Appendix D. Results of Pumping Tests of Shallow Aquifers in the Kane County Area

In a controlled pumping test, groundwater is pumped from a well at a closely monitored, constant rate, and water levels are simultaneously measured in the pumped well and, preferably, in one or more observation wells. Water levels are also measured during the recovery period after pumping has stopped. The time after the beginning or end of pumping is recorded with each water level measurement. Data obtained from controlled pumping tests may be analyzed by one or more similar graphical methods. These methods plot elapsed time since the beginning or end of pumping versus drawdown or recovery. If data are available from several observation wells, distance from the pumped well versus synchronous drawdown or recovery data can be plotted and analyzed. The plots are analyzed, frequently by comparing them to type curves developed from equations describing the relationship between the hydraulic properties of an ideal aquifer and the drawdown and recovery of water levels in the vicinity of a pumping well finished in the aquifer. Software packages automate this curve-matching process. For example, analysis of pumping test data for this project was conducted using the software package AquiferWin32 (Environmental Simulations Inc., 2001).

Locations (Figure D-1 and Figure D-2) and results (Table D-1 and Table D-2) of pumping tests of wells open to sand and gravel aquifers and the Shallow Bedrock Aquifer in the Kane County area are presented in this section. The analyzed pumping test data were obtained largely from the ISWS files and were selected on the basis of data and test quality. Test data that were selected for analysis are from tests that were generally of longer duration, characterized by a fairly constant pumping rate and by relatively frequent and precise water-level measurements. Note that estimates of hydraulic conductivity are not provided for tests of the Shallow Bedrock Aquifer (Table D-2). Hydraulic conductivity is typically calculated by dividing estimates of transmissivity (T) by aquifer thickness. It was not calculated for this study because Shallow Bedrock Aquifer thickness is not determinable from available information. Note also that more than one result is sometimes provided for a given well. Such multiple results reflect use of more than one analysis technique applied to the same data, or separate analyses of differing portions of the complete set of test data.

