brown	**6**	**17**

Strata (continued)	*Thickness (ft)*	*Depth (ft)*
Solid lime	20	37
Gray limestone	67	104
Glenwood-St. Peter	200	304

A 17-in. diameter hole was drilled to a depth of 120 ft and finished 12 in. in diameter from 120 to 304 ft. The well is cased with 18-in. drive pipe from 1.7 ft above land surface to a depth of 19 ft, and 12-in. pipe from 1.7 ft above land surface to a depth of 120 ft (cemented in).

A production test was conducted by the State Water Survey on July 29, 1953. After 1.1 hr of pumping at rates of 80 to 82 gpm, the drawdown was 10.0 ft from a nonpumping water level of 84.0 ft. After a 1.2-hr idle period, pumping was continued for 56 min at rates of 150 to 163 gpm with a drawdown of 17.2 ft. Pumping was continued for 1.2 hr at a rate of 250 gpm with a drawdown of 29.7 ft. After an additional 25 min of pumping at a rate of 320 gpm, the final drawdown was 37.5 ft. Eighteen min after pumping was stopped, the water level had recovered to 88.0 ft.

Nonpumping water levels were reported to be 104 ft below land surface on August 17, 1965, and 88 ft on November 11, 1977.

The pumping equipment presently installed consists of a 15-hp Fairbanks-Morse electric motor (Serial No. 388849), and an 8-in., 6-stage Aurora vertical turbine pump (No. 74383) which is set at 140 ft and rated at 240 gpm at about 170 ft TDH, and which has 140 ft of 5-in. column pipe. A 30-ft section of 5-in. suction pipe is attached to the pump intake.

A mineral analysis of a sample (Lab. No. 153358) collected October 5, 1960, after pumping for 15 min at 240 gpm, showed the water to have a hardness of 294 mg/1, total dissolved minerals of 311 mg/1, and a trace of iron.

WELL NO. 2, open to the St. Peter Sandstone, was completed in January 1972 to a depth of 314 ft by the Lyons Well Drilling Co., Stockton. The well is located about 100 ft northeast of Well No. 1, approximately 2760 ft N and 1375 ft W of the SE corner of Section 36, T29N, R7E. The land surface elevation at the well is approximately 870 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil	2	2
Yellow clay	9	11
Limestone	40	51
Limestone (Galena)	34	85
Glenwood (dolomite)	20	105
St. Peter sandstone	207	312
Red clay and St. Peter	2	314

A 12-in. diameter hole was drilled to a depth of 144 ft and finished 8 in. in diameter from 144 to 314 ft. The well is cased with 8-in. pipe from land surface to a depth of 144 ft (cemented in).

Upon completion, the well reportedly produced 220 gpm for 12 hr with a drawdown of 48 ft from a nonpumping water level of 80 ft.

The pumping equipment presently installed consists of a 15-hp U. S. Holloshaft electric motor (Model No. 9200357745C, Serial No. R2045568), and an 8-in., 8-stage Crane Deming turbine pump (Serial No. T-71489) which is set at 150 ft and rated at 220 gpm at about 210 ft TDH, and which has 150 ft of 5-in. column pipe. A 10-ft section of 4-in. suction pipe is attached to the pump intake.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B18220) is for a water sample from the well collected October 24, 1977, after 30 min of pumping.

WELL NO. 2, LABORATORY NO. B18220

		mg/l	*me/I*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	11	
Manganese	Mn	0.01		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	2	0.09	Cyanide	CN	0.00	
Potassium	K	0.7	0.02	Nitrate	NO_3	1.3	0.02
Calcium	Ca	61	3.04	Chloride	Cl	1.5	0.04
Magnesium	Mg	34	2.80	Sulfate	SO_4	18	0.37
				Alkalinity(as$CaCO_3$)		283	5.66
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as$CaCO_3$)		301	6.02
Cadmium	Cd	0.00					
Chromium	Cr	0.00		Total dissolved			
Copper	Cu	0.03		minerals		290	
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.8	

