



Water quality Data from two Agricultural Drainage Basins in Northwestern Indiana and Northeastern Illinois: III. Biweekly Data, 2000- 2002



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

Cover photograph: Top photo, Iroquois River at the State Highway 55 bridge near Foresman, Indiana, on May 22, 2002. Bottom photo, Sugar Creek at the State Highway 71 bridge near Raub, Indiana, on February 27, 2002.



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Water-quality Data from two Agricultural Drainage Basins in northwestern Indiana and northeastern Illinois: III. Biweekly Data, 2000- 2002

By Ronald C. Antweiler, Richard L. Smith, Mary A. Voytek, John-Karl Böhlke and David H. Dupré

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Conversion Factors

Multiply	By	To obtain
Length		
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Volume		
gallon (gal)	3.785	liter (L)
gallon (gal)	0.003785	cubic meter (m ³)
cubic foot (ft ³)	0.02832	cubic meter (m ³)
Flow rate		
acre-foot per day (acre-ft/d)	0.01427	cubic meter per second (m ³ /s)
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second (m ³ /s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F}=(1.8\times^{\circ}\text{C})+32$$

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$^{\circ}\text{C}=(^{\circ}\text{F}-32)/1.8$$

ABBREVIATED WATER-QUALITY UNITS

Chemical concentration and water temperature are given only in metric units. Chemical concentration in water is given in milligrams per liter (mg/L), micrograms per liter (µg/L), or nanograms per liter (ng/L). Milligrams per liter is a unit expressing the solute mass (milligrams) per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter. One thousand nanograms per liter is equivalent to 1 microgram per liter. For all concentrations in this report, concentrations in milligrams per liter are about the same as for concentrations in parts per million. Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

ABBREVIATED CHEMICAL NAMES

Throughout this report, chemical elements and compounds are abbreviated according to their chemical symbols. The table below describes these.

Symbol	Name	Symbol	Name	Symbol	Name
Al	Aluminum	Ho	Holmium	SO ₄	Sulfate
As	Arsenic	K	Potassium	Sb	Antimony
B	Boron	La	Lanthanum	Se	Selenium
Ba	Barium	Li	Lithium	Si	Silicon
Be	Beryllium	Lu	Lutetium	SiO ₂	Silica
Bi	Bismuth	Mg	Magnesium	Sm	Samarium
Br	Bromine	Mn	Manganese	Sr	Strontium
C	Carbon	Mo	Molybdenum	TDN	Total Dissolved Nitrogen
CH ₄	Methane	N	Nitrogen	Ta	Tantalum
Ca	Calcium	N ₂ O	Nitrous Oxide	Tb	Terbium
Cd	Cadmium	NH ₄	Ammonium	Te	Tellurium
Ce	Cerium	NO ₂	Nitrite	Th	Thorium
Cl	Chlorine	NO ₃	Nitrate	Ti	Titanium
Co	Cobalt	Na	Sodium	Tl	Thallium
Cr	Chromium	Nd	Neodymium	Tm	Thulium
Cs	Cesium	Ni	Nickel	U	Uranium
Cu	Copper	O	Oxygen	V	Vanadium
Dy	Dysprosium	P	Phosphorus	W	Tungsten
Er	Erbium	Pb	Lead	Y	Yttrium
Eu	Europium	Pr	Praseodymium	Yb	Ytterbium
Fe	Iron	Rb	Rubidium	Zn	Zinc
Gd	Gadolinium	Re	Rhenium	Zr	Zirconium
H	Hydrogen	S	Sulfur		

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Abstract

Methods of data collection and results of analyses are presented for biweekly water-quality data collected from two nearby agricultural drainage basins in northwestern Indiana and northeastern Illinois, the Iroquois River and Sugar Creek. Over the course of 28 months, from February 2000 to June 2002, 110 discrete samples were collected from a single sampling site on each drainage in northwestern Indiana. Data were collected for nutrients, including nitrate, nitrite, ammonium, total dissolved nitrogen and phosphorus; major inorganic constituents (excepting bicarbonate and carbonate); trace elements; suspended sediment; dissolved trace gases; and chlorophyll-*a* concentrations. In addition, field measurements of pH, specific conductance, air and water temperature, and dissolved oxygen concentrations were collected for all sampling events.

