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*Public Groundwater Supplies
in Perry County*

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ILLINOIS STATE WATER SURVEY

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PUBLIC GROUNDWATER SUPPLIES IN PERRY COUNTY

by Dorothy M. Woiler

Introduction

This publication presents all available information on production wells used for public water supplies in Perry 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 groundwater supplies of 2 municipalities in Perry County. These are preceded by brief summaries of the groundwater geology of the county and the development of groundwater sources for municipal use. An explanation of the format used in the descriptions is also given.

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Geology

The geology of Perry County is described generally in Illinois State Geological Survey Circular 212, *Groundwater Geology in Southern Illinois*. The following brief discussion of geologic conditions in the county is taken largely from that publication. For a more detailed definition of the geology in this portion of the state, the reader is referred to the State Geological Survey which is located on the University of Illinois campus, Urbana.

The unconsolidated materials forming the present day land surface in Perry County are generally thin, and bedrock crops out in many places. Water-yielding sand and gravel deposits are restricted to the bottomlands of Beaucoup Creek, the Little Muddy River, and their tributaries. In these areas, domestic water supplies can usually be developed from these deposits. In the remainder of the county the unconsolidated

materials consist primarily of nonwater-yielding glacial till and lake sediments or loess.

Beneath the glacial deposits are the upper bedrock units of Pennsylvanian age. In the northern and eastern parts of the county, water for farm and domestic use is obtained from shallow Pennsylvanian age sandstones at depths less than 100 ft. In the southwestern part of the county, more permeable sandstones in these rocks occur at depths ranging from 300 to 575 ft. These same sandstones are present in the northeastern part of the county, but contain water that is too highly mineralized for most uses.

Mississippian age rocks directly underlie the Pennsylvanian system at depths varying from about 500 to 575 ft. In the northern and eastern parts of the county water found in the Mississippian is generally too highly mineralized for most

uses. In the southwestern part of the county fresh water is found in limestone and sandstone layers in the upper 50 ft of these rocks.

Groundwater Development for Municipal Use

In the southwestern part of the county, consolidated bed-rock aquifers are tapped as the primary source of municipal water supply for the village of Cutler and as a standby source for the village of Willisville. At Cutler, the two wells tap Pennsylvanian sandstones at depths of 550 and 575 ft. Their reported yields are 33 and 130 gpm. Estimated production of the Cutler wells was 35,000 gpd in 1974. Past and recent analyses of water they produce indicate that the iron content ranges from 0.0 to 0.7 mg/l and the hardness ranges from 166 to 186 mg/l. The water is not treated.

At Willisville, Pennsylvanian sandstone and underlying Mississippian limestone are tapped by two wells 550 and 557 ft deep. Their reported yields are 40 and 90 gpm. Estimated production of these wells was 30,000 gpd in 1972. Past and recent analyses of water they produce indicate that the iron content ranges from 0.4 to 1.4 mg/l and the hardness ranges from 183 to 220 mg/l. These wells are available for standby use and water is now obtained from the Kinkaid-Reeds Creek Conservancy District.

Water from the shallower Pennsylvanian rocks including thin coals is fairly highly mineralized in most of Perry County. For this reason, at Cutler and Willisville these rocks have been cased from the well and the deeper sandstone and limestone units containing less mineralized water are tapped for municipal supplies.

Format

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

The U. S. Census of population for 1970 is given at the

beginning of each description.

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 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 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.

Abbreviations Used

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/l.....	milliequivalents per liter
mg/l.....	milligrams per liter
min.....	minute(s)
No.(s).....	number(s)
OD.....	outside diameter
pc/l.....	picocuries per liter
R.....	range
rpm.....	revolutions per minute
T.....	township

CUTLER

The village of Cutler (508) installed a public water supply in 1941. One well (No. 2) is in use and another well (No. 1) is available for emergency use. In 1957 there were 140 services, all metered; the average and maximum daily pumpages were 18,000 and 30,000 gpd, respectively. In 1974 there were 255 services, all metered; the estimated average daily pumpage was 35,000 gpd. The water is not treated.