OTTER CREEK LAKE UTILITY DISTRICT

Otter Creek Lake Utility District (est. 1350), formerly known as Lake Summerset Subdivision, located about 3 miles northwest of Durand, installed a public water supply in 1970. This district also extends into Winnebago County and one of the wells is located there. Two wells are in use. In 1973 there were 150 services, none metered; the average and maximum pumpages were 70,000 and 100,000 gpd, respectively. In 1980 there were 450 services, 2 percent metered; the average and maximum pumpages were 162,000 and 350,000 gpd, respectively. The water is chlorinated and fluoridated.

WELL NO. 1, open to the St. Peter Sandstone, was completed in May 1969 to a depth of 277 ft by the Layne-Western Co., Aurora. The well is located north of Lake Summerset Drive and west of Sextant Drive extended, approximately 900 ft S and 350 ft W of the NE corner of Section 7, T28N, R10E, Winnebago County. The land surface elevation at the well is approximately 789 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Black soil	2	2
Blue clay	15	17
Sand and gravel	23	40
Gray clay, few lime lenses	50	90
St. Peter sandstone	123	213
St. Peter with streaks of reddish brown lime, turned fluid reddish brown	12	225
St. Peter	5	230
Reddish brown lime, some St. Peter	5	235
St. Peter, fluid turned red at 258 ft with lime lenses reddish and white	35	270
White lime	7	277

A 17.5-in. diameter hole was drilled to a depth of 40 ft, reduced to 15.2 in. between 40 and 105 ft, and finished 12 in. in diameter from 105 to 277 ft. The well is cased with 16-in. steel pipe from land surface to a depth of 40 ft and 12-in. steel pipe from about 2 ft above land surface to a depth of 105 ft (cemented in).

Upon completion, the artesian flow of the well was estimated to be 25 gpm from the top of the casing (2 ft above land surface).

A production test was conducted by the driller on May 27, 1969. After 4.5 hr of pumping at rates of 517 to 372 gpm, the drawdown was 45 ft from a nonpumping water level of more than 2 ft above land surface.

The pumping equipment presently installed is an 8-in., 16-stage Layne & Bowler turbine pump (Serial No. 62524) set at 100 ft, rated at 200 gpm at about 500 ft TDH, and powered by a 40-hp 1765 rpm U. S. electric motor (Serial No. R-1780-01-269).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B100356) is for a water sample from the well collected July 12, 1973, after 30 min of pumping.

WELL NO. 1, LABORATORY NO. B100356

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.00		Silica	SiO_2	12	
Manganese	Mn	0.01		Fluoride	F	0.1	0.00
Ammonium	NH_4	0.3	0.02	Boron	B	0.2	
Sodium	Na	1.8	0.08	Nitrate	NO_3	0.9	0.01
Potassium	K	1.0	0.03	Chloride	Cl	0	0.00
Calcium	Ca	60	2.99	Sulfate	SO_4	0	0.00
Magnesium	Mg	33	2.72	Alkalinity(as$CaCO_3$)		284	5.68
Arsenic	As	0.00		Hardness (as$CaCO_3$)		285	5.70
Barium	Ba	0.0		Total dissolved minerals		276	
Cadmium	Cd	0.00					
Chromium	Cr	0.00					
Copper	Cu	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.7	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alphapc//		3.8	
Selenium	Se	0.00		± deviation		2.0	
Silver	Ag	0.00		Beta *pc/l*		9.3	
Zinc	Zn	0.00		± deviation		2.0	

WELL NO. 2, open to the St. Peter Sandstone, was completed in July 1977 to a depth of 190 ft by the Layne-Western Co., Aurora. The well is located on the south side of the west gate entrance west of Lake Summerset Drive, approximately 1620 ft S and 95 ft E of the NW corner of Section 1, T28N, R9E, Stephenson County. The land surface elevation at the well is approximately 840 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Broken lime and clay	5	5
Brown lime	36	41
Gray lime	36	77
Sandstone	91	168
Reddish shale and sandstone	13	181
Brown and white lime	9	190

A 19.5-in. diameter hole was drilled to a depth of 93 ft and finished 12 in. in diameter from 93 to 190 ft. The well is cased with 12-in. steel pipe from land surface to a depth of 92 ft (cemented in).