Introduction

Scientists first recorded hypoxic, or low-oxygen, zones on the continental shelf of the northern Gulf of Mexico in the 1970s (Turner and Allen, 1982), and began systematic assessments of these zones in 1985 (Rabalais and others, 1991). Studies have concluded that nutrient loads being carried by the Mississippi River are one of the dominant causes of this hypoxia (Bierman and others, 1994; Justic and others, 1993, 1995a, b; Rabalais, 1998; Rabalais and others, 1996, 1998; Turner and Rabalais, 1991, 1994). Other studies (e.g., Antweiler and others, 1996a; Goolsby and others, 1999; Carey and others, 1999; Battaglin and others, 2001) determined that one of the chief sources of these nutrients within the Mississippi River was agricultural practices in the Upper Mississippi River basin (that part of the Mississippi River basin upstream from the confluence with the Missouri River, herein called UMRB). At the same time, various modeling programs (for instance, SPARROW, Smith and others, 1997; and Howarth and others, 1996) based on our present understanding of nutrient processing in streams, indicated that large amounts of nitrate should have been removed by natural denitrification reactions within the surface waters of the UMRB, especially in the headwaters of small streams before reaching the Gulf of Mexico. These models indicated that nitrate concentrations in some parts of the UMRB should be lower than they are based on current understanding. The apparent inconsistencies between the model results and observations led the U.S. Geological Survey (USGS) to undertake a study, in cooperation with the U.S. Department of Agriculture, to determine the sources and fate of nitrogen in representative headwater streams of the UMRB. Accordingly, two small predominantly agricultural drainage basins of the Illinois River (one of the chief tributaries of the Mississippi River in the UMRB) in northwestern Indiana and northeastern Illinois were selected for in-depth, intense study. Two sites were selected on the Iroquois River and one of its tributaries, Sugar Creek, both in northwestern

Indiana (fig 1) . The chief purpose motivating the overall study was to collect data both spatially and temporally along each of the two selected drainages, with an ultimate aim to understanding in-stream processes, particularly involving nitrogen.

Purpose and Scope

This report describes water-quality data that were collected at two specific sites (one in each drainage basin) during a biweekly sampling effort spanning 28 months, from February 2000 through June 2002, and which resulted in 110 discrete samples – 55 from each drainage. In addition, field measurements were made coincident with each sample collection, comprised of air and water temperature, dissolved oxygen concentration, pH, specific conductance, and streamflow. Short-term temporal data, consisting of collecting samples every 2 to 4 hours for as many as 4 days, were obtained on each drainage during four discrete sampling trips between 1999 and 2001 (Antweiler and others, 2005). The spatial component was examined by collecting Lagrangian and synoptic data along a reach on each drainage that included the sampling sites in this report (Antweiler and others, 2004). Additional work, including tracer studies, ground-water analyses, and incubation studies also were performed at these sites. This report only describes the biweekly data, that is, the data that were collected every other week between February 2000 and June 2002 in each drainage.

Acknowledgments

This work was supported in part by U.S. Department of Agriculture Grant #2001-35102-09870. We wish to acknowledge the contributions of George Groschen, Mike Friedel, Elizabeth Murphy and Phillip Gaebler of the USGS Illinois Water Science Center; the personnel of the USGS Indiana Water Science Center who maintain the stream gages at the study site; Kevin Richards of the USGS Wisconsin Water Science Center; and Terry Plowman, Dave Roth, Dale Peart, Howard Taylor, Julie Kirshstein, Brendan Aiken, Deborah Repert, Charles Hart and Seanne Buckwalter of the USGS National Research Program.

Sampling Locations and Times

Figure 1 shows the location of the two sites. The Iroquois River site was at the USGS streamflow gaging station near Foresman, Ind. (USGS station number 05524500), where Indiana State Highway 55 crosses the river approximately 5 kilometers east of Brook, Ind. The Sugar Creek site was at the Indiana State Highway 71 bridge crossing, which was approximately 3 kilometers east of the Illinois-Indiana state line and about 12 kilometers southwest of Kentland, Ind.

The first biweekly samples were collected on February 24, 2000. Thereafter, samples were collected (on the average) every 2 weeks until June 17, 2002. There were two gaps in sample collection lasting more than 24 days: from September 20, 2000 to November 2, 2000 (43 days); and from September 13, 2001 to October 11, 2001 (29 days).

