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Surface-Water Quality on the Prairie Band of Potawatomi Reservation, Northeastern Kansas, June 1996 Through November 1998

Water-Resources Investigations Report 99–4266

U.S. Department of the Interior
U.S. Geological Survey

Cover photograph taken by Gregory P. Wold, Biologist, Prairie Band of Potawatomi, Mayetta, Kansas.

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By THOMAS J. TROMBLEY

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Lawrence, Kansas
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U.S. Department of the Interior

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CONVERSION FACTORS AND ABBREVIATIONS

Multiply	By	To obtain
acre	4,047	square meter
cubic feet per second (ft^3/s)	0.02832	cubic meter per second
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
ton	907.2	kilogram
	0.9072	megagram

Temperatures given in this report can be converted to degrees Celsius (°C) or degrees Fahrenheit (°F) by the equations:

$$°C = 5/9 (°F - 32)$$
$$°F = 9/5 (°C) + 32.$$

Surface-Water Quality on the Prairie Band of Potawatomi Reservation, Northeastern Kansas, June 1996 Through November 1998

By Thomas J. Trombley

Abstract

Water-quality samples were collected from 20 surface-water sites across the Prairie Band of Potawatomi Reservation in northeastern Kansas. Samples were collected twice at all 20 sites during June 1996 and June 1997 after herbicide application and quarterly at 5 of the 20 sampling sites from June 1996 through November 1998. Water-quality constituents of primary interest included physical properties, nitrogen and phosphorus nutrients, herbicides, fecal bacteria, and suspended solids. Samples were considered to be representative of flows that occur 65 percent of the time at each of five surface-water sites.

The median nitrite plus nitrate concentration was 0.183 mg/L (milligram per liter) for 79 samples, and the maximum concentration was 1.46 mg/L as nitrogen, which is substantially less than the U.S. Environmental Protection Agency's Maximum Contaminant Level for drinking water of 10 mg/L as nitrogen. The median concentration for total phosphorus was 0.048 mg/L for 79 samples, five of which, from four sites sampled quarterly, exceeded the U.S. Environmental Protection Agency's recommended criterion of 0.100 mg/L for aquatic life.

Of 82 samples analyzed for triazine herbicides, primarily atrazine, 29 contained triazine concentrations that were less than the minimum reporting level of 0.1 µg/L (microgram per liter). Triazine concentrations in four samples collected on June 26, 1996, exceeded 3.0 µg/L. Triazine herbicide concentrations tended to be highest during late spring runoff after herbicide application.

Fecal coliform bacteria concentrations in 79 samples had a median concentration of 290 colonies per 100 milliliters of water. In six samples, two from Bills Creek and one each from four Little Soldier Creek sites, fecal coliform bacteria concentrations exceeded the Kansas Department of Health and Environment's criterion for noncontact recreation (2,000 colonies per 100 milliliters), indicating possible contamination from waste systems, agricultural sources, or wildlife populations.

Suspended-solid concentrations tended to be somewhat higher in samples from Soldier Creek than in samples from Little Soldier Creek and in samples from tributary streams. Higher concentrations of suspended solids may result from agricultural runoff as well as streambank erosion, especially along Soldier Creek.

INTRODUCTION

The Prairie Band of Potawatomi Reservation (fig. 1) is located in Jackson County, about 20 mi north of Topeka in northeastern Kansas. The reservation covers an area of 121 mi^2, of which 40 mi^2 is currently (1999) tribally owned (tribal trust, allotted, or new purchases); the remainder is fee ownership primarily by nontribal members. Surface-water quality is an important consideration for the Prairie Band of Potawatomi. Three of the four creeks draining the reservation, Soldier (commonly referred to as Big Soldier Creek), Little Soldier, and South Cedar Creeks, are

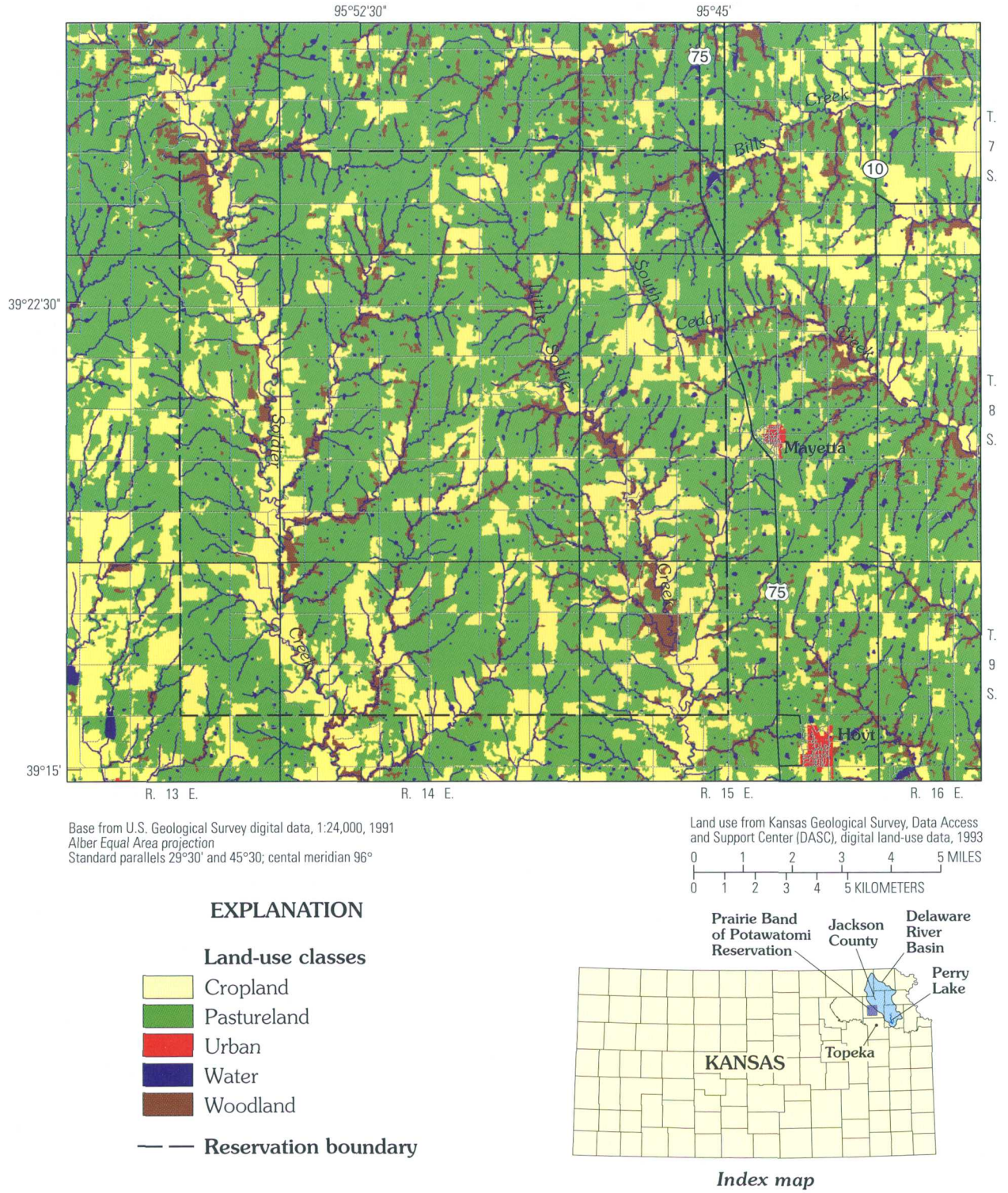

Figure 1. Land use on and near Prairie Band of Potawatomi Reservation, northeastern Kansas, 1993.

important tribal resources. These creeks are particularly important for maintaining subsistence fishing and hunting needs of tribal members who supplement their income by using wildlife for food (John Zoellner, Potawatomi Department of Planning and Environmental Protection, oral commun., 1996). Therefore, the quality of surface water needs to be maintained at a level that protects wildlife resources on the reservation.

Land use on the reservation (fig. 1) and in the surrounding areas is predominantly agricultural, with cropland mostly along Soldier Creek and pastureland across most of the rest of the reservation. Woodland generally is located along streams. No documented point sources of wastewater discharge are located on the reservation (Gregory P. Wold, Potawatomi Department of Planning and Environmental Protection, oral commun., 1999). Consequently, runoff from agricultural lands and leachate from septic systems or sewage lagoons serving a rural population are considered the primary sources of potential water-quality problems on the reservation.

Of the major physical divisions of the United States defined by Fenneman (1938), Fenneman and Johnson (1946), and Schoewe (1949), the Prairie Band of Potawatomi Reservation lies within the Kansas Drift Plains section of the Central Lowland Province of the Interior Plains. The topography of the Kansas Drift Plains reflects a gently undulating, glacial-drift-dominated, erosional surface. The broad, smooth, well-rounded, interstream areas are remnants of the uneroded original basal till deposited by the last retreating glacial ice sheet. Beneath this surface lie glacial deposits of boulder till, sand and gravel, silt, and clay. A preglacial bedrock valley, buried by glacial deposits, lies along the course of Soldier Creek within the reservation (Dreeszen and Burchett, 1971).

Under the Federal 1972 Clean Water Act, an Indian tribe is sovereign for the purposes of delegating the authority to regulate water within reservation boundaries. As part of efforts to develop a water plan for their reservation, which includes setting water-quality standards for surface water, the Prairie Band of Potawatomi began a study with the U.S. Geological Survey (USGS) in 1996 to define and monitor surface-water quality on the reservation. This report describes selected water-quality characteristics of surface water on the reservation using water samples collected from June 1996 through November 1998.

METHODS

Surface-water-quality samples collected from streams on and near the Prairie Band of Potawatomi Reservation serve the following two specific purposes:

(1) Samples collected at 20 surface-water-quality sampling sites (fig. 2, table 1) during June 1996 and 1997 after fertilizer and herbicide application in the spring provide a "snapshot" of water quality on the reservation following potential agricultural runoff. Herbicide concentrations may be high because of runoff resulting from precipitation shortly after herbicide application. During early summer, streamflows are generally high; therefore, bacteria and suspended-solid concentrations would be expected to be high in association with runoff.

(2) Quarterly samples collected at specific sites of interest, over a wide range of streamflows, can be used to evaluate annual ranges in the water-quality data.

The 20 sampling sites (fig. 2) (table 1) were selected to be representative of water quality across the reservation using the following criteria. It was important for the sites to be accessible when samples were needed. Road access to the site decreases the time necessary to get to the site, and bridges located at the sites make it possible to sample during high flows when wading into the streams could be dangerous. Roadways to the streams were to be passible even during extended rainy periods. Roads with a dirt or clayey surface were to be avoided because they are hard to drive on when wet. Sites used for quarterly sampling were located where streams do not generally go dry during long periods without precipitation. Finally, and probably most important, sampling sites were to represent:

(1) areal distribution across the reservation;

(2) surface water flowing into or out of the reservation; or

(3) surface water downgradient from potential sources of contamination such as sewage lagoons or croplands.

Before each sampling trip, all collection equipment were cleaned according to methods described in Horowitz and others (1994) and Wilde and others (1998). All water samples were collected using the protocol outlined in Horowitz and others (1994). Stream discharge and physical properties of surface water were measured at all sites when samples were collected. Some samples were collected from pools in the stream channel when there was no observable flow. Physical properties measured were specific conductance (relative indicator of dissolved-solids concentration), pH, water and air temperature, air pressure, and dissolved oxygen (DO).

Surface-water samples were collected for the analysis of nutrients, herbicides, bacteria, and suspended solids. Nutrient analyses included a determination of

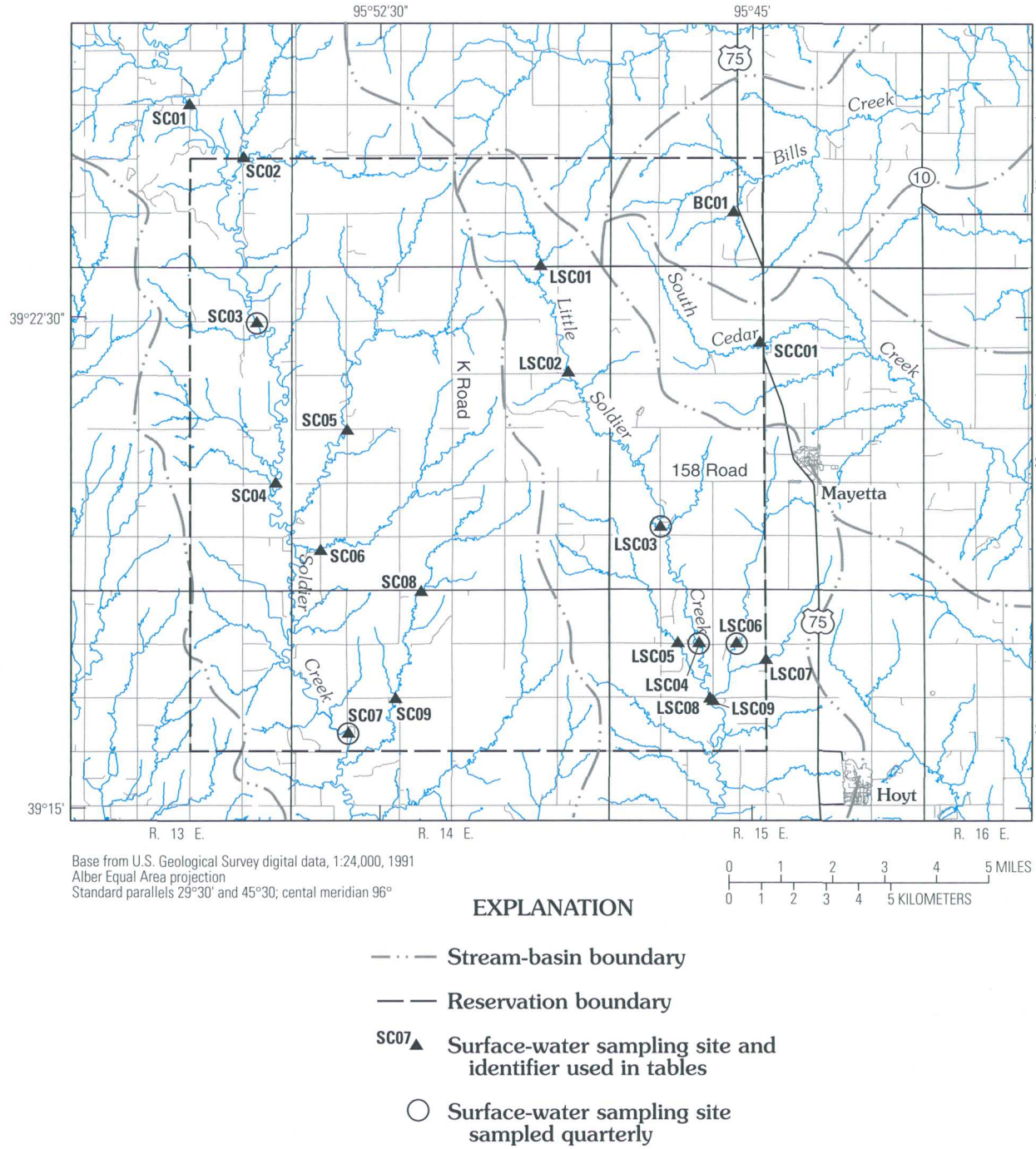

Figure 2. Surface-water-quality sampling sites and stream-basin boundaries on and near Prairie Band of Potawatomi Reservation.

total nitrogen, nitrite plus nitrate, dissolved ammonia, total phosphorus, and orthophosphate concentrations. Samples were analyzed at the USGS National Water-Quality Laboratory (NWQL) in Denver, Colorado, using methods described in Ziegler and Combs (1997).