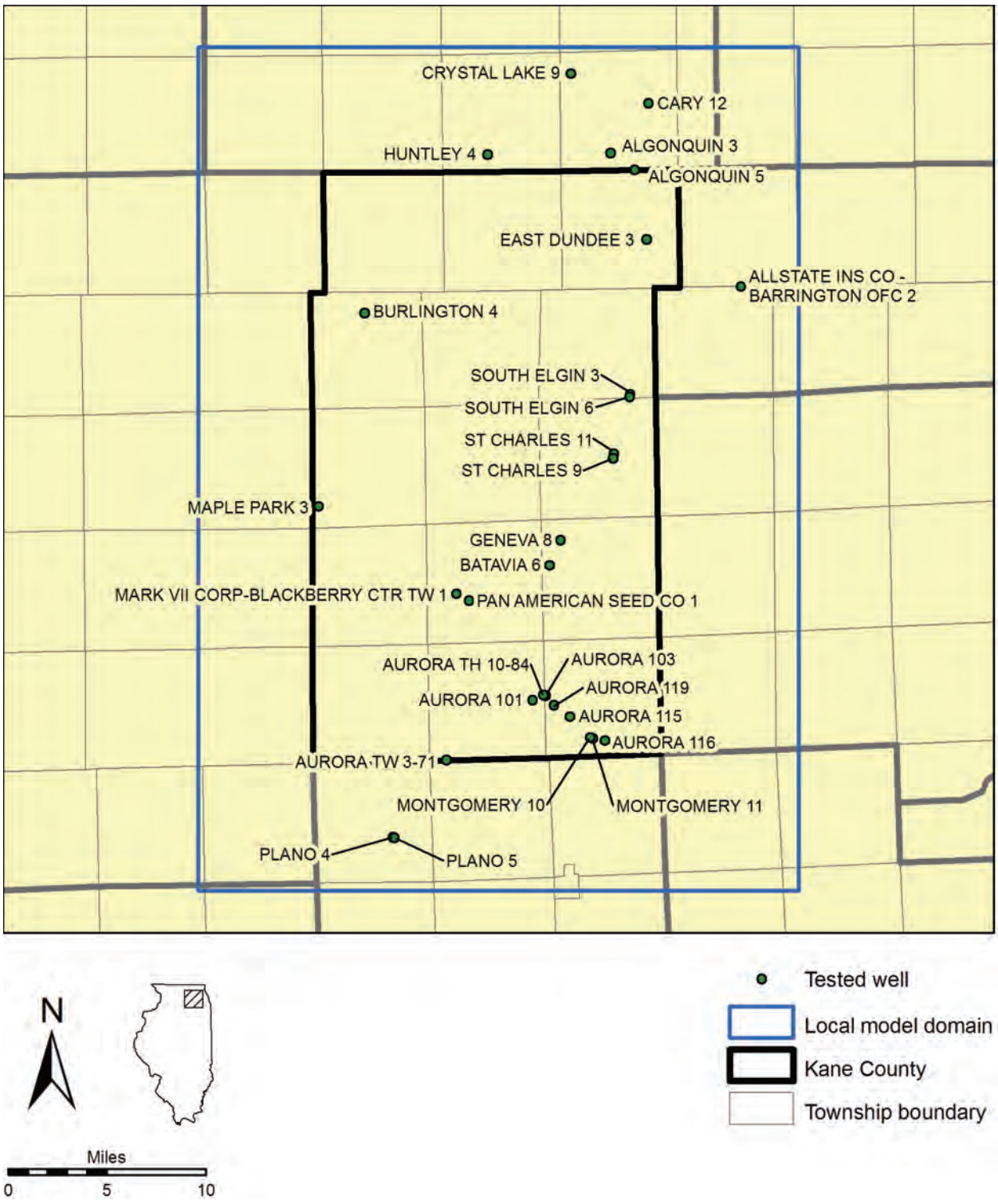

Figure D-1. Locations of pumping tests of wells open to sand and gravel aquifers in the Kane County area. See Table D-1 for analytical results.