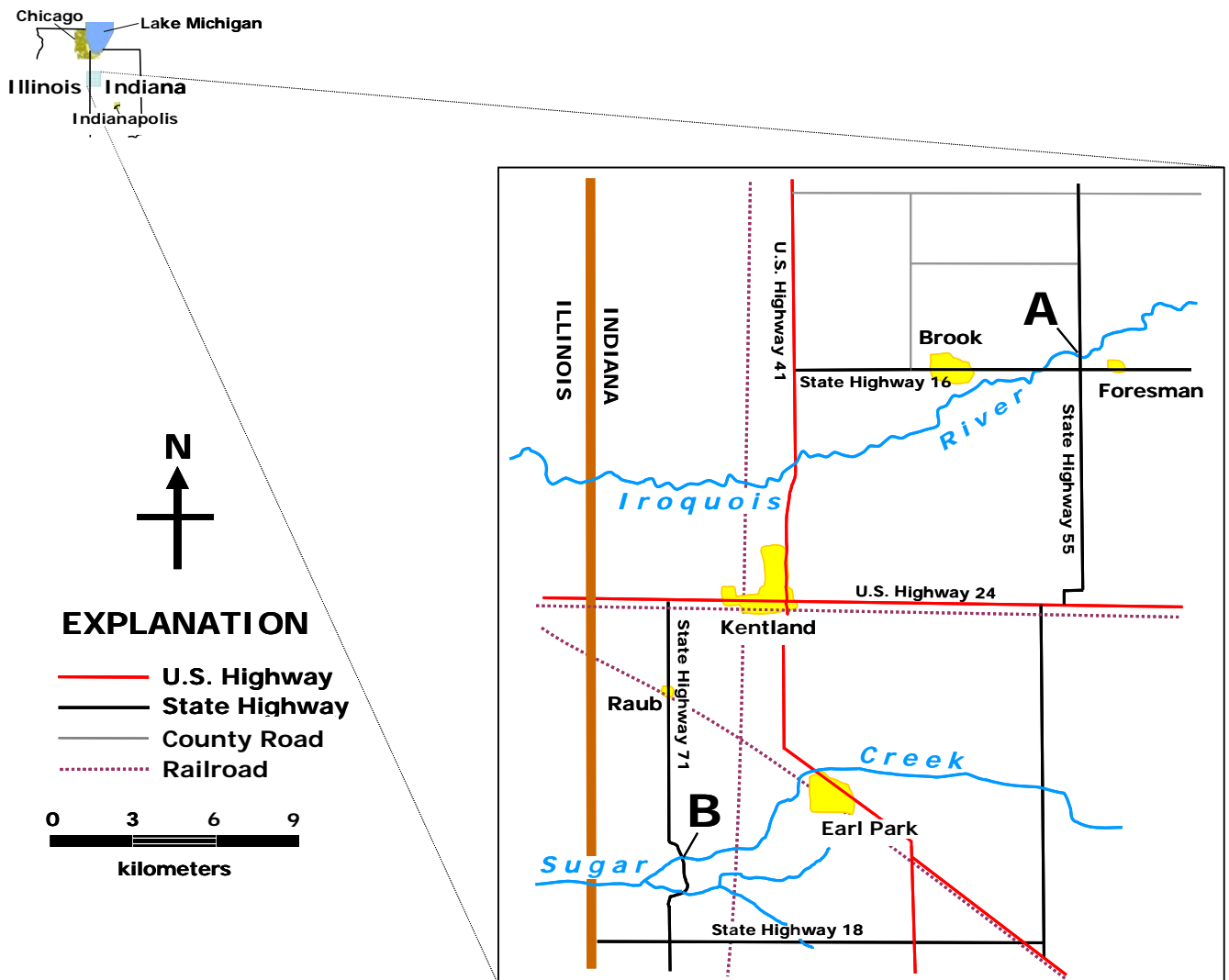


Figure 1. Location of the two sampling sites. A. Iroquois River at State Highway 55 bridge (USGS station number: 05524500); B. Sugar Creek at Indiana Highway 71 bridge.

Precipitation

Although no rainfall measurements were made at the two sampling sites, there were eight nearby National Weather Service weather stations which surrounded the study area (fig. 2) and which collected daily precipitation data during the entire period of sampling. The daily values for each station were summed on a monthly basis, and these totals were averaged for all eight stations. Figure 3 shows this monthly average precipitation over the course of the study. One of the interesting features of this graph is the overall consistency of the data: of the 33 months presented in figure 3, there were only three with less than 30 millimeters (mm) of precipitation (November 1999, and January and March 2001), and only one (October 2001) with greater than 140 mm. In addition, the graph shows seasonal variations with (on average) the greatest precipitation occurring during the summer (May-August) and the least during the winter (November-March).