Dissolved pesticides, including herbicides and insecticides, were analyzed using two methods. Enzyme-linked immunosorbent assay (ELISA) was used for all samples to test for triazine herbicides. Samples were analyzed at the USGS laboratory in Lawrence, Kansas, using procedures described in Thurman and others (1990) and used previously in a surface-water study of atrazine in northeastern Kansas (Pope and others, 1997). Selected samples were

Table 1. Location of surface-water-quality sampling sites used in this study

[*, asterisk indicates quarterly samples collected at that site; --, not determined]

Site identifier (fig. 1)	Site identification number	Stream basin and site name	Latitude (degrees, minutes, sections)	Longitude (degrees, minutes, sections)	Local number (township, range, section)[1]
		Bills Creek Basin			
BC01	392425095445100	Bills Creek, U.S. Highway 75 near Holton	39°24'25"	95°44'51"	7S 15E 28CDD
		Little Soldier Creek Basin			
LSC01	392328095490300	Little Soldier Creek, 190 Road near Mayetta	39°23'28"	95°49'03"	7S 14E 35DCDC
LSC02	392143095482700	Little Soldier Creek, 174 Road near Mayetta	39°21'43"	95°48'27"	8S 14E 12CCDD
LSC03*	391915095463100	Little Soldier Creek, O Road near Mayetta	39°19'15"	95°46'31"	8S 15E 29CCBC
LSC04*	391720095454200	Little Soldier Creek, 134 Road near Mayetta	39°17'20"	95°45'42"	9S 15E 08ABAA
LSC05	391721095460900	Little Soldier Creek tributary, 134 Road near Hoyt	39°17'21"	95°46'09"	9S 15E 05CDCD
LSC06*	391720095445400	Big Elm Creek, 134 Road near Hoyt	39°17'20"	95°44'54"	9S 15E 04CDDD
LSC07	391704095441700	Little Elm Creek, Q Road near Hoyt	39°17'04"	95°44'17"	9S 15E 10BCBB
LSC08	391629095452400	Big Elm Creek, P Road near Hoyt	39°16'29"	95°45'24"	9S 15E 09CCCC
LSC09	391628095452800	Little Soldier Creek, 126 Road near Hoyt	39°16'28"	95°45'28"	9S 15E 17AAAA
		Soldier Creek Basin			
SC01	392603095563000	Soldier Creek, 214 Road near Circleville	39°26'03"	95°56'30"	7S 13E 23BBBB
SC02	392512095552800	Soldier Creek tributary, G Road near Circleville	39°25'12"	95°55'28"	7S 13E 23 DDDD
SC03*	06889180	Soldier Creek near Saint Clere	39°22'33"	95°55'06"	8S 13E 12BABB
SC04	391956095544000	Soldier Creek, 158 Road near Saint Clere	39°19'56"	95°54'40"	8S 13E 25ABAB
SC05	392049095531300	Crow Creek, 166 Road near Saint Clere	39°20'49"	95°53'13"	8S 14E 18DDDD
SC06	391852095534500	South Branch Soldier Creek, H.5 Road near Saint Clere	39°18'52"	95°53'45"	8S 14E 31BADD
SC07*	391557095531100	Soldier Creek, I Road near Delia	39°15'57"	95°53'11"	9S 14E 17CBBC
SC08	391813095513200	James Creek, 142 Road near Delia	39°18'13"	95°51'32"	8S 14E 33CDDD
SC09	391630095520800	James Creek, 126 Road near Delia	39°16'30"	95°52'08"	9S 14E 08DDDD
		South Cedar Creek Basin			
SCC01	392212095441800	South Cedar Creek, U.S. Highway 75 near Mayetta	39°22'12"	95°44'18"	8S 15E 09ADDA

[1]Local numbers are assigned according to a modification of the Bureau of Land Management's system of land subdivision. In this system, the first set of digits in the number refers to the township north (N) or south (S) of the Kansas-Nebraska State line; the second set refers to the range east (E) or west (W) of the sixth principal meridian; and the third set refers to the section in which the site is located. The terminal letters refer to the 160-acre, 40-acre, 10-acre, and 2.5-acre tracts within the section. The letters A, B, C, D are assigned in a counterclockwise direction beginning in the northeast quadrant. For example, the local number 7S 14E 35DCDC indicates a site located in the southwest quarter of the southeast quarter of the southwest quarter of the southeast quarter of sec. 35, T. 7 S., R. 14 E.

analyzed using both ELISA and gas chromatography/mass spectrometry (GC/MS) as verification of the ELISA method. Samples from selected sites were analyzed at the NWQL for a wide range of dissolved pesticides (table 2) using methods described in Ziegler and Combs (1997).

Fecal coliform and fecal streptococcus bacteria concentrations were analyzed by tribal or USGS personnel. All bacteria were processed within 6 hours of collection using the membrane-filtration method presented in Wilde and others (1998, p. 3–38). Suspended-solid concentration was measured using total residue solids concentration analyzed by the NWQL. Finally, after an oil spill in the upstream reaches of Soldier Creek in April 1997, two oil-and-grease samples were collected, one upstream from the spill and one downstream from the spill. During sampling on June 26–27, 1997, oil-and-grease samples were collected at five sites. All oil-and-grease samples were analyzed at the NWQL according to methods described in Ziegler and Combs (1997).

Each sample trip included collection of at least one blank sample consisting of deionized water processed through the same filtering units as regular samples. In addition, duplicate samples from at least one sampling site were collected by filling a second set of sample bottles using the original sample water. Blank and duplicate samples were submitted for analysis along with the regular samples as part of USGS quality-control procedures (Ziegler and Combs, 1997). Blank-sample concentrations were evaluated to verify that the measured concentrations were less than the minimum report level(s). The minimum reporting level is a statistical value for the method of analysis whereby the reported value is at the 90-percent confidence level. Estimated values less than the minimum reporting level have a higher associated error. Duplicate-sample concentrations were compared to regular-sample concentrations to verify that the difference between the two sample concentrations was less than 10 percent of the regular-sample concentration.

Figure 3 shows flow duration for Soldier Creek near Saint Clere (sampling site SC03, fig. 2), located in the northwestern part of the reservation. It is the only sampling site with sufficient discharge data to calculate flow duration. A flow-duration curve shows

Table 2. Dissolved pesticides and metabolites for which analyses were performed by the U.S. Geological Survey's National Water-Quality Laboratory in Denver, Colorado

Acetochlor	EPTC	Prometryn
Alachlor	Ethalfluralin	Pronamide
Alpha BHC	Ethoprop	Propachlor
Atrazine	Fonofos	Propanil
Ametryn	Lindane	Propargite
Benfluralin	Linuron	Propazine
Butylate	Malathion	Simazine
Carbaryl	Methyl azinphos	Tebuthiuron
Carbofuran	Methyl parathion	Terbacil
Chlorpyrifos	Metolachlor	Terbufos
Cyanazine	Metribuzin	Terybutryn
DCPA	Molinate	Thiobencarb
p,p' DDE	Napropamide	Triallate
Deethylatrazine	Parathion	Trifluralin
Deisoproylatrazine	Pebulate	
Diazinon	Pendimethalin	
Dieldrin	Permethrin	
2,6-Diethylanaline	Phorate	
Disulfoton	Prometon	

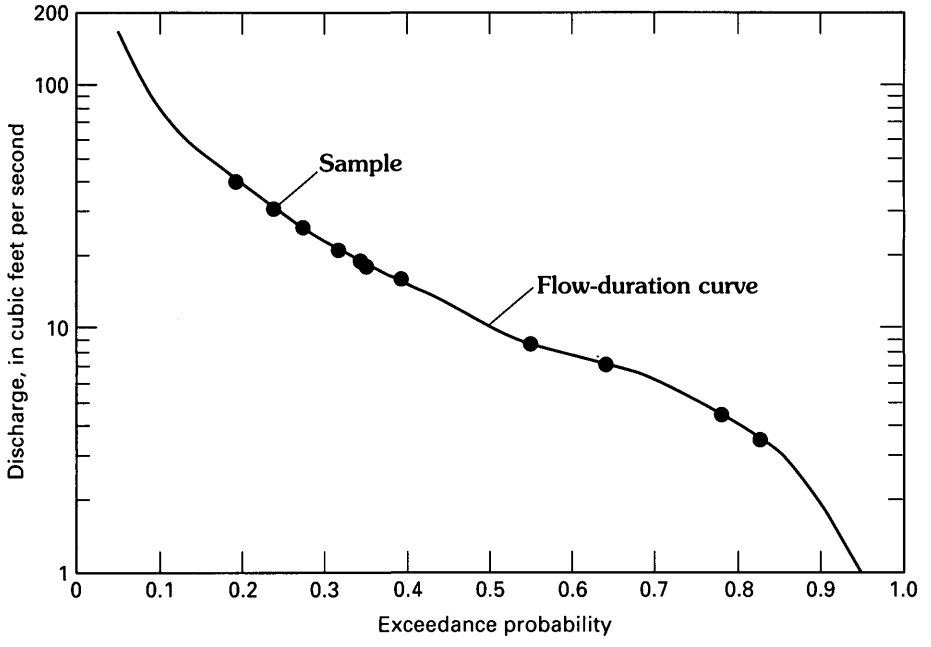

Figure 3. Flow duration for Little Soldier Creek near Saint Clere and stream discharge at time of water-quality sample collection, June 1996 through November 1998.

the proportion of time that a specific stream discharge will be exceeded. For example, when the stream discharge at sampling site SC03 is about 10 ft^3/s, the exceedance probability is 0.5; therefore, stream discharge is greater than 10 ft^3/s for half of the time. Also shown in figure 3 are stream discharges at sampling site SC03 for each sample that was collected during this study. Quarterly surface-water-quality samples were collected throughout most of the range of streamflow between exceedance probabilities of about 0.20 and 0.85, as indicated by figure 3, and therefore, were considered representative of flows that occur about 65 percent of the time. Streamflows at the very high end of flow duration with exceedance probabilities less than 0.20 and streamflows at the very low end with exceedance probabilities greater than 0.85 were not sampled. Flows in these ranges may need to be sampled in the future.

SURFACE-WATER QUALITY

Physical Properties

Specific conductance (table 3) can be used as a surrogate for (in lieu of) dissolved-solids concentration and generally is proportional to the concentrations of calcium, magnesium, sodium, chloride, bicarbonate, and sulfate (Hem, 1985, p. 66–69). Specific conductance values (fig. 4*A*) for streams on the Prairie Band of Potawatomi Reservation generally ranged from about 500 to 700 µS/cm (microsiemens per centimeter at 25 °C). As the map in figure 4*B* indicates, specific conductance values in the Little Soldier Creek Basin (sampling sites LSC01–LSC09) generally were less than those in the Soldier Creek Basin (sampling sites SC01–SC09), suggesting lower dissolved-solids concentrations in Little Soldier Creek.

Hydrogen activity of water is measured by pH (table 3). According to Hem (1985, p. 64), pH of stream water not affected by pollution generally ranges from 6.5 to 8.5 standard units. Where photosynthesis by aquatic organisms takes up carbon dioxide during daylight and releases carbon dioxide at night, pH fluctuations may occur, and the maximum pH value may reach as high as 9.0 standard units. In contrast, other factors such as oxidation of dissolved ferrous iron, lower the pH. The U.S. Environmental Protection Agency (1986) recommends a pH range of 6.5 to 8.5 standard units (limits of Secondary Maximum Contaminant Level, SMCL) for drinking-water supplies because, within that range, pH can be adjusted easily by treatment processes.

Onsite measurements of pH in 79 surface-water samples (fig. 5) from the reservation ranged from a low of 7.0 to a high of 9.0 standard units. Most values, however, ranged from about 7.5 to about 8.5 standard units. Consequently, pH of surface water on the reservation generally is within acceptable limits as established by the U.S. Environmental Protection Agency (1986).

Results of dissolved-oxygen measurements (table 3) are shown in figure 6. Concentrations ranged from 6.3 to 18.1 mg/L (milligrams per liter) in samples collected from throughout the reservation. Higher dissolved-oxygen concentrations are generally more desirable than lower concentrations for maintaining water quality to support aquatic organisms. Several factors can affect dissolved-oxygen concentration;

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; WH, whole water sample; °C, degrees Celsius; mm of Hg, millimeters of mercury; --, undetermined]

Site no. (fig. 2)	Site name	Date of sample collection (month/day/ year)	Time of sample collection (24-hour)	Dis-charge instan-taneous (ft^3/s)	Specific conduc-tance (µS/cm)	pH, WH, onsite (stand-ard units)	Water tempera-ture (°C)	Air tempera-ture (°C)	Air pressure (mm of Hg)	Oxygen, dis-solved (mg/L)
				Regular samples						
Bills Creek Basin										
BC01	Bills Creek, U.S. High-way 75 near Holton	6/27/96	13:45	0.21	605	7.6	29.1	32.5	730	6.3
		6/26/97	13:00	0	593	7.9	31.2	26.2	735	11.3
Little Soldier Creek Basin										
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	.34	556	7.9	28.0	29.0	731	10.4
		6/25/97	16:30	.10	411	9.0	30.1	25.2	732	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	.68	637	7.9	24.2	28.0	731	8.2
		6/26/97	11:55	.26	647	7.8	22.8	22.5	--	7.2
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	1.2	624	8.0	28.0	27.0	730	9.7
		6/26/97	15:30	.53	604	7.6	24.8	25.5	735	9.8
		2/19/98	10:20	4.8	603	8.3	4.6	2.5	735	14.2
		6/2/98	10:05	.20	653	7.7	20.0	30.5	736	6.9
		8/11/98	10:25	4.2	614	8.0	21.8	27.0	741	6.8
		11/24/98	11:20	5.3	654	7.8	6.2	14.0	743	11.0
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	1.5	605	7.9	26.7	32.5	730	10.9
		11/13/96	10:40	3.3	663	8.0	3.0	1.0	748	12.8
		2/19/97	14:00	4.9	477	8.2	5.3	11.5	737	15.8
		5/8/97	15:20	5.6	633	8.1	19.8	24.0	735	11.9
		6/26/97	12:55	.51	613	7.8	24.0	25.0	735	8.2
		11/12/97	9:35	.01	540	7.9	2.1	2.5	739	11.0
		2/19/98	10:55	5.7	599	8.3	3.2	3.0	740	13.9
		6/2/98	9:55	.35	625	7.8	19.9	25.0	726	6.6

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Discharge instantaneous (ft^3/s)	Specific conductance ($\mu S/cm$)	pH, WH, onsite (standard units)	Water temperature (°C)	Air temperature (°C)	Air pressure (mm of Hg)	Oxygen, dissolved (mg/L)
				Regular samples—Continued						
Little Soldier Creek Basin—Continued										
LSC04	Little Soldier Creek, 134 Road near Mayetta	8/11/98	10:20	1.4	532	7.9	22.1	27.0	741	8.1
		11/24/98	12:10	6.5	675	8.1	7.5	--	741	11.4
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	.21	577	7.9	28.2	32.5	730	10.8
		6/26/97	14:30	.02	663	7.5	24.2	25.5	735	8.4
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	.35	671	8.2	27.0	29.0	731	7.6
		11/13/96	9:45	.88	703	7.9	3.3	1.0	748	12.7
		2/19/97	15:10	1.4	635	8.1	9.2	10.0	735	11.9
		5/8/97	11:10	1.4	599	8.1	17.1	20.5	--	11.8
		6/26/97	12:05	.15	686	7.5	24.4	25.0	735	7.2
		8/13/97	10:15	0	650	7.7	23.7	24.0	738	6.9
		11/12/97	9:50	.11	714	7.9	3.0	2.5	740	12.6
		2/19/98	9:35	1.4	692	8.2	3.0	3.0	740	14.2
		6/2/98	9:05	.15	681	8.0	19.4	24.0	736	8.5
		8/11/98	11:45	5.3	610	8.1	23.4	30.0	741	9.4
		11/24/98	11:00	1.7	535	8.1	6.7	--	741	11.3
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	.09	614	7.4	23.3	28.0	736	7.0
		6/26/97	11:40	.04	649	7.2	22.8	25.0	735	6.6
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	.60	646	8.4	24.5	30.0	731	9.3
		6/26/97	9:20	.37	604	8.0	21.8	21.5	--	8.6

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/ year)	Time of sample collection (24-hour)	Dis-charge instan-taneous (ft^3/s)	Specific conduc-tance ($\mu S/cm$)	pH, WH, onsite (stand-ard units)	Water tempera-ture (°C)	Air tempera-ture (°C)	Air pressure (mm of Hg)	Oxygen, dis-solved (mg/L)
				Regular samples—Continued						
Little Soldier Creek Basin—Continued										
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	2.4	607	7.8	24.5	30.0	731	7.5
		6/26/97	9:50	.88	667	7.8	22.8	22.5	--	7.3
Soldier Creek Basin										
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	11	684	8.0	25.9	30.0	733	9.3
		6/25/97	16:45	4.9	747	7.6	29.6	29.0	730	9.5
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	2.6	690	7.8	23.4	30.0	733	--
		6/25/97	15:15	1.5	743	7.4	23.7	29.6	730	8.8
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	18	--	--	--	--	733	--
		11/13/96	13:25	16	734	8.1	3.1	1.0	742	13.1
		2/19/97	11:20	26	609	8.1	5.4	6.5	737	14.2
		5/8/97	11:30	31	653	7.9	17.8	20.0	737	11.4
		6/25/97	15:20	8.6	709	8.6	27.5	25.2	732	--
		8/13/97	12:25	3.5	688	7.0	21.5	26.0	735	--
		11/12/97	13:35	4.4	764	8.1	3.5	3.0	738	13.3
		2/19/98	12:45	19	683	8.3	4.3	5.0	732	14.0
		6/2/98	12:35	7.1	720	8.1	24.1	30.0	736	9.6
		8/11/98	14:00	21	623	8.1	26.4	30.0	741	11.6
		11/24/98	13:55	40	737	8.2	8.7	18.0	743	11.3
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	22	--	--	--	--	733	--
		6/25/97	11:30	11	707	7.6	25.5	29.0	732	9.5
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	1.9	554	7.8	25.9	31.0	733	8.2
		6/25/97	13:40	.89	493	7.4	24.9	28.5	730	8.1