A production test was conducted by the driller on July 19-20, 1977. After 6 hr of pumping at rates of 257 to 246 gpm, the drawdown was 78 ft from a nonpumping water level of 26 ft below land surface. Pumping was continued for 16 hr at rates ranging from 292 to 323 gpm with a drawdown of 126 ft. After an additional 2 hr of pumping at a rate of 257 gpm, the final drawdown was 84 ft. Fifty min after pumping was stopped, the water level had recovered to 27 ft.

The pumping equipment presently installed consists of a 40-hp 1800 rpm U. S. electric motor, and an 8-in., 12-stage

Layne & Bowler vertical turbine pump (Serial No. 83915) which is set at 150 ft and rated at 250 gpm at about 370 ft TDH, and which has 150 ft of 6-in. column pipe.

A partial analysis of a sample (Lab. No. 205636) collected July 20, 1977, after pumping for 8 hr at 320 gpm, showed the water to have a hardness of 282 mg/1, total dissolved minerals of 286 mg/1, and an iron content of 0.0 mg/1.

PARK CREST WATER CO.

Park Crest Water Co. (est. 1200), located on the west edge of Freeport, installed a public water supply in 1960. Two wells are in use. In 1964 there were 54 services. In 1980 there were 350 services, all metered; the average pumpage was 62,780 gpd. The water is chlorinated and fluoridated.

WELL NO. 1, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in September 1960 to a depth of 407 ft by the Lyons Well Drilling Co., Stockton. The well is located about 150 ft south of Bedford Road and 750 ft east of Park Crest Drive, approximately 2020 ft S and 2270 ft E of the NW corner of Section 35, T27N, R7E. The land surface elevation at the well is approximately 865 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift	20	20
Limestone	255	275
Sandstone	132	407

A 17-in. diameter hole was drilled to a depth of 140 ft and finished 12 in. in diameter from 140 to 407 ft. The well is cased with 17-in. pipe from land surface to a depth of 140 ft, and 12-in. pipe from 1 ft above land surface to a depth of 140 ft (cemented in).

A production test was conducted by the State Water Survey on September 8, 1960. After 5 hr of pumping at a rate of 150 gpm, the drawdown was 84.0 ft from a nonpumping water level of 91.0 ft below land surface. One hr after pumping was stopped, the water level had recovered to 101.9 ft. On the basis of the production test data, it was estimated that this well should yield 135 gpm (194,400 gpd) on a long-term basis.

Nonpumping water levels were reported to be 104 ft on June 1, 1965, and 97.9 ft on February 15, 1972.

The pumping equipment presently installed is a Fairbanks-Morse Pomona turbine pump (Serial No. A2C2395) set at 300 ft, rated at 150 gpm, and powered by a 25-hp 1755 rpm Fairbanks-Morse electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B15267) is for a water sample from the well collected October 7, 1975, after 30 min of pumping at 150 gpm.

WELL NO. 1, LABORATORY NO. B15267

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.3		Silica	SiO_2	12	
Manganese	Mn	0.00		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.1	0.01	Boron	B	0.3	
Sodium	Na	5.5	0.24	Cyanide	CN	0.00	
Potassium	K	0.8	0.02	Nitrate	NO_3	0.4	0.01
Calcium	Ca	77	3.84	Chloride	Cl	5	0.14
Magnesium	Mg	41	3.37	Sulfate	SO_4	21	0.44
				Alkalinity(as $CaCO_3$)		354	7.08
Arsenic	As	0.00					
Barium	Ba	0.1		Hardness (as $CaCO_3$)		361	7.22
Cadmium	Cd	0.00					
Chromium	Cr	0.00		Total dissolved			
Copper	Cu	0.00		minerals		371	
Lead	Pb	0.01		pH (as rec'd)		7.8	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha *pc/l*		3.7	
Selenium	Se	0.00		± deviation		1.8	
Silver	Ag	0.00		Beta *pc/l*		4.3	
Zinc	Zn	0.1		± deviation		1.5	