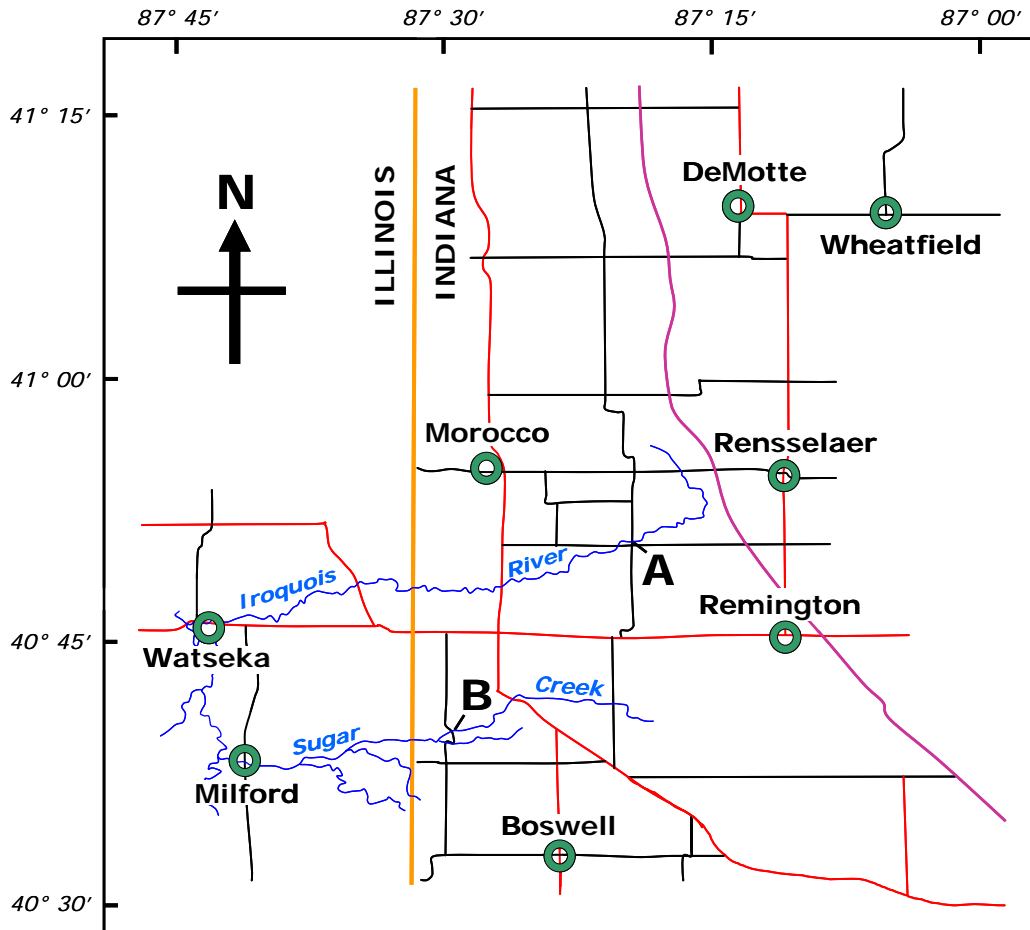
Field Methods

Collection of Field Data

Prior to the collection of samples, streamflow was determined at each site. At the Iroquois River site near Foresman, this was normally done by reading the gage height from the USGS gage (station number 05524500) located there. Occasionally, the stage/discharge rating was checked by measuring streamflow using standard USGS protocols (U.S. Geological Survey, variously dated). This involved selecting between 15 and 25 vertical measurement locations across the channel, measuring the water depth and average velocity at each vertical, and integrating over all verticals in a section to obtain the total streamflow. Because the Sugar Creek site had no USGS gage, streamflow measurements were always made (Rantz and others, 1982) when samples were collected.

Measurements made on-site included air and water temperature, pH, specific conductance, and dissolved oxygen concentration. Air temperature was determined using an alcohol thermometer. The other four parameters were measured using a YSI Model 600XL-4 parameter instrument which was calibrated daily against known standards according to standard USGS protocols (Wilde and Radtke, 1998). Measurements were obtained in-situ at the center of flow of the stream, as well as examining a cross-section to determine mixing in the vertical and horizontal stream column.

Beginning on November 19, 2001, photographs were taken looking both upstream and downstream at each of the two sites. These photographs were taken during every sample collection period thereafter, until the study ended on June 17, 2002. A representative portion of this record is shown in figure 4 for the Iroquois River and figure 5 for Sugar Creek. These photographs were all taken at the same location on each river at six different sampling periods, each spaced by about a month and a half.



EXPLANATION

- Interstate Highway
 - U.S. Highway
 - State Highway
 - ⊕ Weather Station having Precipitation Data
 - A** Iroquois River sampling site
 - B** Sugar Creek sampling site
- 0 5 10 15

 kilometers

Figure 2. Location of the eight local weather stations which had daily precipitation data available for the duration of the study.