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/ year)	Time of sample collection (24-hour)	Dis-charge instan-taneous (ft^3/s)	Specific conduc-tance (µS/cm)	pH, WH, onsite (stand-ard units)	Water tempera-ture (°C)	Air tempera-ture (°C)	Air pressure (mm of Hg)	Oxygen, dis-solved (mg/L)
				Regular samples—Continued						
Soldier Creek Basin—Continued										
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	0.29	554	7.9	26.0	31.0	733	8.7
		6/25/97	10:25	.13	587	7.3	23.5	25.5	731	7.8
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	27	615	8.1	28.8	31.0	733	7.9
		11/13/96	12:20	28	702	7.2	3.2	1.0	748	13.8
		2/19/97	11:00	42	630	8.1	6.8	6.5	742	13.5
		5/8/97	14:20	51	647	8.1	18.9	23.0	735	10.9
		6/25/97	10:45	12	685	8.0	25.6	24.8	732	9.0
		7/2/97	12:00	18	680	7.6	28.5	27.0	736	15.4
		8/13/97	10:15	4.1	609	7.0	21.9	23.0	736	--
		11/12/97	11:25	4.3	714	8.2	4.2	3.0	741	12.8
		2/19/98	14:45	29	660	8.4	4.2	6.0	732	14.1
		6/2/98	14:30	10	676	8.3	28.2	28.0	736	10.7
		8/11/98	15:55	35	633	8.2	26.0	28.0	741	9.4
		11/24/98	15:45	62	744	8.2	8.3	16.0	743	11.1
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	.08	557	7.4	22.2	30.0	737	6.8
		6/25/97	13:25	0	701	7.8	24.0	23.0	732	--
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	.38	595	7.8	25.1	33.0	733	9.7
		6/25/97	12:20	.06	652	7.9	24.8	24.0	732	17.3
		7/2/97	11:15	.10	698	7.4	26.0	26.5	733	18.1

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/ year)	Time of sample collection (24-hour)	Dis-charge instan-taneous (ft^3/s)	Specific conduc-tance (µS/cm)	pH, WH, onsite (stand-ard units)	Water tempera-ture (°C)	Air tempera-ture (°C)	Air pressure (mm of Hg)	Oxygen, dis-solved (mg/L)
				Regluar samples—Continued						
South Cedar Creek Basin										
SCC01	South Cedar Creek, U.S. Highway 75 near May-etta	6/27/96	12:20	0.62	598	8.1	26.4	29.0	731	10.9
		6/26/97	14:10	.16	641	8.0	23.4	25.0	--	9.0
				Duplicate samples						
Little Soldier Creek Basin										
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	.68	637	7.9	24.2	28.0	731	8.2
		6/26/97	12:00	.26	647	7.8	22.8	22.5	--	7.2
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	4.8	603	8.3	4.6	2.5	735	14.2
		6/2/98	10:10	.20	653	7.7	20.0	30.5	736	6.9
		8/11/98	10:30	4.2	614	8.0	21.8	27.0	741	6.8
		11/24/98	11:25	5.3	654	7.8	6.2	14.0	743	11.0
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	1.4	599	8.1	17.1	20.5	--	11.8
Soldier Creek Basin										
SC03	Soldier Creek near Saint Clere	11/12/97	13:50	4.4	764	8.1	3.5	3.0	738	13.3
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	.29	554	7.9	26.0	31.0	733	8.7

Table 3. Stream discharge at selected sampling sites and physical properties in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/ year)	Time of sample collection (24-hour)	Dis-charge instan-taneous (ft^3/s)	Specific conduc-tance ($\mu S/cm$)	pH, WH, onsite (stand-ard units)	Water tempera-ture (°C)	Air tempera-ture (°C)	Air pressure (mm of Hg)	Oxygen, dis-solved (mg/L)
				Duplicate samples—Continued						
Soldier Creek Basin—Continued										
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	28	702	7.2	3.2	1.0	748	13.9
		2/19/97	11:05	42	630	8.1	6.8	6.5	742	13.5
		6/25/97	10:50	12	685	8.0	25.6	24.8	732	9.0
		8/13/97	10:20	4.1	609	7.0	21.9	2.0	736	--

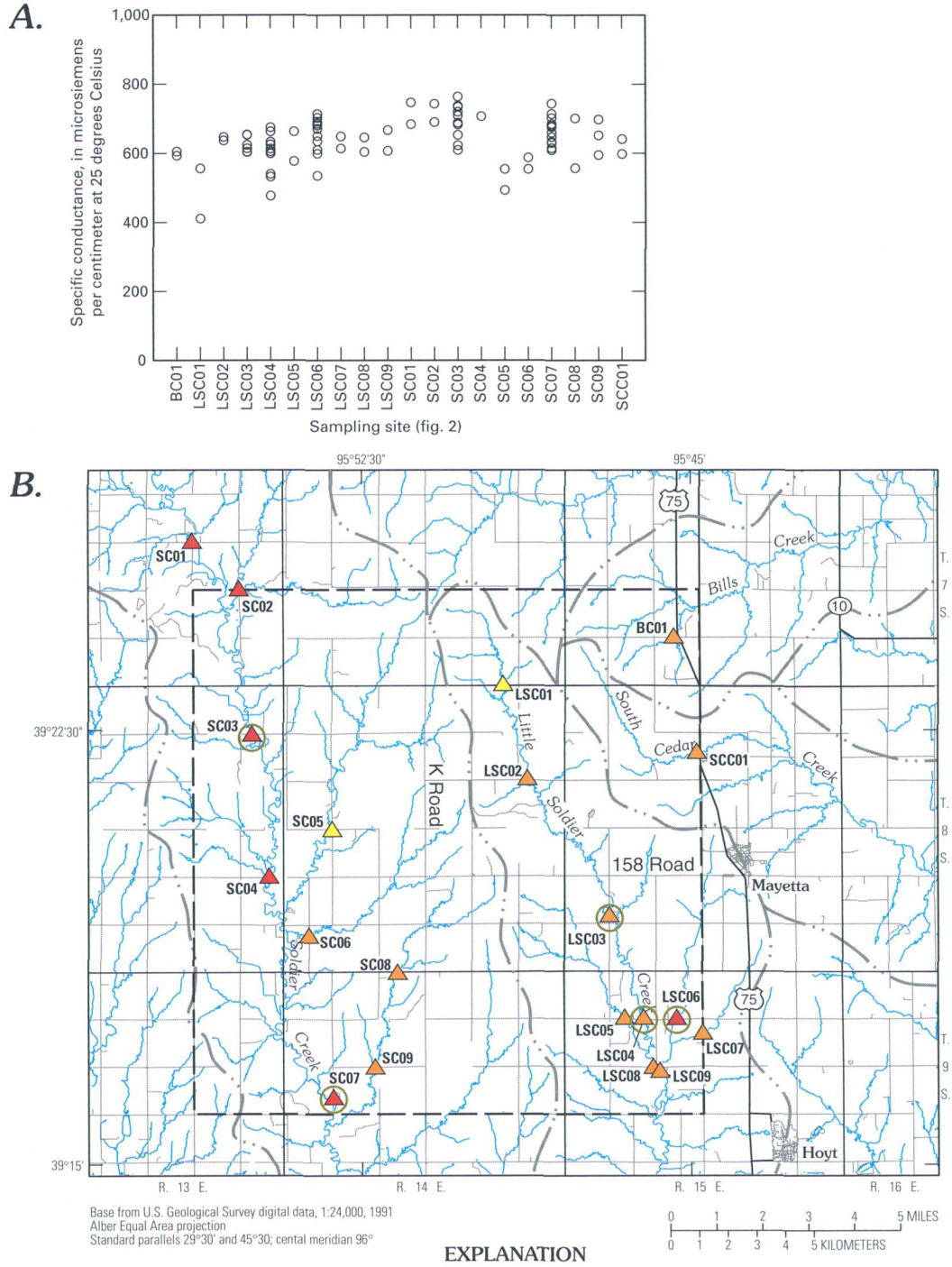

Figure 4. Distribution of specific conductance values in surface-water samples, June 1996 through November 1998.

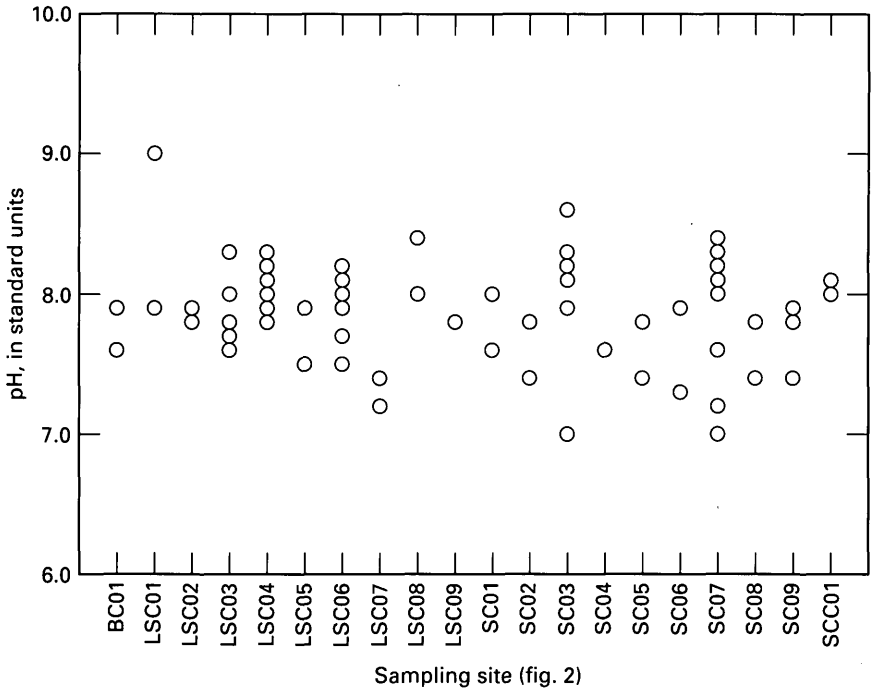

Figure 5. Distribution of pH values in surface-water samples, June 1996 through November 1998.

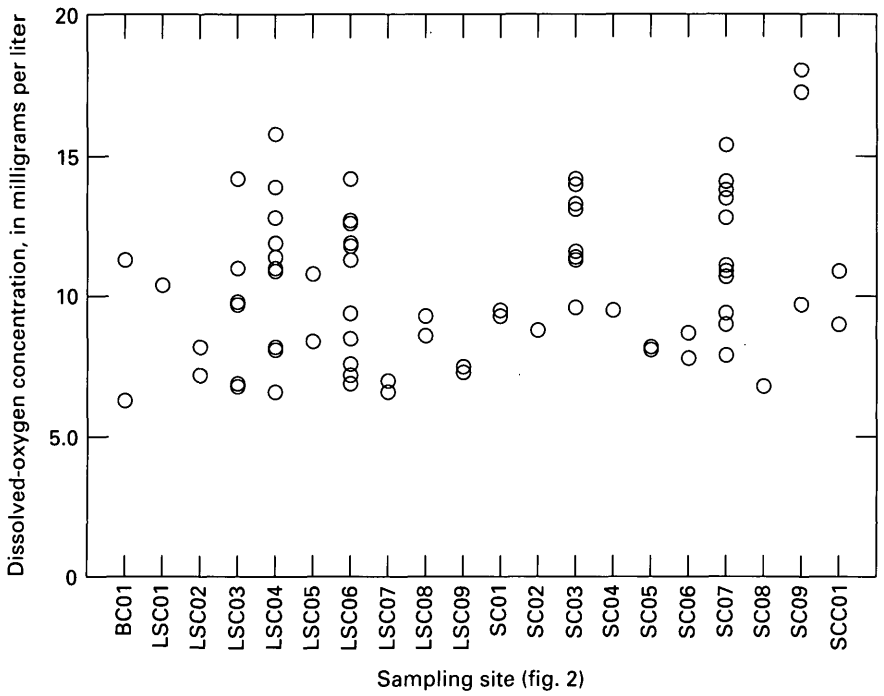

Figure 6. Distribution of dissolved-oxygen concentrations in surface-water samples, June 1996 through November 1998.

water temperature and atmospheric pressure have a fairly strong effect. In figure 7, a comparison of dissolved-oxygen concentrations with water temperatures shows that dissolved-oxygen concentrations are greater than 10 mg/L when water temperatures are less than about 20 °C. At temperatures greater than 20 °C, slower moving water can have lower dissolved-oxygen concentrations.

Nutrients

Nitrogen and phosphorus are essential for the growth and reproduction of plants (Hem, 1985, p. 121). Rooted aquatic plants and algae, for example, require dissolved forms of nitrogen and phosphorus as nutrients. Compounds of nitrogen, such as nitrite, nitrate, and ammonia, are the basic building blocks for protein synthesis. Phosphorus serves as an energy source in cellular chemical reactions. However, large inputs of nitrogen and phosphorus compounds to streams can cause excessive algal growth. This may produce taste and odor problems in drinking water, reduce the aesthetic and recreational value of water, and stress aquatic organisms due to decreased dissolved-oxygen concentrations when algal blooms die. Therefore, it is desirable to prevent or mitigate the introduction of excessive nutrient concentrations into surface water used as public supply or where sensitive aquatic organisms may be present.

Major sources of nutrients in and around the reservation include agricultural activities such as the application of fertilizers and the pasturing and confined feeding of livestock. Common fertilizers used include, among others, anhydrous ammonia, ammonium nitrate, urea, and mono- and diammonium phosphates. The amount of fertilizer applied in Kansas has increased substantially during the last four decades. In 1950, about 180,000 tons of

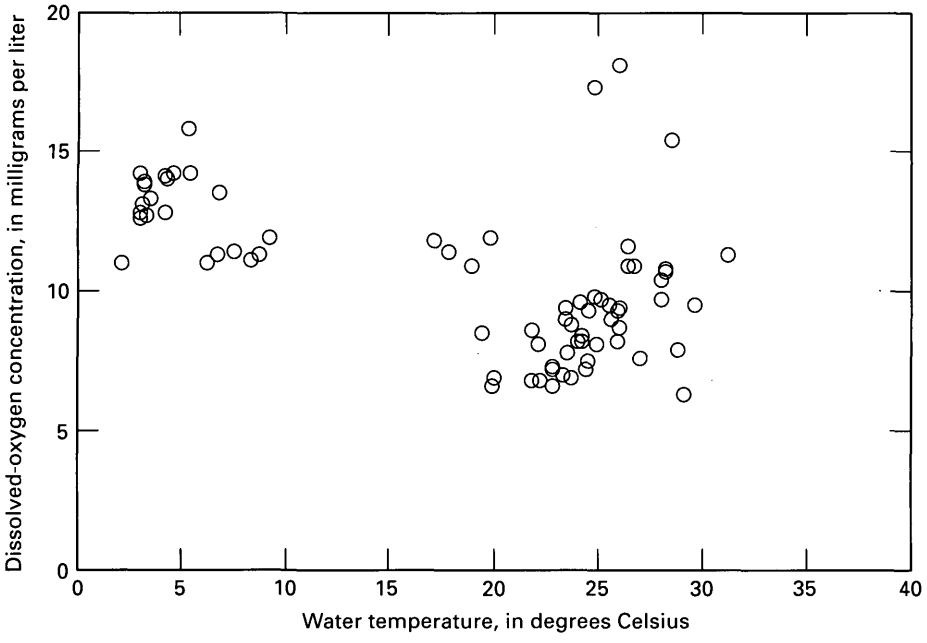

Figure 7. Dissolved-oxygen concentrations compared to water temperatures in surface-water samples, June 1996 through November 1998.

fertilizer (Kansas State Board of Agriculture and U.S. Department of Agriculture, 1985) were applied in Kansas, whereas by 1994, application was about 1,700,000 tons (Kansas Department of Agriculture and U.S. Department of Agriculture, 1997). It is likely that this statewide increasing trend in fertilizer use also occurred on and near the reservation. Additionally, farm livestock can produce considerable amounts of nitrogenous waste (urine and manure) that can concentrate in areas where large numbers of animals are pastured or confined. Decomposition of large amounts of fertilizers and manure can release nutrients to surface runoff or to shallow ground water with the potential for discharge to nearby streams.

A less significant potential source of nutrients on the reservation is bacterial decomposition of plant and animal protein and leeching from septic systems or sewage lagoons. Also, nutrients, particularly nitrate and ammonia, may be components of precipitation (Christensen and Pope, 1997); however, because of dominant agricultural land use in the area, precipitation is probably a minor contributor of nutrients to reservation surface water.

Nitrite Plus Nitrate

Nitrate is formed by complete oxidation of ammonium ions by microorganisms found in soil, water, sewage, and the digestive tract (U.S. Environmental Protection Agency, 1986). In most oxygenated surface water, nitrate is by far the dominant ion due to rapid oxidation of nitrite. Nitrate nitrogen is the form of nitrogen most easily used by most rooted green plants and algae. Nitrate nitrogen generally occurs in uncontaminated surface water with a worldwide average concentration of 0.30 mg/L (Reid and Wood, 1976, p. 235). Larger concentrations may stimulate growth of rooted plants or accelerate algal production to an extent that may produce taste or odor problems in finished drinking water. Because most aquatic organisms can tolerate nitrite plus nitrate concentrations far in excess of what normally might be found even in contaminated surface water, no water-quality criteria have been established for protection of aquatic life. However, a Maximum Contaminant Level (MCL) in drinking water of 10 mg/L as nitrogen was established by the U.S. Environmental Protection Agency (1986) for nitrite plus nitrate as nitrogen because of possible toxic effects to infants.

Concentrations of dissolved nitrite plus nitrate (table 4, fig. 8) in surface-water samples from the reservation were less than the minimum reporting level of 0.050 mg/L as nitrogen in 9 of the 79 samples collected. The median concentration was 0.183 mg/L, and the maximum concentration was 1.46 mg/L. The two highest concentrations were from Soldier Creek samples (sampling sites SC03 and SC07, fig. 2); however, these concentrations were considerably less than the MCL of 10 mg/L.

