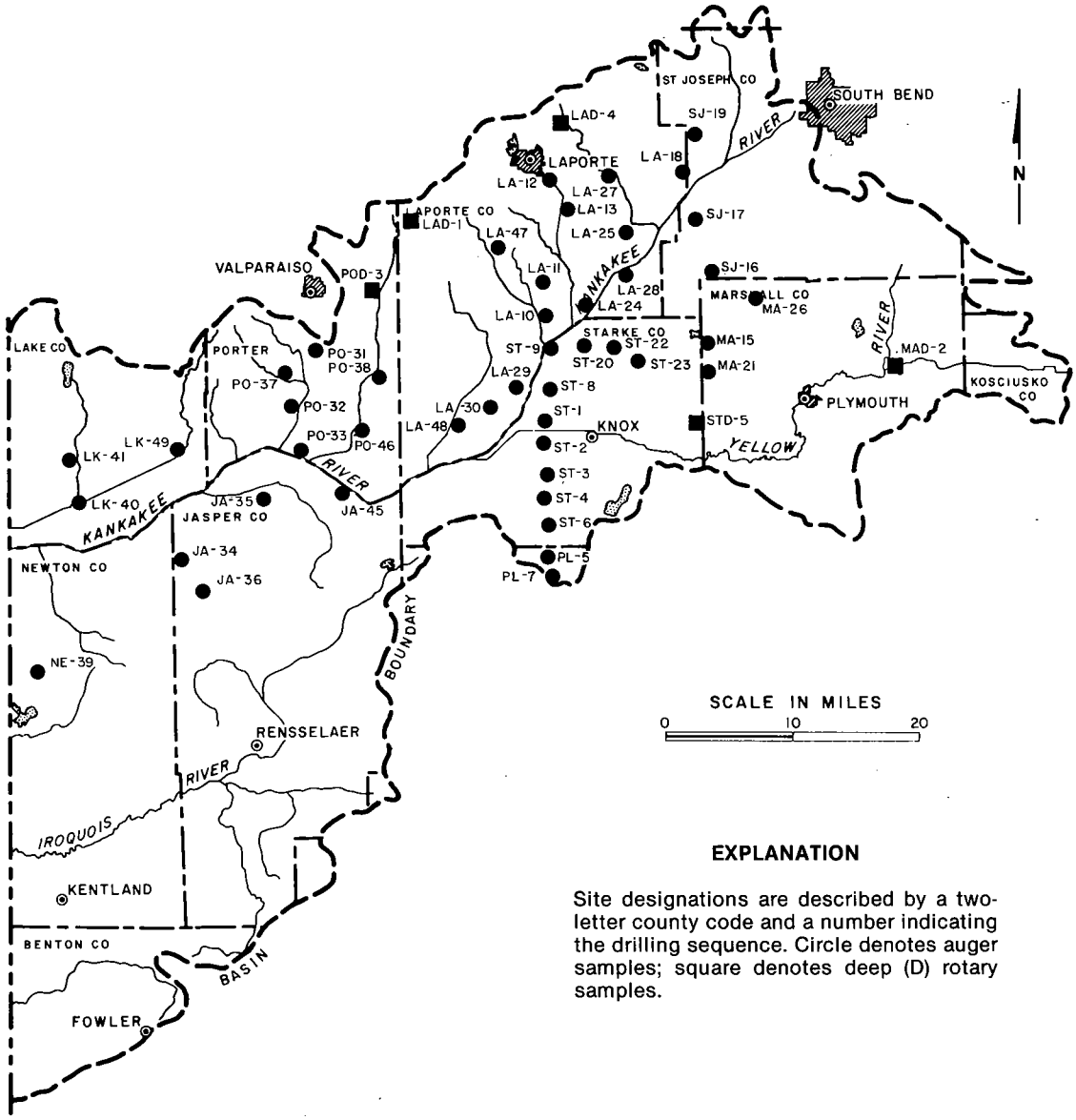
APPENDICES

Appendix 1. Historic and projected county population

Upper figures: Division of Water estimates, in-basin portion only.
Lower figures: U.S. Census Bureau, total county (1910-1980); Indiana State Board of Health (1988), total county (1990-2000).

County	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Benton	5139	4943	4814	5402	4642	4824	4561	4138	4086	4050
	12688	12206	11886	11117	11462	11912	11262	10218	10090	10000
Elkhart	1799	2069	2528	2666	3102	3920	4644	5040	5499	5799
	49008	56384	68875	72634	84512	106790	126529	137330	149840	158020
Jasper	12457	13333	12786	13749	16265	17994	19510	24962	25861	26415
	13044	13961	13388	14397	17031	18842	20429	26138	27080	27660
Kosciusko	1703	1502	1502	1521	1718	2230	2830	3488	3739	3879
	27936	27120	27488	29561	33002	40373	48127	59555	64130	66800
Lake	6991	7715	8488	10433	14643	21930	27742	36270	41560	44202
	82864	159957	261310	293195	368152	513269	546253	522965	490330	473860
LaPorte	16349	18194	18759	20032	25468	31752	33979	38375	38229	37008
	45797	50443	60490	63660	76808	95111	105342	108632	104400	99390
Marshall	18151	17734	18764	19493	22360	24807	26610	29930	32115	33556
	24175	23744	25077	25935	29468	32443	34986	39155	42060	43880
Newton	10504	10144	9841	10775	11006	11502	11606	14844	14150	13650
	10504	10144	9841	10775	11006	11502	11606	14844	14150	13650
Porter	5667	5815	5489	6291	7091	9006	11235	20549	24576	27597
	20540	20256	22821	27836	40076	60279	87114	119816	127850	133710
Pulaski	612	570	515	555	575	590	577	610	646	677
	13312	12385	11195	12056	12493	12837	12534	13258	14040	14720
St. Joseph	8513	10450	16216	16383	20774	24185	24845	24488	24443	24590
	84312	103304	160033	161823	205058	238614	244827	241617	241140	242530
Starke	9031	8820	9251	10606	13489	15945	17032	19561	18585	18360
	10567	10278	10620	12258	15282	17911	19280	21997	21480	21240
White	686	677	617	664	704	769	819	931	906	882
	17602	17351	15831	17037	18042	19709	20995	23867	23220	22620
Total	97602	101966	109570	117670	141837	169454	185990	223186	234395	240665
	412349	517533	698855	752284	922392	1179592	1289284	1339392	1329810	1328080



EXPLANATION

Site designations are described by a two-letter county code and a number indicating the drilling sequence. Circle denotes auger samples; square denotes deep (D) rotary samples.

Appendix 2. Location of test drilling sites

Appendix 3. Location of general soil associations and generalized irrigation potential

{General soil maps are adapted from U.S. Department of Agriculture (1971), and are intended only for general planning. For operational planning, use detailed maps that may be available in published or unpublished form at the local Soil and Water Conservation District Office. Irrigation maps are derived from methods described by Yahner (1978).}

DESCRIPTION OF SOIL ASSOCIATIONS

4. *Genesee-Shoals-Eel:* Nearly level, well drained, loamy Genesee, moderately well drained, loamy Eel, and somewhat poorly drained, loamy Shoals in alluvial deposits.

10. *Alida-Del Rey-Whitaker:* Nearly level, somewhat poorly drained, loamy Alida on shaley outwash sand and gravel, clayey Del Rey in lake deposits, and loamy Whitaker in outwash or lacustrine sand and silt.

11. *Bono-Maumee-Warners:* Nearly level, very poorly drained, clayey Bono, sandy Maumee, and mineral over organic Warners in lake deposits.

12. *Chelsea-Hillsdale-Oshtemo:* Sloping, excessively drained, sandy Chelsea in wind-blown sands, well drained, loamy Hillsdale in glacial till, and well drained, loamy Oshtemo on outwash sand and gravel.

13. *Conrad-Wooten-Weiss:* Nearly level, somewhat poorly drained, sandy Weiss and Wooten and poorly drained, sandy Conrad in mixed sandy and organic strata in lake beds.

14. *Door-Tracy-Quinn:* Nearly level, well drained, loamy Door and Tracy, and poorly drained, loamy Quinn on shaley outwash sand and gravel.

15. *Door-Lydick:* Nearly level, well drained, loamy soils on shaley outwash sand and gravel.

23. *Maumee-Gilford-Rensselaer:* Nearly level, very poorly drained, sandy Maumee and loamy Gilford and Rensselaer in outwash or lake-deposited sand and silt.

24. *Maumee-Newton:* Nearly level, very poorly drained, sandy soils in outwash or lake-deposited sands.

27. *Martinsville-Whitaker:* Nearly level and sloping, well drained, loamy Martinsville and nearly level, somewhat poorly drained, loamy Whitaker in outwash or lake-deposited sand and silt.

34. *Oakville-Plainfield-Adrian:* Sloping, excessively drained, sandy Oakville and Plainfield in wind-blown sands, and very poorly drained organic Adrian in the depressions.

35. *Oshtemp-Fox:* Nearly level and sloping, well drained, loamy soils on outwash sand and gravel.

37. *Ockley-Wea:* Nearly level, well drained, loamy soils on outwash sand and gravel.

39. *Plainfield-Brems-Morocco:* Sloping, excessively drained, sandy Plainfield, nearly level, moderately well drained, sandy Brems, and nearly level, somewhat poorly drained, sandy Morocco in wind-blown or outwash sands.

40 *Plainfield-Tyner-Oshtemo:* Sloping, excessively drained, sandy Plainfield in wind-blown sands and sloping and nearly level, excessively drained, sandy Tyner and well drained, loamy Oshtemo on outwash sand and gravel.

41. *Plainfield-Watseka:* Sloping, excessively drained, sandy Plainfield and nearly level, somewhat poorly drained, sandy Watseka soils in wind-blown or outwash sand.

42. *Plainfield-Chelsea:* Sloping, excessively drained, sandy soils in wind-blown sands.

47. *Rensselaer-Montgomery:* Nearly level, very poorly drained, loamy Rensselaer and clayey Montgomery in lake deposits.

48. *Rensselaer-Darroch:* Nearly level, very poorly drained, loamy Rensselaer and somewhat poorly drained, loamy Darroch on outwash or lake-deposited sand and silt.

49. *Rensselaer-Whitaker:* Nearly level, very poorly drained, loamy Rensselaer and somewhat poorly drained, loamy Whitaker on outwash or lake-deposited sand and silt.

51. *Volinia:* Nearly level, well drained, loamy soils on outwash sand and gravel.

58. *Crosier-Brookston:* Nearly level, somewhat poorly drained, loamy Crosier and very poorly drained, loamy Brookston in glacial till.

59. *Brookston-Odell-Corwin:* Nearly level, very poorly drained, loamy Brookston, Somewhat poorly drained, loamy Odell, and moderately well drained, loamy Corwin in glacial till.

61. *Blount-Morely-Pewamo:* Nearly level, somewhat poorly drained, clayey Blount and very poorly drained, clayey Pewamo and sloping, well drained, clayey Morley in glacial till.

63. *Miami-Riddles-Crosier:* Sloping, well drained, loamy Miami and Riddles and nearly level, somewhat poorly drained, loamy Crosier in glacial till.

65. *Elliott-Markham-Pewamo:* Nearly level, somewhat poorly drained, clayey Elliott and very poorly drained, clayey Pewamo and sloping, well drained, clayey Markham in glacial till.

69. *Parr-Miami:* Sloping, well drained, loamy soils in glacial till.

70. *Parr-Corwin:* Sloping, well drained, loamy Parr and moderately well drained, loamy Corwin in glacial till.

78. *Miami-Metea-Celina:* Sloping, well drained, loamy Miami and moderately well drained, loamy Celina soils in glacial till, and well drained, loamy Metea in sandy deposits and till.

79. *Miami-Owosso-Riddles:* Sloping, well drained, loamy soils in glacial till.

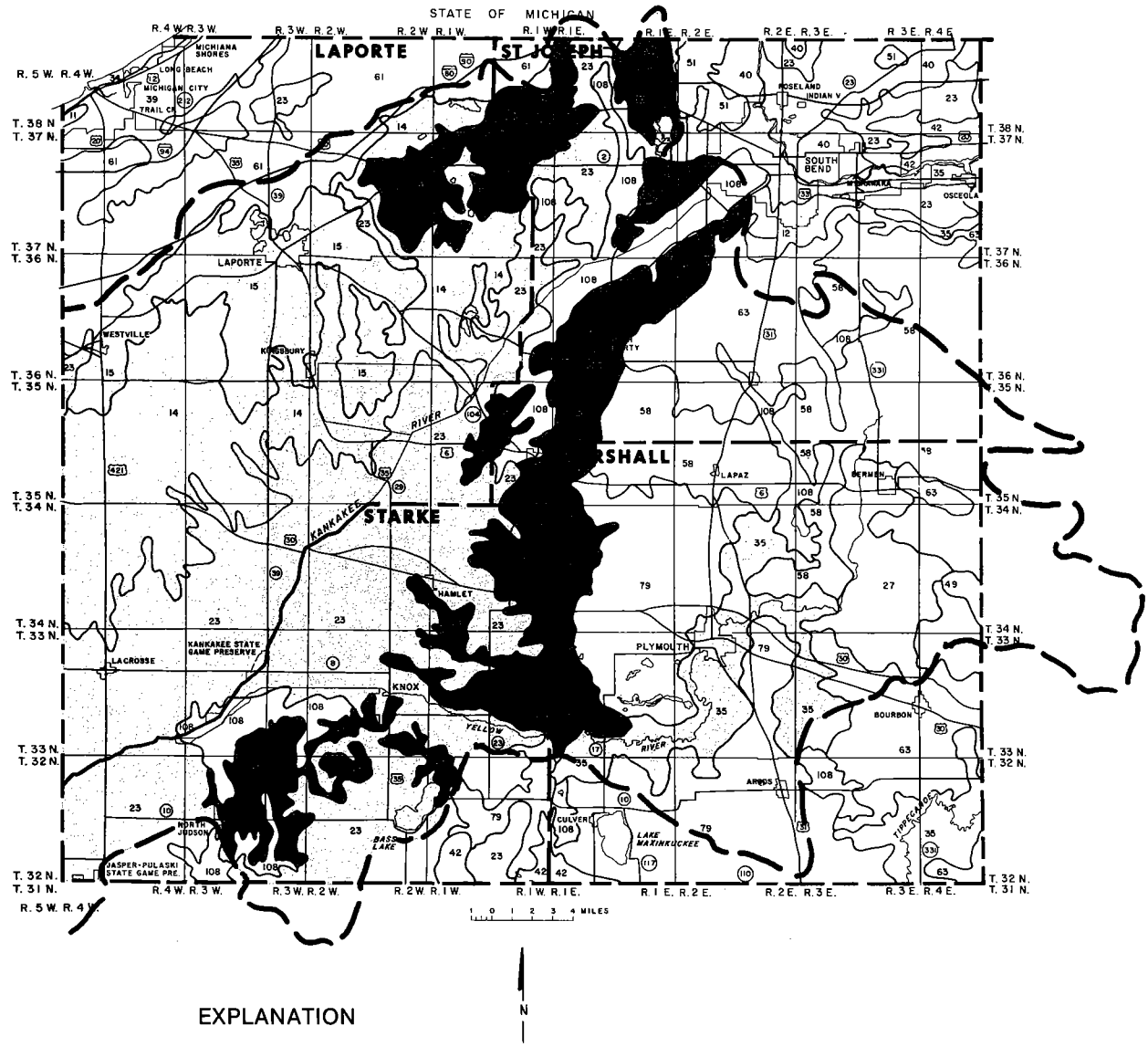
81. *Miami-Russell-Fincastle:* Sloping, well drained, loamy Miami in glacial till and silty Russell in wind-blown silts and glacial till and nearly level somewhat poorly drained, silty Fincastle in wind-blown silts and glacial till.

88. *Odell-Chalmers:* Nearly level, somewhat poorly darined, loamy Odell and very poorly drained, loamy Chalmers in glacial till.

89. *Sidell-Parr:* Sloping, well drained, silty Sidell in wind-blown silts and glacial till and loamy Parr in glacial till.

108. *Mucks and peats:* Nearly level, very poorly drained soils developed in organic materials.

Appendix 3. Location of general soil associations and generalized irrigation potential — Continued



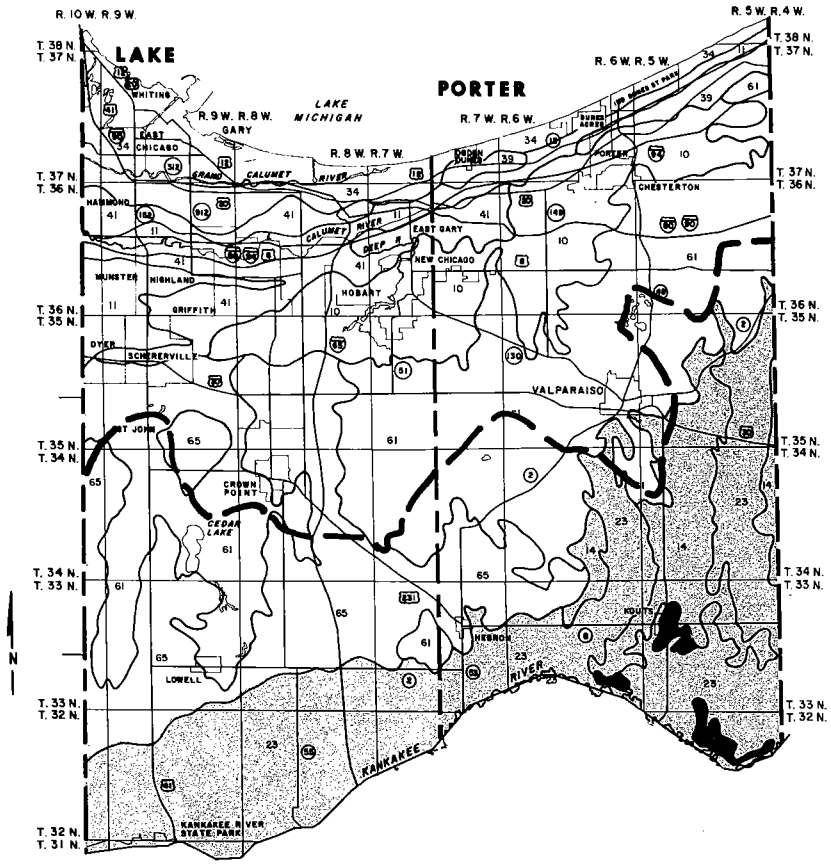
EXPLANATION

IRRIGATION POTENTIAL OF SOIL ASSOCIATIONS

- None — little or no profitable response
- Slight — response 1-2 years in 5 years
- Moderate — response 3-4 years in 5 years
- High — response expected yearly

NOTE: MAP UNITS FOR IRRIGATION RESPONSE ARE DEFINED ON THE BASIS OF SOIL PROPERTIES, WITHOUT REGARD TO TOPOGRAPHY AND LAND USE; CONSEQUENTLY, MAP UNITS CONTAIN AREAS WHERE IRRIGATION IS IMPRACTICAL, SUCH AS SLOPING OR POORLY DRAINED CROPLAND, URBAN OR BUILT-UP LAND, AND MAJOR WATERBODIES.