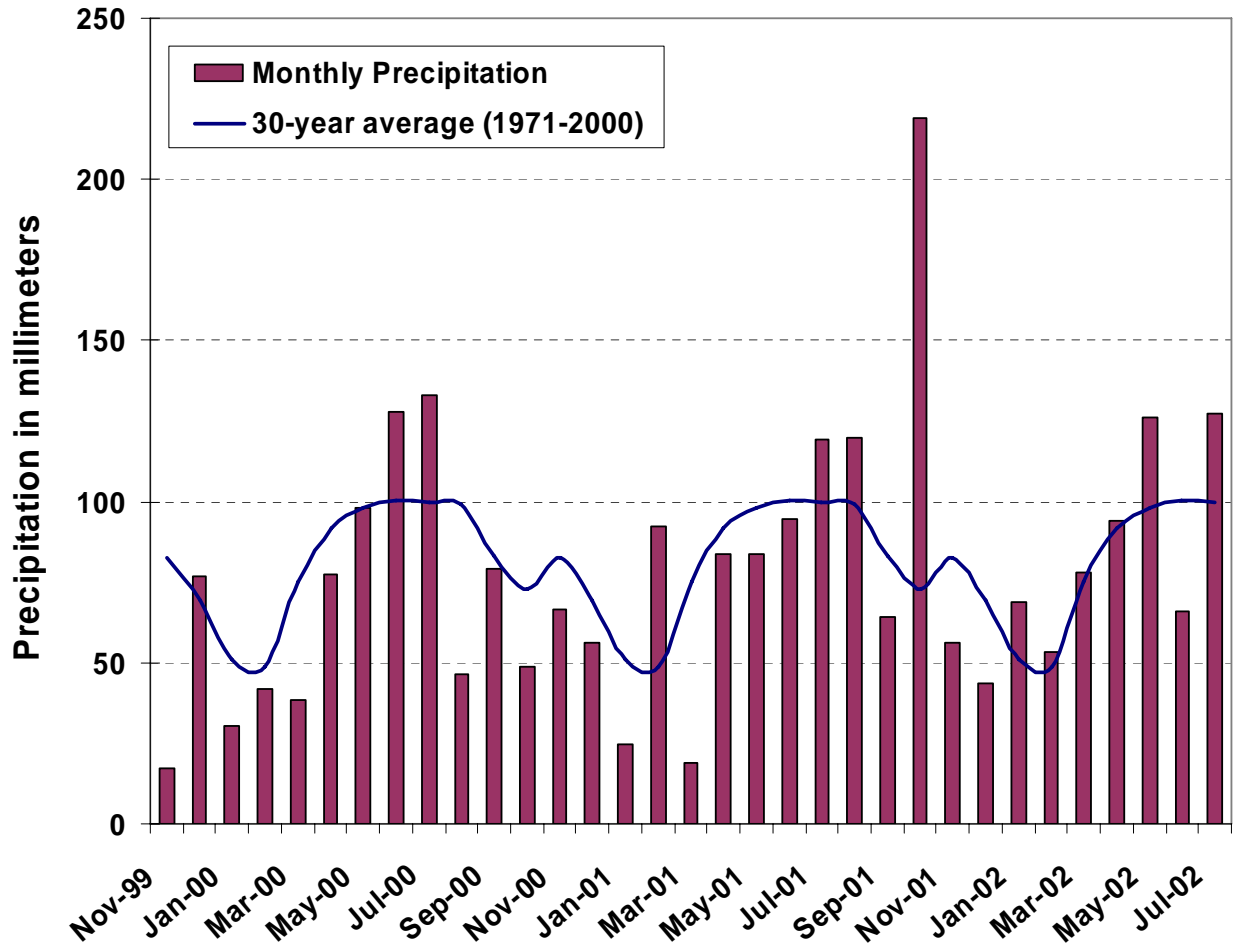


Figure 3. Monthly precipitation data averaged for eight weather stations in the vicinity of the two sampling sites from November 1999 through July 2002. Biweekly sampling occurred from February 2000 through July 2002.



Figure 4. Photographs looking upstream from the State Highway 55 bridge crossing of the Iroquois River at six sampling times. A) November 19, 2001; B) January 3, 2002; C) February 13, 2002; D) March 27, 2002; E) May 7, 2002; F) June 17, 2002.