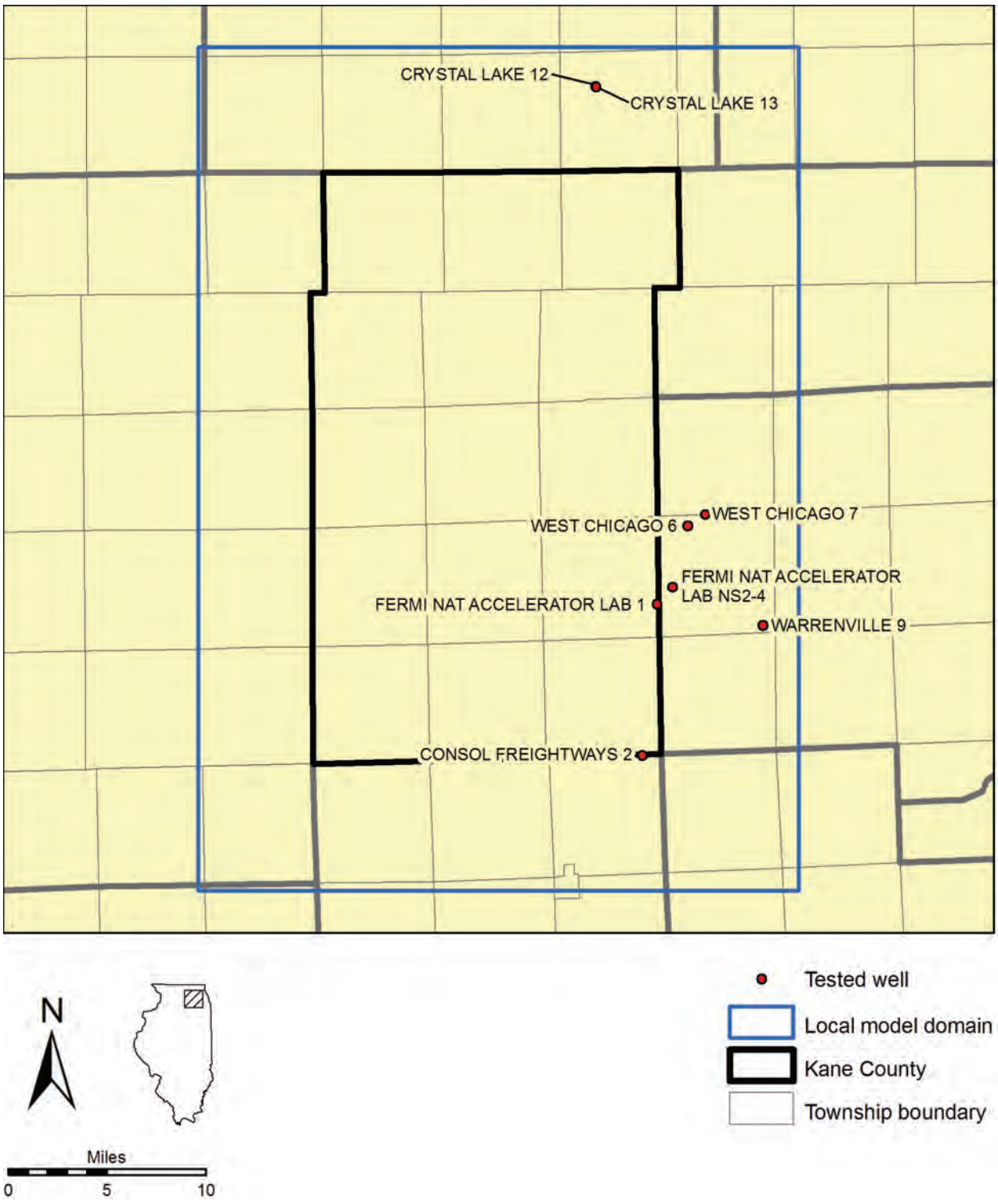

Figure D-2. Locations of pumping tests of wells open to the Shallow Bedrock Aquifer in the Kane County area. See Table D-2 for analytical results.

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (*ft/d*)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Algonquin 5	08/1978	Ashmore Unit	McHenry	43N	8E	34	2A	PW	3672			Cooper and Jacob (1946)
Algonquin 3	04/1970	Glasford Unit (upper sand)	McHenry	43N	8E	33	4H	PW	1320	66		Cooper and Jacob (1946)
Allstate Ins Co - Barrington Ofc 2	09/1980	Yorkville Sand Unit	Cook	42N	9E	34	8A	PW	2390	70		Cooper and Jacob (1946)
Aurora 101	10/1986	Glasford Unit (lower sand)	Kane	38N	7E	24	6H	OW TH 1-86	3015	70	6.8×10^{-4}	Cooper and Jacob (1946)
								OW TH 1-86	3347	78	4.0×10^{-4}	Theis (1935)
Aurora 101	10/1987	Glasford Unit (lower sand)	Kane	38N	7E	24	6H	PW	3717	86		Cooper and Jacob (1946)
Aurora 103	07/1988	Glasford Unit (upper and lower sands)	Kane	38N	8E	18	7B	PW	4161			Cooper and Jacob (1946)
								OW West	6644			Cooper and Jacob (1946)
Aurora 115	07/1988	Glasford Unit (lower sand)	Kane	38N	8E	20	5A	PW	4646	77		Cooper and Jacob (1946)
								OW East	5524	92		Cooper and Jacob (1946)
								OW West	4626	77		Cooper and Jacob (1946)
Aurora 116	04/1988	Glasford Unit (upper sand)	Kane	38N	8E	34	8G	All OW	9388	427	5.2×10^{-4}	Theis (1935)
								All OW	9762	444	4.0×10^{-4}	Cooper and Jacob (1946)

[1] Well that is the basis for T, K, and S determination. PW: pumped well. OW: observation well.

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Continued)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (*ft/d*)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Aurora 116 (continued)	04/1988	Glasford Unit (upper sand)	Kane	38N	8E	34	8G	OW 2 (OW 9-88)	8938	406	1.8×10^{-4}	Cooper and Jacob (1946)
								OW 2 (OW 9-88)	7283	331	2.3×10^{-4}	Cooper and Jacob (1946)
								OW 3 (OW 10-88)	8764	398	3.3×10^{-4}	Cooper and Jacob (1946)
								OW 3 (OW 10-88)	8696	395	3.7×10^{-4}	Cooper and Jacob (1946)
Aurora 119	04/1989	Glasford Unit (upper and lower sands)	Kane	38N	8E	19	5E	OW 1 (TH 15-87)	1948	32	7.0×10^{-4}	Hantush and Jacob (1955)
								OW 2 (TH 13-87)	1831	30	2.5×10^{-4}	Hantush and Jacob (1955)
								OW 3 (TH 16-87)	1903	31	7.8×10^{-5}	Hantush and Jacob (1955)
Aurora 101	12/1970	Glasford Unit (lower sand)	Kane	38N	7E	24	6H	PW	2880	67		Cooper and Jacob (1946)
								OW PP-1-70	2251	52	2.5×10^{-3}	Hantush and Jacob (1955)
								OW SG-70	3855	90	7.2×10^{-5}	Hantush and Jacob (1955)