Appendix 3. Location of general soil associations and generalized irrigation potential — Continued



EXPLANATION

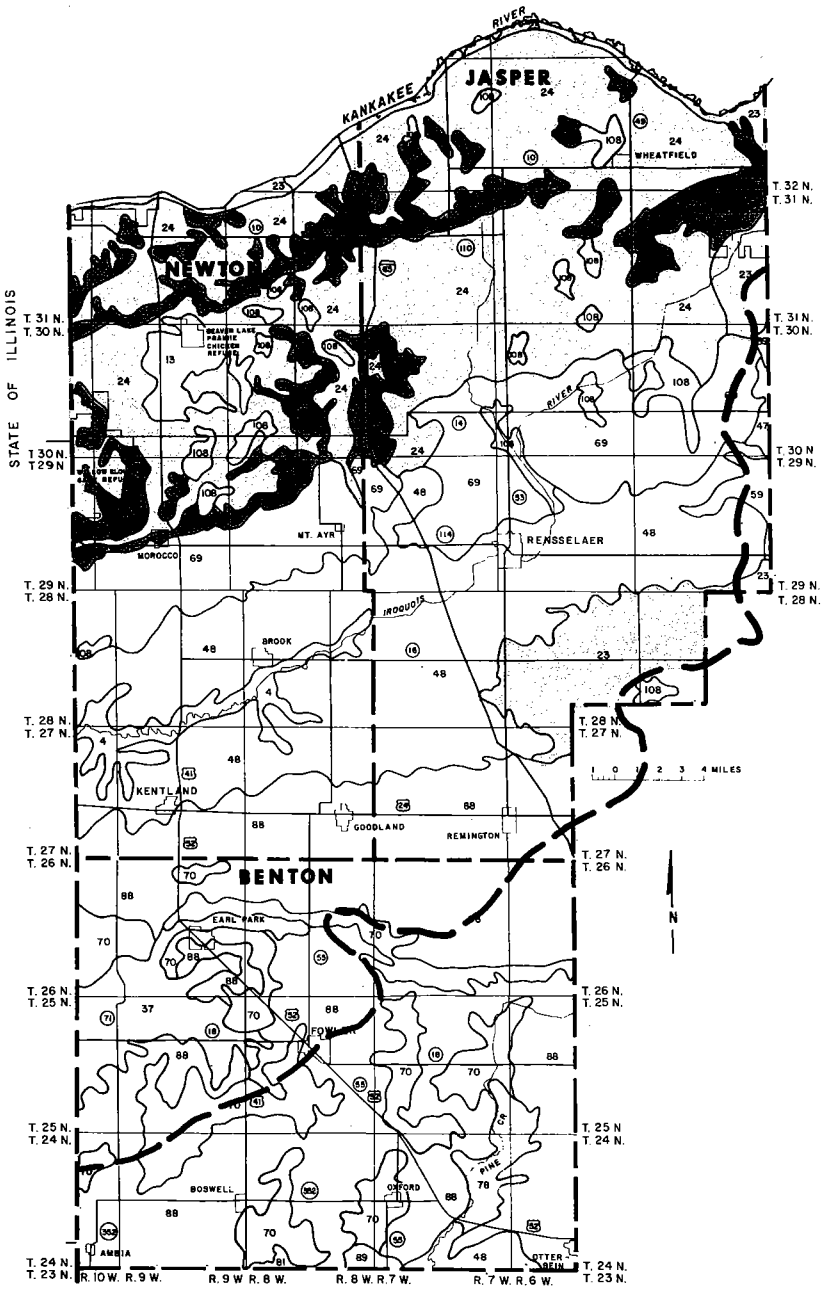
IRRIGATION POTENTIAL OF SOIL ASSOCIATIONS

- None — little or no profitable response
- Slight — response 1-2 years in 5 years
- Moderate — response 3-4 years in 5 years
- High — response expected yearly

0 1 2 3 4 MILES

NOTE: MAP UNITS FOR IRRIGATION RESPONSE ARE DEFINED ON THE BASIS OF SOIL PROPERTIES, WITHOUT REGARD TO TOPOGRAPHY AND LAND USE; CONSEQUENTLY, MAP UNITS CONTAIN AREAS WHERE IRRIGATION IS IMPRACTICAL, SUCH AS SLOPING OR POORLY DRAINED CROPLAND, URBAN OR BUILT-UP LAND, AND MAJOR WATERBODIES.

Appendix 3. Location of general soil associations and generalized irrigation potential — Continued



EXPLANATION

IRRIGATION POTENTIAL OF SOIL ASSOCIATIONS

- None — little or no profitable response
- Slight — response 1-2 years in 5 years
- Moderate — response 3-4 years in 5 years
- High — response expected yearly

NOTE: MAP UNITS FOR IRRIGATION RESPONSE ARE DEFINED ON THE BASIS OF SOIL PROPERTIES, WITHOUT REGARD TO TOPOGRAPHY AND LAND USE; CONSEQUENTLY, MAP UNITS CONTAIN AREAS WHERE IRRIGATION IS IMPRACTICAL, SUCH AS SLOPING OR POORLY DRAINED CROPLAND, URBAN OR BUILT-UP LAND, AND MAJOR WATERBODIES.

Appendix 4. Description of wetland protection programs

Administrative agency: IDNR, Indiana Department of Natural Resources — Divisions of Water (DOW), Nature Preserves (DNP), Fish and Wildlife (DFW), and Soil Conservation (DSC); IDEM, Indiana Department of Environmental Management; USACE, U.S. Army Corps of Engineers; USEPA, U.S. Environmental Protection Agency; USDA, U.S. Department of Agriculture; TNC, The Nature Conservancy. Slash denotes cooperative program.

		Program	Administrative agency	Relevance or benefit to wetlands
REGULATORY	STATE	Flood Control Act (IC 13-2-22)	IDNR-DOW	Requires permit from Natural Resources Commision for construction, excavation or filling within a stream's floodway and its encompassed wetlands
		Lake Preservation Act (IC 13-2-11.1)	IDNR-DOW	Requires permit from Natural Resources Commission to alter the bed or shoreline of a public freshwater lake of natural origin
		Nature Preserves Act (IC 14-4-5)	IDNR-DNP	Protects wetlands contained within a dedicated Nature Preserve[2]
		Water quality regulations	IDEM	Authority to protect most wetland types is inherent in the Indiana Stream Pollution Control Law (IC 1971, 13-1-13) and portions of 330 IAC 1-1, which establishes water quality standards for designated water use categories. Antidegradation provisions typically are applied to wetlands
	FEDERAL	Section 404/401 permit program	USACE/IDEM/USEPA	Regulates discharge of dredge or fill into wetlands and waterways; Section 401 of Federal Clean Water Act requires a water quality certification or waiver by IDEM prior to issuance of a Section 404 dredge-and-fill permit from USACE; USEPA may evaluate suitability of sites for fill placement
		1986 Emergency Wetlands Resources Act		Requires that statewide outdoor recreation plans include wetland priority conservation plan

Appendix 4. Description of wetland protection programs — Continued

		Program	Administrative agency	Relevance or benefit to wetlands
NON-REGULATORY	STATE	Wetland conservation program	IDNR-DFW	Funds land acquisition for wetland protection and waterfowl management
		Natural areas registry	IDNR-DNP/TNC	Encourages voluntary conservation efforts on private land containing significant natural communities or rare plant or animal species
		Natural heritage protection campaign (IC 14-4-5.1)	IDNR-DNP/TNC	Identifies and ranks significant natural areas according to the need for protection; funds acquisition and protection of these areas
		Non-game and endangered wildlife program	IDNR-DFW	Protects wetland habitat if it supports endangered, threatened or special concern wildlife species; program includes monitoring surveys of wetland wildlife
		Wildlife habitat cost-share project	IDNR-DFW	Reimburses landowners for developing or improving wildlife habitat, including wetlands
		Classified wildlife habitat and riparian lands program	IDNR-DFW	Provides technical assistance and reduced property tax assessment for land and wetlands placed in the program
	FEDERAL	Food Security Act (1985 Farm Bill)	USDA	"Swampbuster" provision revokes certain federal farm program benefits if wetlands are converted into farmland Conservation Reserve Program promotes financial incentives for removing wetlands from production for at least 10 years Conservation Easements Program grants easements on wetlands to aid in farm debt reduction

[1]Portions of this table were summarized from the appendix to "Indiana Outdoor Recreation 1989: An Assessment and Policy Plan" (Indiana Department of Natural Resources, 1988).

[2]Nature Preserves, which may be publicly or privately owned, possess significant natural communities, geologic features, or rare plant and animal species.

Appendix 5. Selected data for major lakes

{Data compiled from Glatfelter and others, 1986; Hoggatt, 1975; Indiana Department of Environmental Management, 1986; and Indiana Department of Natural Resources, Division of Water, revised *Guide to Indiana Lakes* and miscellaneous unpublished files.}

Surface area: Acreage at established level; only lakes having a surface area of at least 25 acres and/or U.S. Geological Survey gage records are tabulated. Twin Lakes (St. Joseph County), Redwing Lake (Lake County), and Round Lake (Starke County) are excluded because of limited morphometric data.

Capacity: At average or established level; expressed in acre-feet (af) and million gallons (mg).

Established level: Average normal water level, as determined by local courts; expressed in feet above mean sea level (fmsl).

Period of record: Refers to lake-level data collected by the U.S. Geological Survey under cooperative agreement with the Indiana Department of Natural Resources, Division of Water.

Trophic class and lake management group: Data from Indiana Department of Environmental Management, 1986.

Lake	Drainage Area (mi^2)	Surface area (acres)	Capacity		Maximum depth (ft)	Established level (fmsl)	Period of record	Trophic class[1]	Lake management group[2]
			af	mg					
JASPER COUNTY									
Ringneck[3]	1.94	300	—	—	<4	—	1949-55	—	—
LAKE COUNTY									
Cedar	8.14	781	6750	2200	16	—	1943-	3	IVC
Dalecarlia[3]	20.10	193	—	—	8	—	1947-52	3	IVA
Lake of the 4 Seasons[3]	—	309	2105	686	34	—	—	—	
LAPORTE COUNTY									
Clear	.65[5]	106	760	248	12	798.20	1942-[4]	2	VIIA
Crane[3]	—	58	—	—	12	—	—	3	VIIC
Fishtrap[3]	—	102	—	—	37	—	—	1	V
Hudson	7.92[5]	432	5060	1649	42	763.09	1946-	2	VIIA
Lower Fish	10.4[5]	134	870	284	16	688.22	1946-53	1	V
Pine	10.7[5]	564	—	—	71	796.20	1946-[4]	1	VIIA
Saugany	2.34[5]	74	2190	714	66	781.21	1946-50	1	IIA
Silver[3]	1.72[5]	54	—	—	12	795.20	1946-66	—	—
Stone	10.7[5]	140	—	—	36	796.20	1946-[4]	1	V
Upper Fish	9.65[5]	139	1040	339	24	688.22	1946-53	2	VIIA

See footnotes at end of table

Appendix 5. Selected data for major lakes — Continued

Lake	Drainage Area (mi²)	Surface area (acres)	Capacity		Maximum depth (ft)	Established level (fmsl)	Period of record	Trophic class[1]	Lake management group[2]
			af	mg					
MARSHALL COUNTY									
Cook	—	93	1651	538	64	—	—	2	VIIB
Dixon	6.67[5]	33	479	156	48	—	—	2	VIIB
Flat	—	26	209	68	24	—	—	2	VIIA
Gilbert	—	37	491	160	41	—	—	3	IVB
Holem	—	40	390	127	74	—	—	1	VIIA
Lake of the Woods	9.45[5]	416	6810	2219	48	803.85	1945-	2	VIIB
Latonka[3]	5.77[5]	100	488	159	—	—	—	—	—
Lawrence	—	69	1580	515	63	—	—	1	IIA
Mill Pond-(Kreighbaum)	5.34[5]	168	1020	332	36	767.75	1945-53	4 (2)	IVA (VIIA)
Myers	1.41	96	2000	652	59	768.69	1945-53	1	VIA
Pretty	.85	97	2140	697	40	787.36	1954-66	1	IVA
NEWTON COUNTY									
J.C. Murphey	13.0	1400	—	—	8	—	1952-61	2	III
PORTER COUNTY									
Eliza[3]	1.70	45	—	—	35	738.70	1954-[4]	3	VIIB
Flint[3]	2.62	86	—	—	67	797.66	1946-	1	VIA
Long	1.31	65	520	169	27	797.66	1947-52	2	VIIA
Loomis-(Spectacle)	.53	62	540	176	30	812.82	1946-53	3 (2)	IVB (VIIC)
Mink[3]	—	35	—	—	24	—	—	3	VIIC
Wauhob	.40	21	—	—	48	—	1946-	2	IIC
ST. JOSEPH COUNTY									
Chamberlain[3]	—	51	—	—	27	—	—	4	IVA
Mud[3]	—	197	—	—	8	—	—	4	IVA
North Chain (Bass)	3.89[5]	88	1400	456	37	721.17	1946-53	1	V
Pleasant[3]	—	29	—	—	39	—	—	2	VIIB
Worster Lake (Potato Creek Reservoir)	—	327	3270	1066	25	—	—	2	VIIA
Riddles	11.7[5]	77	640	209	20	817.50	1946-[4]	2	VIIA
Sously[3]	—	40	—	—	19	—	—	2	IVA
South Chain (Szmanda)	6.32[5]	90	270	88	9	717.04	1946-53	4	IVA
South Clear[3]	—	51	—	—	15	—	—	3	IVA
Wharton (Goodman)	1.85[5]	18	—	—	25	—	1960-[4]	—	—

See footnotes at end of table

Appendix 5. Selected data for major lakes — Continued

Lake	Drainage Area (mi²)	Surface area (acres)	Capacity		Maximum depth (ft)	Established level (fmsl)	Period of record	Trophic class[1]	Lake management group[2]
			af	mg					
STARKE COUNTY									
Bass	5.18	1405	—	—	30	713.65	1943-	2	III
Eagle	25.5[5]	24	160	52	21	713.25	1946-53	2	VIIC
Koontz	6.25[5]	346	3170	1033	31	714.56	1943-	—	—
Skitz[3],[6]	—	1400	—	—	6	—	1949-53	—	—

[1]Class 1 — high-quality lakes assigned a total of 0-25 eutrophy points; class 2 — intermediate-quality lakes assigned a total of 26-50 eutrophy points; class 3 — poor-quality lakes assigned a total of 51-75 eutrophy points; class 4 — remnant natural lakes and oxbow lakes.
[2]Groups of similar lake types were derived from cluster analysis based on lake morphometry and trophic state. Groups applicable to in-basin lakes are summarized as follows:

Group	*Surface area (acres)*	*Mean depth (feet)*	*Eutrophy points*
I	3060-3180	17.5-22.0	16-20
IIA	50-488	17.5-31.0	1-16
IIC	37-388	32.7-40.5	18-41
III	1291-1864	5.0-24.5	23-48
IVA	26-385	2.0-7.3	50-65
B	25-326	7.9-20.0	50-75
C	150-575	5.0-14.0	62-75
V	30-414	5.5-15.7	2-18
VIA	25-421	15.0-27.0	13-39
VIIA	25-828	5.0-13.2	18-37
B	28-551	12.2-19.6	27-54
C	25-424	5.5-14.4	33-46

[3]No depth contour map available for sale by the Indiana Department of Natural Resources, Division of Water.
[4]Gaps occur in years of record.
[5]Contains drainage area (5 percent or greater) that does not contribute directly to surface-water runoff.
[6]Artificial impoundment is no longer maintained; area is now a seasonally flooded marsh.

Appendix 6. Maximum contaminant levels for selected inorganic constituents

{All values except pH and mercury are in milligrams per liter. If multiple uses have been designated, the most protective standard applies. Dash indicates no available criterion. References to standards are current as of late 1988.}

Aquatic life: Values for all constituents except iron, pH, selenium, and silver are 4-day average concentrations; selenium value is the 24-hour average; silver criterion is not to be exceeded at any time. All values are chronic aquatic criteria which apply outside the mixing zone, except for silver which is the acute aquatic criterion. Where applicable, trace metal standards were calculated using a hardness value of 325 milligrams per liter.

Public supply: Maximum permissable level of contaminant in water at the tap. National secondary regulations (reference e) are not enforceable; both national primary regulations and state regulations are enforceable (references b, c and f); lead and copper have new proposed national primary regulations (reference l) which are not enforceable until promulgated.

Irrigation and livestock: All values from the National Academy of Sciences, 1974.

Constituent	Aquatic life		Public supply		Irrigation	Livestock
	Value	Reference	Value	Reference		
Arsenic (trivalent)	0.190	a	0.05	b,c	0.10	0.2
Barium	—	—	1.0	b,c	—	—
Cadmium	0.003	a	0.01	b,c	0.01	0.05
Chloride	230	i	250	d,e	—	—
Chlorine	0.011	a	—	—	—	—
Chromium (hexavalent)	0.011	a	0.05	b,c	0.1	1.0
Copper	0.032	a	1.0	e	0.20	0.5
			1.3	l		
Cyanide	0.005	a	—	—	—	—
Flouride	—	—	4.0 prim	f	1.0	2.0
			2.0 sec	f		
Iron	1.00	j	0.3	e	5.0	—
Lead	0.014	a	0.05	b,c	5.0	0.1
Manganese	—	—	0.05	e	0.20	—
Mercury (ug/1)	0.012	a	2.0	b,c	—	0.01
Nickel	0.427	k	—	—	0.20	—
Nitrate (as nitrogen)	—	—	10.0	b,c	—	—
pH (standard unit)	6.0-9.0	d	6.5-8.5	e	4.5-9.0	—
Selenium	0.035	g	0.01	b,c	0.02	0.05
Silver	0.015	g	0.05	b,c	—	—
Sulfate	—	—	250	d,e	—	—
Total dissolved solids	—	—	500	e	500-1000	3000
Zinc	0.288	h	5.0	e	2.0	25.0

[a] U.S. Environmental Protection Agency, 1985a.
[b] Indiana Environmental Management Board, 1979.
[c] U.S. Environmental Protection Agency, 1986c.
[d] Indiana Stream Pollution Control Board, 1985.
[e] U.S. Environmental Protection Agency, 1979.
[f] _____1986a.
[g] _____1980.
[h] _____1987a.
[i] _____1988a.
[j] _____1976b.
[k] _____1986b.
[l] _____1988b.

Appendix 7. Summary of selected stream quality constituents

{Values are for 1978-87. Constituents are reported as total recoverable, and in milligarms per liter, except as indicated. Dash indicates limited or unavailable data.}

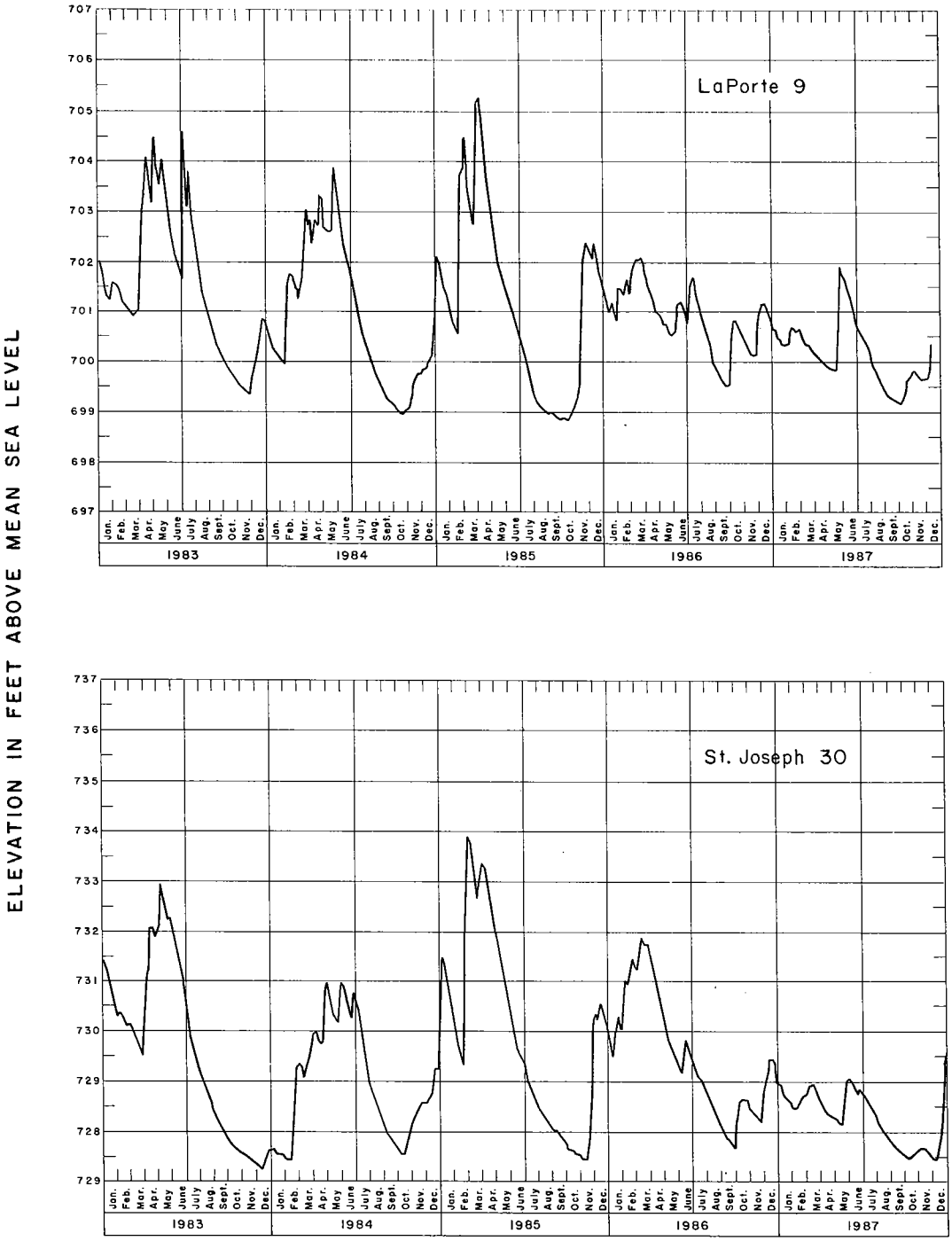
Station 1: Indiana Department of Environmental Management, KR118 (KR125), Kankakee River near Kingsbury, Indiana
Station 2: Indiana Department of Environmental Management, KR68 (KR65), Kankakee River at Shelby, Indiana
Station 3: Illinois Environmental Protection Agency, 05520500, Kankakee River at Momence, Illinois
Station 4: Illinois Environmental Protection Agency, 05525000, Iroquois River at Iroquois, Illinois
Station 5: Illinois Environmental Protection Agency, 05525500, Sugar Creek at Milford, Illinois