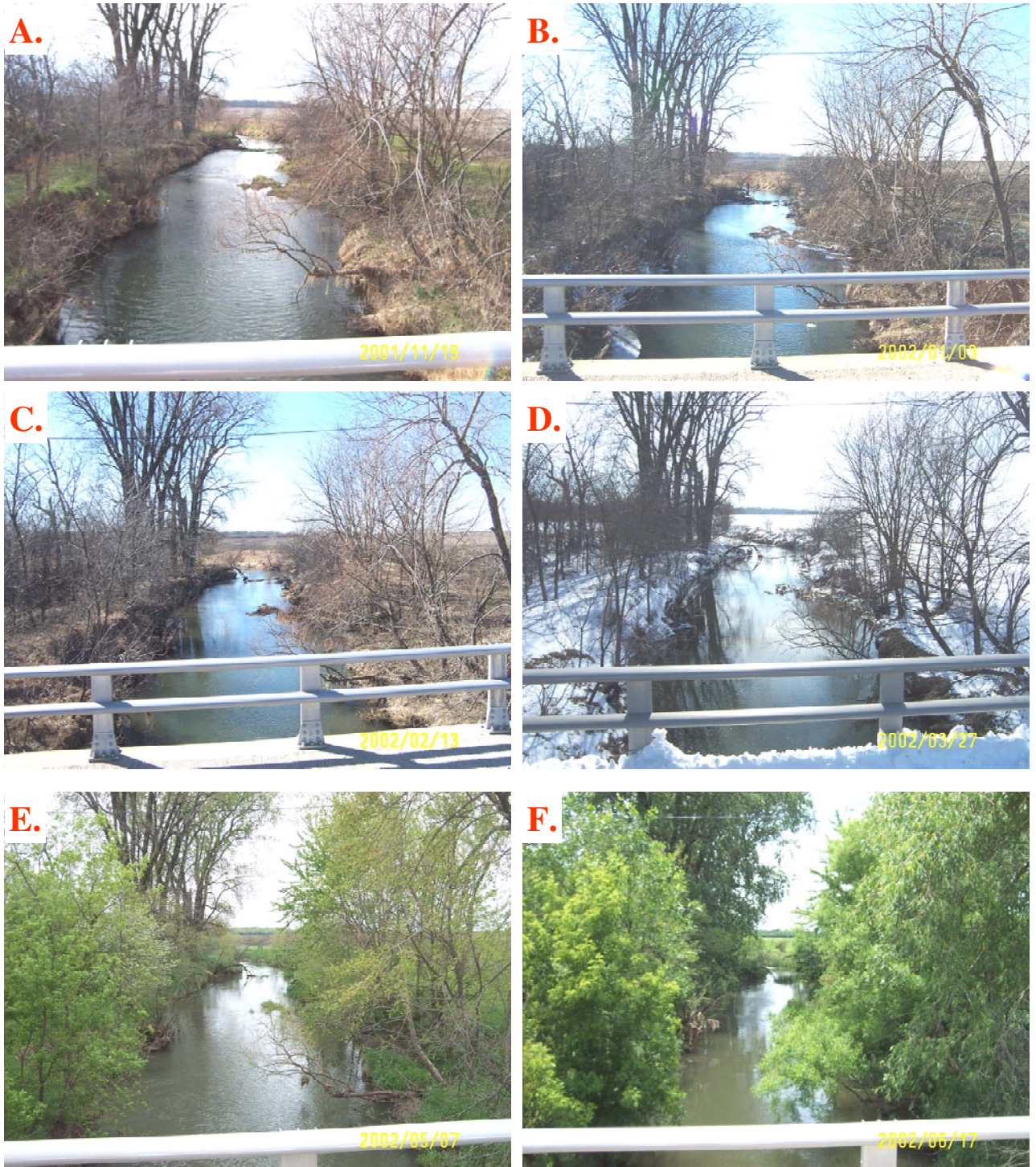


Figure 5. Photographs looking downstream from the State Highway 71 bridge crossing of Sugar Creek at six sampling times. A) November 19, 2001; B) January 3, 2002; C) February 13, 2002; D) March 27, 2002; E) May 7, 2002; F) June 17, 2002.

Sample Collection

Samples were collected using isokinetic, depth-integrated methods outlined in the USGS National Field Manual (U.S. Geological Survey, variously dated). Equipment used to collect and process samples were cleaned following protocols outlined in the National Field Manual for the cleaning of equipment for inorganic sample collection. The cleaning protocols were used to help ensure that the sampling equipment was not a source of foreign substances that could affect the ambient concentrations of target analytes. In addition, care was taken to ensure that clean sample handling techniques were observed during the collection and processing of all samples, including the wearing of polyvinyl gloves. While the field parameters were determined, stream water was sampled using a weighted-bottle sampler. Samples were composited into a 3-L bottle which was shaken and immediately thereafter a 250-mL polyethylene bottle was filled using a peristaltic pump. This bottle, which was subsequently chilled, was used for the estimation of the suspended sediment concentration. The 3-L bottle was then completely remixed by shaking and, using a peristaltic pump, approximately 1-L of water was pumped through a 0.4- μ m nominal pore-size 47-mm glass fiber filter (GFF) held in a Swinnex filter holder. The volume of water pumped through the filter was measured and recorded. Using forceps, the GFF was folded, placed in a sleeve holder, and frozen. This filter was used for the determination of chlorophyll-*a* concentration. Finally, samples for the determination of dissolved constituents were collected. The peristaltic pump was attached to a 0.45- μ m nominal pore size in-line Gelman cartridge filter, and approximately 500-mL of water from the 3-L sampler was passed through the filter and discarded. Then, the following three samples were collected: (1) a 60-mL polyethylene bottle for the determination of ammonium and total dissolved nitrogen (TDN). This sample was kept chilled for immediate shipping (see below); (2) a 125-mL polyethylene bottle for the determination of anions (including chloride, sulfate, nitrate and nitrite, but excluding bicarbonate and carbonate). This sample was frozen as soon as possible after collection (typically 3-5 hours); and (3) a 125-mL polyethylene bottle for the determination of trace metals, major cations and silica. As with the ammonium sample, this bottle was kept chilled for immediate shipping. The remainder of the composite sample was discarded.