Ammonia

According to the U.S. Environmental Protection Agency (1986), concentrations of ammonia as nitrogen ranging from 0.440 to 19.0 mg/L (uncorrected for pH) are acutely toxic to 19 freshwater invertebrate species. Concentrations ranging from 0.070 to 3.80 mg/L are acutely toxic to 29 fish species. Acute toxicity of ammonia in fish causes increased respiration, oxygen uptake, and heart rate; reduction in hatching success and growth and morphological

Table 4. Nutrient concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998

[mg/L, milligrams per liter; <, less than indicated minimum reporting level; --, not determined]

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Nitrogen, nitrite (mg/L as N)	Nitrite plus nitrate, dissolved (mg/L as N)	Nitrogen, ammonia (mg/L as N)	Nitrogen, ammonia plus organic material (mg/L as N)	Phosphorus, total (mg/L as P)	Phosphorus, ortho (mg/L as P)
				Regular samples					
Bills Creek Basin									
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	<0.010	0.050	0.030	0.90	<0.010	<0.010
		6/26/97	13:00	.039	.141	.068	.80	.034	<.010
Little Soldier Creek Basin									
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	<.010	<.050	<.015	.50	.020	<.010
		6/25/97	16:30	<.010	<.050	<.015	.51	.038	<.010
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	<.010	.120	.020	.20	<.010	.020
		6/26/97	11:55	.013	.081	.020	.53	.055	.018
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	<.010	.070	<.015	.20	.020	.020
		6/26/97	15:30	<.010	.136	<.015	.29	.033	.031
		2/19/98	10:20	<.010	.290	.020	.23	.034	.034
		6/2/98	10:05	.011	.172	.067	.48	.051	.017
		8/11/98	10:25	<.010	.207	.054	.25	.062	.045
		11/24/98	11:20	<.010	.226	.027	.19	.055	.041
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	<.010	.070	.020	.40	.010	.020
		11/13/96	10:40	.030	.360	.030	<.20	.040	.030
		2/19/97	14:00	.010	.110	<.015	.30	.030	<.010
		5/8/97	15:20	<.010	<.050	<.015	.22	.034	.015
		6/26/97	12:55	<.010	.110	<.015	.33	.029	.023
		11/12/97	9:35	<.010	<.050	<.020	.35	.072	.094
		2/19/98	10:55	<.010	.302	<.020	.24	.040	.037
		6/2/98	9:55	<.010	<.050	.039	.37	.072	.018
		8/11/98	10:20	.027	.446	.044	.45	.163	.146
		11/24/98	12:10	<.010	.307	.029	.18	.058	.047
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	<.010	.130	.030	<.20	<.010	.020
		6/26/97	14:30	<.010	.097	.051	.30	.022	.021

Table 4. Nutrient concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collec- tion (24-hour)	Nitro- gen, nitrite (mg/L as N)	Nitrite plus nitrate, dissol- ved (mg/L as N)	Nitro- gen, ammonia (mg/L as N)	Nitrogen, ammonia plus organic material (mg/L as N)	Phos- phorus, total (mg/L as P)	Phos- phorus, ortho (mg/L as P)
				Regular samples—Continued					
Little Soldier Creek Basin—Continued									
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	<0.010	0.230	0.030	<0.20	0.070	0.070
		11/13/96	9:45	.020	.410	.040	<.20	.060	.060
		2/19/97	15:10	.020	.270	<.015	.20	.050	.030
		5/8/97	11:10	<.010	.126	<.015	<.20	<.010	<.010
		6/26/97	12:05	<.010	.169	.031	.24	.072	.068
		8/13/97	10:15	.011	<.050	.106	.50	.023	.016
		11/12/97	9:50	<.010	<.050	.021	.19	.064	.105
		2/19/98	9:35	<.010	.227	<.020	.22	.051	.041
		6/2/98	9:05	<.010	.333	.027	.21	.094	.097
		8/11/98	11:45	<.010	.153	.039	.27	.053	.051
		11/24/98	11:00	<.010	.524	.042	.27	.185	.130
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	<.010	.080	.020	.30	.030	.030
		6/26/97	11:40	.011	.121	.018	.51	.081	.033
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	<.010	.270	.020	<.20	.060	.070
		6/26/97	9:20	<.010	.35	<.015	<.20	.059	.066
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	<.010	.10	<.015	.20	.030	.040
		6/26/97	9:50	<.010	.183	.028	.41	.097	.044
Soldier Creek Basin									
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	.040	1	.020	.50	.080	.05
		6/25/97	16:45	.023	.287	<.015	.53	.076	.027
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	<.010	.38	<.015	<.20	<.010	.010
		6/25/97	15:15	.022	.336	.019	.27	.036	.025
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	.010	.370	.020	.40	.040	.020
		11/13/96	13:25	.030	.610	.030	<.20	.090	.090
		2/19/97	11:20	.020	.650	<.015	.40	.040	<.010
		5/8/97	11:30	<.010	.148	<.015	.26	.026	<.010
		6/25/97	15:20	<.010	.122	<.015	.59	.049	.022

Table 4. Nutrient concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Nitrogen, nitrite (mg/L as N)	Nitrite plus nitrate, dissolved (mg/L as N)	Nitrogen, ammonia (mg/L as N)	Nitrogen, ammonia plus organic material (mg/L as N)	Phosphorus, total (mg/L as P)	Phosphorus, ortho (mg/L as P)
				Regular samples—Continued					
Soldier Creek Basin—Continued									
SC03	Soldier Creek near Saint Clere	8/13/97	12:25	<0.010	0.074	<0.015	0.30	<0.010	<0.010
		11/12/97	13:35	<.010	.079	<.020	.28	.029	.035
		2/19/98	12:45	<.010	.343	<.020	.21	.046	.034
		6/2/98	12:35	.012	.220	.024	.74	.115	.021
		8/11/98	14:00	<.010	.119	.045	.37	.028	.025
		11/24/98	13:55	<.010	1.460	.033	.21	.085	.052
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	.010	.620	.020	.30	.040	.030
		6/25/97	11:30	.012	.256	<.015	.32	.048	.041
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	<.010	.130	.020	.20	.030	.030
		6/25/97	13:40	<.010	.142	.032	.31	.056	.032
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	<.010	.060	.020	.30	.020	.020
		6/25/97	10:25	.014	.231	.049	.37	.046	.027
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	.010	.710	<.015	.50	.080	.040
		11/13/96	12:20	.030	.630	.030	<.20	.050	.050
		2/19/97	11:00	.020	.330	<.015	.30	.050	<.010
		5/8/97	14:20	<.010	.152	<.015	.26	.019	.020
		6/25/97	10:45	.015	.357	<.015	.38	.069	.056
		8/13/97	10:15	<.010	<.050	.050	.69	.097	.125
		11/12/97	11:25	<.010	.051	<.020	.47	.046	.051
		2/19/98	14:45	<.010	.289	<.020	.19	.038	.033
		6/2/98	14:30	<.010	<.050	<.020	.80	.125	.018
		8/11/98	15:55	<.010	.271	.057	.41	.087	.047
		11/24/98	15:45	<.010	1.4	.033	.31	.137	.065
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	<.010	.260	.050	.60	.060	<.010
		6/25/97	13:25	<.010	.073	.039	.27	.047	.025

Table 4. Nutrient concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Nitrogen, nitrite (mg/L as N)	Nitrite plus nitrate, dissolved (mg/L as N)	Nitrogen, ammonia (mg/L as N)	Nitrogen, ammonia plus organic material (mg/L as N)	Phosphorus, total (mg/L as P)	Phosphorus, ortho (mg/L as P)
				Regular samples—Continued					
Soldier Creek Basin—Continued									
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	<0.010	0.110	0.020	<0.20	0.030	0.030
		6/25/97	12:20	.017	.232	<.015	.28	.044	.036
South Cedar Creek Basin									
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	<.010	.290	.030	.40	.070	.040
		6/26/97	14:10	.012	.267	.017	.29	.075	.063
				Blank samples					
Little Soldier Creek Basin									
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	<.010	<.050	<.015	<.20	<.010	<.010
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:45	<.010	<.050	<.015	<.20	<.010	<.010
		6/26/97	9:50	<.010	<.050	<.015	<.20	<.010	<.010
Soldier Creek Basin									
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	<.010	<.050	.020	<.20	<.010	<.010
		11/13/96	11:20	.030	<.050	.030	<.20	<.010	<.010
		2/19/97	13:15	<.010	<.050	<.015	<.20	<.010	<.010
		6/25/97	13:55	<.010	<.050	<.015	<.20	<.010	<.010
		8/13/97	10:00	<.010	<.050	<.015	<.20	<.010	<.010
		11/12/97	11:00	<.010	<.050	<.020	<.10	<.010	.033
		6/2/98	10:30	<.010	<.050	<.020	<.10	<.010	<.010
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	<.010	.066	<.020	<.10	<.010	.018
		8/11/98	10:30	<.010	<.050	.044	<.10	<.010	.017
		11/24/98	11:05	<.010	<.050	.025	<.10	<.050	.010
				Duplicate samples					
Little Soldier Creek Basin									
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	<.010	.06	.020	.30	.020	.020
		6/26/97	12:00	.013	.084	.025	.55	.057	.024

Table 4. Nutrient concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Nitrogen, nitrite (mg/L as N)	Nitrite plus nitrate, dissolved (mg/L as N)	Nitrogen, ammonia (mg/L as N)	Nitrogen, ammonia plus organic material (mg/L as N)	Phosphorus, total (mg/L as P)	Phosphorus, ortho (mg/L as P)
				Dupulicate samples—Continued					
Little Soldier Creek Basin—Continued									
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	<0.010	0.298	<0.020	0.24	0.041	0.033
		6/2/98	10:10	.012	.169	.073	.43	.077	.020
		8/11/98	10:30	<.010	.217	.039	.31	.042	.046
		11/24/98	11:25	<.010	.219	.027	.19	.049	.040
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	<.010	.123	<.015	<.20	<.010	<.010
Soldier Creek Basin									
SC03	Soldier Creek near Saint Clere	11/12/97	13:50	<.010	.072	<.020	.28	.028	.034
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	<.010	.060	.020	.20	<.010	.010
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	.025	.631	.023	<.20	.065	.043
		2/19/97	11:05	.020	.49	<.015	.30	.100	<.010
		6/25/97	10:50	.017	.364	<.015	.34	.056	.058
		8/13/97	10:20	<.010	<.050	<.015	.63	.079	<.010

development; and injuries to gills, liver, and kidneys. At larger concentrations, fish may experience convulsions, coma, and death. The most likely source for ammonia on the reservation is from nonpoint sources related to agricultural land use or septic systems. Nonpoint sources refer to a broad area, such as agricultural land, as opposed to discrete points, such as a factory or wastewater-treatment outflow.

Dissolved ammonia concentrations as nitrogen (table 4) for surface-water samples collected from the reservation ranged from a low of less than 0.015 mg/L to a high of 0.106 mg/L, with a median concentration less than a minimum reporting level of 0.02 mg/L. Thirty-two of the 79 samples had concentrations less than minimum reporting levels of either 0.02 or 0.015 mg/L. Most other concentrations were less than about 0.060 mg/L (fig. 9). None of the dissolved ammonia as nitrogen concentrations exceeded the Kansas Department of Health and Environment (1994) chronic water-quality criterion, which varies depending on water temperature and pH.

Phosphorus

Excessive concentrations of phosphorus in water may contribute to eutrophication of reservoirs. Eutrophication (nutrient enrichment) is characterized by excessive nutrient concentrations, decreasing dissolved-oxygen concentrations, and dense growths of algae (Reid and Wood, 1976, p. 293). The U.S. Environmental Protection Agency (1986) criterion for total phosphate (as phosphorus) is 0.100 mg/L for aquatic life. Higher concentrations may interfere with

coagulation in water-treatment plants. To prevent excessive algal growth, the concentration should not exceed 0.048 mg/L in any stream at the point where it enters a lake or reservoir nor should it exceed 25 mg/L within the lake or reservoir (U.S. Environmental Protection Agency, 1986). Potential sources for high concentrations of phosphorus in streams on the Prairie Band of Potawatomi Reservation are probably human or animal waste and fertilizers applied to agricultural lands to enhance plant production.

Total phosphorus concentrations in surface-water samples from the reservation (table 4, fig. 10) were less than the minimum reporting level of 0.010 mg/L in 6 of 79 samples. The median concentration was 0.048 mg/L, and the maximum concentration was 0.185 mg/L. Generally, concentrations ranged from about 0.020 to 0.100 mg/L, with five samples from four sites sampled quarterly (sampling sites LSC04, LSC06, SC03, and SC07) exceeding 0.100 mg/L. The occurrence of total phosphorus concentrations near and exceeding 0.100 mg/L probably reflects nonpoint-source contributions from agricultural activities or septic systems.

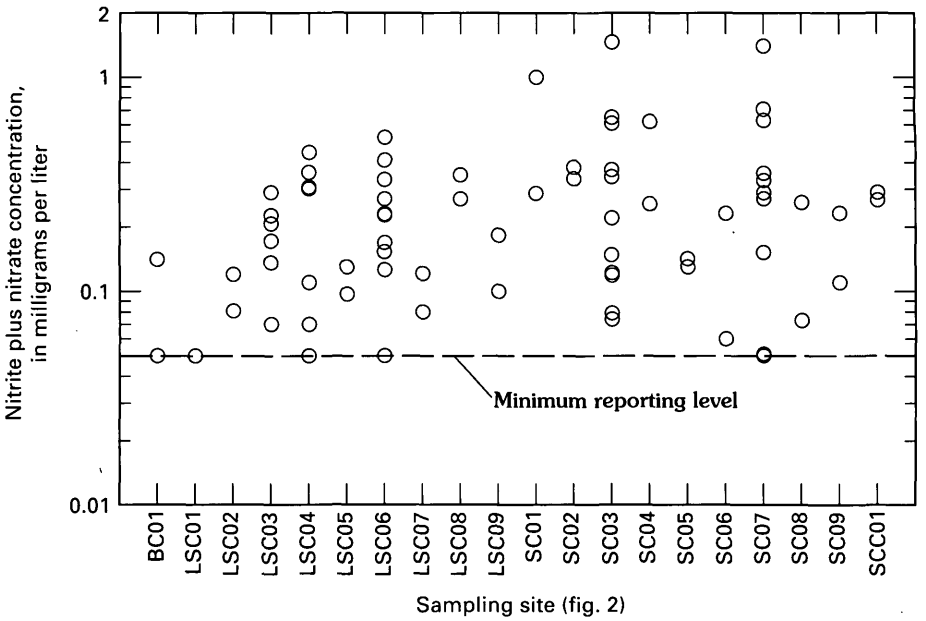

Figure 8. Distribution of nitrite plus nitrate concentrations in surface-water samples, June 1996 through November 1998. Undetected concentrations are plotted at the minimum reporting level.

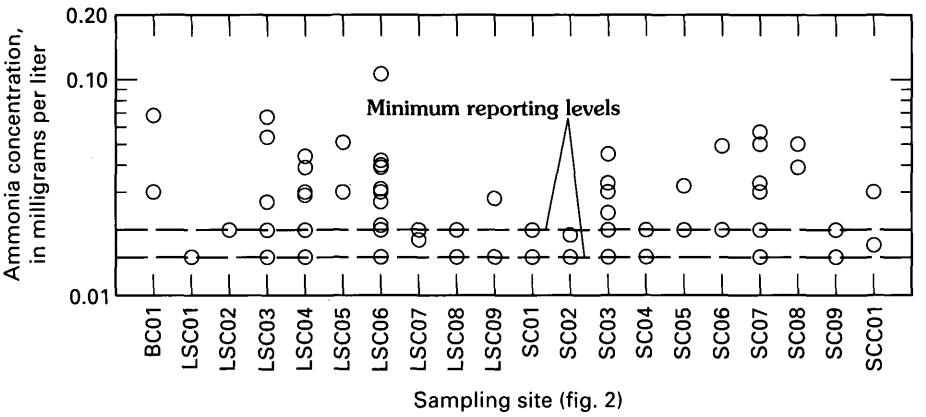

Figure 9. Distribution of ammonia concentrations in surface-water samples, June 1996 through November 1998. Undetected concentrations are plotted at the minimum reporting levels.

Pesticides

Several studies relating to herbicide use have been conducted in Kansas during the past few years. Atrazine, one of the triazine herbicides, is the major herbicide of interest in and around the reservation because it has been used since the 1950's in the production of corn and grain sorghum in the area. Another potential source of atrazine may be its use in controlling weeds along railroad right-of-ways and along roads and highways. It is the most frequently detected herbicide in Kansas surface water (Stamer and Zelt, 1994).