Constituent	Station	No. of samples	Percentiles			Mean	Range of values
			10th	50th	90th		
	1	106	407	580	680	569	150-900
Specific	2	101	436	590	679	570	322-780
conductance	3	106	506	633	733	624	291-900
(micro-mhos)	4	94	479	683	763	651	221-840
	5	99	400	670	760	637	80-980
	1	107	6.7	8.7	11.6	8.9	5.9-13.7
Dissolved	2	99	6.7	8.8	11.6	9.0	6.0-14.7
oxygen	3	90	6.8	9.8	12.7	9.9	5.8-13.9
	4	71	5.2	8.3	12.4	8.5	4.1-13.4
	5	72	5.9	8.8	13.5	9.3	4.7-19.8
	1	106	11	17	28	19	5-65
Chemical	2	100	13	21	34	3	10-83
oxygen	3	100	12	18	29	19.4	0-60
demand	4	93	12	19	31	21	1-44
(low level)	5	97	6	13	40	20	<1-130
	1	106	50	495	3050	1972	<10-56000
Fecal	2	97	20	140	976	955	<10-35000
coliform	3	63	25	190	1340	1342	10-39000
(cols./	4	52	110	345	3600	1037	10-8000
100ml)	5	54	205	2850	7950	5018	71-84000
	1	104	7	18	38	21	4-104
Suspended	2	101	6	23	57	31	2-206
solids,	3	90	3	20	72	33	1-370
residue	4	93	6	49	128	61	1-242
at 105 °C	5	98	5	37	180	216	0-1930
	1	106	0.8	1.2	3.1	1.5	0.5-5.6
Nitrate-	2	100	0.7	1.2	2.9	1.6	0.1-5.3
nitrite,	3	102	0.60	1.4	3.9	1.9	0.12-6.5
total as	4	94	0.4	5.4	9.7	5.1	0-14
N	5	99	0.4	6.4	11.0	6.1	0-19
	1	106	≤0.1	≤0.1	0.3	0.16	<0.1-1.4
Ammonia,	2	100	≤0.1	≤0.1	0.2	—	0-0.4
total	3	102	≤0.1	≤0.1	0.27	0.12	0-.79
at N	4	94	≤0.1	≤0.1	0.29	—	<.1-1.2
	5	99	≤0.1	≤0.1	0.3	0.13	<.1-.96
	1	86	0.4	0.7	1.1	0.8	0.2-2.4
TKN-ammonia	2	80	0.4	0.7	1.2	0.8	.1-2.6
and organic	3	79	0.5	0.8	1.9	1.1	.2-11
nitrogen,	4	6	—	1.4	—	1.35	.8-1.8
total as N							
	1	82	74	90	110	90	33-150
Sulfate,	2	79	77	92	110	94	40-180
dissolved	3	104	72	100	125	100	19-140

Appendix 7. Continued

Constituent	Station	No. of samples	Percentiles			Mean	Range of values
			10th	50th	90th		
Phosphorus	1	106	< 0.03	0.06	0.15	0.07	< .03-.33
	2	100	0.05	0.09	0.14	1.10	< .03-.42
	3	92	0.03	0.08	0.22	0.11	0-.64
	4	36	0.05	0.15	0.24	0.15	.03-.26
	5	36	0.04	0.1	0.33	0.15	.03-.97
Chloride, dissolved	1	83	13	16	27	18	9-42
	2	79	17	20	23	20	14-38
	3	103	18	22	27	26	9-400
	4	7	—	32	—	30	7-40
Potassium	3	62	1.9	2.3	3.2	2.4	1.4-4.1
	4	57	1.8	2.4	3.2	2.5	1.3-4.8
	5	61	1.1	1.8	3.2	2.0	1.1-6.6
Sodium	3	65	6.1	10	15	10.2	4.1-21
	4	58	5.9	11	22	12.4	4.7-26
	5	62	4.0	9.8	18.4	10.4	1.9-27
Arsenic[1]	1	105	1	2	3	2.2	1-8
	2	98	1	2.0	4	2.4	1-6
	3	96	0	2	4	1.8	0-9
Barium[1]	3	65	40	52	72	62	0-500
	4	64	45	70	90	67	0-100
	5	63	32	50	85	54	0-200
Zinc[1]	1	76	10	10	20	15	< 10-90
	2	69	10	20	40	20	< 10-70
	3	72	< 50	—	—	—	—
	4	64	< 50	< 50	—	—	< 50-250
	5	67	—	< 50	—	—	< 50-300

[1]Micrograms per liter.



Appendix 8. Water-level fluctuations in unconfined aquifers in irrigation areas

{Values are the average of maximum daily water levels every fifth day.}

STATE OF INDIANA
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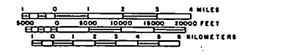
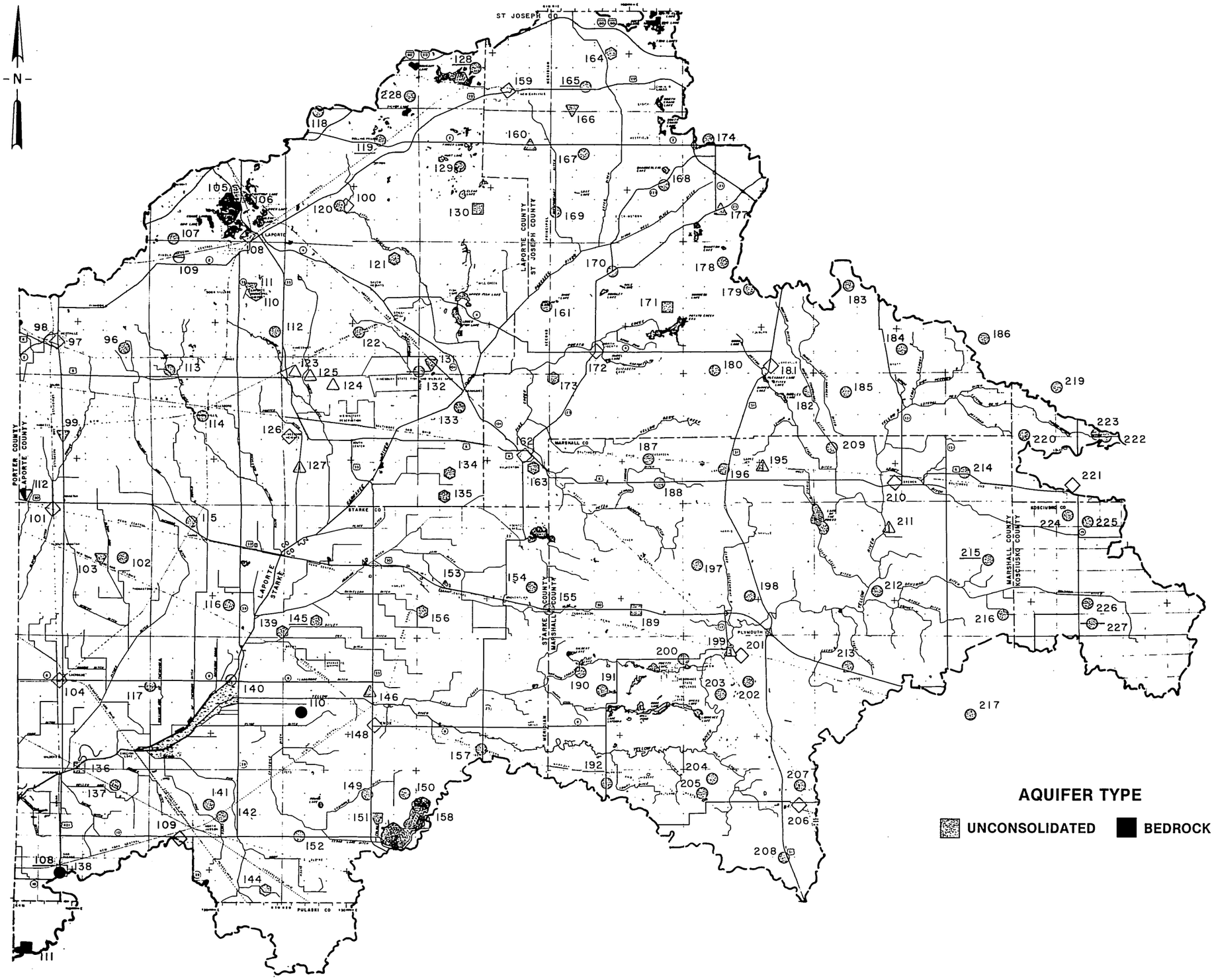
DIVISION OF WATER

UPPER KANKAKEE RIVER BASIN





AQUIFER TYPE

UNCONSOLIDATED BEDROCK

EXPLANATION

WELL TYPE	MAJOR DATA SOURCE[2]			
	IGS	ISBH	USGA	PRIVATE LAB
Municipal[1]	◆	◇	◐	◈
Public supply[1]	■	□	◧	⬒
Industrial or commercial	▲	△	◭	◬
Irrigation	⬢	⬡	◑	◒
Domestic	●	○	◐	◓
Observation and test	▼	▽	▼	▼
Rural (livestock, fish)	●—○	○—○	◐—○	◓—○

● [3] Sampling site and designation

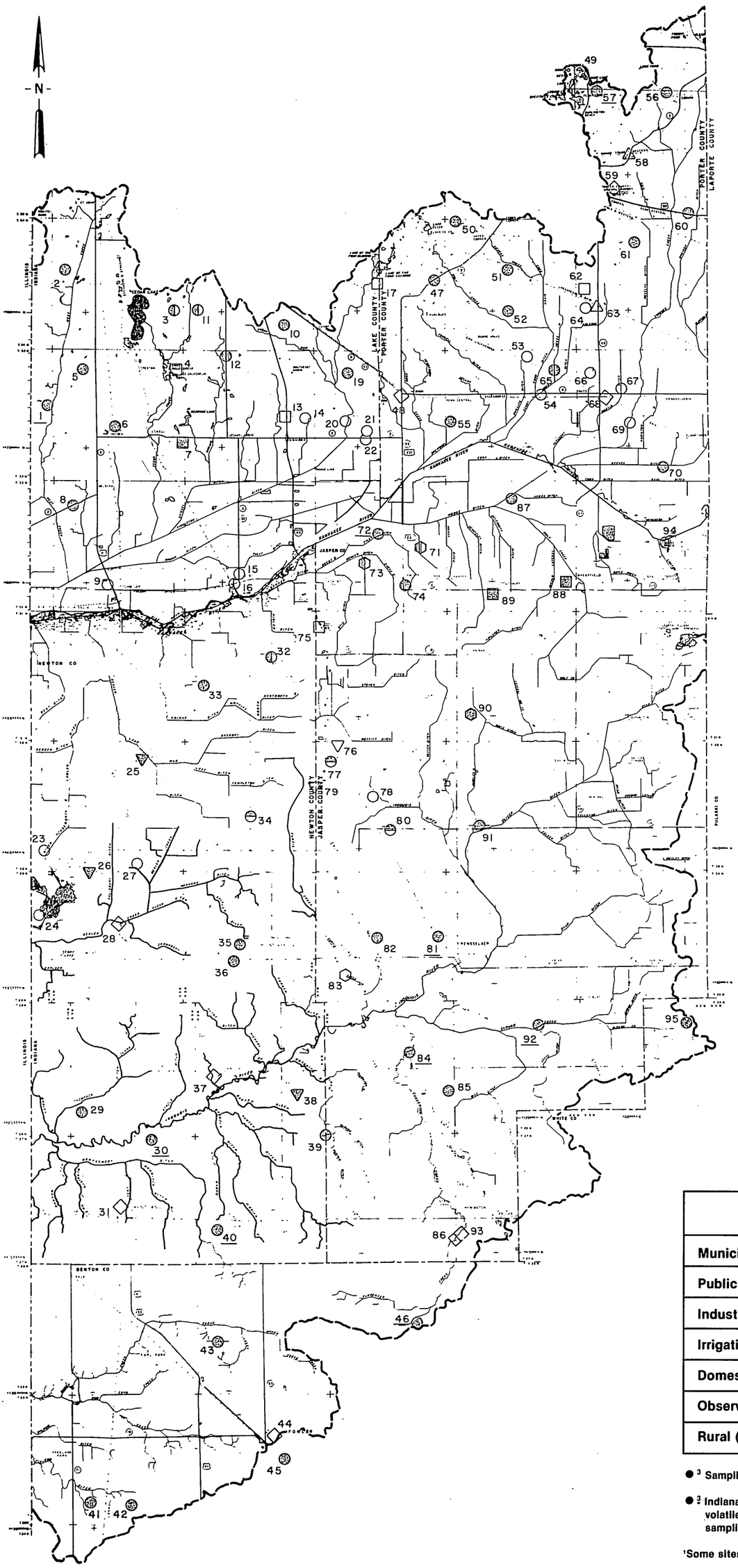
● [3] Indiana Department of Environmental Management volatile organic and pesticide sampling site

[1]Some sites have two or more wells

[2]IGS, Indiana Geological Survey; ISBH, Indiana State Board of Health; USGS, U.S. Geological Survey

Appendix 9. Location of ground-water chemistry sites for bedrock and unconsolidated deposits of the upper Kankakee River Basin

Appendix 10. Location of ground-water chemistry sites for unconsolidated deposits of the lower Kankakee River Basin



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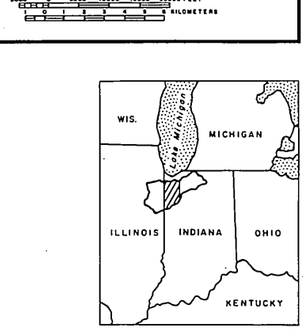
LOWER KANKAKEE RIVER BASIN



EXPLANATION

WELL TYPE	MAJOR DATA SOURCE[2]			
	IGS	ISBH	USGA	PRIVATE LAB
Municipal[1]	◆	◇	◈	◈
Public supply[1]	▣	□	▣	▣
Industrial or commercial	▲	△	◭	◭
Irrigation	⬢	⬡	⬢	⬢
Domestic	●	○	◐	◐
Observation and test	▼	▽	▼	▼
Rural (livestock, fish)	⊕	○	⊕	⊕

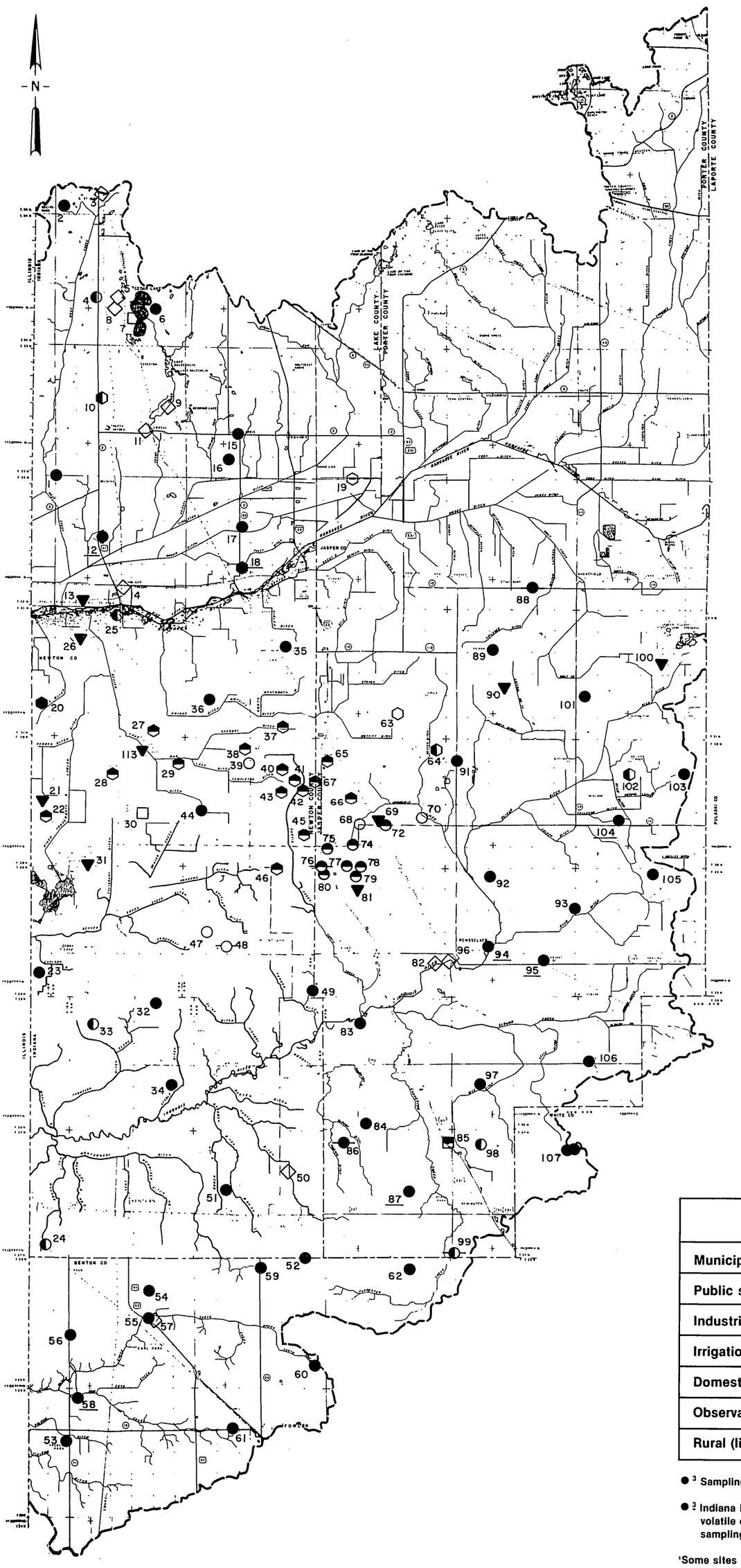
● [3] Sampling site and designation

● [3] Indiana Department of Environmental Management volatile organic and pesticide sampling site

[1]Some sites have two or more wells

[2]IGS, Indiana Geological Survey; ISBH, Indiana State Board of Health; USGS, U.S. Geological Survey

Appendix 11. Location of ground-water chemistry sites of bedrock wells sampled in the lower Kankakee River Basin



STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

LOWER KANKAKEE RIVER BASIN

EXPLANATION

WELL TYPE	MAJOR DATA SOURCE[1]			
	IGS	ISBH	USGA	PRIVATE LAB
Municipal[1]	◆	◇	◐	◈
Public supply[1]	■	□	◧	◨
Industrial or commercial	▲	△	◭	◬
Irrigation	⬢	⬡	◑	◒
Domestic	●	○	◐	◓
Observation and test	▼	▽	▼	▼
Rural (livestock, fish)	●—	○—	◐—	◓—

● [3] Sampling site and designation

● [3] Indiana Department of Environmental Management volatile organic and pesticide sampling site

[1]Some sites have two or more wells

[2]IGS, Indiana Geological Survey; ISBH, Indiana State Board of Health; USGS, U.S. Geological Survey

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits

{All values in milligrams per liter except as indicated.}

Location Number: *, analysis of softened water; -, anomalous analysis (epm balance error >5%); X, Indiana Department of Environmental Management volatile organic and pesticide sampling site; #, incomplete analysis.

Well owner: CC, Country Club; CH, Church; F&W, Fish and Wildlife; IDNR, Indiana Department of Natural Resources; Lapt, LaPorte County; New, Newton County; Obs, Observation; S, Shallow; Stark, Starke County; USGS, United States Geological Survey; (133), sample number for data collected in joint Division of Water and Indiana Geological Survey Study. Data collected summer and fall, 1986, except where prefixed with SJ (St. Joseph River Basin) and LM (Lake Michigan Basin).

Township: N, North.

Range: E, East; W, West.

Section: M, MRL (Michigan Road Land).

Aquifer system: ES, Eolian Sands; IQB, Iroquois Basin; IQM, Iroquois Moraine; IQV, Iroquois Buried Valley; KK, Kankakee; MM, Maxinkuckee Moraine; NAP, Nappanee; SJ, St. Joseph; VM, Valparaiso Moraine; VOA, Valparaiso Outwash Apron.