WELL NO. 2, open to the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in September 1966 to a depth of 402 ft by the Lyons Well Drilling Co., Stockton. The well is located at the southwest corner of North Greenfield Drive and Bedford Road, approximately 1500 ft S and 2900 ft E of the NW corner of Section 35, T27N, R7E. The land surface elevation at the well is approximately 872 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Till	14	14
Limestone	161	175
Oil rock	10	185
Limestone	90	275
Sandstone	127	402

A 14-in. diameter hole was drilled to a depth of 151 ft and finished 10 in. in diameter from 151 to 402 ft. The well is cased with 10-in. pipe from 1 ft above land surface to a depth of 151 ft (cemented in).

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

The pumping equipment presently installed consists of a 30-hp electric motor, and a 16-stage Tait turbine pump (Model No. 410HA) which is set at 350 ft and rated at 170 gpm, and which has 350 ft of 4-in. column pipe. A 10-ft section of suction pipe is attached to the pump intake.

PEARL CITY

The village of Pearl City (5 35) installed a public water supply in 1896. One well (No. 4) is in use and another well (No. 3) is available for emergency use. In 1950 there were 135 services, none metered; the average and maximum pumpages were 15,000 and 18,000 gpd, respectively. In 1980 there were 260 services, none metered; the average pumpage was 81,959 gpd. The water is chlorinated and fluoridated.

Initially, water was obtained from a well completed in 1896 to an unknown depth. This well was abandoned about 1903. The well was located on high ground in the southwest part of the village, approximately 2700 ft N and 900 ft W of the SE corner of Section 8, T26N, R6E.

Water was purchased from a creamery company from 1903 to 1910.

WELL NO. 1, finished in sand and gravel, was completed in 1910 to a depth of 40 ft. This well was abandoned prior to 1937. The well is located on the south side of Freeport Road about 220 ft east of Main St., approximately 1450 ft S and 220 ft E of the NW corner of Section 9, T26N, R6E. The land surface elevation at the well is approximately 815 ft.

A 6-in. diameter hole was drilled to a depth of 40 ft. No information on the casing and screen records is available.

In 1916, the nonpumping water level was reported to be 15 to 18 ft below land surface.

WELL NO. 2, finished in sand and gravel, was completed in 1910 to a depth of 40 ft. This well was abandoned prior to 1937. The well is located about 10 ft east of Well No. 1, approximately 1450 ft S and 230 ft E of the NW corner of Section 9, T26N, R6E. The land surface elevation at the well is approximately 815 ft.

An 8-in. diameter hole was drilled to a depth of 40 ft. No information on the casing and screen records is available.

In 1916, the nonpumping water level was reported to be 15 to 18 ft below land surface.

WELL NO. 3, open to the St. Peter Sandstone, was constructed in 1922 to a depth of 322 ft, was deepened in March 1925 to a reported depth of 428 ft by Gus Nelson, Hayfield, Minn., and was deepened again in September 1969 to a depth of 625 ft by the Allabaugh Well Co., Rockford. This well is available for emergency use. The well is located about 13 ft west of Well No. 1, approximately 1450 ft S and 207 ft E of the NW corner of Section 9, T26N, R6E. The land surface elevation at the well is approximately 815 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
QUATERNARY SYSTEM		
Pleistocene Series		
Glacial drift sand and gravel	118	118
ORDOVICIAN SYSTEM		
Galena and Platteville Groups, dolomite	284	402
Ancell Group		
St. Peter Sandstone	26	428
"Sandstone"	20	448
"Sandstone with lime and red shale"	177	625

Originally, an 8-in. diameter hole was drilled to a depth of 40 ft and finished 6 in. in diameter from 40 to 322 ft. In 1925, the well was cased with 8-in. pipe from land surface to a depth of 40 ft. After deepening in 1969, the hole was reported to be 16 in. in diameter from land surface to a depth of 54 ft, 14 in. between 54 and 424 ft, and 8 in. between 424 and 625 ft. The well is presently cased with 16-in. pipe from land surface to a depth of 54 ft, and 8-in. pipe from land surface to a depth of 424 ft (cemented in).