A second 3-L composite sample was collected for the dissolved trace gas samples. Approximately 25 mL of stream water was collected in a 30-mL plastic syringe, taking care to exclude air bubbles. After filling, a needle was placed on the syringe and 20 mL was injected into a 30-mL serum bottle that had been fitted with a thick butyl rubber stopper and aluminum crimps and which contained 0.2 mL 12.5 normal sodium hydroxide and a helium headspace. The filled serum bottle was stored at room temperature.

The chlorophyll-*a*, anions, and dissolved gases samples were stored at the USGS Illinois Water Science Center in Urbana until a sufficient number of them had been collected to effect a shipment to the analyzing laboratories. However, the cations/trace metals, ammonium/TDN, and suspended sediment samples were overnight shipped on ice to the USGS National Research Program (NRP) laboratories in Boulder, Colo. either on the day of collection or the next day. Upon receipt, suspended sediment samples were refrigerated. From the ammonium/TDN bottles, a 1.8-mL aliquot was pipetted into a baked (250°C) 2-mL glass autosampler vial fitted with a Teflon septa cap for the determination of TDN. These samples were preserved by adding 14 μ L of 1 normal hydrochloric acid and subsequently refrigerated until analysis (Bronk and others, 2000). The remainder of the ammonium/TDN samples were then acidified with 1-mL of concentrated sulfuric acid for the determination of ammonium. Both of these aliquots were stored at room temperature until analysis. Upon receipt, the cations/trace metals samples were immediately

acidified with 1 mL of double-distilled trace-metal-grade nitric acid and stored at room temperature until analysis.

Methods of Analysis

The methods of analysis for most samples have been described in detail elsewhere (Antweiler and others, 2004) and will be summarized here. Major cations, total phosphorus, silica, and dissolved iron were determined by inductively coupled-atomic emission spectrophotometry (ICP-AES) (Mitko and Bebek, 1999, 2000); trace elements were analyzed by inductively coupled-mass spectrometry (ICP-MS) (Taylor, 2001); Suspended sediment concentrations were measured gravimetrically (Antweiler and others, 2004); Nitrite was analyzed colorimetrically (Antweiler and others, 1996b); Nitrous oxide and methane were measured by gas chromatography (Brooks and others, 1992; Weiss and Price, 1980; Yamamoto and others, 1976). All of these analyses were done at the USGS NRP laboratories in Boulder, Colo. Chlorophyll-*a* was determined at the USGS NRP laboratories in Reston, Vir., by fluorescence following the procedures of Arar and Collins (1997).

Dissolved chloride, nitrate and sulfate were analyzed by ion chromatography on a Dionex DX500 instrument which utilized an AS15A analytical column; details can be found in Savoie and others (2004). Ammonium was analyzed by ion chromatography on a Dionex DX300 instrument which utilized a CS12A analytical column; analytical details can be found in Savoie and others (2004). These analyses were done at the USGS NRP laboratories in Boulder, Colo.

Total dissolved nitrogen was determined with an Antek Model 9000N Total N Analyzer equipped with a Model 735-740 multi-matrix sample drive and Model 738 autosampler. Organic and fixed inorganic nitrogen were converted to nitric oxide (NO) by high temperature combustion (1050°C) and oxidation using ultra-pure oxygen (99.997%). The NO gas was then reacted with ozone to create metastable NO₂, producing a chemiluminescent emission which was measured. Analytical details can be found in Bronk and others (2000). These analyses were done at the USGS NRP laboratories in Boulder, Colo.

Detection limits for the constituents listed in this report are given in Antweiler and others (2004).

Quality Control/Quality Assurance

The quality of the analytical data for trace metals and major cations was assessed by a vigorous laboratory program involving a large number of quality-control (QC) standards, which were analyzed as unknowns during the analysis of all samples collected during the study. The frequency of analysis of these QC standards was variable depending upon the methodology used, but was always at least 20 percent of the total number of samples collected. All of the analyses for QC are presented in Antweiler and others (2004). Results of these analyses indicated good agreement between the published values and the observed concentrations for all trace elements and major cations.