Date sampled: month and year

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
											LAKE COUNTY										
1X	D. Doodeman (111)	33N	10W	13	53	VM	8/86	7.2	444	108.2	42.4	10.8	0.9	2.70	< 0.10	393.9	14.3	92.9	0.3	< 0.02	509
2	L. Sylvester (89)	34N	9W	18	76	VM	7/86	7.4	403	98.0	38.6	10.3	0.9	2.30	< 0.10	420.0	6.9	11.1	0.2	< 0.02	420
3	M. Strake	34N	9W	25	62	VM	5/62	7.0	573	114.0	70.0	12.0	2.5	3.50	0.05	471.0	1.0	120.0	0.1	0.18	606
4	Dalecarlia 1	33N	9W	1	86	VM	7/74	7.4	468	106.0	49.0	18.0	3.0	2.50	0.05	418.0	3.0	80.0	0.3	0.40	513
5	C. Williams (90)	33N	9W	5	56	VM	7/86	7.1	408	101.6	37.6	40.7	0.9	2.30	0.10	271.6	112.0	120.0	0.2	< 0.02	578
6	G. Fox (91)	33N	9W	21	72	VM	7/86	6.2	351	80.8	36.2	15.0	1.1	1.80	< 0.10	375.2	13.9	22.0	0.3	< 0.02	396
7	First Church of the Nazarene (96)	33N	9W	25	46	VM	7/86	6.4	515	131.0	45.8	13.5	0.9	2.20	0.20	330.4	48.0	150.0	0.2	< 0.02	590
8	C. Bailey (106)	32N	9W	6	74	VM	10/87	7.6	358	96.7	28.3	6.5	0.5	1.30	0.10	246.3	12.9	98.1	0.1	< 0.02	400
9	Huber Sod Farm	32N	9W	28	32	KK	8/81	6.8	466	124.0	38.0	30.0	42.0	5.50	1.00	344.0	59.0	150.0		0.90	657
10	A. Moos (117)	34N	8W	26	86	VM	8/86	7.6	283	61.3	31.6	50.9	1.6	1.70	< 0.10	400.2	9.8	< 0.1	0.3	< 0.02	397

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
LAKE COUNTY - Continued																					
11	W. Heath	34N	8W	30	67	VM	5/62	6.8	618	132.0	70.0	14.0	2.0	9.30	0.11	451.0	1.5	178.0	0.1	0.11	678
12	D. Randall (94)	33N	8W	4	108	VM	7/86	6.7	424	104.6	39.6	12.2	1.0	3.20	< 0.10	403.8	1.3	43.2	0.3	< 0.02	448
13	IN I-65	33N	8W	14	63	VM	8/86	7.7	480	99.0	56.0	9.4	1.5	2.50	0.05	452.0	< 5.0	59.0	0.2	0.10	499
14	J. Hayden	33N	8W	24	56	VM	8/81	7.1	516	121.0	52.0	8.0	1.6	2.40	0.05	376.0	9.0	140.0		< 0.10	560
15	R. Mathis Farm	32N	8W	28	27	KK	8/81	7.3	229	64.0	17.0	10.0	0.8	1.80	0.22	123.0	15.0	93.0		0.20	276
16	E. Fraikin	32N	8W	28	34	KK	7/81	8.1	290	64.0	32.0	100.0	5.2	1.20	0.02	330.0		74.0	0.5	< 0.10	475
17	Twin Lakes 2	34N	7W	16	118	VM	4/78	7.5	590	118.0	71.0	20.0	4.0	2.80	0.02	472.0	3.0	150.0	0.3	0.30	653
19	D. Osburn (83)	33N	7W	5	47	VM	7/86	7.9	398	97.5	37.7	6.8	0.7	3.20	0.10	297.9	5.1	114.0	0.2	< 0.02	444
20	R. Creekmur	33N	7W	20	48	VM	8/81	7.2	412	83.0	50.0	14.0	1.7	3.80	0.04	352.0	7.0	86.0		< 0.10	457
21	H. Henson	33N	7W	21	63	VM	8/81	7.1	516	106.0	61.0	12.0	1.9	5.40	0.06	378.0	< 5.0	150.0		< 0.10	563
22	R. Sherman	33N	7W	28	40	VOA	8/81	7.1	586	128.0	65.0	26.0	2.1	0.31	0.18	386.0	44.0	200.0		0.50	698
NEWTON COUNTY																					
23	Willow Slough	30N	10W	25	36	KK	10/79	8.2	150	41.0	12.0	2.0	1.0	0.60	0.10	102.0	5.0	44.0	0.1	< 0.10	167
24	IDNR	29N	10W	12	27	KK	4/78	7.4	156	40.0	14.0	9.0	2.0	0.50	0.18	114.0	11.0	39.0	0.1	< 0.10	184
25	USGS New10 (185)	30N	9W	2	45	KK	10/86	7.2	411	120.9	26.5	15.7	0.8	7.00	0.10	397.0	17.3	56.1	0.3	< 0.02	483
26-	USGS New9 (183)	30N	9W	32	45	KK	10/86	8.4	55	15.4	3.9	3.4	0.3	< 0.10	0.10	49.3	2.7	27.1	< 0.1	< 0.02	83
27	R. Gumz	30N	9W	34	153	KK	9/84	8.1	168	45.0	14.0	73.0	4.0	1.10	0.02	282.0	26.0	< 5.0	0.8	< 0.10	333
28	Morocco	29N	9W	15	51	KK	4/86	6.7	216	62.0	15.0	19.0	1.9	1.20	0.16	168.0	35.0	50.0	0.1	< 0.10	285
29	V. Buswell (171)	28N	9W	30	85	IQB	8/86	8.0	123	33.1	9.9	55.1	1.1	0.50	< 0.10	241.7	7.6	< 0.1	0.6	< 0.02	253
30X	S. Olszyk (148)	27N	9W	2	107	IQV	8/86	7.0	184	48.5	15.4	32.9	0.9	0.60	< 0.10	258.3	2.6	3.3	0.6	< 0.02	260
31	Kentland 3	27N	9W	21	105	IQB	11/82	7.7	143	33.0	15.0	70.0	2.4	0.15	< 0.02	281.0	< 5.0	5.0	0.7	< 0.10	295
31	Kentland 2	27N	9W	21	115	IQB	11/82	7.6	149	33.0	16.0	68.0	2.5	0.14	< 0.02	284.0	< 5.0	5.0	0.6	< 0.10	296
31	Kentland 1	27N	9W	21	121	IQB	11/82	7.8	144	33.0	15.0	65.0	2.6	0.12	< 0.02	274.0	< 5.0	5.0	0.7	< 0.10	286
32	A. Villanova	31N	8W	14	20	KK	5/62	7.3	258	77.0	16.0	63.0	28.0	0.04	1.40	182.0	112.0	59.0	0.2	4.42	470
33	Dugan (174)	31N	8W	19	34	KK	8/86	8.5	93	27.5	5.9	5.1	0.4	< 0.10	< 0.10	54.1	8.0	23.1	0.1	2.34	105
34-	L. Prohosky	30N	8W	22	30	KK	7/85	7.4	187	47.0	17.0	8.5	2.7	< 0.10	0.07	98.0	25.0	56.0	< 0.5	23.00	238
35	D. Weston (115)	29N	8W	21	36	IQM	8/86	7.4	325	91.1	23.8	7.5	0.5	1.70	0.10	234.4	8.5	73.7	0.2	< 0.02	348

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
NEWTON COUNTY — Continued																					
36	J. Talley (114)	29N	8W	28	167	IQM	8/86	7.9	93	20.6	10.1	89.6	2.5	< 0.10	< 0.10	267.6	6.1	2.0	0.7	< 0.02	292
37	Brook 2	28N	8W	19	127	IQV	5/83	7.2	266	67.0	24.0	21.0	1.2	1.20	0.05	306.0	< 5.0	6.0	0.5	< 0.10	313
37	Brook 1	28N	8W	19	119	IQV	5/83	7.2	240	62.0	20.0	28.0	1.8	0.92	0.03	292.0	< 5.0	< 5.0	< 0.1		288
38	USGS New6 (188)	28N	8W	23	80	IQV	10/86	7.6	265	62.2	26.7	31.8	1.4	0.90	< 0.10	356.1	2.8	1.6	0.8	< 0.02	342
39	L. Putt (123)	28N	8W	36	33	IQB	8/86	7.1	174	50.6	11.6	18.6	0.5	< 0.10	0.10	106.2	27.8	64.1	0.2	0.59	238
40X	L. Garring (150)	27N	8W	30	30	IQB	8/86	7.3	330	83.6	29.6	29.5	1.2	1.70	< 0.10	308.8	5.7	83.9	0.5	< 0.02	421
BENTON COUNTY																					
41	D. Scherer (120)	25N	9W	30	84	IQB	8/86	6.8	264	70.8	21.2	19.8	1.3	1.50	< 0.10	304.9	1.7	15.3	0.6	< 0.02	315
42	D. Klenme (118)	25N	9W	33	198	IQB	8/86	7.7	221	61.3	16.6	49.1	2.0	1.10	< 0.10	294.4	2.2	39.1	0.9	< 0.02	349
43	J. Budreau (170)	26N	8W	19	174	IQB	8/86	8.1	254	66.9	21.3	33.4	1.5	0.90	< 0.10	296.8	8.5	34.6	0.8	< 0.02	346
44	Fowler 10	25N	8W	10	119	IQB	4/79	7.5	276	70.0	25.0	19.0	3.0	1.60	0.02	304.0	4.0	18.0	0.5	< 0.10	323
44	Fowler 9	25N	8W	10	122	IQB	4/79	7.4	310	77.0	28.0	16.0	2.0	1.60	0.02	308.0	4.0	33.0	0.4	< 0.10	347
45	R. Nesbitt (137)	25N	8W	15	40	IQB	8/86	6.2	375	99.0	31.1	8.5	0.6	2.20	0.10	279.5	10.9	89.2	0.2	< 0.02	410
46X	P. Clark (144)	26N	7W	14	75	IQB	8/86	6.6	229	62.9	17.5	35.3	1.5	1.20	< 0.10	309.4	1.7	12.8	0.7	0.00	319
PORTER COUNTY																					
47	G. Hammond (82)	34N	7W	13	120	VM	7/86	7.8	255	65.7	22.1	9.9	0.8	0.60	0.10	262.1	7.2	14.3	0.2	< 0.02	278
48	Hebron 3	33N	7W	11	85	VM	2/82	7.5	452	105.0	46.0	11.0	1.6	1.50	0.05	365.0	23.0	83.0	0.2	0.10	491
49	Hebron 1	33N	7W	14	87	VM	2/82	7.4	470	108.0	49.0	19.0	1.9	1.80	0.06	396.0	24.0	83.0	0.2	0.10	525
50	Kielpikowski (88)	35N	6W	31	105	VM	7/86	7.2	507	112.7	55.0	14.5	1.1	2.80	< 0.10	476.0	1.5	83.9	0.2	< 0.02	560
51	C. Graeber (87)	34N	6W	16	51	VM	7/86	6.8	396	101.7	34.6	3.1	0.6	1.70	0.10	270.5	7.3	113.0	0.2	< 0.02	425
52	W. Herlitz (85)	34N	6W	28	75	VOA	7/86	7.2	457	115.1	41.4	3.9	0.6	2.50	0.10	325.9	5.4	152.0	0.2	< 0.02	517
53	M. Jinks	33N	6W	3	35	VOA	10/81	7.2	296	74.0	27.0	2.1	3.1	3.70	0.26	224.0	11.0	73.0		< 0.10	329
54-	H. Rumpke	33N	6W	14	27	KK	10/81	7.6	303	74.0	28.0	16.0	3.1	0.90	0.02	183.0	20.0	170.0		0.30	422
55	Hansel (84)	33N	6W	19	45	KK	7/86	7.0	374	94.7	33.6	24.3	1.0	0.90	0.10	129.4	157.0	119.0	0.1	< 0.02	508
49	K. Berkober	36N	5W	31	146	VM	10/81	7.2	572	136.0	56.0	5.0	2.3	6.00	0.16	416.0	32.0	120.0			607
56	K. Kuehn (81)	35N	5W	2	76	VM	7/86	7.1	420	109.9	35.4	2.3	0.8	1.30	0.10	287.8	20.8	106.0	0.1	< 0.02	449
57X	J. Frencl (167)	35N	5W	5	150	VM	8/86	7.1	385	104.2	30.3	4.2	0.7	2.20	0.10	343.1	10.5	64.4	< 0.1	< 0.02	422
58	M. Samuelson (166)	35N	5W	21	51	VM	8/86	7.5	320	88.5	24.0	5.0	1.1	1.10	0.10	235.9	34.4	68.2	< 0.1	< 0.02	364

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
PORTER COUNTY — Continued																					
59	Valparaiso 1	35N	5W	29	138	VOA	9/87	7.4	332	90.0	26.0	3.4	1.7	1.70	0.14	246.0	5.0	79.0	< 0.1	< 0.10	222
59	Valparaiso 2	35N	5W	29	125	VOA	9/87	7.3	386	109.0	28.0	3.1	1.6	2.00	0.16	236.0	5.0	120.0	< 0.1	< 0.10	283
59	Valparaiso 3	35N	5W	29	126	VOA	9/87	7.4	314	90.0	22.0	2.8	1.6	3.60	0.22	200.0	< 5.0	100.0	< 0.1	< 0.10	232
59	Valparaiso 4	35N	5W	29	124	VOA	9/87	7.4	319	85.0	26.0	3.0	1.5	1.40	0.14	224.0	6.0	82.0	0.1	< 0.10	219
59	Valparaiso 5	35N	5W	28	122	VOA	9/87	7.3	310	85.0	24.0	3.7	1.4	6.70	0.20	214.0	6.0	85.0	< 0.1	< 0.10	225
59	Valparaiso 6	35N	5W	28	139	VOA	9/87	7.4	296	82.0	22.0	6.1	1.3	2.20	0.13	200.0	15.0	82.0	< 0.1	< 0.10	200
59	Valparaiso 7	35N	5W	28	142	VOA	9/87	7.4	270	71.0	22.0	3.5	1.2	1.20	0.11	174.0	7.0	88.0	< 0.1	< 0.10	204
60	R. Grass (165)	35N	5W	36	40	VOA	8/86	7.5	500	134.7	39.9	3.0	0.3	9.80	0.80	245.6	26.8	249.7	< 0.1	< 0.02	612
61	M. Nova (169)	34N	5W	9	46	VOA	8/86	7.7	234	64.1	18.0	3.4	0.4	0.20	0.10	87.9	26.8	115.8	< 0.1	< 0.02	282
62	Shults & Lewis	34N	5W	19	62	VOA	10/81	7.8	237	53.0	26.0	2.9	11.0	0.17	0.17	140.0	16.0	100.0		< 0.10	293
63	Porter Co. Co-op	34N	5W	19	59	VOA	10/81	7.3	276	66.0	27.0	3.1	1.7	0.33	0.06	164.0	13.0	110.0		0.20	320
64	C. Birkey	34N	5W	30	26	VOA	10/81	7.4	288	69.0	28.0	3.0	1.3	0.17	0.11	190.0	11.0	100.0		< 0.10	327
65	W. Geese (86)	33N	6W	1	29	VOA	7/86	7.8	238	64.1	18.8	5.0	0.5	0.20	0.10	138.9	13.4	83.3	< 0.1	< 0.02	269
66	D. Briars	33N	5W	6	26	VOA	10/81	7.5	165	40.0	16.0	12.0	2.9	0.30	0.05	107.0	16.0	71.0		0.20	222
67	Birkey	33N	5W	9	25	KK	10/81	7.2	332	80.0	32.0	6.2	1.4	3.50	0.26	216.0	20.0	110.0		< 0.10	383
68	Kouts 1	33N	5W	17	43	KK	5/77	7.5	218	59.0	17.0	17.0	3.0	0.60	0.19	136.0	25.0	73.0	0.2	< 0.10	277
68	Kouts 3	33N	5W	17	44	KK	5/87		235	61.0	20.0	13.0	2.2	0.51	0.16	129.0	28.0	85.0		< 0.10	291
69	G. Haman	33N	5W	21	56	KK	10/81	7.4	262	69.0	22.0	6.2	0.9	4.80	0.29	164.0	9.0	110.0		< 0.10	321
70	C. Goodwin (59)	33N	5W	34	30	KK	7/86	6.3	345	96.6	25.1	10.6	13.4	7.50	0.30	296.8	28.9	100.0	0.2	< 0.02	461
JASPER COUNTY																					
71	F. Modlenaar	32N	7W	14	40	KK	5/60	7.2	204	55.0	16.0	4.8	0.4	1.50	0.04	123.0	7.6	72.0	0.2	0.09	231
72X	M. Moolenaar (103)	32N	7W	16	25	KK	7/86	7.6	173	52.5	10.2	3.2	0.6	3.50	0.30	96.3	17.7	56.7	0.1	< 0.02	203
73	P. Dittner	32N	7W	21	25	KK	5/62	7.2	233	62.0	19.0	5.7	0.5	2.20	0.21	117.0	16.0	103.0	0.1	0.14	279
74	G. Glessner (102)	32N	7W	26	30	KK	7/86	5.8	382	104.4	29.6	78.1	0.9	9.10	0.90	212.8	117.0	204.0	0.3	< 0.02	672

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
JASPER COUNTY — Continued																					
75	I-65 South	31N	7W	6	54	KK	10/84	7.9	132	38.0	9.0	2.3	0.5	0.54	0.08	74.0	8.0	49.0	0.1	< 0.10	200
75#	I-65 North	31N	7W	6	57	KK	12/76	8.1	136			5.0	< 1.0	0.40	0.06	92.0	15.0	38.0		< 0.10	152
76	Prudential 49	30N	7W	6	48	KK	5/84	7.6	148	43.0	10.0	3.0	0.8	0.99	0.12	128.0	< 5.0	35.0	< 0.1	< 0.10	170
77	J. McKinney	30N	7W	6	36	KK	7/85	7.2	81	23.0	5.7	3.1	2.4	< 0.10	< 0.05	54.0	5.0	27.0	< 0.5	3.00	102
78	H & H Feedlot	30N	7W	16	54	KK	8/82	7.1	372	116.0	20.0	10.0	13.0	2.60	0.36	248.0	15.0	140.0	0.2	0.20	466
79	Prud. Jasp11S Obs	30N	7W	18	34	KK	5/83	7.3	324	97.0	20.0	23.0	1.3	1.90	0.15	184.0	85.0	71.0	0.1	< 0.10	410
80	R. Hammond	30N	7W	22	20	IQM	7/85	6.6	153	40.0	13.0	82.0	2.1	< 0.10	< 0.05	105.0	55.0	63.0	< 0.5	33.00	351
81X	J. Gawthrop (152)	29N	7W	13	172	IQM	8/86	7.0	255	62.1	24.3	37.2	1.0	0.50	< 0.10	334.1	1.4	10.8	0.5	< 0.02	338
82	E. Prohosky (128)	29N	7W	21	49	IQM	8/86	6.4	379	103.2	29.4	17.2	0.8	2.40	0.10	263.4	34.5	95.6	0.3	< 0.02	441
83	Curtis Creek CC	29N	7W	29	91	IQV	11/83	7.7	232	65.0	17.0	6.0	0.9	0.41	0.06	186.0	6.0	49.0	0.2	< 0.10	258
84X	Maienbrook (151)	28N	7W	15	50	IQB	8/86	7.0	249	63.5	22.0	26.0	0.9	2.40	< 0.10	314.6	2.0	< 0.1	0.7	< 0.02	306
85	G. Sutton (126)	28N	7W	24	45	IQB	8/86	6.9	109	28.0	9.4	21.2	1.0	0.10	< 0.10	156.1	1.5	< 0.1	0.8	< 0.02	156
86	Remington 3	27N	7W	25	55	IQB	7/83	7.2	330	84.0	29.0	17.0	3.1	1.40	0.02	342.0	< 5.0	10.0	0.5	0.30	351
87	W. Misch (175)	32N	6W	3	20	KK	10/87	7.3	234	60.7	20.1	2.9	2.1	0.10	0.40	160.9	22.2	53.0	0.2	4.20	281
88	Wheatfield Fire Department (95)	32N	6W	25	31	KK	7/86	7.1	263	78.4	16.2	24.6	2.5	0.10	0.50	180.3	39.4	71.1	0.1	1.45	342
89	Kankakee Valley High School (97)	32N	6W	33	35	KK	7/86	7.3	251	73.8	16.3	7.3	1.0	< 0.10	0.20	128.8	7.9	131.1	< 0.1	< 0.02	315
90	G. Fritts 2 (101)	31N	6W	29	42	KK	8/86	7.2	298	87.2	19.5	4.4	0.5	1.70	0.30	141.7	17.3	110.0	0.2	1.39	327
91	R. Bozell (99)	30N	6W	20	108	IQM	8/86	6.7	226	61.9	17.3	26.7	0.9	1.20	< 0.10	280.0	2.7	18.5	0.7	< 0.02	298
92X	R. Walter (129)	28N	6W	2	35	IQB	8/86	6.7	458	123.0	36.7	4.6	0.7	1.40	0.50	229.6	27.3	235.0	0.2	< 0.02	567
93	Remington 4	27N	6W	30	54	IQB	7/83	7.2	388	98.0	35.0	17.0	3.3	1.60	0.03	352.0	11.0	52.0	0.5	0.10	430
93	Remington 1	27N	6W	30	43	IQB	7/83	7.3	340	82.0	33.0	18.0	2.8	1.30	0.03	346.0	5.0	9.0	0.5	0.30	360
93	Remington 2	27N	6W	30	48	IQB	7/83	7.2	388	95.0	36.0	18.0	3.2	2.10	0.03	354.0	30.0	29.0	0.5	0.50	427
94	D. Hargis (61)	32N	5W	14	18	KK	7/86	6.8	231	72.6	12.2	3.1	0.6	< 0.10	0.10	111.9	22.0	53.0	0.2	5.36	236