Nonpumping water levels were reported to be 30 to 40 ft below land surface in November 1947, and 12.6 ft below land surface on August 5, 1965.

After the deepening of the well in 1969 to a depth of 625 ft, a production test was conducted on September 3-4, 1969, by representatives of the Allabaugh Well Co. and the State Water Survey. After 24.2 hr of pumping at a rate of 215 gpm, the final drawdown was 132 ft from a nonpumping water level of 68 ft below land surface. The water level recovered to 86 ft after pumping had been stopped for 1.2 hr.

The pumping equipment presently installed is a turbine pump set at 200 ft, rated at 200 gpm, and powered by an electric motor.

A partial analysis of a sample (Lab. No. 179421) collected September 3, 1969, after pumping for 5 hr at 215 gpm, showed the water to have a hardness of 410 mg/1, total dissolved minerals of 424 mg/1, and an iron content of 1.2 mg/1.

WELL NO. 4, open to the St. Peter Sandstone, was completed in July 1968 to a depth of 668 ft by the Allabaugh Well Co., Rockford. The well is located on the north side of Devore Ave. west of Summit St., approximately 2000 ft S and 825 ft W of the NE corner of Section 8, T26N, R6E. The land surface elevation at the well is approximately 850 ft.

A drillers log of Well No. 4 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil, clay, black mucky	65	65
Lime brown	270	335
Lime gray	55	390
Glenwood sandstone and shale	20	410
St. Peter sandstone white	50	460
Sandstone and lime	120	580
Sandstone and shale strips	60	640
Sandstone and lime (6-ft crevice in bottom)	28	668

A 16-in. diameter hole was drilled to a depth of 70 ft, reduced to 14 in. between 70 and 422 ft, and finished 8 in. in diameter from 422 to 668 ft. The well is cased with 16-ia steel pipe from land surface to a depth of 70 ft and 8-in. steel pipe from 0.5 ft above the pumphouse floor to a depth of 422 ft (cemented in).

A production test was conducted on July 8-9, 1968, by representatives of the driller and the State Water Survey. After 24.7 hr of pumping at a rate of 407 gpm, the final drawdown was 80 ft from a nonpumping water level of 120 ft below land surface. Forty-one min after pumping was stopped, the water level had recovered to 131 ft.

The pumping equipment presently installed is a 16-stage Sta-Rite submersible turbine pump set at 400 ft, rated at 262 gpm at about 200 ft TDH, and powered by a 30-hp Sta-Rite electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B17009) is for a water sample from the well collected October 18, 1977, after 1.5 hr of pumping at 200 gpm.

WELL NO. 4, LABORATORY NO. B17009

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.2		Silica	SiO_2	11	
Manganese	Mn	0.01		Fluoride	F	0.3	0.02
Ammonium	NH_4	0.0	0.00	Boron	B	0.1	
Sodium	Na	5	0.22	Cyanide	CN	0.00	
Potassium	K	1.8	0.05	Nitrate	NO_3	0.0	0.00
Calcium	Ca	74	3.69	Chloride	Cl	0.9	0.02
Magnesium	Mg	40	3.29	Sulfate	SO_4	18	0.37
				Alkalinity(as$CaCO_3$)		340	6.80
Arsenic	As	0.00					
Barium	Ba	0.3					
Cadmium	Cd	0.00		Hardness (as$CaCO_3$)		359	7.18
Chromium	Cr	0.00					
Copper	Cu	0.00		Total dissolved			
Lead	Pb	0.00		minerals		356	
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.6	

ROCK CITY

The village of Rock City (251) installed a public water supply in 1957. One well (No. 1) is in use and another well (No. 2) is available for emergency use. In 1957 there were 60 services, none metered. In 1981 there were 134 services, none metered; the average pumpage in 1980 was 21,080 gpd. The water from Well No. 1 is chlorinated and fluoridated.