WELL NO. 1, finished in sandstone, was completed in February 1940 to a depth of 550 ft by Glen Clark, Fredericktown, Mo. This well is available for emergency use. The well is located about 100 ft S of the Missouri-Pacific RR and 100 ft W of Market St., approximately 2080 ft N and 2300 ft W of the SE corner of Section 5, T6S, R4W. The land surface elevation at the well is approximately 500 ft.

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

Strata	Thickness (ft)	Depth (ft)
PLEISTOCENE SYSTEM		
Clay	30	30
PENNSYLVANIAN SYSTEM		
Shale, limestone, and thin coal beds	390	420
Sandstone	130	550

An 8-in. diameter hole was drilled to a depth of 200 ft, reduced to 6 in. between 200 and 495 ft, and finished 4.8 in. in diameter from 495 to 550 ft. The well is cased with 8-in. ID pipe from land surface to a depth of 36 ft, 6-in. ID pipe from above the pumphouse floor to a depth of 212 ft, and 4.9-in. ID pipe from 175 ft to a depth of 495 ft.

A production test was conducted by the State Water Survey on February 12, 1940. When pumping at rates of 33 to 35 gpm, the drawdown was below the airline, or more than 77.0 ft below the nonpumping water level of 91.7 ft below land surface.

In January 1969, the nonpumping water level was reported to be 135 ft.

The pumping equipment presently installed is a Jacuzzi turbine pump rated at 50 gpm, and powered by a 5-hp 3400 rpm U. S. electric motor.

A mineral analysis of a sample (Lab. No. 113695) collected March 4, 1948, after pumping for 15 min at 30 gpm, showed the water to have a hardness of 186 mg/l, total dissolved minerals of 313 mg/l, and an iron content of 0.7 mg/l.

WELL NO. 2, finished in sandstone, was completed in March 1966 to a depth of 575 ft by the Gwin Drilling Co.,

Percy. The well is located on the east edge of town, 3 blocks north and 2 blocks east of Well No. 1, approximately 2526 ft N and 1620 ft W of the SE corner of Section 5, T6S, R4W. The land surface elevation at the well is approximately 495 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	20	20
Limestone and shale	81	101
Old mine works	6	107
Fire clay	2	109
Limestone and shale	16	125
Coal	4	129
Shale and limestone	231	360
Shaley gray sandstone	40	400
Sandstone — light gray to white	175	575

A 16-in. diameter hole was drilled to a depth of 23.5 ft, reduced to 15 in. between 23.5 and 108 ft, reduced to 10.6 in. between 108 and 418 ft, and finished 6.1 in. in diameter from 418 to 575 ft. The well is cased with 16-in. pipe from land surface to a depth of 23.5 ft, 12-in. pipe from land surface to a depth of 108 ft, and 7-in. OD pipe from 2 ft above the pumphouse floor to a depth of 418 ft.

In 1969, the well reportedly produced 130 gpm with a drawdown of 65 ft from a nonpumping water level of 135 ft.

The pumping equipment presently installed is a vertical turbine pump rated at 150 gpm, and powered by a 20-hp U. S. Hollowshaft electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. A102823) is for a water sample from the well collected August 18, 1974, after 1 hr of pumping at 80 gpm.