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
								WHITE COUNTY													
95-	P. Tiede (179)	28N	5W	2	27	IQB	8/86	8.3	205	62.2	11.9	2.7	0.6	0.60	0.30	172.4	6.2	70.5	0.1	< 0.02	259
								LAPORTE COUNTY													
96	A. Rutz (66)	36N	4W	26	27	VOA	8/86	7.9	278	77.5	20.5	11.6	0.6	2.90	0.20	180.2	16.8	98.2	< 0.1	< 0.02	336
97	Westville 1	36N	4W	29	125	VM	1/86	7.5	250	69.0	19.0	5.5	2.7	1.10	0.08	180.0	25.0	70.0		< 0.10	300
98	Westville 2	36N	4W	29	150	VM	1/86	7.6	303	81.0	25.0	13.0	2.7	1.70	0.09	231.0	28.0	75.0		< 0.10	365
99-	USGS Lapt11 (197)	35N	4W	16	100	VOA	10/86	7.9	139	39.7	9.7	2.5	0.2	0.10	0.10	78.0	3.2	75.0	< 0.1	< 0.02	177
101	Wanatah 1	34N	4W	5	72	VOA	1/84	8.2	326	94.0	22.0	62.0	5.5	2.90	0.18	228.0	93.0	79.0	0.6	< 0.10	496
101	Wanatah 2	34N	4W	5	68	VOA	1/84	8.1	340	100.0	22.0	55.0	6.4	4.00	0.24	250.0	87.0	76.0	0.2	0.20	501
102	W. Stull (64)	34N	4W	14	60	KK	7/86	6.9	162	47.1	10.7	2.8	0.4	0.10	0.10	68.5	8.9	77.8	< 0.1	< 0.02	189
103	USGS Lapt9 (196)	34N	4W	15	32	VOA	10/86	7.8	144	41.7	9.8	2.6	0.3	0.20	0.10	57.6	12.2	83.7	< 0.1	< 0.02	185
104	Lacrosse 1	33N	4W	17	29	KK	4/86	6.9	408	109.0	33.0	140.0	6.5	4.20	0.62	360.0	210.0	79.0	0.2	< 0.10	708
104	Lacrosse 2	33N	4W	17	30	KK	4/86	6.8	390	99.0	35.0	89.0	9.3	4.30	0.64	320.0	130.0	93.0	0.2	< 0.10	656
105	Pine Lake Cem. (71)	37N	3W	22	163	VM	7/86	7.7	227	66.4	15.0	2.6	0.4	0.80	0.10	202.0	11.0	8.6	< 0.1	< 0.02	226
106	J. Magnuson (70)	37N	3W	26	42	VM	7/86	7.1	410	110.8	32.5	16.4	1.0	0.30	0.10	321.2	46.0	54.4	< 0.1	0.30	455
107	L. Olson (69)	37N	3W	32	69	VM	7/86	7.4	380	103.6	29.6	15.0	0.7	0.20	0.20	252.9	23.2	109.0	< 0.1	< 0.02	433
108	Lapt Hawthorne	37N	3W	35	139	VM	11/73	7.8	342	93.0	27.0	10.0	2.0	3.80	0.15	296.0	22.0	42.0	0.1	0.60	378
109#	Scott-Forseman Co.	36N	3W	5	237	VM	4/86	7.0	288					1.00	0.15	272.0	26.0		0.2		
110	J. Ridgeway (168)	36N	3W	14	150	VOA	8/86	7.2	302	79.7	25.1	3.0	0.4	1.10	0.10	226.7	18.2	66.7	< 0.1	< 0.02	330
111-	USGS Lapt12 (198)	36N	3W	14	77	VOA	10/86	7.8	302	79.2	25.3	3.0	0.5	0.80	0.10	228.8	24.6	78.1	0.1	< 0.02	349
112	J. Fishbaher (65)	36N	3W	24	41	VOA	7/86	7.8	211	56.7	17.0	5.0	0.6	0.50	0.10	106.3	12.2	93.0	0.1	< 0.02	249
113	W. Lange (67)	36N	3W	31	69	VOA	7/86	6.7	340	98.1	23.0	4.5	0.6	5.00	0.30	285.3	6.1	49.3	0.1	< 0.02	358
114	W. Lindburg (68)	35N	3W	16	34	VOA	7/86	7.3	349	101.0	23.6	13.4	16.1	< 0.10	0.10	199.7	40.3	70.0	< 0.1	18.23	403
115	Stephenson (164)	34N	3W	5	40	VOA	8/86	7.9	202	55.7	15.2	3.5	0.4	0.20	0.10	91.6	22.0	88.4	< 0.1	< 0.02	240
116	Kankakee F&W (36)	34N	3W	27	53	KK	7/86	7.8	185	55.4	11.4	2.4	3.6	0.50	0.30	134.1	10.1	54.9	0.2	< 0.02	219
117	F. Swanson (37)	33N	3W	18	26	KK	7/86	7.2	362	109.0	21.8	6.8	0.6	3.20	0.30	286.5	27.5	72.1	0.3	< 0.02	414
228-	G. Bladecki (LM7)	38N	2W	36	116	KK	9/87	7.5	390	108.0	29.6	3.4	0.6	0.10	0.30	376.6	22.1	41.3	0.1	1.20	441

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
LAPORTE COUNTY — Continued																					
118	L. Sims (72)	37N	2W	5	190	VM	7/86	7.2	299	79.6	24.4	2.0	0.6	< 0.10	< 0.10	250.4	6.7	34.0	< 0.1	2.00	299
119X	J. Harris (57)	37N	2W	11	50	VOA	10/87	7.2	454	132.5	30.0	39.4	2.5	< 0.10	< 0.10	341.9	76.2	61.5	< 0.1	8.96	595
120	G. Anderson (73)	37N	2W	28	36	VM	7/86	7.8	282	79.6	20.2	3.1	0.5	1.70	0.10	190.2	12.0	66.5	< 0.1	< 0.02	298
100	Lapt Kankakee	37N	2W	28	125	KK	5/69	8.0	316	89.0	23.0	6.0	2.0	3.00	0.17	222.0	9.0	100.0	0.1	0.20	365
121-	D. Tuholski (78)	36N	2W	2	105	KK	7/86	7.4	291	81.9	20.9	4.3	1.5	1.20	0.10	143.4	13.0	77.1	< 0.1	0.32	286
122	R. Tarnow (74)	36N	2W	27	41	VOA	7/86	7.4	216	60.7	15.7	3.4	0.5	0.10	0.20	118.1	13.6	72.7	< 0.1	< 0.02	238
123	Kingsbury E	36N	2W	31	80	VOA	8/83	7.6	228	62.0	18.0	14.0	1.1	4.30	0.45	200.0	11.0	30.0	0.2	< 0.10	271
124	Kingsbury B	35N	2W	4	76	VOA	4/78	7.6	252	65.0	22.0	3.0	1.0	0.10	0.06	160.0	12.0	54.0	0.1	9.60	263
125	Kingsbury A	35N	2W	5	74	VOA	8/84	8.1	240	64.0	19.0	10.0	1.8	0.66	0.11	172.0	17.0	55.0	0.1	0.10	271
126	Kingsford Heights 5	35N	2W	18	60	VOA	3/82	7.7	192	53.0	15.0	5.8	1.0	0.54	0.12	133.0	10.0	57.0	0.1	0.20	223
126	Kingsford Heights 4	35N	2W	18	68	VOA	3/82	7.8	197	54.0	15.0	5.3	1.1	0.33	0.09	133.0	12.0	55.0	0.1	1.10	224
126	Kingsford Heights 3	35N	2W	18	74	VOA	3/82	6.7	194	53.0	15.0	5.3	1.6	0.26	0.08	122.0	12.0	60.0	0.1	2.00	223
127	R. Gumz	35N	2W	30	24	VOA	6/56	7.0	414	115.0	31.0	3.9	5.8	3.10	0.69	246.0	18.0	160.0	0.1	0.02	485
128X	W. Wolfe (54)	38N	1W	28	42	VM	7/86	7.2	359	97.2	28.3	38.5	1.5	4.20	0.40	308.8	77.7	51.9	< 0.1	< 0.02	485
129	A. Pekofske (55)	37N	1W	17	104	VOA	7/86	8.0	243	65.9	19.2	3.2	0.4	< 0.10	< 0.10	213.2	9.0	22.6	0.1	2.68	251
130	Sauktown CH (56)	37N	1W	28	22	VOA	7/86	7.7	226	66.6	14.4	2.7	1.2	1.60	0.10	212.0	5.0	31.2	0.1	< 0.02	250
131	Mixsawbah Hatchery	36N	1W	31	41	KK	11/79	7.9	268	74.0	20.0	4.0	0.4	6.90	0.26	214.0	5.0	55.0	0.2	< 0.10	295
131-	USGS Lapt10 (199)	36N	1W	31	104	KK	11/86	7.9	67	10.6	9.9	11.0	0.7	< 0.10	< 0.10	93.0	7.0	< 0.1	0.3	< 0.02	95
132	Kingsbury F & W (79)	36N	1W	31	175	VOA	7/86	7.0	286	75.2	23.8	19.5	1.0	0.50	0.10	226.2	7.4	112.0	0.3	< 0.02	375
133	C. Daube (75)	35N	1W	8	26	KK	7/86	7.4	329	84.0	29.1	5.8	1.0	2.20	0.60	217.6	12.1	100.0	0.3	< 0.02	366
134	H. Cole (160)	35N	1W	29	43	VOA	8/86	7.2	207	59.1	14.6	4.1	0.5	< 0.10	0.10	128.0	18.2	37.3	< 0.1	7.64	218
135	L. Johnson (159)	35N	1W	32	105	VOA	8/86	7.4	423	126.6	25.9	3.7	0.3	12.60	0.70	366.6	33.1	53.1	< 0.1	< 0.02	476
STARKE COUNTY																					
136	Nazarene Church	33N	4W	33	30	KK	5/62	6.9	302	82.0	28.0	16.0	0.5	6.00	0.31	243.0	12.0	81.0	0.4	0.09	372
137	J. Adams (5)	32N	4W	2	61	KK	7/86	8.1	221	62.0	16.1	20.9	0.8	1.80	0.10	214.9	23.3	23.4	0.4	< 0.02	278
138	Co. Mary Hosp. 2	32N	4W	28	40	ES	12/75	8.2	156	46.0	10.0	11.0	2.0	0.60	0.10	102.0	25.0	36.0	0.1	2.20	194
138	Co. Mary Hosp. 1	32N	4W	28	40	ES	12/75	8.1	236	70.0	15.0	16.0	3.0	0.80	0.10	120.0	71.0	49.0	0.1	2.60	300
139-	B. Lawrence (76)	34N	3W	36	90	KK	7/86	7.7	313	94.1	19.0	4.6	0.3	9.20	0.80	165.9	21.2	112.0	0.2	< 0.02	361
140	KK Game Preserve	33N	3W	10	107	VOA	3/80	8.0	212	45.0	24.0	95.0	4.4	1.00	0.02	332.0	58.0	7.0	0.8	< 0.10	435

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
STARKE COUNTY — Continued																					
141	B. Manns (4)	32N	3W	9	94	ES	7/86	7.2	89	27.4	5.0	6.7	0.3	0.20	< 0.10	100.5	0.4	2.9	0.2	< 0.02	103
142	M. Vermilyer (3)	32N	3W	15	25	ES	7/86	7.4	169	51.0	10.1	6.9	1.0	< 0.10	< 0.10	117.9	11.9	26.1	< 0.1	5.05	183
144	H. Lippelt (153)	32N	3W	36	126	ES	8/86	7.3	136	39.6	9.1	8.6	0.4	0.20	0.10	153.0	< 0.1	3.6	0.5	< 0.02	154
145X	M. Riley (77)	34N	2W	32	33	VOA	7/86	7.1	461	142.0	25.9	4.6	0.5	8.20	0.80	319.4	25.4	106.0	0.1	< 0.02	505
146	J. Shilling (8)	33N	2W	15	26	VOA	7/86	7.6	212	59.7	15.3	29.4	1.1	2.10	0.50	179.7	51.3	32.7	0.2	< 0.03	300
148	Knox 3	33N	2W	23	124	ES	9/80	7.7	146	44.0	9.0	4.0	0.4	1.50	0.09	112.0	9.0	29.0	0.2	< 0.10	165
148	Knox 2	33N	2W	23	128	ES	9/80	7.4	174	54.0	9.0	4.0	0.4	3.00	0.11	168.0	6.0	9.0	0.2	< 0.10	187
148	Knox 1	33N	2W	23	124	ES	9/80	7.4	146	43.0	9.0	4.0	0.4	1.40	0.06	116.0	10.0	23.0	0.2	< 0.10	161
149	Rev. Hurlbut (7)	32N	2W	10	30	ES	7/86	8.4	109	32.4	6.8	8.0	0.4	0.10	< 0.10	74.5	7.0	37.9	< 0.1	< 0.02	137
150	M. Milo (1)	32N	2W	12	81	ES	7/86	7.2	144	45.1	7.6	2.3	0.2	0.40	0.10	125.4	1.0	18.7	0.3	< 0.02	151
151	USGS Strk2 (195)	32N	2W	14	85	ES	10/86	8.0	191	55.4	12.8	6.2	0.4	2.30	0.10	209.5	8.9	< 0.1	0.4	0.27	213
152	B. Sakaguchi (2)	32N	2W	18	125	ES	7/86	6.2	112	32.8	7.4	17.7	1.5	< 0.10	0.10	57.2	15.2	66.2	< 0.1	2.36	178
153	Hensler Nursery(158)	34N	1W	20	21	ES	8/86	7.5	152	44.7	9.7	2.4	1.7	1.30	0.20	127.8	2.0	33.4	< 0.1	< 0.02	172
154	J. Garcia (35)	34N	1W	24	40	ES	7/86	7.6	219	63.3	14.8	5.2	0.5	< 0.10	< 0.10	126.1	7.0	34.0	< 0.1	15.68	216
155	S. Clark (34)	34N	1W	25	153	ES	7/86	7.6	236	60.3	20.8	6.3	0.6	0.40	< 0.10	264.7	1.7	< 0.1	0.1	< 0.02	249
156	H. Sinn (157)	34N	1W	30	92	VOA	8/86	7.9	201	62.5	11.0	3.1	0.3	1.20	0.10	108.8	27.2	65.6	< 0.1	< 0.02	236
157	R. Dickson (156)	33N	1W	27	75	ES	8/86	7.7	148	45.5	8.5	10.1	0.3	0.30	< 0.10	131.6	8.8	30.2	0.3	< 0.02	183
158	Bass Lake State Beach	32N	1W	18	136	ES	5/60	7.3	248	63.0	22.0	5.8	0.7	1.50	0.02	253.0	2.4	6.2	0.2	0.50	254
ST. JOSEPH COUNTY																					
159	New Carlisle 3	38N	1W	34	192	VOA	3/83	7.6	302	80.0	25.0	5.0	1.0	1.10	0.04	242.0	12.0	48.0	0.2	< 0.10	318
159	New Carlisle 2	38N	1W	35	132	VOA	4/60	7.8	241	54.0	26.0	4.0	1.0	1.00	0.05	202.0	4.0	35.0	0.0	0.10	246
159	New Carlisle 1	38N	1W	35	116	VOA	5/78	7.6	280	72.0	24.0	3.0	1.0	0.60	0.03	224.0	11.0	52.0	0.2	< 0.10	298
160	Bendix Auto (53)	37N	1W	12	106	KK	7/86	7.5	281	71.8	24.6	10.4	0.6	< 0.10	< 0.10	233.8	21.3	48.0	0.1	1.75	319
161	P. Ives (46)	36N	1W	13	44	VOA	7/86	7.5	278	76.1	21.4	3.1	0.6	0.50	0.10	221.2	9.1	68.2	0.1	< 0.02	312
162	Walkerton 2	35N	1W	23	95	MM	9/78	7.6	270	73.0	21.0	13.0	2.0	0.20	0.19	220.0	22.0	48.0	0.1	0.10	312
163	R. Pugsley (80)	35N	1W	25	48	MM	7/86	7.4	238	70.5	15.2	14.9	0.8	< 0.10	< 0.10	185.9	21.4	23.0	0.1	2.93	260
164	D. Millar (163)	38N	1E	21	88	KK	8/86	7.0	310	80.5	26.5	3.8	0.5	< 0.10	< 0.10	259.8	6.6	52.3	< 0.1	3.07	329
165X	J. Wilson (162)	38N	1E	29	27	KK	8/86	7.9	274	72.7	22.5	4.5	0.4	0.70	< 0.10	214.9	17.8	61.4	< 0.1	< 0.02	309

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
166	USGS SJ30 (200)	38N	1E	32	88	KK	11/86	7.7	271	71.8	22.4	5.5	0.4	0.50	< 0.10	218.5	17.6	68.9	0.2	< 0.02	318
167	Dobrzykowski (51)	37N	1E	17	45	KK	7/86	7.2	236	65.8	17.3	9.1	0.7	1.00	0.10	180.5	22.2	51.6	0.1	< 0.02	277
168	R. Hay (50)	37N	1E	24	73	KK	7/86	7.6	151	43.1	10.5	5.8	0.3	1.40	0.10	159.9	2.8	13.4	0.1	< 0.02	174
169	H. Wordinger (52)	37N	1E	30	80	KK	10/87	7.9	527	146.5	39.2	3.7	0.4	5.70	0.10	252.3	3.6	297.0	< 0.1	< 0.02	656
170	N. Kenkle (47)	36N	1E	9	105	MM	7/86	7.9	250	67.3	20.0	4.4	0.4	0.70	< 0.10	240.7	4.0	32.9	0.1	< 0.02	274
171	Potato Creek 3 (45)	36N	1E	24	109	MM	7/86	7.7	318	82.9	27.0	3.8	0.6	0.80	0.20	321.5	4.5	24.7	0.1	< 0.02	337
172	N. Liberty 1	36N	1E	28	67	MM	7/66	7.2	320	74.0	33.0	9.0	2.0	0.40	0.30	296.0	6.0	36.0	0.1	0.08	338
172	N. Liberty 2	36N	1E	28	100	MM	6/72	7.6	290	70.0	28.0	8.0	2.0	0.50	0.22	268.0	4.0	23.0	0.2	0.20	297
172	N. Lberty 3	36N	1E	33	69	MM	1/69	7.7	332	86.0	28.0	6.0	1.0	0.60	0.31	288.0	5.0	47.0	0.2	< 0.10	347
173	Clingenpeel (161)	35N	1E	6	116	MM	8/86	7.7	225	63.2	16.4	3.4	0.3	0.60	0.10	174.1	9.5	57.4	< 0.1	< 0.02	255
174	D. Lee (48)	37N	2E	8	40	SJ	7/86	7.8	256	70.3	19.5	13.8	1.0	1.00	0.20	221.2	25.3	52.2	0.0	0.00	316
177	H & R Product (49)	37N	2E	29	44	MM	7/86	7.0	297	75.7	26.3	3.3	0.5	0.40	0.20	276.8	6.8	41.6	0.1	< 0.02	321
178	J. Fenters (44)	36N	2E	5	161	MM	7/86	6.6	299	75.3	27.1	4.4	0.5	2.10	< 0.10	323.7	3.2	10.1	0.1	< 0.02	317
179	R. Rogers (43)	36N	2E	16	85	MM	7/86	6.9	398	103.1	34.2	8.1	1.4	< 0.10	< 0.10	343.8	16.8	51.0	0.1	5.77	427
180	R. Vater (27)	36N	2E	32	190	MM	7/86	7.3	304	80.6	24.9	4.3	0.6	3.40	< 0.10	297.8	5.1	12.9	0.1	< 0.02	311
181	Lakeville 1	36N	2E	34	84	MM	6/83	7.4	346	96.0	26.0	10.0	1.3	0.36	0.09	264.0	29.0	74.0	0.2	0.10	395
181	Lakeville 2	36N	2E	35	85	MM	6/77	7.5	294	72.0	28.0	4.0	0.8	0.89	0.08	232.0	6.0	50.0	0.2	< 0.10	295
182	D. Drake (41)	35N	2E	1	44	NAP	7/86	7.2	220	56.5	19.3	3.3	0.3	0.20	0.10	133.5	13.5	85.5	0.1	< 0.02	259
183	H. Dunning (42)	36N	3E	17	97	NAP	7/86	7.1	327	85.3	27.7	4.6	0.5	2.00	0.30	309.4	5.8	50.1	0.2	< 0.02	362
184*	M. Fox (39)	36N	3E	26	145	NAP	7/86	7.5	68	18.0	5.6	74.2	0.9	0.30	< 0.10	234.4	2.0	< 0.1	1.2	< 0.02	243
185	D. Carbiener (40)	35N	3E	5	130	NAP	7/86	7.7	271	79.0	17.8	7.5	0.5	6.00	0.10	283.6	6.3	< 0.1	0.2	< 0.02	287
186	R. Eberhart (SJ7)	36N	4E	29	153	NAP	6/85	8.6	259	59.6	25.8	21.5	0.9	2.10	< 0.10	326.3	5.0	< 0.1	0.5	< 0.02	312
											MARSHALL COUNTY										
187	M. Shaw (29)	35N	1E	23	114	MM	7/86	6.4	241	59.6	22.4	9.2	0.6	0.10	0.20	239.6	4.7	< 0.1	0.2	< 0.02	241
188	E. Hostetler (28)	35N	1E	35	30	MM	7/86	6.7	315	84.5	25.2	52.7	2.4	< 0.10	< 0.10	243.0	120.0	27.5	0.3	2.50	461
189	Jellystone Park - Resort (33)	34N	1E	27	98	MM	7/86	7.5	452	98.6	50.0	4.2	0.8	1.60	0.10	376.5	6.4	103.0	0.1	< 0.02	491
190	B. Ballinger (9)	33N	1E	8	99	MM	7/86	7.7	236	64.2	18.4	3.1	0.4	0.80	< 0.10	204.5	7.5	20.0	0.1	< 0.02	237
191	R. Suseland (155)	33N	1E	16	123	MM	8/86	7.2	228	57.1	20.8	7.7	0.5	0.50	< 0.10	245.0	7.4	3.7	0.1	< 0.02	245