Atrazine, where used extensively, may pose a potential threat to surface water on the reservation because of possible adverse effects on human health and potential toxicity to aquatic life. Currently (1999), the Kansas Department of Health and Environment (1994) and the U.S. Environmental Protection Agency

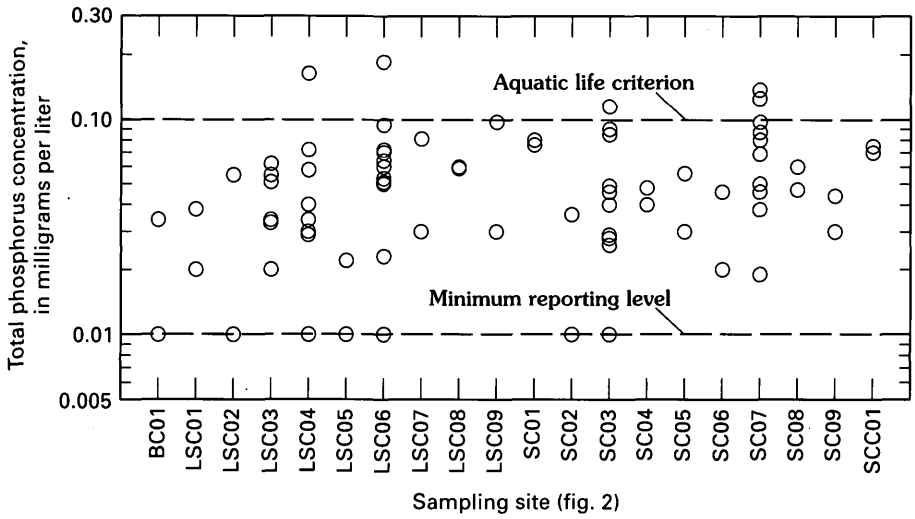

Figure 10. Distribution of total phosphorus concentrations in surface-water samples, June 1996 through November 1998. Aquatic life criterion from U.S. Environmental Protection Agency (1986). Undetected concentrations are plotted at the minimum reporting level.

(1994) have established an annual mean MCL of 3.0 µg/L (micrograms per liter) in finished drinking-water supplies.

On the basis of a study of atrazine concentrations in the Delaware River Basin (fig. 1) in northeastern Kansas, Pope (1995) showed that daily mean triazine concentrations exceeded 3.0 µg/L for atrazine at times during the months of May, June, and July. Daily mean concentrations at or greater than 30 µg/L were not uncommon. However, daily mean concentrations greater than 3.0 µg/L were rare at other times of the year and generally were less than 1.0 µg/L between August and April; consequently, the annual mean concentration was less than the MCL (Pope, 1995).

In a study of the distribution, transport, and relative age of atrazine in Perry Lake in northeastern Kansas, Fallon (1994) described the effects of precipitation, reservoir residence time, and herbicide application. Runoff occurring immediately after atrazine application increased atrazine concentrations in the lake. Results of Pope's (1995) study of the Delaware River Basin and Fallon's (1994) study of Perry Lake suggest that runoff resulting from precipitation in late spring and early summer after atrazine application increases atrazine concentrations in the streams.

Figure 11*A* shows the concentrations of dissolved triazine herbicides as analyzed using the ELISA method (triazine screen in table 5). Of the 82 triazine analyses, 29 contained triazine concentrations less than the minimum reporting level of 0.1 µg/L. The median concentration was 0.2 µg/L, and the maximum concentration was 10 µg/L. Triazine concentrations in four samples (fig. 11*B*) exceeded 3.0 µg/L; three samples had a concentration of 4.0 µg/L, and one had a concentration of 10 µg/L. All samples exceeding 3.0 µg/L were from Soldier Creek sampling sites (sampling sites SC01, SC03, SC04, SC07; fig. 2) and were collected during June 26, 1996.

Dissolved atrazine concentrations (table 5, fig. 12) analyzed using the GC/MS method ranged from a low of 0.016 µg/L to a maximum of 7.40 µg/L. Of the 30 samples analyzed using this method, none were less than the minimum reporting level of 0.001 µg/L. The median concentration was 0.161 µg/L. Two samples collected on June 26, 1996, from sampling sites SC01 (7.40 µg/L) and SC07 (5.10 µg/L), exceeded 3.0 µg/L.

Figure 13 compares triazine herbicide concentrations, determined using ELISA, to dissolved atrazine concentrations, determined using GC/MS. At concentrations greater than the triazine minimum reporting level (0.1 µg/L), a direct relation exists where the triazine concentration slightly overestimates the atrazine concentration. This is due, in part, to the presence of other triazine herbicides in the water samples such as the atrazine metabolite deethylatrazine and the triazine herbicide cyanazine. Of 30 samples analyzed for deethylatrazine, one sample (sampling site LSC01) contained a concentration that was less than the minimum reporting level of 0.050 µg/L; in the remainder of the samples, the deethylatrazine concentrations were estimated and ranged from 0.002 to 0.290 µg/L, with a median estimated concentration of 0.020 µg/L. Of 30 samples analyzed for dissolved cyanazine, 20 contained concentrations that were less than the minimum reporting levels of 0.004 or 0.050 µg/L. Nine samples with detected dissolved cyanazine all had concentrations of 0.008 µg/L or less.

Other detected herbicides included alachlor and metolachlor. Alachlor concentrations were detected in 21 of 30 surface-water samples, with a median concentration of 0.018 µg/L and a maximum

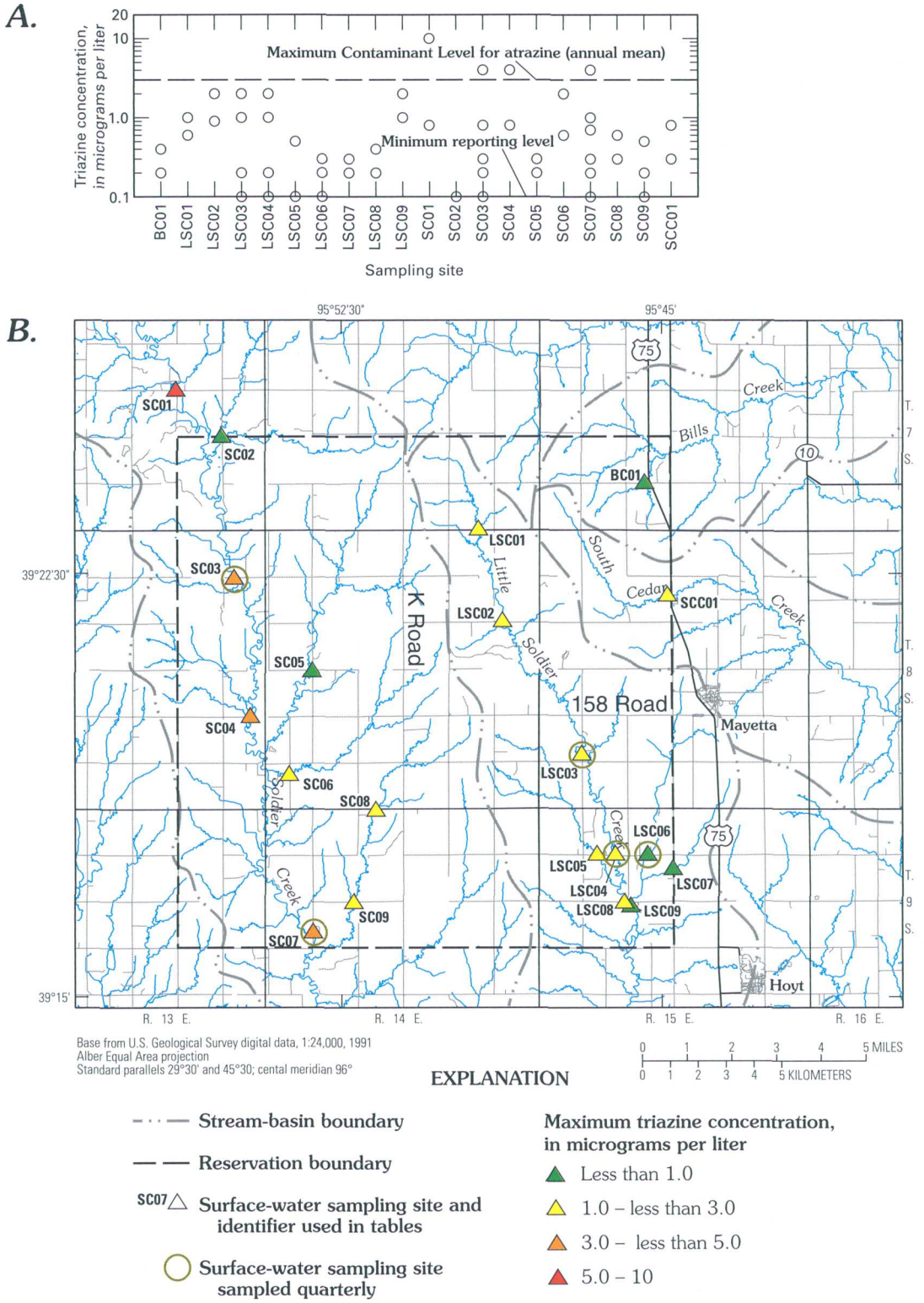

Figure 11. Distribution of triazine herbicide concentrations determined by enzyme-linked immunosorbent assay in surface-water samples, June 1996 through November 1998. Maximum Contaminant Level for atrazine is from Kansas Department of Health and Environment (1994) and U.S. Environmental Protection Agency (1994). Undetected concentrations are plotted at the minimum reporting level.

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998

[ELISA, enzyme-linked immunosorbent assay; GC/MS, gas chromatography/mass spectrometry; µg/L, micrograms per liter; <, less than indicated minimum reporting level; E, estimated; --, not determined]

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
					Regular samples						
Bills Creek Basin											
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	0.4	--	--	--	--	--	--	--
		6/26/97	13:00	.2	--	--	--	--	--	--	--
Little Soldier Creek Basin											
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	.6	0.45	<0.05	0.06	--	<0.05	--	--
		6/25/97	16:30	1	--	--	--	--	--	--	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	.9	--	--	--	--	--	--	--
		6/26/97	11:55	2	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	1	--	--	--	--	--	--	--
		6/26/97	15:30	2	--	--	--	--	--	--	--
		2/19/98	10:20	<.1	.031	<.002	<.002	<.002	--	<0.002	<0.002
		6/2/98	10:05	.2	.076	<.002	.015	<.002	--	<.002	<.002
		8/11/98	10:25	<.1	.08	<.002	.004	<.002	--	<.002	<.002
		11/24/98	11:20	<.1	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
					Regular samples—Continued						
Little Soldier Creek Basin—Continued											
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	1	1	<0.05	0.05	--	<0.05		
		11/13/96	10:40	<.1	--	--	--	--	--	--	--
		2/19/97	14:00	<.1	--	--	--	--	--	--	--
		5/8/97	15:20	.2	.247	.0052	.307	<0.002	--	<0.002	<0.002
		6/26/97	12:55	2							
		11/12/97	9:35	<.1	.066	<.002	<.03	<.002	--	<.002	<.002
		2/19/98	10:55	<.1	.03	<.002	<.002	<.002	--	<.002	<.002
		6/2/98	9:55	.1	--	--	--	--	--	--	--
		8/11/98	10:20	<.1	--	--	--	--	--	--	--
		11/24/98	12:10	<.1	--	--	--	--	--	--	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	.1	--	--	--	--	--	--	--
		6/26/97	14:30	.5	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	0.3	--	--	--	--	--	--	--
		11/13/96	9:45	<.1	.019	<.002	<.002	<.002	--	<.002	<.002
		2/19/97	15:10	<.1	.016	<.002	<.002	<.002	--	<.002	<.002
		5/8/97	11:10	<.1	.035	.0055	.006	<.002	--	<.002	<.002
		6/26/97	12:05	.3	--	--	--	--	--	--	--
		8/13/97	10:15	<.1	--	--	--	--	--	--	--
		11/12/97	9:50	<.1	.022	<.002	.01	<.002	--	<.002	<.002
		2/19/98	9:35	<.1	--	--	--	--	--	--	--
		6/2/98	9:05	<.1	--	--	--	--	--	--	--
		8/11/98	11:45	.2	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
				Regular samples—Continued							
Little Soldier Creek Basin—Continued											
LSC06	Big Elm Creek, 134 Road near Hoyt	11/24/98	11:00	<0.1	--	--	--	--	--	--	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	.3	--	--	--	--	--	--	--
		6/26/97	11:40	.2	--	--	--	--	--	--	--
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	.4	0.31	<0.002	0.026	<0.002	--	<0.002	<0.002
		6/26/97	9:20	.2	.173	<.002	.027	<.002	--	<.002	<.002
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	1	.72	<.002	.045	<.002	--	<.002	<.002
		6/26/97	9:50	2	1.05	<.002	.053	<.002	--	<.002	<.002
Soldier Creek Basin											
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	10	7.4	<.002	2.6	<.002	--	<.002	<.002
		6/25/97	16:45	.8	.682	<.002	.044	<.002	--	<.002	<.002
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	.1	--	--	--	--	--	--	--
		6/25/97	15:15	.1	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
					Regular samples—Continued						
Soldier Creek Basin—Continued											
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	4	--	--	--	--	--	--	--
		11/13/96	13:25	<.1	--	--	--	--	--	--	--
		2/19/97	11:20	<.1	--	--	--	--	--	--	--
		5/8/97	11:30	.3	0.234	0.0055	0.016	<0.002	--	<0.002	<0.002
		6/25/97	15:20	.8	--	--	--	--	--	--	--
		8/13/97	12:25	.2	--	--	--	--	--	--	--
		11/12/97	13:35	<.1	.041	<.002	.02	<.002	--	<.002	<.002
		2/19/98	12:45	<.1	--	--	--	--	--	--	--
		6/2/98	12:35	<.1	--	--	--	--	--	--	--
		8/11/98	14:00	.2	--	--	--	--	--	--	--
		11/24/98	13:55	<.1	.016	<.002	<.002	<.002	--	<.002	<.002
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	4	--	--	--	--	--	--	--
		6/25/97	11:30	.8	--	--	--	--	--	--	--
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	.2	--	--	--	--	--	--	--
		6/25/97	13:40	.3	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	.6	--	--	--	--	--	--	--
		6/25/97	10:25	2	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
					Regular samples—Continued						
Soldier Creek Basin—Continued											
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	4	5.1	<0.002	0.52	<0.002	--	<0.002	<0.002
		11/13/96	12:20	<.1	--	--	--	--	--	--	--
		2/19/97	11:00	<.1	--	--	--	--	--	--	--
		5/8/97	14:20	.2	.228	.009	.019	<.002	--	<.002	<.002
		6/25/97	10:45	1	--	--	--	--	--	--	--
		7/2/97	12:00	.7	.492	<.002	.015	<.002	--	<.002	<.002
		8/13/97	10:15	.3	.149	<.002	.006	<.002	--	<.002	<.002
		11/12/97	11:25	<.1	.052	<.002	<.002	<.002	--	<.002	<.002
		2/19/98	14:45	<.1	--	--	--	--	--	--	--
		6/2/98	14:30	.3	.328	<.002	.055	<.002	--	<.002	<.002
		8/11/98	15:55	.2	.11	<.002	.004	<.002	--	<.002	<.002
		11/24/98	15:45	<.1	--	--	--	--	--	--	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	.6	--	--	--	--	--	--	--
		6/25/97	13:25	.3	--	--	--	--	--	--	--
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	.5	.45	<.002	.048	<.002	--	<.002	<.002
		6/25/97	12:20	.2	--	--	--	--	--	--	--
		7/2/97	11:15	.1	.124	<.002	E .003	<.002	--	<.002	<.002
South Cedar Creek Basin											
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	.3	--	--	--	--	--	--	--
		6/26/97	14:10	.8	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
					Blank samples						
Little Soldier Creek Basin											
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/26/97	9:50	<0.1	E 0.001	<0.002	<0.002	<0.002	--	<0.002	<0.002
Soldier Creek Basin											
SC03	Soldier Creek near Saint Clere	6/25/97	13:55	<.1	--	--	--	--	--	--	--
		8/13/97	10:00	<.1	--	--	--	--	--	--	--
		11/12/97	11:00	<.1	<.001	<.002	<.002	<.002	--	<.002	<.002
		6/2/98	10:30	<.1	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	<.1	--	--	--	--	--	--	--
		11/24/98	11:05	<.1	--	--	--	--	--	--	--
					Duplicate samples						
Little Soldier Creek Basin											
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	.7	--	--	--	--	--	--	--
		6/26/97	12:00	2	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	<.1	.03	<.002	<.002	<.002	--	<.002	<.002
		6/2/98	10:10	<.1	--	--	--	--	--	--	--
		8/11/98	10:30	<.1	--	--	--	--	--	--	--
		11/24/98	11:25	<.1	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:51	1	.9	<.05	.05	--	<0.05	--	--
		2/19/97	14:01	<.1	--	--	--	--	--	--	--
		6/26/97	12:56	2	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Triazine screen using ELISA (µg/L)	Atrazine, dissolved, using GC/MS (µg/L)	Acetochlor, filtered (µg/L)	Alachlor, dissolved (µg/L)	Alpha BHC (µg/L)	Ametryn, dissolved (µg/L)	Benfluralin, filtered (µg/L)	Butylate, dissolved (µg/L)
				Duplicate samples—Continued							
Little Soldier Creek Basin—Continued											
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	<0.1	0.035	0.0054	0.007	<0.002	--	<0.002	<0.002
		2/19/98	9:36	<.1	--	--	--	--	--	--	--
Soldier Creek Basin											
SC03	Soldier Creek near Saint Clere	6/25/97	15:21	.7	--	--	--	--	--	--	--
		8/13/97	12:26	.2	--	--	--	--	--	--	--
		11/12/97	13:50	<.1	.04	<.002	<.02	<.002	--	<.002	<.002
		11/12/97	13:51	.1	--	--	--	--	--	--	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:21	4	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	.6	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	<.1	--	--	--	--	--	--	--
		11/13/96	12:26	<.1	--	--	--	--	--	--	--
		2/19/97	11:05	<.1	--	--	--	--	--	--	--
		6/25/97	10:50	1	.594	<.002	.027	<.002	--	<.002	<.002
		7/2/97	12:01	.5	--	--	--	--	--	--	--
		8/13/97	10:20	.2	--	--	--	--	--	--	--
		2/19/98	14:46	<.1	--	--	--	--	--	--	--
		8/11/98	15:56	.1	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
							Regular samples						
Bills Creek Basin													
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	--	--	--	--	--	--	--	--	--	--
		6/26/97	13:00	--	--	--	--	--	--	--	--	--	--
Little Soldier Creek Basin													
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	--	--	--	<0.05	--	--	<0.05	<0.05	--	--
		6/25/97	16:30	--	--	--	--	--	--	--	--	--	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:55	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	--	--	--	--	--	--	--	--	--	--
		6/26/97	15:30	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:20	<0.003	<0.003	<0.004	<.004	<0.002	<0.006	E.0101	--	<0.002	<0.001
		6/2/98	10:05	<.003	<.003	<.004	<.004	<.002	<.006	E.0214	--	<.002	<.001
		8/11/98	10:25	<.003	<.003	<.004	<.004	<.002	<.006	E.0176	--	<.002	<.001
		11/24/98	11:20	--	--	--	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	--	--	--	<.05	--	--	.1	<.05	--	--
		11/13/96	10:40	--	--	--	--	--	--	--	--	--	--
		2/19/97	14:00	--	--	--	--	--	--	--	--	--	--
		5/8/97	15:20	<.003	<.003	<.004	.008	<.002	<.006	E.0172	--	<.002	<.001
		6/26/97	12:55	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:35	<.003	<.003	<.004	<.004	<.002	<.006	E.0042	--	<.002	<.001
		2/19/98	10:55	<.003	<.003	<.004	<.004	<.002	<.006	E.0104	--	<.002	<.001