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Continued)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (*ft/d*)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Aurora TH 10-84	12/1985	Glasford Unit (upper and lower sands)	Kane	38N	8E	18	8B	OW TH 7-84	5430	86	2.9×10^{-4}	Hantush and Jacob (1955)
								OW TH 8-84	7446	118	2.8×10^{-4}	Hantush and Jacob (1955)
								OW TH 8-84	7772	123	2.8×10^{-4}	Hantush and Jacob (1955)
								OW TH 8-84	8790	140	2.3×10^{-4}	Cooper and Jacob (1946)
								PW	6605	105		Cooper and Jacob (1946)
Aurora TW 3-71	02/1971	Glasford Unit (upper sand)	Kane	38N	7E	31	1A	OW 20B3-71 (SWS 1)	4611	77	5.5×10^{-4}	Hantush and Jacob (1955)
								OW 30B3-71 (SWS 3)	9333	156	6.6×10^{-5}	Hantush and Jacob (1955)
								OW 3-71 (SWS 2)	8877	148	8.3×10^{-5}	Hantush and Jacob (1955)
Batavia 6	12/1988	Glasford Unit (lower sand)	Kane	39N	8E	18	5G	PW	8587	296		Cooper and Jacob (1946)
								OW 2 (TH 6-88)	1075	371	3.0×10^{-4}	Hantush and Jacob (1955)
								OW 2 (TH 6-88)	9126	315	4.8×10^{-4}	Cooper and Jacob (1946)
								OW 3 (TH 7-88)	8361	288	3.1×10^{-4}	Hantush and Jacob (1955)

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Continued)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (ft/d)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Batavia 6 (continued)	12/1988	Glasford Unit (lower sand)	Kane	39N	8E	18	5G	OW 3 (TH 7-88)	8922	308	2.6×10^{-4}	Cooper and Jacob (1946)
Burlington 4	12/1988	Ashmore Unit	Kane	41N	6E	09	1G	PW	1908	159		Cooper and Jacob (1946)
Cary 12	02/1993	Yorkville Sand Unit	McHenry	43N	8E	14	5C	PW	12807	366		Cooper and Jacob (1946)
Crystal Lake 9	09/1986	Glasford Unit (upper and lower sands)	McHenry	43N	8E	6	4A	PW	1972	282		Cooper and Jacob (1946)
East Dundee 3	04/1969	Ashmore Unit	Kane	42N	8E	23	6E	PW	1253	391		Cooper and Jacob (1946)
Geneva 8	06/1986	Glasford Unit (lower sand)	Kane	39N	8E	05	8A	PW	3484	850		Theis, 1935 (Recovery)
								PW	37083	904		Cooper and Jacob (1946)
								OW 2	34019	830	2.7×10^{-4}	Cooper and Jacob (1946)
								OW 2	28511	695	6.8×10^{-4}	Hantush and Jacob (1955)
								OW 3	29759	726	6.2×10^{-4}	Hantush and Jacob (1955)
								OW 4	35139	857	4.2×10^{-4}	Cooper and Jacob (1946)
								OW 4	34327	837	4.6×10^{-4}	Hantush and Jacob (1955)
								OW 5	35948	877	3.0×10^{-4}	Cooper and Jacob (1946)
								OW 5	33503	817	3.8×10^{-4}	Hantush and Jacob (1955)

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Continued)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (ft/d)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Huntley 4	11/1953	Batestown Sand Unit	McHenry	43N	7E	33	6H	PW	1910	83		Cooper and Jacob (1946)
Maple Park 3	05/1971	Glasford Unit (upper and lower sands)	Kane	40N	6E	30	5A	PW	110			Cooper and Jacob (1946)
Mark VII Corp-Blackberry Ctr TW 1	08/1974	Glasford Unit (upper sand)	Kane	39N	7E	20	4D	PW	8365	186	9.1×10^{-3}	Hantush and Jacob (1955)
								OW E-11	8730	194	7.0×10^{-3}	Cooper and Jacob (1946)
								OW E-11	8276	184	7.1×10^{-3}	Hantush and Jacob (1955)
								OW E-9	8726	194	1.2×10^{-2}	Cooper and Jacob (1946)
								OW E-9	8455	188	1.2×10^{-2}	Hantush and Jacob (1955)
								PW	9032	201		Cooper and Jacob (1946)
Montgomery 10	12/1986	Glasford Unit (upper and lower sands)	Kane	38N	8E	33	4H	OW 1	1995	46	1.1×10^{-4}	Hantush and Jacob (1955)
								OW 4	1904	44	3.1×10^{-4}	Hantush and Jacob (1955)
								OW 5	2766	64	8.1×10^{-5}	Hantush and Jacob (1955)
								OW SI	2461	57	1.7×10^{-4}	Hantush and Jacob (1955)
Montgomery 11	09/1987	Glasford Unit (upper and lower sands)	Kane	38N	8E	33	5H	Mont-gomery 10	4339	128	1.6×10^{-4}	Hantush and Jacob (1955)