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
192X	S. Ulery (154)	32N	1E	4	81	MM	8/86	7.4	390	108.4	29.0	23.3	1.7	0.30	0.20	302.5	51.7	86.6	0.1	1.59	484
195	B & O RR	35N	2E	27	156	NAP	5/56	7.8	275	69.0	25.0	5.9	0.7	4.50	0.04	271.0	2.0	8.8	0.1	0.54	279
196*	R. Kaser (26)	35N	2E	M5	40	MM	7/86	7.5	2	0.6	0.2	203.1	0.6	<0.10	<0.10	321.2	23.4	102.0	<0.1	<0.02	523
197	J. Batcho (32)	34N	2E	18	42	MM	7/86	7.8	290	78.0	23.2	3.0	0.5	0.60	0.10	245.9	8.5	46.3	<0.1	<0.02	308
198	D. Koontz (16)	34N	2E	27	134	MM	7/86	6.8	233	56.4	22.5	16.4	0.8	0.90	<0.10	273.8	3.2	<0.1	0.3	<0.02	265
199	Schlosser Dairy	33N	2E	4	54	MM	8/54	7.9	350	84.0	34.0	12.0	1.4	2.10	0.03	257.0	17.0	93.0	0.0	0.11	398
200	R. Peterson (31)	33N	2E	6	NA	MM	10/87	7.3	250	69.8	18.4	2.2	0.3	2.80	0.20	163.4	17.9	75.5	0.1	<0.02	291
201	Plymouth 2B	33N	2E	M13	187	MM	5/77	7.6	319	82.0	28.0	4.0	1.0	1.60	0.34	284.0	4.0	34.0	0.2	0.10	326
201	Plymouth 1	33N	2E	M13	192	MM	5/77	7.4	319	82.0	28.0	4.0	1.0	1.50	0.33	281.0	4.0	34.0	0.2	<0.10	324
202	L. Klingerman (30)	33N	2E	M14	135	MM	7/86	7.9	312	84.8	24.3	2.9	0.5	1.10	0.20	269.3	7.6	48.9	0.1	<0.02	332
203	W. Ralston (13)	33N	2E	17	78	MM	7/86	7.7	279	76.4	21.3	2.7	0.6	3.50	0.20	219.5	7.5	58.1	0.1	<0.02	302
204	H. Berger (12)	32N	2E	5	26	MM	7/86	7.8	273	79.2	18.4	2.2	8.7	<0.10	<0.10	235.7	13.2	18.3	0.2	9.82	291
205	M. Corey (11)	32N	2E	7	117	MM	7/86	8.4	301	82.8	22.9	3.9	0.4	4.80	0.10	280.2	7.5	22.9	0.2	<0.02	314
206	Argos 2	32N	2E	12	143	MM	9/80	7.5	312	82.0	26.0	7.0	1.0	1.80	0.03	298.0	7.0	25.0	0.4	<0.10	329
206	Argos 1	32N	2E	12	148	MM	9/80	7.3	368	95.0	32.0	11.0	0.9	1.70	0.04	330.0	13.0	44.0	0.9	<0.10	396
207	P. Nifong (14)	32N	2E	19	148	MM	7/86	7.5	315	88.2	22.9	2.9	0.5	1.10	0.10	275.0	4.0	33.0	0.2	<0.02	318
208	E. Hughes (10)	32N	2E	23	176	MM	7/86	6.8	305	82.1	24.3	9.3	0.6	1.10	<0.10	324.1	2.7	2.7	0.3	<0.02	318
209	J. Rader (25)	35N	3E	19	72	NAP	7/86	7.6	247	63.0	21.9	8.5	0.6	0.90	<0.10	222.5	4.2	39.0	0.3	<0.02	272
210	Bremen 5	35N	3E	34	126	NAP	3/82	7.4	260	61.0	26.0	21.0	1.4	1.10	<0.02	300.0	5.0	<5.0	0.7	<0.10	296
210	Bremen 3	35N	3E	27	157	NAP	3/82	7.4	262	64.0	25.0	20.0	1.3	1.00	<0.02	278.0	16.0	7.0	0.6	0.80	303
210	Bremen 4	35N	3E	34	153	NAP	3/82	7.8	260	62.0	25.0	24.0	1.4	1.10	0.02	300.0	9.0	<5.0	0.7	0.70	304
211	Clay Products	34N	3E	10	75	NAP	6/55	7.7	286	68.0	28.0	12.0	0.5	3.50	0.00	300.0	2.5	0.7	0.6	0.05	296
212	J. Taylor (19)	34N	3E	28	26	NAP	7/86	7.7	209	58.0	15.7	6.9	5.5	0.70	0.40	149.5	6.1	67.4	0.2	<0.02	251
213	R. Filson (15)	33N	3E	8	116	NAP	7/86	7.6	215	58.5	16.8	8.9	0.4	2.00	0.20	232.8	2.4	<0.1	0.5	<0.02	230
214	Pla Mor Campground (24)	35N	4E	30	71	Nap	7/86	7.6	372	99.5	30.0	14.1	0.5	2.20	0.10	292.1	32.7	62.3	0.2	<0.02	417
215X	J. Rowe (20)	34N	4E	17	74	NAP	7/86	7.8	290	76.9	23.8	7.1	0.5	0.80	0.40	267.0	4.7	31.5	0.3	<0.02	306
216	J. Lemler (18)	34N	4E	28	56	NAP	10/86	7.4	309	89.1	21.1	6.9	0.3	0.80	<0.10	260.7	5.1	80.1	0.2	<0.02	368
217	E. Gochenour (17)	33N	4E	19	48	NAP	7/86	7.5	455	127.5	33.1	5.0	0.9	0.40	0.30	281.3	24.3	140.0	0.1	2.07	502

Appendix 12. Results of chemical analysis from selected water wells completed in unconsolidated deposits — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
								ELKHART COUNTY													
219	W. Harter (SJ5)	35N	4E	1	125	NAP	6/85	8.2	295	74.7	25.6	12.7	0.8	1.90	<0.10	340.4	3.1	<0.1	0.5	<0.02	324
220	E. Bolt (38)	35N	4E	15	27	NAP	7/86	7.7	254	67.9	20.6	4.4	0.4	<0.10	<0.10	177.6	12.9	40.4	0.2	7.09	260
221	Nappanee 2A	35N	4E	36	164	NAP	6/82	7.7	330	87.0	27.0	11.0	1.0	1.50	0.03	338.0	5.0	5.0	0.5	0.10	341
221	Napannee 1	35N	4E	36	154	NAP	6/82	7.8	318	88.0	24.0	11.0	1.1	1.60	0.02	336.0	5.0	5.0	0.5	0.10	338
221	Nappanee 2	35N	4E	36	150	NAP	1/75	7.7	320	81.0	28.0	10.0	1.0	2.20	0.04	334.0	2.0	1.0	0.5	0.10	326
222	R. Hahn (SJ16)	35N	5E	17	185	NAP	6/85	7.9	363	91.7	32.2	7.6	0.6	0.80	<0.10	379.7	1.7	27.6	0.4	<0.02	390
223	R. Hahn (SJ15)	35N	5E	18	140	NAP	6/85	7.9	307	74.5	28.8	12.5	0.7	1.20	<0.10	363.5	1.3	<0.1	0.7	<0.02	338
								KOSCIUSKO COUNTY													
224	G. Flowers (21)	34N	4E	1	51	NAP	7/86	7.3	377	99.3	31.5	5.5	0.5	0.40	0.10	269.3	13.5	90.1	0.2	<0.02	403
225	R. Hoffer (SJ36)	34N	5E	6	65	NAP	6/85	7.3	356	91.0	31.2	4.3	0.5	0.30	0.20	243.9	17.9	111.0	0.3	<0.02	403
226	D. Hartzell (22)	34N	5E	30	140	NAP	7/86	7.7	284	84.4	17.8	3.8	0.4	0.90	<0.10	227.1	4.5	52.3	0.2	<0.02	300
227	E. Kuhns (23)	34N	5E	31	44	NAP	7/86	7.9	304	90.3	19.0	4.3	0.7	<0.10	0.20	180.8	21.7	85.8	<0.1	1.75	332

[1]Results in standard pH units.
[2]Laboratory analysis
[3]TDS values are the sum of major constituents expected in an anhydrous residue of a ground-water sample with bicarbonate converted to carbonate in the solid phase.

Appendix 13. Results of chemical analysis from selected bedrock water wells

{All values in milligrams per liter except as indicated.}

Location Number: *, analysis of softened water; -, anomalous analysis (epm balance error > 5%); X, Indiana Department of Environmental Management volatile organic and pesticide sampling site; #, incomplete analysis.

Well owner: F&W, Fish and Wildlife; Jasp, Jasper County; Lk, Lake County; New, Newton County; Obs, Observation; Prud, Prudential; Pul, Pulaski County; Subd, Subdivision; USGS, United States Geological Survey; (133), sample number for data collected in joint Division of Water and Indiana Geological Survey Study. Data collected summer and fall, 1986, except where prefixed by SJ (St. Joseph River Basin) and LM (Lake Michigan Basin).

Township: N, North.

Range: E, East; W, West.

Aquifer system: D2, Devonian Antrim shale; Dm, Devonian/Mississippian New Albany shale; dM, Devonian/Mississippian Ellsworth shale; M1, Mississippian Borden group; SD, Silurian (S3)/Devonian (D1) carbonates; +SD, Silurian (S3)/Devonian (D1) carbonates overlain by Devonian/Mississippian shale; und., undetermined.

Date sampled: month and year

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
											LAKE COUNTY										
1	J. Henning (112)	32N	10W	1	132	SD	8/86	7.2	316	80.6	27.9	20.3	0.8	0.10	<0.10	336.2	2.1	24.6	0.3	<0.02	359
2	Buchmeier (110)	35N	9W	31	202	SD	8/86	7.4	303	66.5	33.2	34.4	2.1	0.10	<0.10	383.6	12.0	16.4	0.5	<0.02	396
3	St. John 2	35N	9W	33	280	SD	11/78	7.2	602	112.0	78.0	51.0	5.0	1.90	0.02	464.0	4.0	220.0	0.5	<0.10	751
3	St. John 1	35N	9W	33	277	SD	11/78	7.2	610	114.0	79.0	48.0	5.0	1.90	0.02	460.0	6.0	230.0	0.4	<0.10	760
3	St. John 3	34N	9W	5	150	SD	11/82	7.6	431	86.0	52.0	75.0	7.5	1.10	<0.02	415.0	<5.0	190.0	0.6	<0.10	661
4	J. Stanko	34N	9W	20	243	SD	5/62	7.0	385	80.0	45.0	35.0	8.6	0.36	0.06	380.0	3.5	69.0	0.6	2.40	473
5	Utilities, Inc. 4	34N	9W	21	302	SD	5/76	7.5	464	104.0	50.0	20.0	5.0	1.70	<0.02	396.0	2.0	100.0	0.4	<0.10	521
6	H. Mackey (104)	34N	9W	26	199	SD	8/86	7.4	484	109.6	51.2	71.6	4.2	0.30	<0.10	426.5	13.6	224.0	0.4	<0.02	731
7	Lake Shore Subd1	34N	9W	27	273	SD	8/61	7.6	353	78.0	39.0	36.0	6.0	0.80		394.0	2.0	30.0	0.1	0.00	428
8	Utilities, Inc. 2	34N	9W	28	216	SD	7/61	7.7	382	84.0	42.0	28.0	5.0	1.10	0.00	388.0	3.0	63.0	0.3	0.90	460
9	Lowell 4	33N	9W	13	397	SD	5/82	8.3	37	12.0	2.0	420.0	8.8	0.16	0.02	524.0	240.0	78.0	8.0	<0.10	1086
10	N. Cumming	33N	9W	16	703	SD	5/55	7.8	48	11.0	4.9	111.0	5.3	0.19	0.00	246.0	7.0	39.0	1.6	0.02	328

Appendix 13. Results of chemical analysis from selected bedrock water wells — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
LAKE COUNTY — Continued																					
11	Lowell 3	33N	9W	23	280	SD	6/87	7.9	119	27.0	12.0	140.0	5.7	0.07	<0.02	332.0	41.0	62.0	2.9		490
11	Lowell 2	33N	9W	23	300	SD	5/82	7.7	67	18.0	6.0	180.0	5.4	0.58	0.02	336.0	47.0	44.0	5.7	0.10	509
11	Lowell 1	33N	9W	23	285	SD	12/75	8.2	96	21.0	11.0	170.0	8.0	0.10	0.02	348.0	57.0	52.0	3.5	0.10	532
12X	J. Bruce (107)	32N	9W	16	57	SD	8/86	7.3	339	87.6	29.3	26.6	1.3	<0.10	<0.10	308.2	28.2	<0.1	0.1	<0.02	424
13-	USGS LK12 (189)	32N	9W	32	82	SD	10/86	8.0	157	39.9	14.1	65.7	1.6	0.90	<0.10	265.0	1.6	<0.1	0.8	<0.02	284
14	Schneider 2	32N	9W	34	200	SD	10/73	7.5	248	56.0	26.0	62.0	6.0	0.20	<0.02	296.0	38.0	46.0	0.7	1.40	414
15	C. Ebert (93)	33N	8W	21	169	SD	7/86	6.7	234	58.0	21.6	107.3	3.5	<0.10	<0.10	375.2	35.4	5.9	1.1	<0.02	458
16	Van Deursen (105)	33N	8W	32	76	SD	8/86	7.3	300	68.9	31.1	23.7	1.2	0.30	<0.10	356.8	9.9	<0.1	0.2	<0.02	355
17	E. Fraikin (108)	32N	8W	16	90	SD	8/86		334	106.9	16.3	69.8	3.5	3.90	0.40	274.4	66.6	161.0	0.3	0.59	594
18-	R. Mathis (109)	32N	8W	28	406	SD	8/86	7.5	280	70.3	25.3	108.4	4.3	<0.10	<0.10	256.4	278.0	45.7	0.6	<0.02	686
19	J. Little 2	32N	7W	5	291	SD	3/81	7.6	352	90.0	31.0	60.0	6.0	0.60	0.03	316.0	110.0	6.0	0.2	<0.10	493
NEWTON COUNTY																					
20	T. Schuster (133)	31N	10W	25	427	SD	8/86	7.4	167	43.6	14.2	31.2	1.2	0.10	<0.10	207.2	7.9	9.3	0.7	<0.02	232
21	USGS New11 (190)	30N	10W	13	150	SD	10/86	7.6	58	14.5	5.2	59.8	0.9	0.10	<0.10	178.6	2.4	<0.1	0.8	<0.02	191
22	Prudential 40	30N	10W	24	360	SD	7/85	7.1	147	34.0	15.0	53.0	1.2	0.13	<0.05	160.0	30.0	58.0	<0.5	<0.50	287
23	N. Johnson (141)	29N	10W	25	170	SD	8/86	7.5	103	26.7	8.9	71.7	1.2	0.20	<0.10	223.9	21.6	<0.1	0.8	<0.02	266
24	A.Saxton	27N	10W	35	100	M1	5/62	7.5	90	20.0	9.9	100.0	3.8	0.41	0.07	264.0	2.0	40.0	0.6	0.09	335
25	Kankakee St. Park	31N	9W	4	128	SD	8/56	7.5	191	47.0	18.0	80.0	3.4	0.36	0.00	279.0	65.0	2.0	0.6	0.02	384
26	USGS New14 (187)	31N	9W	8	153	SD	10/86	7.6	123	32.2	10.3	58.1	2.0	0.10	<0.10	240.1	7.1	<0.1	1.0	<0.02	255
27	Prudential 30	31N	9W	35	600	SD	7/85	7.5	194	43.0	21.0	71.0	5.5	<0.10	<0.05	283.0	27.0	3.0	0.9	<0.50	341
113-	USGS News (186)	30N	9W	2	150	SD	10/86	7.7	167	45.8	12.8	79.8	1.6	0.80	<0.05	219.9	29.3	1.6	1.0	0.61	305
28	Prudential 37	30N	9W	9	505	SD	7/85	7.3	183	42.0	19.0	56.0	4.6	<0.10	<0.05	266.0	32.0	2.0	0.8	<0.50	316
29	Prudential 46	30N	9W	12	550	SD	7/85	7.5	191	42.0	21.0	78.0	4.6	<0.10	<0.05	294.0	28.0	11.0	0.8	<0.50	362
30#	North Vernon HS	30N	9W	23	260	SD	8/65	7.6	166			90.0		0.08		317.0	33.0	20.0			389
31	USGS New7 (184)	30N	9W	32	150	SD	10/86	7.8	99	25.4	8.6	69.2	1.2	0.50	<0.10	223.2	15.9	<0.1	0.8	<0.02	256
32	V. Elijah (113)	28N	9W	2	294	+SD	8/86	7.7	54	12.4	5.7	262.2	8.6	<0.10	<0.10	513.4	120.0	1.3	2.3	<0.02	720
33	G. Best	28N	9W	8	196	+SD	5/60	7.6	82	15.0	11.0	197.0	8.6	0.24	0.05	448.0	38.0	9.0	0.5	0.00	548
34-	Standish 2(149)	28N	9W	23	140	+SD	10/87	7.8	200	50.7	18.0	40.0	1.4	<0.10	<0.10	304.8	10.0	<0.1	0.5	<0.02	311
35	J. Pierson (121)	31N	8W	11	112	SD	8/86	6.4	122	32.6	9.9	29.1	0.8	<0.10	<0.10	178.8	4.4	<0.1	0.8	<0.02	185