WELL NO. 2, LABORATORY NO. A102823

	mg/l	me/l	rng/l	me/l
Iron	Fe 1.8	Silica	SiO ₂ 15	
Manganese	Mn 0.0	Fluoride	F 0.2	0.01
Ammonium	NH ₄ 0.7	Boron	B 8	0.2
Sodium	Na 56	Nitrate	NO ₃ 0.0	0.00
Potassium	K 3.7	Chloride	Cl 17	0.48
Calcium	Ca 45	Sulfate	SO ₄ 15	0.31
Magnesium	Mg 15	Alkalinity (as CaCO ₃)	250	5.00
Arsenic	As 0.00			
Barium	Ba 0.0	Hardness (as CaCO ₃)	180	3.6 0
Copper	Cu 0.00			
Cadmium	Cd 0.00	Total dissolved minerals	290	
Chromium	Cr 0.00			
Lead	Pb 0.00			
Mercury	Hg 0.0000	pH (as rec'd)	7.3	
Nickel	Ni 0.0	Radioactivity		
Selenium	Se 0.00	Alpha pc/l	0.6	
Silver	Ag 0.00	± deviation	1.2	
Cyanide	CN 0.000	Beta pc/l	4.2	
Zinc	Zn 0.0	ideviation	2.0	

WILLISVILLE

The village of Willisville (659) installed a public water supply in 1940. A total of two production wells were utilized as a source of water supply until September 1974

when the village began purchasing water from the Kinkaid-Reeds Creek Conservancy District. In 1949 there were 230 services, all metered; the average and maximum daily

groundwater pumpages were 24,000 and 35,000 gpd, respectively. In 1972 there were 250 services, all metered; the average daily groundwater pumpage was 30,000 gpd.

WELL NO. 1, finished in limestone, was completed in March 1940 to a depth of 550 ft by Glen Clark, Fredericktown, Mo. This well is not in use. The well is located in the west part of the village at the intersection of East Park and Williams Sts., approximately 340 ft S and 425 ft E of the NW corner of Section 30, T6S, R4W. The land surface elevation at the well is approximately 500 ft.

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

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
PLEISTOCENE SYSTEM		
Clay	20	20
PENNSYLVANIAN SYSTEM		
Shale, limestone, and thin coal beds	65	85
Sand, gray	55	140
Shale, limestone, some sand, and thin coal beds	185	325
Sand, white	105	430
Limestone and shale	50	480
Sand, white	55	535
Sand, white, and shale	5	540
MISSISSIPPIAN SYSTEM(?)		
Chester Series(?)		
Limestone, gray	10	550

An 11-in. diameter hole was drilled to a depth of 23 ft, reduced to 10 in. between 23 and 87 ft, reduced to 8 in. between 87 and 350 ft, reduced to 6 in. between 350 and 490 ft, and finished 4.8 in. in diameter from 490 to 550 ft. The well is cased with 10-in. pipe from 1.5 ft above the pumphouse floor to a depth of 23 ft, 8-in. pipe from 1.5 ft above the pumphouse floor to a depth of 83 ft, and 6.2-in. pipe from 83 ft to a depth of 458 ft.

A production test was conducted by the State Water Survey on March 20, 1940. When pumping at a rate of 40 gpm, the drawdown was more than 212.0 ft from a nonpumping water level of 130.3 ft below the top of the casing.

In 1946, it was reported that undesirable water was entering the well. This water was believed to be coming from abandoned mine workings close to the well at a depth of 86 ft. It was at this time that the 6.2-in. pipe was installed in the well.

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

A mineral analysis of a sample (Lab. No. 113696) collected March 4, 1948, after pumping for 10 hr at 25 gpm, showed the water to have a hardness of 183 mg/l, total dissolved minerals of 291 mg/l, and an iron content of 0.4 mg/l.

WELL NO. 2, finished in limestone, was completed in June 1954 to a depth of 557 ft by the Gwin Drilling Co., Percy. This well is not in use. The well is located in the

southwest part of town, approximately 1300 ft S and 400 ft E of the NW corner of Section 30, T6S, R4W. The land surface elevation at the well is approximately 500 ft.