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Continued)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (*ft/d*)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
Montgomery 11 (continued)	09/1987	Glasford Unit (upper and lower sands)	Kane	38N	8E	33	5H	OW TH 1-87 DEEP	2073	61	7.0×10^{-5}	Hantush and Jacob (1955)
								OW TH 1-87 DEEP	1993	59	7.7×10^{-5}	Hantush and Jacob (1955)
								OW TH 3-87 DEEP	1894	56	3.4×10^{-4}	Hantush and Jacob (1955)
								OW TH 4-87	1246	37	4.4×10^{-5}	Hantush and Jacob (1955)
								OW TH 4-87	1712	50	4.8×10^{-5}	Hantush and Jacob (1955)
								OW TH 9-84	3636	107	2.1×10^{-4}	Hantush and Jacob (1955)
								OW TH 9-84	3692	109	1.4×10^{-4}	Hantush and Jacob (1955)
Pan American Seed Co 1	07/1985	Ashmore Unit	Kane	39N	7E	21	7A	PW	2821	134		Cooper and Jacob (1946)
Plano 4	06/1966	Glasford Unit (lower sand)	Kendall	37N	6E	23	8C	PW	1765	570		Cooper and Jacob (1946)
Plano 5	07/1966	Glasford Unit (lower sand)	Kendall	37N	6E	23	8C	PW	3121	844		Cooper and Jacob (1946)
South Elgin 3	04/1962	Ashmore Unit	Kane	41N	8E	35	3C	PW	4693	293		Cooper and Jacob (1946)
South Elgin 6	08/1987	Glasford Unit (upper sand)	Kane	41N	8E	35	3A	PW	3503	292		Cooper and Jacob (1946)
St Charles 11	11/1988	Glasford Unit (lower sand)	Kane	40N	8E	15	1C	PW	2223	2040		Cooper and Jacob (1946)

Table D-1. Pumping Tests of Wells Finished in Sand and Gravel Aquifers in the Kane County Area (Concluded)

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*[1]	*T* (ft^2/d)	*K* (*ft/d*)	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*					
St Charles 11 (continued)	11/1988	Glasford Unit (lower sand)	Kane	40N	8E	15	1C	OW 2 (TH 4-88)	1581	1450	1.1×10^{-2}	Cooper and Jacob (1946)
								OW 3 (TH 5-88)	1608	1475	1.4×10^{-4}	Cooper and Jacob (1946)
St Charles 9	12/1979	Glasford Unit (upper and lower sands)	Kane	40N	8E	15	2A	OW	150029	2381		Cooper and Jacob (1946)

Table D-2. Pumping Tests of Wells Finished in the Shallow Bedrock Aquifer in the Kane County Area

Pumped Well	*Month/ Year*	*Tested Interval*	*Pumped Well Location*					*Analysis Well*	*T (ft^2/d)*	*S*	*Analysis Method*
			County	*T*	*R*	*Section*	*Plot*				
Consol Freightways 2	02/1973	Silurian+ Maquoketa	Kane	38N	8E	35	1A	PW	5959		Cooper and Jacob (1946)
Crystal Lake 12	12/1986	Silurian	McHenry	43N	8E	8	1C	PW	2202		Cooper and Jacob (1946)
Crystal Lake 13	02/1987	Silurian	McHenry	43N	8E	8	1C	OW (Crystal Lake 12)	2736	3.2×10^{-4}	Cooper and Jacob (1946)
Warrenville 9	06/1985	Silurian+ Maquoketa	DuPage	39N	9E	36	7A	PW	4527		Cooper and Jacob (1946)
West Chicago 6	11/1980	Silurian+ Maquoketa	DuPage	39N	9E	5	4D	PW	6511		Cooper and Jacob (1946)
West Chicago 7	12/1980	Silurian+ Maquoketa	DuPage	40N	9E	33	5A	PW	1824		Cooper and Jacob (1946)
Fermi National Accelerator Laboratory 1	03/1997	Silurian+ Maquoketa	Kane	39N	8E	25	1E	OW S-1213	7985	8.5×10^{-5}	Theis (1935)
Fermi National Accelerator Laboratory NS 2-4	08/1996	Silurian	DuPage	39N	9E	19	3D	All OW	53	5.4×10^{-4}	Hantush and Jacob (1955)

D.1 References

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