Appendix 13. Results of chemical analysis from selected bedrock water wells — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids
NEWTON COUNTY — Continued																					
36	W. Eck (173)	31N	8W	29	130	SD	8/86	7.8	201	50.3	18.4	61.7	1.9	0.60	<0.10	327.4	18.2	<0.1	0.5	<0.02	348
37-	Prudential 8	31N	8W	35	639	SD	7/85	7.0	385	95.0	36.0	19.0	4.5	0.15	<0.05	371.0	9.0	6.0	<0.5		392
38	Prudential 28	30N	8W	4	400	SD	7/85	7.2	305	68.0	33.0	36.0	3.6	0.22	<0.05	334.0	11.0	2.0	0.5	<0.50	355
39#	Prohosky	30N	8W	9	95	SD	8/84	7.8	260			41.0	2.9			320.0	12.0	14.0	0.6	<0.10	
40	Prudential 10	30N	8W	11	349	SD	7/85	7.1	305	76.0	28.0	21.0	2.5	0.13	0.05	288.0	14.0	54.0	<0.5	<0.50	368
41-	Prudential 26	30N	8W	12	528	SD	7/85	7.4	271	59.0	30.0	28.0	5.4	0.11	<0.05	276.0	2.6	92.0	0.8	<0.50	383
42	Prudential 15	30N	8W	13	455	SD	7/85	7.2	297	68.0	31.0	35.0	5.1	0.11	<0.05	286.0	26.0	55.0	0.9	<0.50	393
43-	Prudential 11	30N	8W	14	372	SD	7/85	7.0	243	53.0	27.0	33.0	3.9	<0.10	<0.05	267.0	18.0	59.0	0.7	<0.50	355
44	G. Schultz (116)	30N	8W	19	108	SD	8/86	7.4	199	50.2	17.8	81.8	2.1	0.20	<0.10	321.9	33.9	<0.1	0.5	<0.02	380
45	Prudential 17	30N	8W	25	585	SD	7/85	7.4	125	27.0	14.0	45.0	4.7	0.21	<0.05	194.0	4.0	30.0	1.0	<0.50	242
46	B. Summers	29N	8W	2	100	SD	7/85	7.5	184	36.0	23.0	81.0	6.6	<0.10	<0.05	284.0	14.0	63.0	0.9	<0.50	395
47	M. Miller	29N	8W	20	160	SD	9/84	8.3	174	39.0	18.0	64.0	9.4	0.08	0.03	246.0	9.0	54.0	1.0	<0.10	342
48	T. Garrison	29N	8W	20	227	+SD	8/84	7.5	220	48.0	24.0	58.0	12.0	0.14	<0.02	300.0	11.0	63.0	1.0	<0.10	397
49	R. Zak (172)	29N	8W	36	138	SD	8/86	8.1	209	54.5	17.8	38.7	1.0	1.00	<0.10	255.0	10.4	41.9	0.4	<0.02	319
50	Goodland 2	27N	8W	14	160	+SD	6/82	7.6	104	25.0	10.0	190.0	8.7	0.11	0.02	400.0	95.0	28.0	1.3	0.10	598
50	Goodland 1	27N	8W	14	185	+SD	6/82	6.8	100	22.0	11.0	190.0	8.7	0.28	0.02	396.0	95.0	29.0	1.3	0.10	595
51	Larsen (147)	27N	8W	17	230	und.	8/86	7.6	28	6.0	3.2	203.8	3.4	<0.10	<0.10	439.1	4.0	2.1	1.5	<0.02	487
52	R. Bower (145)	27N	8W	36	200	M1	8/86	7.0	64	17.2	5.2	209.3	5.3	<0.10	<0.10	470.7	14.5	66.9	1.6	<0.02	602
BENTON COUNTY																					
53	G. Hamilton (136)	25N	10W	13	95	M1	8/86	7.0	364	93.8	31.5	56.0	1.7	1.20	<0.10	288.7	1.6	181.7	0.4	<0.02	541
54	A Wetli (140)	26N	9W	10	120	M1	8/86	6.7	242	56.2	24.6	42.5	2.1	0.20	<0.10	318.0	2.3	20.9	1.0	<0.02	341
55	M. Bennett (139)	26N	9W	14	300	M1	8/86	7.3	284	71.9	25.4	20.5	1.4	<0.10	<0.10	272.1	4.7	48.4	0.2	<0.02	336
56	L. Lanie (134)	26N	9W	19	140	M1	8/86	7.1	141	37.4	11.5	69.3	1.7	0.40	<0.10	257.2	1.8	36.8	0.7	<0.02	314
57	Earl Park	26N	9W	23	185	M1	3/82	7.5	242	58.0	24.0	48.0	3.6	1.00	0.04	291.0	<5.0	49.0	0.5	0.40	359
58X	J. Hawkins(135)	25N	9W	6	320	M1	8/86	6.6	250	60.1	24.4	107.0	3.6	0.10	<0.10	311.1	2.5	166.8	0.3	<0.02	551
59	Schlutnhofr (146)	26N	8W	3	50	M1	8/86	7.2	166	41.2	15.4	60.7	3.5	0.20	<0.10	314.0	1.2	<0.1	0.6	<0.02	311
60	M. Moore (138)	26N	8W	36	178	M1	8/86	6.6	416	108.5	35.4	14.6	1.2	1.50	0.10	315.7	30.7	91.0	0.2	<0.02	473
61	B. Gick (119)	25N	8W	8	100	M1	8/86	7.2	260	60.6	26.4	37.3	1.7	1.00	<0.10	308.1	1.8	15.4	0.5	<0.02	330
62	G. Martin (143)	26N	7W	3	60	M1	8/86	6.6	337	84.8	30.4	12.8	0.9	2.10	<0.10	355.9	9.4	8.7	0.4	<0.02	363

Appendix 13. Results of chemical analysis from selected bedrock water wells — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCO_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCO_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
											JASPER COUNTY										
63	Dekoch Farm	31N	7W	27	315	SD	9/71	7.3	316	89.0	23.0	8.0	1.0	0.10	0.05	318.0	2.0	5.0	0.4	0.90	320
64	R. Kolhagen 1	30N	7W	1	598	SD	8/56	7.3	425	121.0	30.0	11.0	3.0	0.71	0.00	443.0	2.3	2.3	0.3	0.30	437
65	Prudential 7	30N	7W	7	475	SD	7/85	7.4	167	44.0	14.0	18.0	1.6	<0.10	<0.05	173.0	8.0	27.0	0.6	<0.50	217
66	Prudential 1	30N	7W	17	350	SD	7/85	7.4	208	44.0	24.0	46.0	6.0	0.15	<0.05	277.0	9.0	20.0	0.9	<0.50	316
67	Prud Jasp11 OBS	30N	7W	18	630	SD	6/81	7.5	180	41.0	18.0	30.0	3.6	0.05	0.01	210.0	8.4	17.0	0.6	0.72	245
68	Randolph Estate	30N	7W	21	91	SD	8/82	6.8	314	80.0	28.0	32.0	6.5	0.06	<0.02	338.0	10.0	45.0	0.6	<0.10	405
69	USGS Jasp12 (192)	30N	7W	22	150	SD	10/86	7.5	201	47.1	20.4	61.9	4.7	<0.10	<0.10	258.1	5.3	91.3	1.1	<0.02	387
70	B.Webb	30N	7W	23	169	SD	8/82	7.1	366	91.0	34.0	41.0	6.2	0.06	<0.02	286.0	17.0	170.0	0.6	<0.10	531
72	B. Stephenson 2	30N	7W	27	120	SD	7/85	7.2	112	25.0	12.0	39.0	2.1	0.34	<0.05	183.0	1.0	4.0	1.0	<0.50	194
72	B. Stephenson	30N	7W	27	116	SD	7/85	7.5	135	31.0	14.0	42.0	3.6	<0.10	<0.05	199.0	3.0	20.0	1.0	<0.50	234
74	E. Kosta	30N	7W	29	105	SD	7/85	7.4	262	59.0	28.0	42.0	9.7	<0.10	<0.05	303.0	10.0	43.0	0.8	<0.50	374
75	A. Brinkman	30N	7W	31	95	SD	8/85	7.6	162	37.0	17.0	50.0	4.5	<0.10	<0.05	232.0	4.0	40.0	1.0	<0.50	293
76	B. Callahan	30N	7W	31	125	SD	8/85	7.5	170	37.0	19.0	52.0	5.9	<0.10	<0.05	258.0	6.0	40.0	1.0	<0.50	316
77	R. Prohosky	30N	7W	32	96	SD	7/85	7.8	100	22.0	11.0	63.0	5.0	<0.10	<0.05	198.0	2.0	25.0	1.0	<0.50	248
78	W. Conley	30N	7W	33	100	SD	7/85	7.4	105	24.0	11.0	60.0	5.9	<0.10	<0.05	210.0	4.0	5.0	1.0	<0.50	237
79	E. Prohosky	29N	7W	5	125	SD	7/85	7.6	126	24.0	16.0	76.0	6.5	<0.10	<0.05	186.0	4.0	110.0	1.0	<0.50	349
80	J. Lane 1	29N	7W	6	85	SD	8/85	7.5	99	23.0	10.0	52.0	2.6	0.16	<0.05	188.0	1.0	11.0	1.0	<0.50	214
81	USGS Jasp13 (191)	29N	7W	9	150	SD	10/86	6.6	102	24.7	9.9	72.8	3.1	<0.10	<0.10	236.1	1.7	11.9	1.2	<0.02	267
82	Rensselaer 3	29N	7W	25	355	SD	4/84	7.4	492	126.0	43.0	44.0	3.2	0.38	0.11	352.0	52.0	147.0	0.4	0.30	628
83	H. Putnam (127)	28N	7W	8	102	+SD	8/86	7.4	252	70.5	18.5	7.2	0.5	1.30	<0.10	265.5	2.9	2.2	0.3	<0.02	263
84	F. Steinkamp (142)	28N	7W	33	110	DM	8/86	7.2	119	29.4	11.1	55.8	3.2	<0.10	<0.10	240.5	9.6	<0.1	1.2	<0.02	255
85#	Carson Inn 1	27N	7W	1	250	+SD	4/71	7.5	294	77.0	25.0			0.01	0.00	330.0	51.0	0.0	0.5		440
86	G. Pettet (122)	27N	7W	5	205	+SD	8/86	6.8	98	21.8	10.5	243.7	6.7	<0.10	<0.10	483.7	87.8	<0.1	1.1	<0.02	662
87X	D. Bledsoe (124)	27N	7W	15	219	+SD	8/86	7.5	310	72.4	31.4	72.3	3.9	1.40	<0.10	347.0	23.8	107.0	0.2	<0.02	521
88	Hamstra Bldr (96)	32N	6W	26	75	SD	8/86	7.9	313	90.2	21.3	31.9	0.6	2.10	0.20	157.6	110.0	77.8	<0.1	<0.02	429
89	Pfledderer (98)	31N	6W	9	42	SD	8/86	7.5	241	67.9	17.4	7.1	0.6	0.10	0.20	133.3	11.1	98.6	<0.1	<0.02	283
90	USGS Jasp9 (194)	31N	6W	21	260	SD	10/86	7.5	104	30.4	6.8	14.7	0.4	0.20	<0.10	137.5	0.5	<0.1	0.8	<0.02	136
91-	M. Risner (100)	30N	6W	6	90	SD	8/86	7.1	175	51.5	11.3	49.7	1.0	0.70	<0.10	225.7	3.7	10.9	0.8	<0.02	265
92-	R. Bozell (176)	29N	6W	4	200	SD	10/87	7.5	240	57.6	23.5	39.8	3.1	<0.10	<0.10	337.6	3.7	29.5	0.4	<0.02	367

Appendix 13. Results of chemical analysis from selected bedrock water wells — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
JASPER COUNTY — Continued																					
93	D. Parkinson (131)	29N	6W	12	42	SD	8/86	6.6	583	161.1	43.8	46.7	13.4	<0.10	0.30	252.6	42.5	258.6	<0.1	27.77	746
94X	R. Sayler (132)	29N	6W	20	90	SD	8/86	6.6	356	85.2	34.9	41.3	3.2	<0.10	<0.10	310.0	39.6	112.0	0.6	<0.02	503
95X	F. Taylor (130)	29N	6W	26	130	SD	8/86	6.6	472	117.8	43.2	7.5	2.8	0.10	0.10	310.0	17.6	140.1	0.2	2.32	518
96	Rensselaer 1	29N	6W	30	550	SD	11/82	7.4	406	98.0	39.0	32.0	2.7	0.09	0.04	336.0	33.0	85.0	0.3	0.30	492
96	Rensselaer 2	29N	6W	30	553	SD	4/84	7.4	376	89.0	37.0	29.0	2.5	0.51	<0.02	336.0	16.0	78.0	0.4	0.30	454
97	K. Howard (125)	28N	6W	20	45	DM	8/86	7.1	291	68.6	29.2	14.6	5.8	<0.10	<0.10	343.3	3.1	<0.1	0.6	<0.02	328
98	M. Carlisle	27N	6W	5	94	DM	5/60	7.3	708	173.0	67.0	70.0	5.9	0.61	0.02	490.0	84.0	232.0	0.2	0.05	927
99	Fairview Htchry	27N	6W	31	192	+SD	5/55	7.4	270	58.0	31.0	94.0	7.2	0.08	0.00	431.0	14.0	23.0	0.4	0.05	486
100	USGS Jasp7 (193)	31N	5W	15	130	+SD	10/86	7.6	62	14.4	6.4	114.6	5.8	<0.10	<0.10	302.1	4.4	<0.1	1.4	<0.02	328
101	J. Klein (177)	31N	5W	30	83	D2	10/87	7.6	89	23.8	7.2	81.9	2.2	<0.10	<0.10	267.6	1.5	<0.1	1.0	<0.02	284
102	W. Gerhing	30N	5W	9	260	SD	6/56	7.0	200	47.0	20.0	85.0	6.9	0.10	0.00	263.0	39.0	77.0	1.2	0.00	434
103	J. Stevens (178)	30N	5W	11	205	SD	10/87	7.9	136	33.9	12.6	37.7	0.9	<0.10	0.10	222.6	0.5	<0.1	1.0	<0.02	229
104X	E. Corbin (62)	30N	5W	20	95	SD	7/86	7.9	167	41.1	15.7	47.0	1.9	<0.10	<0.10	242.3	8.3	29.0	0.7	<0.02	289
105	D. Tillett (60)	29N	5W	3	82	SD	7/86	6.5	513	141.3	39.0	14.8	10.0	<0.10	0.30	372.6	20.1	145.0	0.3	4.11	598
106-	C. Schleman (180)	28N	5W	18	27	SD	8/86	7.9	332	86.5	28.3	8.1	0.4	<0.10	0.10	290.7	23.7	92.2	0.1	<0.02	414
WHITE COUNTY																					
107-	Hasslebring (101)	27N	6W	1	80	DM	10/87	7.8	328	85.0	28.2	30.7	5.2	<0.10	0.10	316.3	23.2	88.6	0.4	2.26	468
107-	Hasslebring (182)	27N	6W	1	228	+SD	10/86	7.8	280	61.5	30.9	675.0	20.0	0.10	0.10	469.2	695.0	622.0	3.1	<0.02	2429
STARKE COUNTY																					
108X	D. Germann (63)	32N	4W	29	172	+SD	7/86	7.3	115	25.9	12.1	184.7	6.4	<0.10	<0.10	511.4	38.2	2.6	2.0	<0.02	579
109	N. Judson 3	32N	3W	17	198	+SD	6/75	8.5	120	34.0	9.0	23.0	3.0	0.20	<0.02	152.0	3.0	3.0	0.8	<0.10	177
109	N. Judson 2	32N	3W	17	197	+SD	10/77	7.7	101	28.0	8.0	17.0	1.0	0.10	<0.02	127.0	3.0	2.0	0.8	0.50	138
110	M. Koenig (6)	33N	2W	19	126	+SD	7/86	9.1	126	30.0	12.5	24.9	1.2	<0.10	<0.10	180.3	2.0	<0.1	1.0	<0.02	180

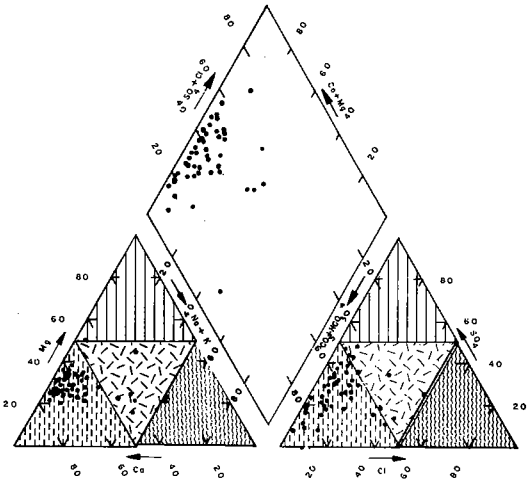
Appendix 13. Results of chemical analysis from selected bedrock water wells — Continued

Location Number	Well Owner	Township	Range	Section	Well Depth (feet)	Aquifer System	Date Sampled	pH[1]	Hardness as $CaCo_3$	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Alkalinity as $CaCo_3$[2]	Chloride	Sulfate	Fluoride	Nitrate as Nitrogen	Total Dissolved Solids[3]
									PULASKI COUNTY												
111	Jasp Pul F&W (58)	31N	4W	18	70	D2	7/86	7.7	102	29.8	6.7	16.6	0.8	< 0.10	< 0.10	126.1	5.2	15.7	0.6	< 0.02	151
									LAPORTE COUNTY												
112	In Hwy. Dept.	35N	4W	31	184	DM	3/57	7.7	87	17.0	10.0	211.0	8.7	0.07	0.03	266.0	193.0	2.4	1.1	0.20	603

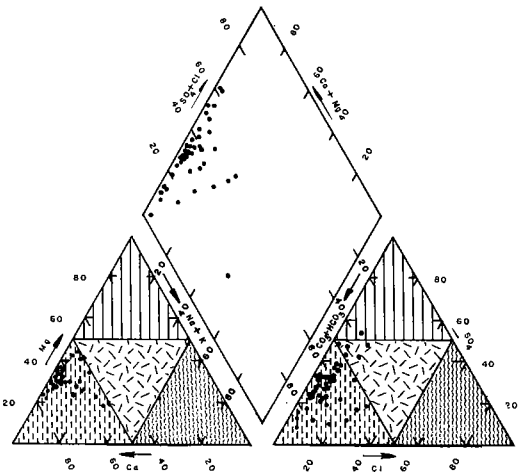
[1]Results in standard pH units.
[2]Laboratory analysis.
[3]TDS values are the sum of major constituents expected in an anhydrous residue of a ground water sample with bicarbonate converted to carbonate in the solid phase.

Appendix 14. Piper trilinear diagrams of ground-water quality data for major aquifer systems

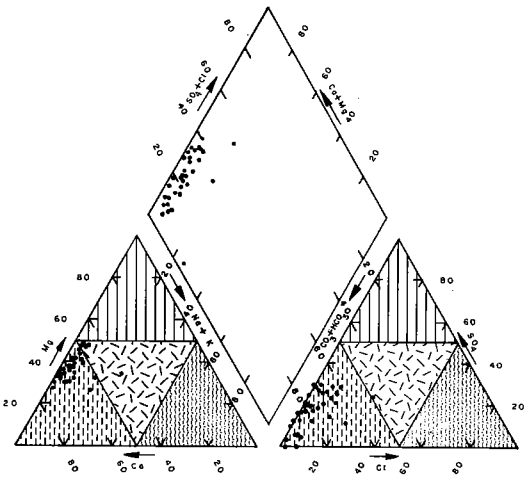
KANKAKEE (KK)



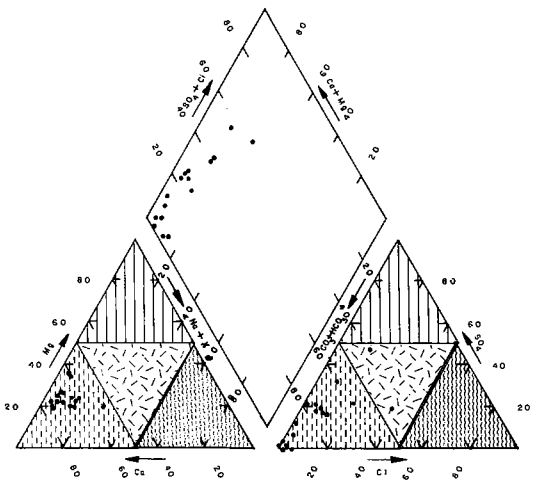
VALPARAISO OUTWASH APRON (VOA)



VALPARAISO MORAINE (VM)



EOLIAN SANDS (ES)



EXPLANATION

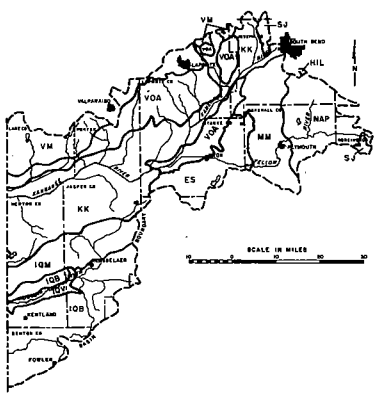
UNCONSOLIDATED AQUIFER SYSTEMS

Cation ground-water types

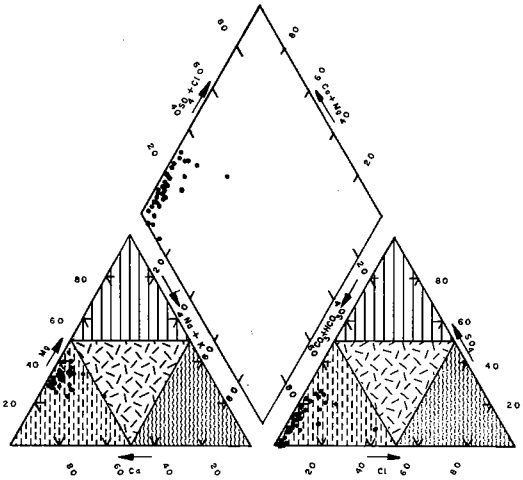
- Magnesium
- Calcium
- Sodium or potassium
- No dominant cation

Anion ground-water types

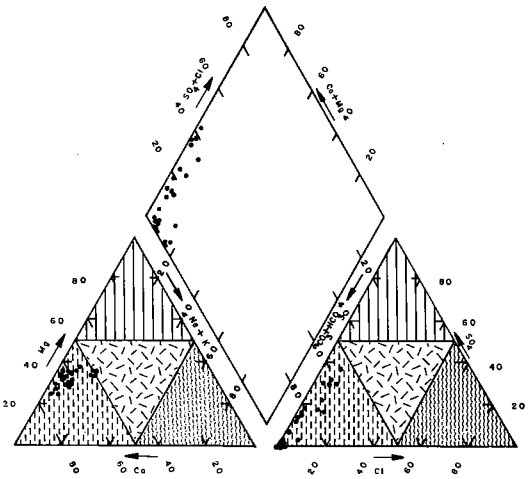
- Sulfate
- Bicarbonate
- Chloride
- No dominant anion



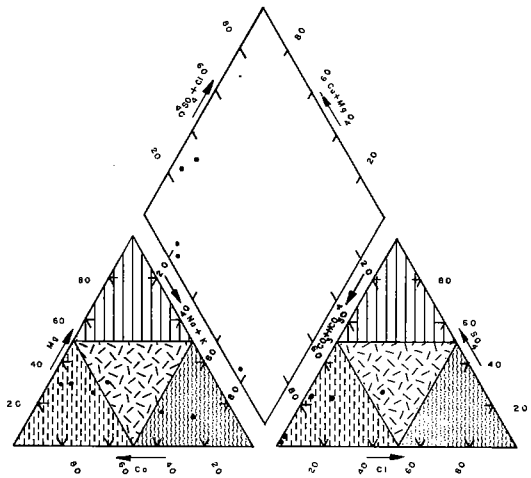
MAXINKUCKEE MORAINE (MM)