A drillers log of Well No. 2 follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Clay	16	16
Lime, gray, hard	4	20
Shale, dark gray	5	25
Lime	2	27
Shale, dark gray	11	38
Shale, black	1	39
Lime, black	5	44
Shale, black	2	46
Coal	5	51
Shale, gray, some lime	9	60
Lime and shale, gray	5	65
Shale, medium hard, gray	15	80
Shale, medium hard, sandy, gray	10	90
Sandstone, gray, coarse, shaley	2	92
Sandstone and hard shale, gray	8	100
Sandy hard shale, gray	10	110
Shale, gray	21	131
Slate	6	137
Coal	2	139
Shale, gray	10	149
Shale gray; shale, hard, gray; lime	40	189
Lime, gray and black	1	190
Shale, hard, dark gray	5	195
Shale, hard and soft, gray	15	210
Sandstone and shale, gray	10	220
Shale, hard and soft, dark gray	5	225
Lime, dark gray and brown	1	226
Lime, gray and brown	1	227
Coal	1	228
Shale, hard and soft, gray	38	266
Shale, gray	4	270
Shale and sandstone, gray	4	274
Sandstone, gray and white, settles out, making water	4	278
Sandstone, light gray, settles out	7	285
Sandstone, light gray, fine and coarse, shaley, still settles out	5	290
Sandstone and shale, gray	5	295
Shale, gray, and sandstone shells	8	303
Shale, gray	2	305
Shale with sand streaks	10	315
Shale, gray, sticky, not mixing	25	340
Shale, gray, and sandstone	2	342
Sandstone, light gray, shaley; sandstone, white and light gray, beginning to settle	24	366
Sandstone, gray, small amount settles out; sandstone, light gray, settles out; sandstone, shale and lime, gray	34	400
Shale and lime shells, gray	5	405
Sandstone, white and shale, gray, breaks	15	420
Shale, gray	4	424
Shale, dark gray, sticky, not mixing	16	440
Shale and sandstone, light gray	10	450
Shale, dark gray	14	464
Shale, dark gray; sandy shale, gray; sandstone, settles out, light gray	26	490
Sandstone, gray, shaley, coarse and fine, settles, some lime brown; sandstone, shaley, does not settle out; sandstone and shale; shale, gray	56	546
Lime, gray; shale, gray	11	557

A 12-in. diameter hole was drilled to a depth of 100 ft, reduced to 10 in. between 100 and 278 ft, and finished 8 in. in diameter from 278 to 557 ft. The well is cased with 10.1-in. ID pipe from 1.8 ft above land surface to a depth of 102.8 ft and 8-in. ID pipe from 1.9 ft above land surface

to a depth of 278 ft (cemented in).

A production test was conducted on July 13, 1954, by representatives of the driller and the State Water Survey. The airline was inoperable; however, the nonpumping water level was approximately 160 ft and the pump performance curve showed a water level of 240 ft during pumping at a rate of 90 gpm.

The pumping equipment presently installed is a Webtrol submersible turbine pump set at 280 ft, and powered by a 10-hp electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. A114749) is for a water sample from the well collected April 22, 1974, after 1 hr of pumping. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 2, LABORATORY NO. A114749

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.8		Silica	SiO ₂	12	
Manganese	Mn	0.01		Fluoride	F	0.1	0.01
Ammonium	NH ₄	0.6	0.03	Boron	B	0.05	
Sodium	Na	43	1.87	Nitrate	NO ₃	0.0	0.00
Potassium	K	3.3	0.08	Chloride	Cl	32	0.90
Calcium	Ca	50	2.50	Sulfate	SO ₄	7	0.15
Magnesium	Mg	16	1.32	Alkalinity (as CaCO ₃)		246	4.92
Arsenic	As	0.00					
Barium	Ba	0.0		Hardness (as CaCO ₃)		192	3.84
Copper	Cu	0.00					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		316	
Lead	Pb	0.00					
Mercury	Hg	0.0002		pH (as rec'd)		7.4	
Nickel	Ni	0.0		Radioactivity			
Selenium	Se	0.00		Alpha pc/l		1.2	
Silver	Ag	0.00		± deviation		1.5	
Cyanide	CN	0.000		Beta pc/l		6.4	
Zinc	Zn	0.08		± deviation		2.1	