WELL NO. 1, open to the St. Peter Sandstone and the Eminence-Potosi Dolomite, was completed in January 1957 to a depth of 430 ft by the Allabaugh Well Co., Rockford. The well is located at the north end of Main St., approximately 1470 ft S and 2200 ft E of the NW corner of Section 21, T28N, R9E. The land surface elevation at the well is approximately 922 ft.

A drillers log of Well No. 1 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Drift - top soil	12	12
Limestone, yellow to gray	197	209
Sandstone, white	166	375
Sandstone, lime and shale	10	385
Limestone, gray hard	45	430

A 15-in. diameter hole was drilled to a depth of 220 ft and finished 8 in. in diameter from 220 to 430 ft. The well is cased with 10-in. wrought iron pipe from about 0.8 ft above land surface to a depth of 220 ft (cemented in).

A production test was conducted by the driller on February 9, 1957. After 4.2 hr of pumping at rates ranging from 155 to 318 gpm, the drawdown was 60 ft from a nonpumping water level of 105 ft.

The pumping equipment presently installed is a Fairbanks-Morse Pomona turbine pump (No. AW2635) set at 170 ft, rated at 200 gpm, and powered by a 25-hp 1750 rpm Fairbanks-Morse electric motor (Serial No. F301891).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B18213) is for a water sample from the well collected October 25, 1977.

WELL NO. 1, LABORATORY NO. B18213

		mg/l	*me/l*			*mg/l*	*me/l*
Iron	Fe	0.0		Silica	SiO_2	15	
Manganese	Mn	0:00		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.0	0.00	Boron	B	0.0	
Sodium	Na	4	0.17	Cyanide	CN	0.00	
Potassium	K	0.5	0.01	Nitrate	NO_3	13	0.21
Calcium	Ca	57	2.84	Chloride	Cl	4.7	0.13
Magnesium	Mg	31	2.55	Sulfate	SO_4	16	0.33
				Alkalinity(as$CaCO_3$)		251	5.02
Arsenic	As	0.00					
Barium	Ba	0.1					
Cadmium	Cd	0.00		Hardness (as$CaCO_3$)		276	5.52
Chromium	Cr	0.00					
Copper	Cu	0.01		Total dissolved			
Lead	Pb	0.00		minerals		305	
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.8	

WELL NO. 2, open to the Glenwood-St. Peter Sandstone, was completed in October 1974 to a depth of 283 ft by the Lyons Well Drilling Co., Stockton. This well is available for emergency use. The well is located about 75 ft north of Market St. and 150 ft west of Jackson St., approximately 2200 ft S and 1300 ft E of the NW corner of Section 21, T28N, R9E. The land surface elevation at the well is approximately 900 ft.

A drillers log of Well No. 2 follows:

Strata	*Thickness (ft)*	*Depth (ft)*
Top soil	3	3
Red clay	10	13
Clay and sand	10	23
Sand and gravel	10	33
Strata (continued)	*Thickness (ft)*	*Depth (ft)*
Galena	91	124
St. Peter sandstone	159	283

A 6-in. diameter hole was drilled to a depth of 283 ft. The well is cased with 6-in. steel pipe from about 0.1 ft above land surface to a depth of 101 ft. The top of the casing is equipped with a Tubbs pitless adapter.

Upon completion, the well reportedly produced 75 gpm for 3 hr with a drawdown of 89 ft from a nonpumping water level of 59 ft below land surface.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 189 ft, rated at 50 gpm, and powered by a 5-hp Sta-Rite electric motor.