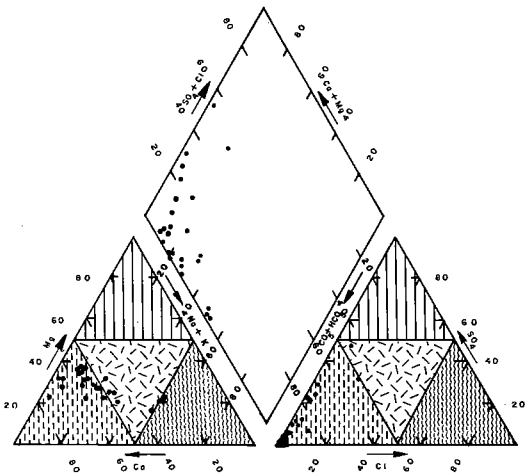
NAPPANEE (NAP)



IROQUOIS MORAINE (IQM)



IROQUOIS BASIN (IQB) AND IROQUOIS VALLEY (IQV)



EXPLANATION

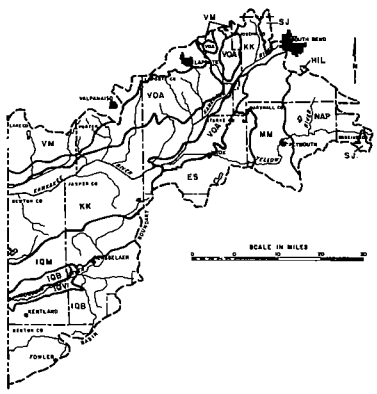
UNCONSOLIDATED AQUIFER SYSTEMS

Cation ground-water types

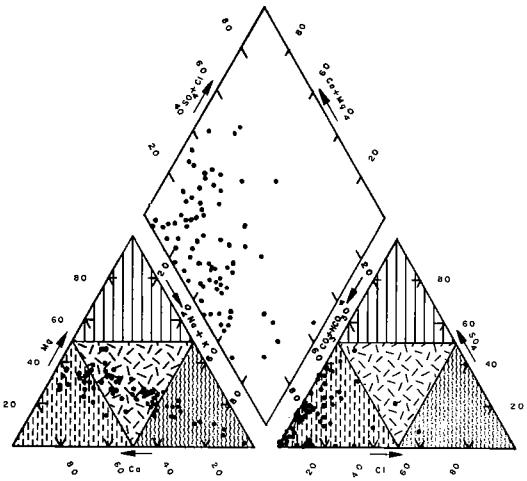
- Magnesium
- Calcium
- Sodium or potassium
- No dominant cation

Anion ground-water types

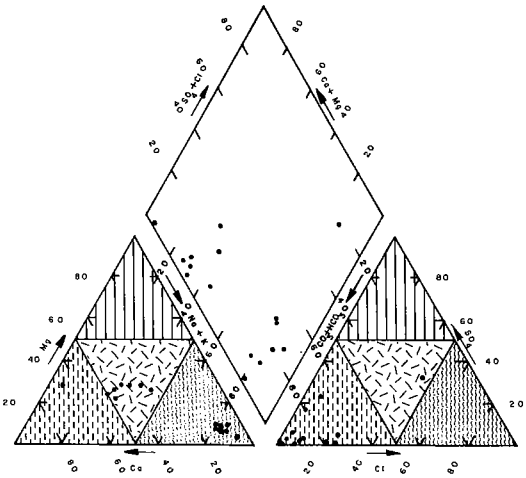
- Sulfate
- Bicarbonate
- Chloride
- No dominant anion



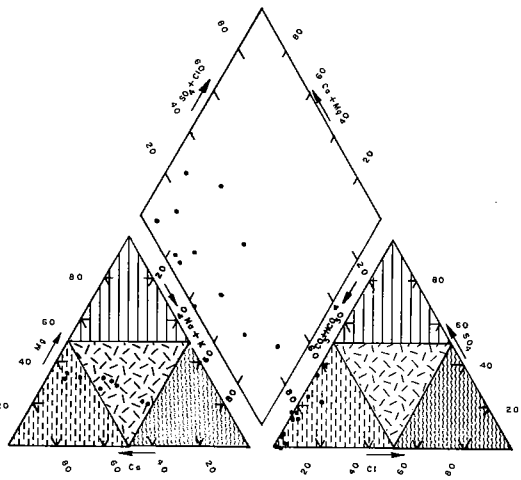
SILURIAN (S_3) AND DEVONIAN (D_1) CARBONATES



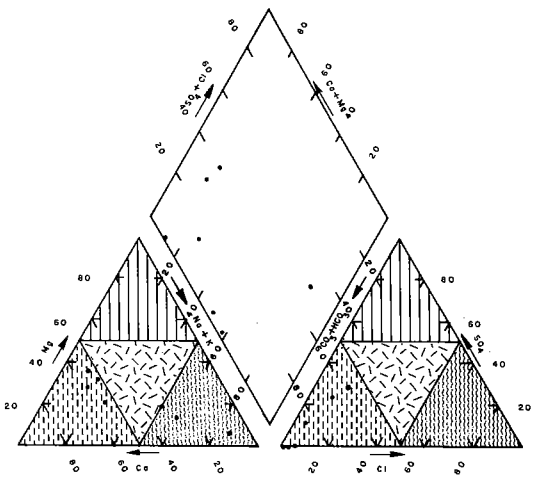
SILURIAN (S_3) AND DEVONIAN (D_1) CARBONATES OVERLAIN BY DEVONIAN OR DEVONIAN AND MISSISSIPPIAN SHALE



MISSISSIPPIAN BORDEN GROUP (M_1)



DEVONIAN (D_2) AND DEVONIAN AND MISSISSIPPIAN (dM, Dm) SHALE



EXPLANATION

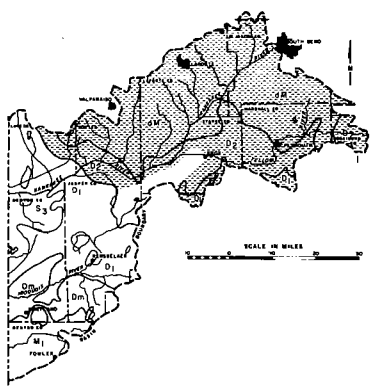
BEDROCK AQUIFER SYSTEMS

Cation ground-water types

- Magnesium
- Calcium
- Sodium or potassium
- No dominant cation

Anion ground-water types

- Sulfate
- Bicarbonate
- Chloride
- No dominant anion



Appendix 15. Annual water withdrawal capability and use for all categories combined

{All values in million gallons per day. Totals may not equal sum of county totals because of differences in rounding.}

County	Year	No. of facilities	Withdrawal capability			Reported use		
			Ground water	Surface water	Combined	Ground water	Surface water	Combined
Benton	1986	2	1.66	0.00	1.66	0.60	0.00	0.60
	1987	2	1.66	0.00	1.66	0.23	0.00	0.23
	1988	2	1.66	0.00	1.66	0.26	0.00	0.26
Elkhart	1986	1	0.43	0.00	0.43	0.04	0.00	0.04
	1987	1	0.43	0.00	0.43	0.04	0.00	0.04
	1988	1	0.43	0.00	0.43	0.04	0.00	0.04
Jasper	1986	110	82.74	164.09	246.82	5.04	15.37	20.41
	1987	112	83.17	173.88	257.04	4.85	19.86	24.71
	1988	119	87.35	285.06	372.41	7.94	29.70	37.63
Kosciusko	1986	2	1.66	0.00	1.66	0.04	0.00	0.04
	1987	2	1.66	0.00	1.66	0.06	0.00	0.06
	1988	2	1.66	0.00	1.66	0.11	0.00	0.11
Lake	1986	79	23.89	390.74	414.63	2.14	6.68	8.83
	1987	81	26.41	392.18	418.59	2.24	3.89	6.14
	1988	83	27.25	406.58	433.84	3.83	9.79	13.62
LaPorte	1986	101	82.29	186.62	268.91	9.06	6.05	15.10
	1987	102	82.20	189.50	271.70	8.27	2.86	11.13
	1988	105	82.95	206.21	289.16	10.78	5.97	16.75
Marshall	1986	36	26.78	20.12	46.90	2.82	0.22	3.04
	1987	36	27.21	20.12	47.33	3.10	0.19	3.28
	1988	37	27.93	19.54	47.48	3.55	0.55	4.10
Newton	1986	58	51.71	71.86	123.56	3.59	1.15	4.74
	1987	57	51.81	70.42	122.22	2.81	0.98	3.79
	1988	56	53.27	79.06	132.32	6.11	1.58	7.68
Porter	1986	30	19.45	31.20	50.66	3.73	1.91	5.64
	1987	30	19.45	31.20	50.66	3.67	1.52	5.19
	1988	33	20.89	34.44	55.34	3.83	3.44	7.27
Pulaski	1986	6	1.51	7.42	8.93	0.01	0.08	0.10
	1987	4	1.51	2.52	4.03	0.02	0.04	0.05
	1988	5	2.66	2.52	5.18	0.18	0.12	0.30
St. Joseph	1986	73	81.56	54.65	136.21	8.08	3.84	11.92
	1987	73	81.56	54.65	136.21	8.54	4.09	12.63
	1988	73	82.39	54.36	136.75	11.15	7.70	18.86
Starke	1986	34	24.81	32.14	56.94	1.06	0.69	1.75
	1987	32	24.20	29.74	53.94	1.17	0.39	1.57
	1988	34	24.13	39.82	63.95	2.03	1.29	3.32
White	1986	1	1.20	0.00	1.20	0.00	0.00	0.00
	1987	1	1.20	0.00	1.20	0.08	0.00	0.08
	1988	1	1.20	0.00	1.20	0.08	0.00	0.08
Total	1986	533	399.68	958.83	1358.50	36.20	36.00	72.20
	1987	533	402.47	964.21	1366.21	35.08	33.82	68.90
	1988	551	413.77	1127.59	1541.38	49.87	60.14	110.00

Appendix 16. Annual water withdrawal capability and seasonal use for irrigation category

{All values in million gallons per day. Totals may not equal sum of county totals because of differences in rounding. Reported use is averaged for 90-day irrigation season.}

County	Year	No. of facilities	Withdrawal capability			Reported use		
			Ground water	Surface water	Combined	Ground water	Surface water	Combined
Jasper	1986	102	73.06	101.45	174.51	14.91	3.11	18.02
	1987	104	73.49	111.24	184.73	13.81	13.90	27.71
	1988	111	77.67	135.07	212.74	25.59	43.83	69.42
Kosciusko	1986	2	1.66	0.00	1.66	0.16	0.00	0.16
	1987	2	1.66	0.00	1.66	0.23	0.00	0.23
	1988	2	1.66	0.00	1.66	0.43	0.00	0.43
Lake	1986	74	18.59	390.74	409.34	3.06	27.11	30.17
	1987	75	18.59	392.18	410.78	1.99	15.79	17.78
	1988	76	19.11	403.27	422.39	7.55	36.76	44.31
LaPorte	1986	82	54.13	162.00	216.13	11.88	15.51	27.39
	1987	84	54.13	164.88	219.01	10.25	11.21	21.46
	1988	87	54.89	181.58	236.47	20.59	23.66	44.25
Marshall	1986	27	14.09	19.40	33.49	1.11	0.34	1.45
	1987	27	14.52	19.40	33.92	1.65	0.75	2.40
	1988	28	14.52	19.54	34.06	2.22	2.85	5.08
Newton	1986	50	46.89	20.45	67.34	11.89	4.68	16.57
	1987	49	46.89	19.01	65.90	8.86	3.30	12.16
	1988	48	48.35	27.65	76.00	21.83	5.15	26.98
Porter	1986	23	9.83	20.66	30.50	0.88	5.94	6.82
	1987	23	9.83	20.66	30.50	0.92	4.53	5.45
	1988	26	11.27	23.90	35.18	1.89	10.44	12.34
Pulaski	1986	6	1.51	7.42	8.93	0.05	0.34	0.39
	1987	4	1.51	2.52	4.03	0.07	0.15	0.22
	1988	5	2.66	2.52	5.18	0.73	0.51	1.23
St. Joseph	1986	52	37.97	46.73	84.69	7.39	7.81	15.20
	1987	52	37.97	46.73	84.69	6.95	8.19	15.14
	1988	51	37.32	46.44	83.76	12.41	22.39	34.80
Starke	1986	28	18.92	32.14	51.06	1.61	2.79	4.40
	1987	26	18.32	29.74	48.05	1.95	1.60	3.55
	1988	28	18.24	39.82	58.06	4.93	5.23	10.16
Total	1986	446	276.65	801.00	1076.65	52.95	67.62	120.57
	1987	446	276.91	806.36	1083.27	46.68	59.41	106.09
	1988	462	285.69	879.79	1165.50	98.17	150.82	249.00

Appendix 17. Annual water withdrawal capability and use for energy production and industrial categories

{All values in million gallons per day. Values are for industrial use unless denoted as energy production (EP). Totals may not equal sum of county totals because of differences in rounding.}

County	Year	No. of facilities	Withdrawal capability			Reported use		
			Ground water	Surface water	Combined	Ground water	Surface water	Combined
Elkhart	1986	1	0.43	0.00	0.43	0.04	0.00	0.04
	1987	1	0.43	0.00	0.43	0.04	0.00	0.04
	1988	1	0.43	0.00	0.43	0.04	0.00	0.04
Jasper	1986	3	0.32	2.16	2.48	0.00	1.34	1.34
	1987	2	0.14	2.16	2.30	0.01	1.34	1.35
	1988	2	0.14	2.16	2.30	0.14	1.34	1.48
Jasper (EP)	1986	1	3.35	60.48	63.82	0.30	13.26	13.56
	1987	1	3.35	60.48	63.82	0.34	15.08	15.43
	1988	1	3.35	60.48	63.83	0.35	17.58	17.93
LaPorte	1986	4	2.40	21.02	23.42	0.03	1.57	1.60
	1987	4	2.42	21.02	23.45	0.05	0.10	0.15
	1988	4	2.42	21.02	23.45	0.03	0.15	0.18
LaPorte (EP)	1986	2	3.18	0.00	3.18	0.53	0.00	0.53
	1987	2	3.18	0.00	3.18	0.60	0.00	0.60
	1988	2	3.18	0.00	3.18	0.56	0.00	0.56
Marshall	1986	4	2.79	0.72	3.51	0.20	0.14	0.34
	1987	4	2.79	0.72	3.51	0.27	0.00	0.27
	1988	4	3.51	0.00	3.51	0.24	0.00	0.24
Newton	1986	1	0.00	5.33	5.33	0.00	0.00	0.00
	1987	1	0.00	5.33	5.33	0.00	0.17	0.17
	1988	1	0.00	5.33	5.33	0.00	0.31	0.31
Porter	1986	1	0.72	0.00	0.72	0.01	0.00	0.01
	1987	1	0.72	0.00	0.72	0.01	0.00	0.01
	1988	1	0.72	0.00	0.72	0.01	0.00	0.01
St. Joseph	1986	4	5.04	7.63	12.67	0.62	1.92	2.54
	1987	4	5.04	7.63	12.67	0.87	2.07	2.94
	1988	5	6.52	7.63	14.16	0.88	2.19	3.08
St. Joseph(EP)	1986	3	12.86	0.00	12.86	4.94	0.00	4.94
	1987	3	12.86	0.00	12.86	5.13	0.00	5.13
	1988	3	12.86	0.00	12.86	4.03	0.00	4.03
Starke	1986	2	0.59	0.00	0.59	0.01	0.00	0.01
	1987	2	0.59	0.00	0.59	0.01	0.00	0.01
	1988	2	0.59	0.00	0.59	0.01	0.00	0.01
Total	1986	20	12.29	36.86	49.15	0.91	4.97	5.88
	1987	19	12.13	36.86	49.00	1.25	3.69	4.94
	1988	20	14.33	36.14	50.49	1.35	3.99	5.35
Total (EP)	1986	6	19.39	60.48	79.86	5.77	13.26	19.03
	1987	6	19.39	60.48	79.86	6.06	15.08	21.15
	1988	6	19.39	60.48	79.87	4.94	17.58	22.52

Appendix 18. Annual water withdrawal capability and use for public supply category

{All values in million gallons per day. Totals may not equal sum of county totals because of differences in rounding.}

County	Year	No. of facilities	Withdrawal capability			Reported use		
			Ground water	Surface water	Combined	Ground water	Surface water	Combined
Benton	1986	2	1.66	0.00	1.66	0.60	0.00	0.60
	1987	2	1.66	0.00	1.66	0.23	0.00	0.23
	1988	2	1.66	0.00	1.66	0.26	0.00	0.26
Jasper	1986	4	6.01	0.00	6.01	1.06	0.00	1.06
	1987	4	6.01	0.00	6.01	1.10	0.00	1.10
	1988	4	6.01	0.00	6.01	1.15	0.00	1.15
Lake	1986	5	5.30	0.00	5.30	1.39	0.00	1.39
	1987	6	7.82	0.00	7.82	1.75	0.00	1.75
	1988	6	8.14	0.00	8.14	1.97	0.00	1.97
LaPorte	1986	11	20.79	0.00	20.79	4.87	0.00	4.87
	1987	10	20.68	0.00	20.68	4.43	0.00	4.43
	1988	10	20.68	0.00	20.68	4.48	0.00	4.48
Marshall	1986	5	9.90	0.00	9.90	2.34	0.00	2.34
	1987	5	9.90	0.00	9.90	2.42	0.00	2.42
	1988	5	9.90	0.00	9.90	2.61	0.00	2.61
Newton	1986	6	4.82	0.00	4.82	0.66	0.00	0.66
	1987	6	4.82	0.00	4.82	0.62	0.00	0.62
	1988	6	4.82	0.00	4.82	0.74	0.00	0.74
Porter	1986	5	8.61	10.54	19.15	3.44	0.45	3.89
	1987	5	8.61	10.54	19.15	3.38	0.40	3.78
	1988	5	8.61	10.54	19.15	3.30	0.87	4.16
St. Joseph	1986	13	25.37	0.29	25.66	0.70	0.00	0.70
	1987	13	25.37	0.29	25.66	0.83	0.00	0.83
	1988	13	25.37	0.29	25.66	3.19	0.00	3.19
Starke	1986	4	5.29	0.00	5.29	0.66	0.00	0.66
	1987	4	5.29	0.00	5.29	0.69	0.00	0.69
	1988	4	5.29	0.00	5.29	0.81	0.00	0.81
Total	1986	55	87.75	10.83	98.58	15.73	0.45	16.18
	1987	55	90.07	10.83	101.00	15.45	0.40	15.85
	1988	55	90.48	10.83	101.31	18.51	0.87	19.37

Appendix 19. Annual water withdrawal capability and use for rural and miscellaneous categories combined

{All values in million gallons per day. Totals may not equal sum of county totals because of differences in rounding.}

County	Year	No. of facilities	Withdrawal capability			Reported use		
			Ground water	Surface water	Combined	Ground water	Surface water	Combined
Jasper	1986	0	0.00	0.00	0.00	0.00	0.00	0.00
	1987	1	0.18	0.00	0.18	0.00	0.00	0.00
	1988	1	0.18	0.00	0.18	0.00	0.00	0.00
Lake	1986	0	0.00	0.00	0.00	0.00	0.00	0.00
	1987	0	0.00	0.00	0.00	0.00	0.00	0.00
	1988	1	0.00	3.31	3.31	0.00	0.76	0.76
LaPorte	1986	2	1.79	3.60	5.39	0.69	0.65	1.34
	1987	2	1.79	3.60	5.39	0.66	0.00	0.66
	1988	2	1.79	3.60	5.39	0.66	0.00	0.66
Newton	1986	1	0.00	46.08	46.08	0.00	0.00	0.00
	1987	1	0.10	46.08	46.18	0.00	0.00	0.00
	1988	1	0.10	46.08	46.18	0.00	0.00	0.00
Porter	1986	1	0.29	0.00	0.29	0.06	0.00	0.06
	1987	1	0.29	0.00	0.29	0.06	0.00	0.06
	1988	1	0.29	0.00	0.29	0.07	0.00	0.07
St. Joseph	1986	1	0.32	0.00	0.32	0.00	0.00	0.00
	1987	1	0.32	0.00	0.32	0.00	0.00	0.00
	1988	1	0.32	0.00	0.32	0.00	0.00	0.00
White	1986	1	1.20	0.00	1.20	0.00	0.00	0.00
	1987	1	1.20	0.00	1.20	0.08	0.00	0.08
	1988	1	1.20	0.00	1.20	0.08	0.00	0.08
Total	1986	6	3.60	49.68	53.28	0.76	0.65	1.41
	1987	7	3.88	49.68	53.56	0.81	0.00	0.81
	1988	8	3.88	52.99	56.87	0.81	0.76	1.57