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Regular samples—Continued							
Little Soldier Creek Basin—Continued													
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/2/98	9:55	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:20	--	--	--	--	--	--	--	--	--	--
		11/24/98	12:10	--	--	--	--	--	--	--	--	--	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:30	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	--	--	--	--	--	--	--	--	--	--
		11/13/96	9:45	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	E0.0086	--	<0.002	<0.001
		2/19/97	15:10	<.003	<.003	<.004	<.004	<.002	<.006	E.0073	--	<.002	<.001
		5/8/97	11:10	<.003	<.003	<.004	.008	<.002	<.006	E.0096	--	<.002	<.001
		6/26/97	12:05	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:15	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:50	<.003	<.003	<.004	<.004	<.002	<.006	E.0023	--	<.002	<.001
		2/19/98	9:35	--	--	--	--	--	--	--	--	--	--
		6/2/98	9:05	--	--	--	--	--	--	--	--	--	--
		8/11/98	11:45	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:00	--	--	--	--	--	--	--	--	--	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:40	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Regular samples—Continued							
Little Soldier Creek Basin—Continued													
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	E0.028	--	<0.002	<0.001
		6/26/97	9:20	<.003	<.003	<.004	<.004	<.002	<.006	E.0112	--	<.002	<.001
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	<.003	<.003	<.004	<.004	<.002	<.006	E.055	--	<.002	<.001
		6/26/97	9:50	<.003	E .0038	<.004	.0057	<.002	<.006	E.0591	--	<.002	<.001
Soldier Creek Basin													
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	<.003	<.003	<.004	.006	<.002	<.006	E.29	--	<.002	.005
		6/25/97	16:45	<.003	E .0045	<.004	.006	<.002	<.006	E.0381	--	<.002	<.001
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	--	--	--	--	--	--	--	--	--	--
		6/25/97	15:15	--	--	--	--	--	--	--	--	--	--
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	--	--	--	--	--	--	--	--	--	--
		11/13/96	13:25	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:20	--	--	--	--	--	--	--	--	--	--
		5/8/97	11:30	<.003	<.003	<.004	.006	<.002	<.006	E.0253	--	<.002	<.001
		6/25/97	15:20	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:25	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:35	<.003	<.003	<.004	<.004	<.002	<.006	E.0055	--	<.002	<.001
		2/19/98	12:45	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Regular samples—Continued							
Soldier Creek Basin—Continued													
SC03	Soldier Creek near Saint Clere	6/2/98	12:35	--	--	--	--	--	--	--	--	--	--
		8/11/98	14:00	--	--	--	--	--	--	--	--	--	--
		11/24/98	13:55	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	E0.0128	--	<0.002	<0.001
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	--	--	--	--	--	--	--	--	--	--
		6/25/97	11:30	--	--	--	--	--	--	--	--	--	--
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:40	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:25	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	<.003	<.003	<.004	.006	<.002	<.006	E.27	--	<.002	E.004
		11/13/96	12:20	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:00	--	--	--	--	--	--	--	--	--	--
		5/8/97	14:20	<.003	<.003	<.004	.0082	<.002	<.006	E.0222	--	<.002	<.001
		6/25/97	10:45	--	--	--	--	--	--	--	--	--	--
		7/2/97	12:00	<.003	<.003	<.004	.0051	<.002	<.006	E.0281	--	<.002	<.001
		8/13/97	10:15	<.003	<.003	<.004	<.004	<.002	<.006	E.0257	--	<.002	<.001
		11/12/97	11:25	<.003	<.003	<.004	<.004	<.002	<.006	E.0169	--	<.002	<.001
		2/19/98	14:45	--	--	--	--	--	--	--	--	--	--
		6/2/98	14:30	<.003	<.003	<.004	<.004	<.002	<.006	E.0328	--	<.002	<.001

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Regular samples—Continued							
Soldier Creek Basin—Continued													
SC07	Soldier Creek, I Road near Delia	8/11/98	15:55	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	E0.0317	--	<0.002	<0.001
		11/24/98	15:45	--	--	--	--	--	--	--	--	--	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:25	--	--	--	--	--	--	--	--	--	--
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	<.003	<.003	<.004	<.004	<.002	<.006	E.041	--	<.002	<.001
		6/25/97	12:20	--	--	--	--	--	--	--	--	--	--
		7/2/97	11:15	<.003	<.003	<.004	E .0038	<.002	<.006	E.0113	--	<.002	<.001
South Cedar Creek Basin													
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:10	--	--	--	--	--	--	--	--	--	--
						Blank samples							
Little Soldier Creek Basin													
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	--	--	--	--	--	--	--	--	--	--
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:45	--	--	--	--	--	--	--	--	--	--
		6/26/97	9:50	<.003	<.003	<.004	<.004	<.002	<.006	<.002	--	<.002	<.001

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Blank samples—Continued							
Soldier Creek Basin													
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	--	--	--	--	--	--	--	--	--	--
		11/13/96	11:20	--	--	--	--	--	--	--	--	--	--
		2/19/97	13:15	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:55	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:00	--	--	--	--	--	--	--	--	--	--
		11/12/97	11:00	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	--	<0.002	<0.001
		6/2/98	10:30	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:05	--	--	--	--	--	--	--	--	--	--
						Duplicate samples							
Little Soldier Creek Basin													
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:00	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:25	<.003	<.003	<.004	<.004	<.002	<.006	E.0112	--	<.002	<.001
		6/2/98	10:10	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	11/24/98	11:25	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	Carbaryl-filtered (µg/L)	Carbofuran, filtered (µg/L)	Chlorpyrifos, dissolved (µg/L)	Cyanazine, dissolved (µg/L)	DCPA, filtered (µg/L)	p,p' DDE dissolved (µg/L)	Deethylatrazine (µg/L)	Deisopropylatrazine (µg/L)	Diazinon, dissolved (µg/L)	Dieldrin, dissolved (µg/L)
						Duplicate samples—Continued							
Little Soldier Creek Basin—Continued													
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:51	--	--	--	<0.05	--	--	0.09	<0.05	--	--
		2/19/97	14:01	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:56	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	<0.003	<0.003	<0.004	.0069	<0.002	<0.006	E.0102	--	<0.002	<0.001
		2/19/98	9:36	--	--	--	--	--	--	--	--	--	--
Soldier Creek Basin													
SC03	Soldier Creek near Saint Clere	6/25/97	15:21	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:26	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:50	<.003	<.003	<.004	<.004	<.002	E .0014	E.0052	--	<.002	<.001
		11/12/97	13:51	--	--	--	--	--	--	--	--	--	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:21	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	--	--	--	--	--	--	--	--	--	--
		11/13/96	12:26	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:05	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:50	<.003	E .0035	<.004	<.004	E.0008	<.006	E.0518	--	<.002	<.001
		7/2/97	12:01	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:20	--	--	--	--	--	--	--	--	--	--
		2/19/98	14:15	--	--	--	--	--	--	--	--	--	--
		8/11/98	15:56	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Regular samples							
Bills Creek Basin														
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	13:00	--	--	--	--	--	--	--	--	--	--	--
Little Soldier Creek Basin														
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	16:30	--	--	--	--	--	--	--	--	--	--	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:55	--	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	15:30	--	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:20	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
		6/2/98	10:05	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		8/11/98	10:25	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		11/24/98	11:20	--	--	--	--	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	10:40	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	14:00	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	15:20	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/26/97	12:55	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:35	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		2/19/98	10:55	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Regular samples—Continued							
Little Soldier Creek Basin—Continued														
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/2/98	9:55	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:20	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	12:10	--	--	--	--	--	--	--	--	--	--	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:30	--	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	9:45	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
		2/19/97	15:10	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		5/8/97	11:10	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/26/97	12:05	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:15	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:50	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		2/19/98	9:35	--	--	--	--	--	--	--	--	--	--	--
		6/2/98	9:05	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	11:45	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:00	--	--	--	--	--	--	--	--	--	--	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:40	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Regular samples—Continued							
Little Soldier Creek Basin—Continued														
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
		6/26/97	9:20	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/26/97	9:50	E.0009	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.002
Soldier Creek Basin														
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/25/97	16:45	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	15:15	--	--	--	--	--	--	--	--	--	--	--
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	13:25	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:20	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	11:30	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/25/97	15:20	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:25	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:35	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		2/19/98	12:45	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Regular samples—Continued							
Soldier Creek Basin—Continued														
SC03	Soldier Creek near Saint Clere	6/2/98	12:35	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	14:00	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	13:55	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	11:30	--	--	--	--	--	--	--	--	--	--	--
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:40	--	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:25	--	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		11/13/96	12:20	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:00	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	14:20	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/25/97	10:45	--	--	--	--	--	--	--	--	--	--	--
		7/2/97	12:00	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		8/13/97	10:15	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		11/12/97	11:25	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		2/19/98	14:45	--	--	--	--	--	--	--	--	--	--	--
		6/2/98	14:30	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Regular samples—Continued							
Soldier Creek Basin—Continued														
SC07	Soldier Creek, I Road near Delia	8/11/98	15:55	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
		11/24/98	15:45	--	--	--	--	--	--	--	--	--	--	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:25	--	--	--	--	--	--	--	--	--	--	--
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/25/97	12:20	--	--	--	--	--	--	--	--	--	--	--
		7/2/97	11:15	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
South Cedar Creek Basin														
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:10	--	--	--	--	--	--	--	--	--	--	--
							Blank samples							
Little Soldier Creek Basin														
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	--	--	--	--	--	--	--	--	--	--	--
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:45	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	9:50	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Blank samples—Continued							
Soldier Creek Basin														
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	11:20	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	13:15	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:55	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:00	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	11:00	<0.003	<0.017	<0.002	<0.004	<0.004	<0.002	<0.006	<0.002	<0.005	<0.001	<0.006
		6/2/98	10:30	--	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:05	--	--	--	--	--	--	--	--	--	--	--
							Duplicate samples							
Little Soldier Creek Basin														
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:00	--	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:25	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		6/2/98	10:10	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	11/24/98	11:25	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/year)	Time of sample collection (24-hour)	2,6-Diethylaniline (µg/L)	Disulfoton (µg/L)	EPTC, filtered (µg/L)	Ethalfluralin, filtered (µg/L)	Ethoprop, filtered (µg/L)	Fonofos, dissolved (µg/L)	Lindane, dissolved (µg/L)	Linuron, filtered (µg/L)	Malathion, dissolved (µg/L)	Methyl azinphos (µg/L)	Methyl parathion (µg/L)
							Duplicate samples—Continued							
Little Soldier Creek Basin—Continued														
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:51	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	14:01	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:56	--	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.004	<0.002	<0.005	<0.001	<0.006
		2/19/98	9:36	--	--	--	--	--	--	--	--	--	--	--
Soldier Creek Basin														
SC03	Soldier Creek near Saint Clere	6/25/97	15:21	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:26	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:50	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		11/12/97	13:51	--	--	--	--	--	--	--	--	--	--	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:21	--	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	--	--	--	--	<.05	--	--	.43	.17	--	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	12:26	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:05	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:50	<.003	<.017	<.002	<.004	<.003	<.003	<.004	<.002	<.005	<.001	<.006
		7/2/97	12:01	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:20	--	--	--	--	--	--	--	--	--	--	--
		2/19/98	14:15	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	15:56	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
						Regular samples							
Bills Creek Basin													
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	--	--	--	--	--	--	--	--	--	--
		6/26/97	13:00	--	--	--	--	--	--	--	--	--	--
Little Soldier Creek Basin													
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	<0.05	<0.05	--	--	--	--	--	--	--	<0.05
		6/25/97	16:30	--	--	--	--	--	--	--	--	--	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:55	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	--	--	--	--	--	--	--	--	--	--
		6/26/97	15:30	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:20	E.004	<.004	<0.004	<0.003	<0.004	<0.004	<0.004	<0.005	<0.002	<.018
		6/2/98	10:05	.012	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		8/11/98	10:25	.012	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		11/24/98	11:20	--	--	--	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	.19	<.05	--	--	--	--	--	--	--	<.05
		11/13/96	10:40	--	--	--	--	--	--	--	--	--	--
		2/19/97	14:00	--	--	--	--	--	--	--	--	--	--
		5/8/97	15:20	.019	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/26/97	12:55	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:35	.019	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		2/19/98	10:55	.005	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/2/98	9:55	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
							Regular samples—Continued						
Little Soldier Creek Basin—Continued													
LSC04	Little Soldier Creek, 134 Road near Mayetta	8/11/98	10:20	--	--	--	--	--	--	--	--	--	--
		11/24/98	12:10	--	--	--	--	--	--	--	--	--	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:30	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	--	--	--	--	--	--	--	--	--	--
		11/13/96	9:45	E0.002	<0.004	<0.004	<0.003	<0.004	<0.004	<0.004	<0.005	<0.002	<0.018
		2/19/97	15:10	.007	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		5/8/97	11:10	.014	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/26/97	12:05	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:15	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:50	<.002	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	E .0038
		2/19/98	9:35	--	--	--	--	--	--	--	--	--	--
		6/2/98	9:05	--	--	--	--	--	--	--	--	--	--
		8/11/98	11:45	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:00	--	--	--	--	--	--	--	--	--	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:40	--	--	--	--	--	--	--	--	--	--
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	.096	.005	<.004	<.003	<.004	<.004	<.004	<.005	<.002	.037
		6/26/97	9:20	.009	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	E.0024
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	.26	.016	<.004	<.003	<.004	<.004	<.004	<.005	<.002	E.012
		6/26/97	9:50	.148	.015	<.004	<.003	<.004	<.004	<.004	<.005	<.002	E.0029