WINSLOW

The village of Winslow (330) installed a public water supply in 1916. One well (No. 2) is in use. In 1949 there were 120 services, 85 percent metered; the estimated average pumpage was 33,000 gpd. In 1981 there were 160 services, all metered; the average pumpage in 1980 was 29,011 gpd. The water is fluoridated and chlorinated.

WELL NO. 1, open to the St. Peter Sandstone, was completed in 1916 to a depth of 200 ft. This well was abandoned prior to 1935 and sealed prior to 1949. The well was located north of Hubbard St. and west of Illinois Route 73 (Carver St.), approximately 1235 ft N and 1250 ft W of the SE corner of Section 22, T29N, R6E. The land surface elevation at the well is approximately 775 ft.

A 10-in. diameter hole was drilled to a depth of 40 ft and finished 8 in. in diameter from 40 to 200 ft. The well was cased with 8-in. pipe from land surface to a depth of 40 ft (cemented in).

On May 10, 1917, the nonpumping water level was reported to be 16 ft.

A mineral analysis of a sample (Lab. No. 40031) collected August 22, 1918, showed the water to have a hardness of 296 mg/1, total dissolved minerals of 315 mg/1, and an iron content of 0.0 mg/1.

WELL NO. 2, open to the St. Peter Sandstone and the Oneota Dolomite, was completed in November 1927 to a depth of 355 ft by the P. E. Millis & Co., Byron. The well is located about one-half block west of Illinois Route 73 on the south bank of Indian Creek about 20 ft northwest of Well No. 1, approximately 1250 ft N and 1260 ft W of the SE corner of Section 22, T29N, R6E. The land surface elevation at the well is approximately 775 ft.

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

Strata	*Thickness (ft)*	*Depth (ft)*
ORDOVICIAN SYSTEM		
Platteville Group		
Dolomite	65	65
Ancell Group		
St. Peter Sandstone		
Sandstone	65	130
Dolomitic shale	2	132
Sandstone	108	240
Sandstone, shale and dolomite (probably chert)	59	299
Oneota Dolomite		
Dolomite	46	345
Sandstone, water	3	348
Dolomite crevices, water flowing strong	7	355

A 16-in. diameter hole was drilled to a depth of 100 ft, reduced to 12 in. between 100 and 288 ft, and finished 10 in. in diameter from 288 to 355 ft. The well is cased with 12-in. steel pipe from land surface to a depth of 100 ft (cemented in) and a 10-in. steel liner from 225 ft to a depth of 288 ft.

Upon completion, the well reportedly flowed at a rate of about 500 gpm and in 1935 the flow rate was 420 gpm with a nonpumping water level of about 9 ft above land surface.

In 1976, the free flow was estimated to be about 200 gpm.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B15264) is for a water sample from the well collected October 7, 1975, during a continuous flow. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 2, LABORATORY NO. B15264

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO_2	10	
Manganese	Mn	0.02		Fluoride	F	0.2	0.01
Ammonium	NH_4	0.1	0.01	Boron	B	0.3	
Sodium	Na	2.9	0.13	Cyanide	CN	0.00	
Potassium	K	1.3	0.03	Nitrate	NO_3	0.0	0.00
Calcium	Ca	59	2.94	Chloride	Cl	1	0.03
Magnesium	Mg	41	3.37	Sulfate	SO_4	5	0.10
				Alkalinity(as$CaCO_3$)		330	6.60
Arsenic	As	0.00		Hardness (as$CaCO_3$)		316	6.32
Barium	Ba	0.1					
Cadmium	Cd	0.00					
				Total dissolved			
Chromium	Cr	0.0		minerals		323	
Copper	Cu	0.00					
Lead	Pb	0.00		pH (as rec'd)		7.8	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alphapc/l		4.1	
Selenium	Se	0.00		± deviation		1.6	
Silver	Ag	0.00		Beta pc/l		4.8	
Zinc	Zn	0.0		± deviation		1.6	