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
						Regular samples—Continued							
Soldier Creek Basin													
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	1.4	0.005	0.001	<0.003	<0.004	<0.004	0.007	<0.005	<0.002	<0.018
		6/25/97	16:45	.24	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	--	--	--	--	--	--	--	--	--	--
		6/25/97	15:15	--	--	--	--	--	--	--	--	--	--
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	--	--	--	--	--	--	--	--	--	--
		11/13/96	13:25	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:20	--	--	--	--	--	--	--	--	--	--
		5/8/97	11:30	.112	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/25/97	15:20	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:25	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:35	.063	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		2/19/98	12:45	--	--	--	--	--	--	--	--	--	--
		6/2/98	12:35	--	--	--	--	--	--	--	--	--	--
		8/11/98	14:00	--	--	--	--	--	--	--	--	--	--
		11/24/98	13:55	.007	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	--	--	--	--	--	--	--	--	--	--
		6/25/97	11:30	--	--	--	--	--	--	--	--	--	--
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:40	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
						Regular samples—Continued							
Soldier Creek Basin—Continued													
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:25	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	0.59	E0.003	<0.004	<0.003	<0.004	<0.004	0.006	<0.005	<0.002	<0.018
		11/13/96	12:20	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:00	--	--	--	--	--	--	--	--	--	--
		5/8/97	14:20	.101	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/25/97	10:45	--	--	--	--	--	--	--	--	--	--
		7/2/97	12:00	.126	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		8/13/97	10:15	.028	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		11/12/97	11:25	.099	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		2/19/98	14:45	--	--	--	--	--	--	--	--	--	--
		6/2/98	14:30	.067	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		8/11/98	15:55	.041	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		11/24/98	15:45	--	--	--	--	--	--	--	--	--	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:25	--	--	--	--	--	--	--	--	--	--
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	.37	.019	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/25/97	12:20	--	--	--	--	--	--	--	--	--	--
		7/2/97	11:15	.043	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
South Cedar Creek Basin													
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:10	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
							Blank samples						
Little Soldier Creek Basin													
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	--	--	--	--	--	--	--	--	--	--
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:45	--	--	--	--	--	--	--	--	--	--
		6/26/97	9:50	<0.002	<0.004	<0.004	<0.003	<0.004	<0.004	<0.004	<0.005	<0.002	<0.018
Soldier Creek Basin													
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	--	--	--	--	--	--	--	--	--	--
		11/13/96	11:20	--	--	--	--	--	--	--	--	--	--
		2/19/97	13:15	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:55	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:00	--	--	--	--	--	--	--	--	--	--
		11/12/97	11:00	<.002	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/2/98	10:30	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:05	--	--	--	--	--	--	--	--	--	--
							Duplicate samples						
Little Soldier Creek Basin													
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:00	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	E.003	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		6/2/98	10:10	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:25	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Station name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Metolachlor, dissolved (µg/L)	Metribuzin, dissolved (µg/L)	Molinate, filtered (µg/L)	Napropamide, filtered (µg/L)	Parathion, dissolved (µg/L)	Pebulate, filtered (µg/L)	Pendimethalin, filtered (µg/L)	Permethrin, filtered (µg/L)	Phorate, filtered (µg/L)	Prometon, dissolved (µg/L)
							Duplicate samples—Continued						
Little Soldier Creek Basin—Continued													
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:51	0.17	<0.05	--	--	--	--	--	--	--	<0.05
		2/19/97	14:01	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:56	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	.018	<.004	<0.004	<0.003	<0.004	<0.004	<0.004	<0.005	<0.002	<.018
		2/19/98	9:36	--	--	--	--	--	--	--	--	--	--
Soldier Creek Basin													
SC03	Soldier Creek near Saint Clere	6/25/97	15:21	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:26	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:50	.064	<.004	<.004	<.003	<.004	<.004	<.004	<.005	<.002	<.018
		11/12/97	13:51	--	--	--	--	--	--	--	--	--	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:21	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	--	--	--	--	--	--	--	--	--	--
		11/13/96	12:26	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:05	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:50	.183	<.004	<.004	<.003	<.004	<.004	E .0038	<.005	<.002	<.018
		7/2/97	12:01	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:20	--	--	--	--	--	--	--	--	--	--
		2/19/98	14:46	--	--	--	--	--	--	--	--	--	--
		8/11/98	15:56	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/ day/ year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Trialate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Regular samples									
Bills Creek Basin																	
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	13:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	<0.05	--	--	--	--	<0.05	<0.05	--	--	--	<0.05	--	--	--
		6/25/97	16:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:55	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	15:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/98	10:20	--	<0.003	<0.007	<0.004	<0.013	--	<.005	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		6/2/98	10:05	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		8/11/98	10:25	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		11/24/98	11:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	<.05	--	--	--	--	<.05	<.05	--	--	--	<.05	--	--	--
		11/13/96	10:40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	14:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	15:20	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	E.0031
		6/26/97	12:55	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:35	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		2/19/98	10:55	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		6/2/98	9:55	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Triallate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Regular samples—Continued									
Little Soldier Creek Basin—Continued																	
LSC04	Little Soldier Creek, 134 Road near Mayetta	8/11/98	10:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	12:10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	9:45	--	<0.003	<0.007	<0.004	<0.013	--	<0.005	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		2/19/97	15:10	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		5/8/97	11:10	--	<.003	<.007	<.004	<.013	--	<.005	E.0037	<.007	<.013	--	<.002	<.001	E.0033
		6/26/97	12:05	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	9:50	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		2/19/98	9:35	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/2/98	9:05	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	11:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	11:40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	--	<.003	<.007	<.004	<.013	--	E.003	<.01	<.007	<.013	--	<.002	<.001	<.002
		6/26/97	9:20	--	<.003	<.007	<.004	<.013	--	E.0036	<.01	<.007	<.013	--	<.002	<.001	E.0023

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Triallate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Regular samples—Continued									
Little Soldier Creek Basin—Continued																	
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	--	<0.003	<0.007	<0.004	<0.013	--	E0.004	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		6/26/97	9:50	--	<.003	<.007	<.004	<.013	--	.0069	<.01	<.007	<.013	--	<.002	<.001	E.0022
Soldier Creek Basin																	
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	--	<.003	E.006	<.004	<.013	--	.027	E.029	<.007	<.013	--	<.002	<.001	<.002
		6/25/97	16:45	--	<.003	<.007	<.004	<.013	--	.0074	<.01	<.007	<.013	--	<.002	<.001	<.002
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	15:15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	13:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	11:30	--	<.003	<.007	<.004	<.013	--	<.005	E.0069	<.007	<.013	--	<.002	<.001	<.002
		6/25/97	15:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:35	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		2/19/98	12:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/2/98	12:35	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	14:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	13:55	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Triallate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Regular samples—Continued									
Soldier Creek Basin—Continued																	
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	11:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	--	<0.003	<0.004	<0.004	<0.013	--	0.022	E0.071	<0.007	<0.013	--	<0.002	<0.001	<0.002
		11/13/96	12:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		5/8/97	14:20	--	<.003	<.007	<.004	<.013	--	<.005	E.0063	<.007	<.013	--	<.002	<.001	<.002
		6/25/97	10:45	--					--					--			
		7/2/97	12:00	--	<.003	<.007	<.004	<.013	--	.0053	<.01	<.007	<.013	--	<.002	<.001	<.002
		8/13/97	10:15	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		11/12/97	11:25	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		2/19/98	14:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/2/98	14:30	--	<.003	<.007	<.004	<.013	--	.028	<.01	<.007	<.013	--	<.002	<.001	<.002
		8/11/98	15:55	--	<.003	<.007	<.004	<.013	--	E.0044	<.01	<.007	<.013	--	<.002	<.001	<.002
		11/24/98	15:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Triallate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Regular samples—Continued									
Soldier Creek Basin—Continued																	
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	--	<0.003	0.009	<0.004	<0.013	--	E 0.002	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		6/25/97	12:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		7/2/97	11:15	--	<.003	<.007	<.004	<.013	--	E .0025	<.01	<.007	<.013	--	<.002	<.001	<.002
South Cedar Creek Basin																	
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	14:10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
								Blank samples									
Little Soldier Creek Basin																	
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	9:50	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
Soldier Creek Basin																	
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	11:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	13:15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	13:55	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	11:00	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		6/2/98	10:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:05	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Triallate, filtered (µg/L)	Trifluralin, filtered (µg/L)
								Duplicate samples									
Little Soldier Creek Basin																	
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	--	<0.003	<0.007	<0.004	<0.013	--	<0.005	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		6/2/98	10:10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	10:30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/24/98	11:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:51	<0.05	--	--	--	--	<0.05	<0.05	--	--	--	<0.05	--	--	--
		2/19/97	14:01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/26/97	12:56	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	--	<.003	<.007	<.004	<.013	--	<.005	E.0038	<.007	<.013	--	<.002	<.001	E .0033
		2/19/98	9:36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Soldier Creek Basin																	
SC03	Soldier Creek near Saint Clere	6/25/97	15:21	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	12:26	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/12/97	13:50	--	<.003	<.007	<.004	<.013	--	<.005	<.01	<.007	<.013	--	<.002	<.001	<.002
		11/12/97	13:51	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:21	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 5. Pesticide and metabolite concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Prometryn, dissolved (µg/L)	Pronamide, filtered (µg/L)	Propachlor, dissolved (µg/L)	Propanil, filtered (µg/L)	Propargite, filtered (µg/L)	Propazine, dissolved (µg/L)	Simazine, dissolved (µg/L)	Tebuthiuron, filtered (µg/L)	Terbacil, filtered (µg/L)	Terbufos, filtered (µg/L)	Terbutryn, dissolved (µg/L)	Thiobencarb, filtered (µg/L)	Trialate, filtered (µg/L)	Triflularin, filtered (µg/L)
								Duplicate samples—Continued									
Soldier Creek Basin—Continued																	
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		11/13/96	12:26	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/97	11:05	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		6/25/97	10:50	--	<0.003	<0.007	<0.004	<0.013	--	E0.0042	<0.01	<0.007	<0.013	--	<0.002	<0.001	<0.002
		7/2/97	12:01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/13/97	10:20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2/19/98	14:46	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		8/11/98	15:56	--	--	--	--	--	--	--	--	--	--	--	--	--	--

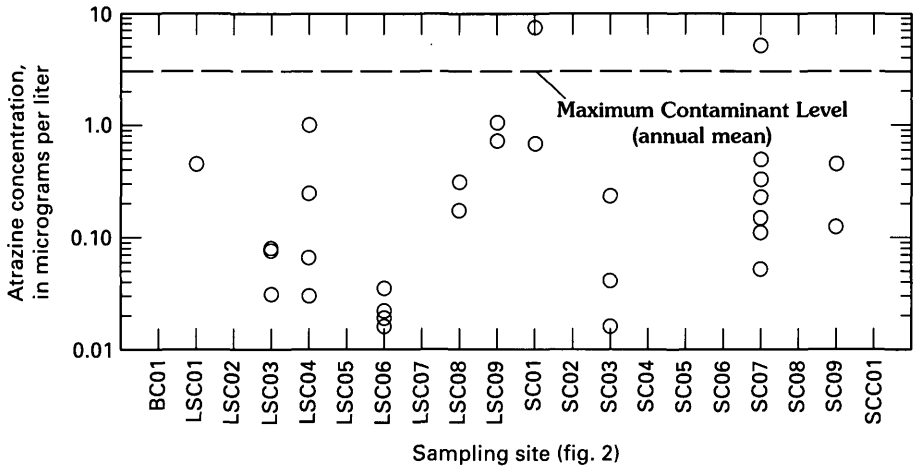

Figure 12. Distribution of atrazine concentrations determined by gas chromatography/mass spectrometry in surface-water samples, June 1996 through November 1998. Maximum Contaminant Level for atrazine from Kansas Department of Health and Environment (1994) and U.S. Environmental Protection Agency (1994).

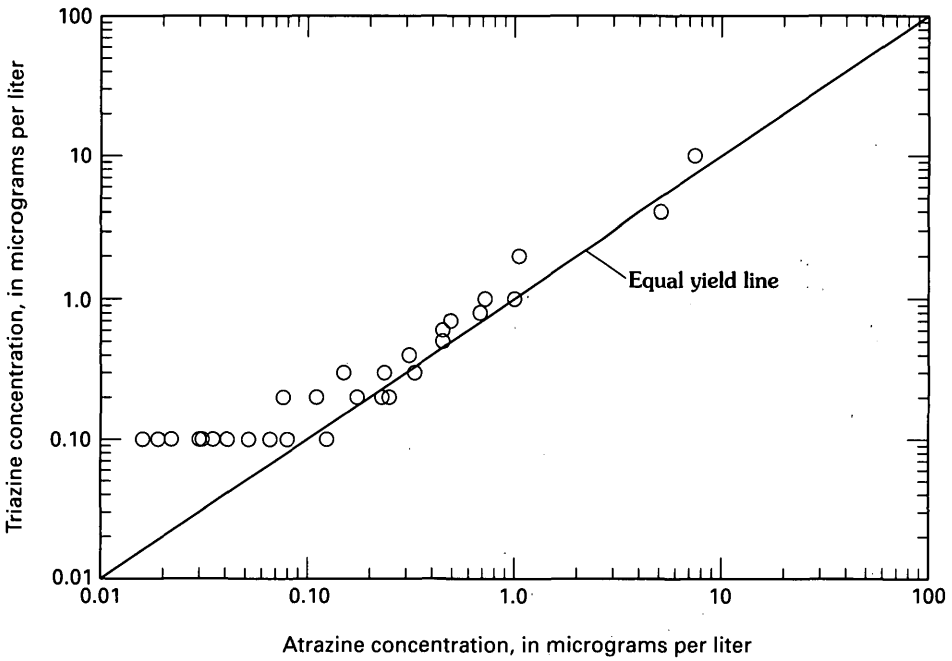

Figure 13. Triazine herbicide concentrations compared to atrazine concentrations in surface-water samples, June 1996 through November 1998.

concentration of 2.60 µg/L, which exceeds the 2.0-µg/L MCL (U.S. Environmental Protection Agency, 1994). Thirty samples were analyzed for metolachlor using the GC/MS method, two samples contained concentrations less than minimum reporting levels of 0.002 and 0.050 µg/L. The median concentration was 0.046 µg/L, and the maximum was 1.40 µg/L. No detections of insecticides were observed in any of the samples.

Bacteria

Fecal coliform and fecal streptococcus bacteria are indigenous to the intestinal tract of warmblooded animals. The presence of high concentrations of these organisms in surface water indicates fecal contamination and also may indicate the presence of pathogenic organisms. Potential sources of these bacteria on the reservation include leachate from domestic septic systems and sewage lagoons, runoff and seepage from livestock areas, such as pastures and confined feedlots, and from wildlife populations.

The U.S. Environmental Protection Agency (1986) established a single-sample maximum allowable density of 576 col/100 mL (colonies per 100 milliliters) for Escherichia coli (E. coli), a member of the fecal coliform group of bacteria, for infrequently used full-contact recreation. Because of public-health concerns associated with fecal contamination, the Kansas Department of Health and Environment (1994) established a criterion for fecal coliform of 2,000 col/100 mL for those streams used for noncontact recreation. Noncontact recreation, during which ingestion of surface water is unlikely, includes, but is not limited to, wading, boating, fishing, trapping, and hunting.

Fecal coliform concentrations in 79 surface-water samples (table 6, fig. 14*A*) ranged from a nonideal count of 7 to 7,700 col/100 mL, with a median concentration of 290 col/100 mL. Quarterly sampled sites included samples collected during periods of lower flows with little or no runoff. Consequently, the

Table 6. Bacteria, suspended-solid, and oil-and-grease concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998

[col/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; >, greater than indicated value; <, less than indicated value; K, nonideal count; --, not determined]

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Bacteria		Suspended solids, residue (mg/L)	Oil and grease (mg/L)
				Fecal coliform (col/100 mL)	Fecal streptococcus (col/100 mL)		
			Regular samples				
Bills Creek Basin							
BC01	Bills Creek, U.S. Highway 75 near Holton	6/27/96	13:45	>2,000	240	58	--
		6/26/97	13:00	3,300	940	34	--
Little Soldier Creek Basin							
LSC01	Little Soldier Creek, 190 Road near Mayetta	6/27/96	11:40	370	33	12	--
		6/25/97	16:30	K 73	88	11	--
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:30	470	740	7	--
		6/26/97	11:55	470	660	15	--
LSC03	Little Soldier Creek, O Road near Mayetta	6/27/96	14:35	470	410	15	--
		6/26/97	15:30	560	560	6	--
		2/19/98	10:20	330	250	5	--
		6/2/98	10:05	K 270	K 380	25	--
		8/11/98	10:25	K 4,100	8,500	23	--
		11/24/98	11:20	96	260	5	--
LSC04	Little Soldier Creek, 134 Road near Mayetta	6/27/96	12:50	730	K 410	7	--
		11/13/96	10:40	32	210	--	--
		2/19/97	14:00	K 7	58	4	--
		5/8/97	15:20	77	96	<1	--
		6/26/97	12:55	270	840	7	--
		11/12/97	9:35	730	580	2	--
		2/19/98	10:55	140	180	7	--
		6/2/98	9:55	210	400	12	--
		8/11/98	10:20	2,700	4,400	12	--
		11/24/98	12:10	62	330	5	--
LSC05	Little Soldier Creek tributary, 134 Road near Hoyt	6/27/96	13:10	>2,000	340	5	--
		6/26/97	14:30	290	960	9	--

Table 6. Bacteria, suspended-solid, and oil-and-grease concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Bacteria: Fecal coliform (col/100 mL)	Bacteria: Fecal streptococcus (col/100 mL)	Suspended solids, residue (mg/L)	Oil and grease (mg/L)
			Regular samples—Continued				
Little Soldier Creek Basin—Continued							
LSC06	Big Elm Creek, 134 Road near Hoyt	6/27/96	11:50	870	920	1	--
		11/13/96	9:45	120	660	--	--
		2/19/97	15:10	26	250	32	--
		5/8/97	11:10	210	360	<1	--
		6/26/97	12:05	7,700	1,400	20	--
		8/13/97	10:15	540	1,600	5	--
		11/12/97	9:50	31	260	2	--
		2/19/98	9:35	88	160	9	--
		6/2/98	9:05	1,200	1,600	3	--
		8/11/98	11:45	1,600	2,000	7	--
		11/24/98	11:00	260	170	2	--
LSC07	Little Elm Creek, Q Road near Hoyt	6/27/96	9:20	K 680	120	18	--
		6/26/97	11:40	290	410	29	--
LSC08	Big Elm Creek, P Road near Hoyt	6/27/96	10:50	420	1,100	3	--
		6/26/97	9:20	730	1,200	<1	--
LSC09	Little Soldier Creek, 126 Road near Hoyt	6/27/96	10:20	590	960	24	--
		6/26/97	9:50	670	1,100	45	--
Soldier Creek Basin							
SC01	Soldier Creek, 214 Road near Circleville	6/26/96	11:15	870	260	28	--
		6/25/97	16:45	430	300	29	<1
SC02	Soldier Creek tributary, G Road near Circleville	6/26/96	13:30	700	560	2	--
		6/25/97	15:15	100	720	6	--
SC03	Soldier Creek near Saint Clere	6/26/96	14:30	180	34	16	--
		11/13/96	13:25	72	700	--	--
		2/19/97	11:20	37	88	22	--

Table 6. Bacteria, suspended-solid, and oil-and-grease concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Bacteria: Fecal coliform (col/100 mL)	Bacteria: Fecal streptococcus (col/100 mL)	Suspended solids, residue (mg/L)	Oil and grease (mg/L)
			Regular samples—Continued				
Soldier Creek Basin—Continued							
SC03	Soldier Creek near Saint Clere	5/8/97	11:30	35	50	14	--
		6/25/97	15:20	K 330	260	11	<1
		8/13/97	12:25	520	2,000	10	--
		11/12/97	13:35	20	92	4	--
		2/19/98	12:45	22	31	6	--
		6/2/98	12:35	200	160	64	--
		8/11/98	14:00	180	310	22	--
		11/24/98	13:55	K 41	390	33	--
SC04	Soldier Creek, 158 Road near Saint Clere	6/26/96	15:20	290	81	30	--
		6/25/97	11:30	430	380	66	<1
SC05	Crow Creek, 166 Road near Saint Clere	6/26/96	15:30	310	270	5	--
		6/25/97	13:40	310	310	18	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:35	170	430	4	--
		6/25/97	10:25	1,600	1,800	8	--
SC07	Soldier Creek, I Road near Delia	6/26/96	13:45	310	140	45	--
		11/13/96	12:20	130	4,600	--	--
		2/19/97	11:00	23	140	38	--
		5/8/97	14:20	25	30	13	--
		6/25/97	10:45	420	220	53	<1
		8/13/97	10:15	140	900	33	--
		11/12/97	11:25	37	140	8	--
		2/19/98	14:45	26	130	10	--
		6/2/98	14:30	67	61	35	--
		8/11/98	15:55	260	87	26	--
		11/24/98	15:45	100	290	78	--
SC08	James Creek, 142 Road near Delia	6/26/96	10:50	1,200	2,500	64	--
		6/25/97	13:25	1,500	2,700	18	--

Table 6. Bacteria, suspended-solid, and oil-and-grease concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Bacteria: Fecal coliform (col/100 mL)	Bacteria: Fecal streptococcus (col/100 mL)	Suspended solids, residue (mg/L)	Oil and grease (mg/L)
			Regular samples—Continued				
Soldier Creek Basin—Continued							
SC09	James Creek, 126 Road near Delia	6/26/96	12:00	400	2,800	3	--
		6/25/97	12:20	290	2,600	2	--
South Cedar Creek Basin							
SCC01	South Cedar Creek, U.S. Highway 75 near Mayetta	6/27/96	12:20	K 700	940	38	--
		6/26/97	14:10	1,500	3,800	3	--
			Blank samples				
Little Soldier Creek Basin							
LSC04	Little Soldier Creek, 134 Road near Mayetta	5/8/97	13:40	--	--	<1	--
LSC09	Little Soldier Creek 126 Road near Hoyt	6/27/96	10:45	--	--	1	--
		6/26/97	9:50	--	--	<1	--
Soldier Creek Basin							
SC03	Soldier Creek near Saint Clere	6/26/96	15:00	--	--	<1	--
		2/19/97	13:15	--	--	<1	--
		6/25/97	13:55	--	--	1	--
		8/13/97	10:00	--	--	<1	--
		11/12/97	11:00	--	--	<1	--
		6/2/98	10:30	--	--	2	--
SC07	Soldier Creek, I Road near Delia	2/19/98	12:10	--	--	<1	--
		8/11/98	10:30	--	--	<1	--
		11/24/98	11:05	--	--	<1	--
			Duplicate samples				
Little Soldier Creek Basin							
LSC02	Little Soldier Creek, 174 Road near Mayetta	6/27/96	9:35	770	900	17	--
		6/26/97	12:00	470	520	13	--
LSC03	Little Soldier Creek, O Road near Mayetta	2/19/98	10:25	270	94	5	--
		6/2/98	10:10	340	480	30	--
		8/11/98	10:30	K 4,100	4,200	18	--
		11/24/98	11:25	74	250	6	--

Table 6. Bacteria, suspended-solid, and oil-and-grease concentrations in surface-water-quality samples collected from Prairie Band of Potawatomi Reservation, June 1996 through November 1998—Continued

Site no. (fig. 2)	Site name	Date of sample collection (month/day/year)	Time of sample collection (24-hour)	Bacteria: Fecal coliform (col/100 mL)	Bacteria: Fecal streptococcus (col/100 mL)	Suspended solids, residue (mg/L)	Oil and grease (mg/L)
			Duplicate samples—Continued				
Little Soldier Creek Basin—Continued							
LSC06	Big Elm Creek, 134 Road near Hoyt	5/8/97	11:15	190	380	--	--
Soldier Creek Basin							
SC03	Soldier Creek near Saint Clere	11/12/97	13:50	--	--	4	--
SC06	South Branch Soldier Creek, H.5 Road near Saint Clere	6/26/96	14:40	220	560	4	--
SC07	Soldier Creek, I Road near Delia	11/13/96	12:25	130	3,600	--	--
		2/19/97	11:05	22	110	36	--
		6/25/97	10:50	330	160	53	<1
		8/13/97	10:20	97	840	29	--

median fecal coliform concentrations in samples from sites sampled quarterly (sampling sites LSC03, LSC04, LSC06, SC03, and SC07) were lower than in samples collected only during June 1996 and 1997. Six samples, two from Bills Creek (sampling site BC01) and one each from four Little Soldier Creek sites (sampling sites LSC03, LSC04, LSC05, and LSC06), exceeded the Kansas Department of Health and Environment (1994) criterion of 2,000 col/100 mL for noncontact recreation, indicating possible contamination from waste systems, agricultural sources, or wildlife populations. Fecal streptococcus concentrations (table 6, fig. 15) ranged from 30 to 8,500 col/100 mL, with a median concentration of 380 col/100 mL. The highest fecal coliform and fecal streptococcus concentrations generally occurred during the summer months throughout the reservation (table 6).

Suspended Solids

In a study of erosion and sediment yield, the U.S. Soil Conservation Service (1992) evaluated sources of suspended solids in the Delaware River Basin, which is adjacent to the reservation (fig. 1). At the time of the study, the Delaware River Basin was 57 percent cropland, 37 percent of which was unprotected (tilled with no cover vegetation). Sheet and rill erosion accounted for 42 percent of the total sediment yield on cultivated cropland, and gullying accounted for 47 percent of total sediment yield. Erosion of cultivated cropland accounted for 47 percent of total sediment yield in the Delaware River Basin (U.S. Soil Conservation Service, 1992).

Suspended-solid concentrations in surface-water-quality samples (table 6, fig. 16) ranged from less than the minimum reporting level of 1 to 78 mg/L, with a median concentration of 18.5 mg/L. A direct relationship between suspended-solid concentration and streamflow is not apparent. Suspended-solid concentrations were somewhat higher in samples from Soldier Creek (sampling sites SC03 and SC07) possibly because it drains more cropland than does Little Soldier Creek or tributary streams, and the streambanks along Soldier Creek may be more susceptible to

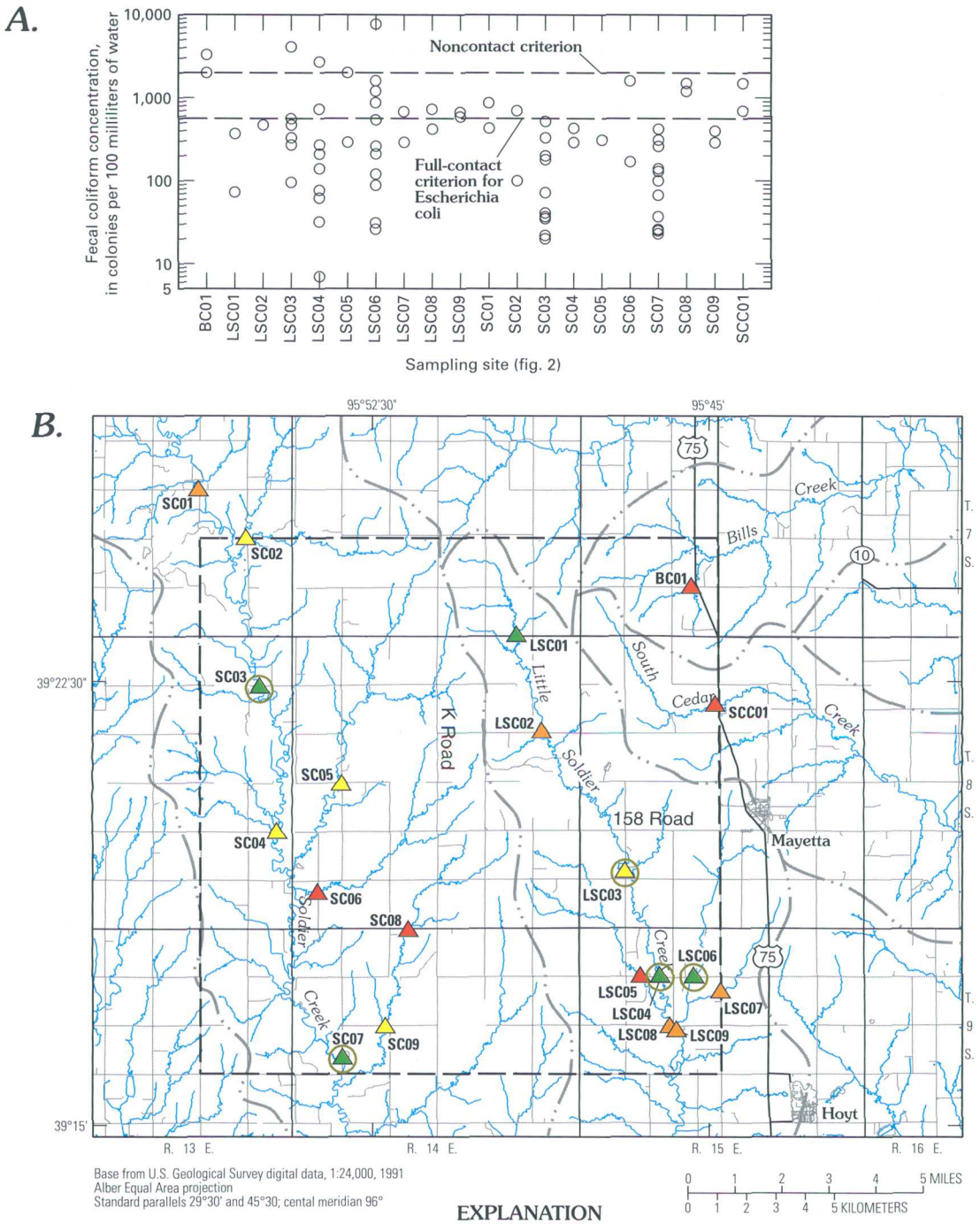

Figure 14. Distribution of fecal coliform bacteria concentrations in surface-water samples, June 1996 through November 1998. Full-contact criterion from U.S. Environmental Protection Agency (1994) and noncontact criterion from Kansas Department of Health and Environment (1994). Concentrations reported as greater than 2,000 colonies per 100 milliliters of water are plotted at 2,000 colonies per 100 mililiters of water.

erosion. Concentrations of suspended solids may come from agricultural runoff as well as streambank erosion, especially along Soldier Creek.

SUMMARY

Water-quality samples were collected from 20 surface-water sites across the Prairie Band of Potawatomi Reservation in northeastern Kansas. Samples were collected twice at all 20 sites during June 1996 and June 1997 after herbicide application in the spring to evaluate the overall surface-water quality on the reservation. Quarterly samples were collected at five sampling sites from June 1996 through November 1998 to evaluate annual fluctuations in water quality. Sampling sites were selected to represent areal distribution across the reservation, surface water flowing into and out of the reservation, and surface water downgradient from potential sources of contamination. Water-quality constituents of primary interest included physical properties, nitrogen and phosphorus nutrients, herbicides, fecal bacteria, and suspended solids. Quarterly samples were collected throughout most of the range of streamflow and were considered representative of flows that occur 65 percent of the time.

The median nitrite plus nitrate concentration was 0.183 mg/L (milligram per liter) for 79 samples, and the maximum concentration was 1.46 mg/L as nitrogen, which is substantially less than the U.S. Environmental Protection Agency's Maximum Contaminant Level for drinking water of 10 mg/L as nitrogen. Ammonia concentrations ranged from less than 0.015 to 0.106 mg/L, with a median concentration less than the minimum reporting level of 0.02 mg/L. The median concentration for total phosphorus was 0.048 mg/L for 79 samples, five of which, from four sites sampled quarterly, exceeded the U.S. Environmental Protection Agency's recommended criterion of 0.100 mg/L for aquatic life, and may reflect possible nonpoint-source contamination from agricultural activities or septic systems.

Of 82 samples analyzed for triazine herbicides, primarily atrazine, 29 contained triazine concentrations less than the minimum reporting level of 0.1 µg/L (microgram per liter). Triazine concentrations in four samples collected on June 26, 1996, exceeded 3.0 µg/L. Triazine herbicide concentrations in the quarterly samples tended to be highest during late spring runoff after herbicide application. The U.S. Environmental Protection Agency Maximum Contaminant Level of 3.0 µg/L refers to an annual

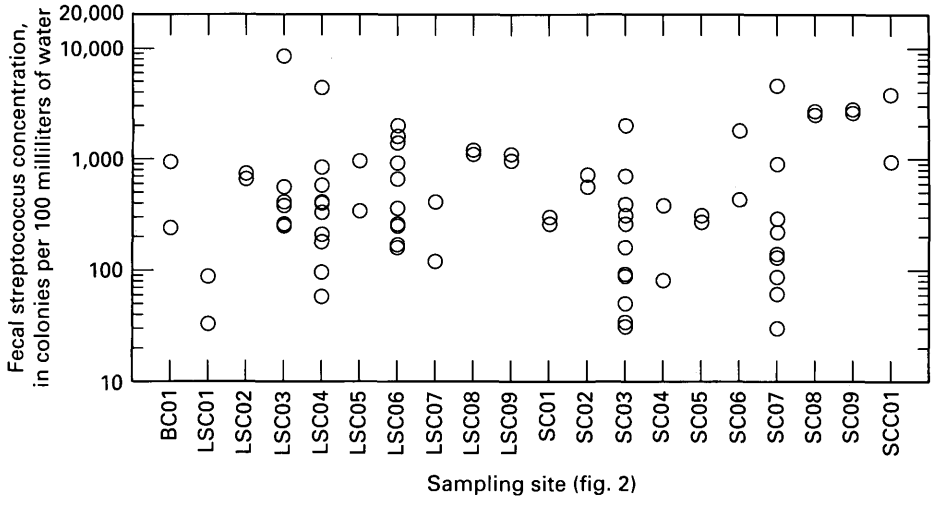

Figure 15. Distribution of fecal streptococcus bacteria concentrations in surface-water samples, June 1996 through November 1998.

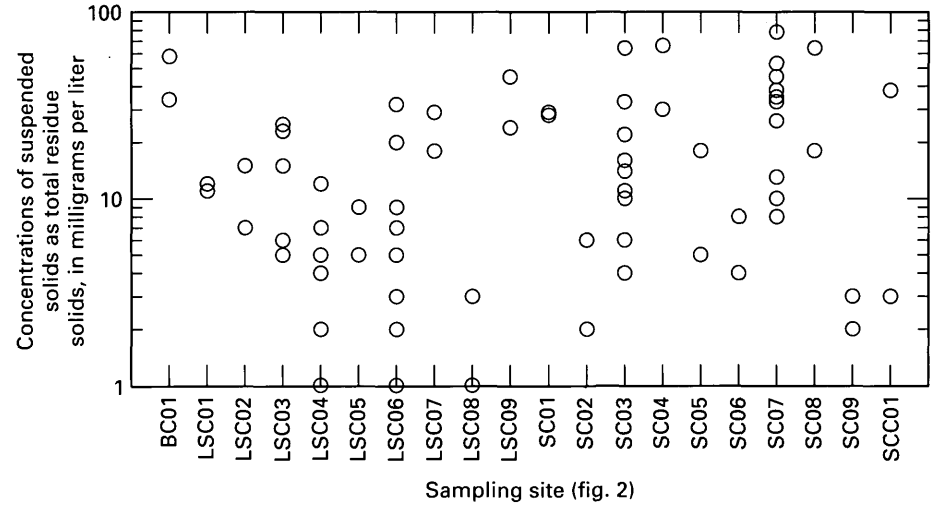

Figure 16. Distribution of suspended-solid concentrations in surface-water samples, June 1996 through November 1998.

mean concentration, not a one-time sample concentration; consequently, triazine herbicide concentrations detected in surface-water samples from the reservation during this study met the drinking-water criterion. However, triazine concentrations are likely to be highest during late spring.

Fecal coliform bacteria in 79 samples had a median concentration of 290 colonies per 100 milliliters of water. In six samples, two from Bills Creek and one each from four Little Soldier Creek sites, fecal coliform bacteria concentrations exceeded the Kansas Department of Health and Environment's criterion for noncontact recreation (2,000 colonies per 100 milliliters of water), indicating possible contamination from waste systems, agricultural sources, or wildlife populations.

Suspended-solid concentrations tended to be somewhat higher in samples from Soldier Creek than in samples from Little Soldier Creek and from tributary streams, possibly because Soldier Creek drains more cropland than does Little Soldier Creek, and the streambanks along Soldier Creek may be more susceptible to erosion. Concentrations of suspended solids may come from agricultural runoff as well as streambank erosion, especially along Soldier Creek.

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