The quality of the chloride, sulfate, nitrate and ammonium analyses by ion chromatography was assessed by analyzing a subset of the calibration standards and blanks every eight to ten samples and by standard reference samples analyzed at the beginning and end of the analysis runs. Table 1 contains the results of these analyses, given as the range and mean for each of the reference standard analytes, as compared with the published “Most Probable Values” for each. The quality of the gas samples was assessed by analyzing a subset of the calibration standards and blanks every eight to ten samples. There are no standard reference materials available that are appropriate for gas samples.

Table 1. Summary of laboratory quality-control data for samples analyzed by ion chromatography.

[USGS, U.S. Geological Survey; SRS, standard reference sample; mg/L, milligrams per liter]

Standard	Dates Analyzed	Analyte ¹	Most Probable Value ¹ , mg/L	Average ¹ , mg/L	Range ¹ , mg/L
Anions					
Dionex Anion Standard Part #37157	10/31/01 to 7/31/02	Cl	30.0	29.6	28.6 - 31.5
		SO ₄	150	147	141 - 156
		NO ₃ -N	22.6	22.1	21.3 - 23.6
USGS SRS M146	12/12/01 to 4/4/02	Cl	46.1	48.2	46.5 - 49.7
		SO ₄	69.1	66.9	64.8 - 69.8
USGS SRS N64	8/28/00 to 12/13/00	NO ₃ -N	1.26	1.23	1.15 - 1.27
Cations					
USGS SRS N63	8/23/00 to 1/4/01	NH ₄ -N	150	176	130 - 210
USGS SRS N64	8/18/00 to 12/4/00	NH ₄ -N	1300	1380	1160 - 1530
USGS SRS N72	3/8/02 to 6/10/02	NH ₄ -N	740	717	660 - 770

¹ Nitrate (NO₃) data are reported as milligrams per liter as nitrogen; ammonium (NH₄) data are reported as micrograms per liter as nitrogen.

Results of Analyses

Tables A1-A8 within Appendix A contain the results of all field measurements and water-quality analyses for the biweekly sampling. The general structure of these tables is as follows: Field measurements are presented first, with Iroquois River results (table A1) presented before Sugar Creek results (table A2). Next, results are presented for nutrients, trace gases, chlorophyll-*a* and suspended sediment concentrations (tables A3-A4), followed by major anions (excepting bicarbonate and carbonate), cations and silica (tables A5-A6), and, finally, trace elements (tables A7-A8). Bicarbonate and carbonate were not determined. Within these tables, many analytes were determined from replicate measurements within the laboratory; for these analytes, the data in the tables are presented as “averages” and “standard deviations” of the replicate measurements. Those data which were determined from a single measurement are headed in the tables by the term “Value”.

Figure 6 is a graph showing streamflow measurements at the Iroquois River at the Foresman, Ind. gage over the course of the sampling. The graph shows the mean daily streamflow and also includes the instantaneous streamflow measurements at the sampling times; as can be seen, actual sampling times occurred during both high- and low-flow conditions, although (in general) tended to miss the peak flows. Figure 7 includes the streamflow measurements for Sugar Creek. In this case, there are no mean daily streamflow measurements, so the graph only shows the measured streamflows.

Representative graphs of the data are presented in figures 8-10, showing both the ranges of values and seasonal patterns of selected constituents. For example, figure 8 shows nitrate (fig. 8A) and phosphorus (fig. 8B) concentrations. Whereas nitrate concentrations are practically the same in both drainages, phosphorus concentrations are uniformly higher in the Iroquois River than in Sugar Creek. Also, nitrate concentrations show a seasonal pattern with highs in the spring/early summer and lows in the fall; phosphorus concentrations on the Iroquois River show a different cyclicity, with highs in the late summer/early fall and lows in the winter and spring. Total dissolved nitrogen – by virtue of the fact that nitrate was the largest component of this – also showed a seasonal pattern.

Representative graphs for the major elements are shown in figure 9, which shows the data for sodium and magnesium. Sodium concentrations (fig. 9A) tend to be higher in the Iroquois River, and have a seasonal cycle, although it is far less pronounced than for the nutrients. Magnesium concentrations (fig. 9B) are usually higher in Sugar Creek and do not display a seasonal pattern for the Iroquois River, although there appears to be a very rough pattern for Sugar Creek. For both of these cations (but especially for magnesium), the effects of sampling during storms can be seen clearly as low concentrations. Of the major elements, sodium and potassium appear to have a rough seasonal pattern on both drainages, whereas chloride and silica have a cyclicity on the Iroquois River but not on Sugar Creek, and sulfate and magnesium have a weak cyclicity on Sugar Creek but not on the Iroquois River.

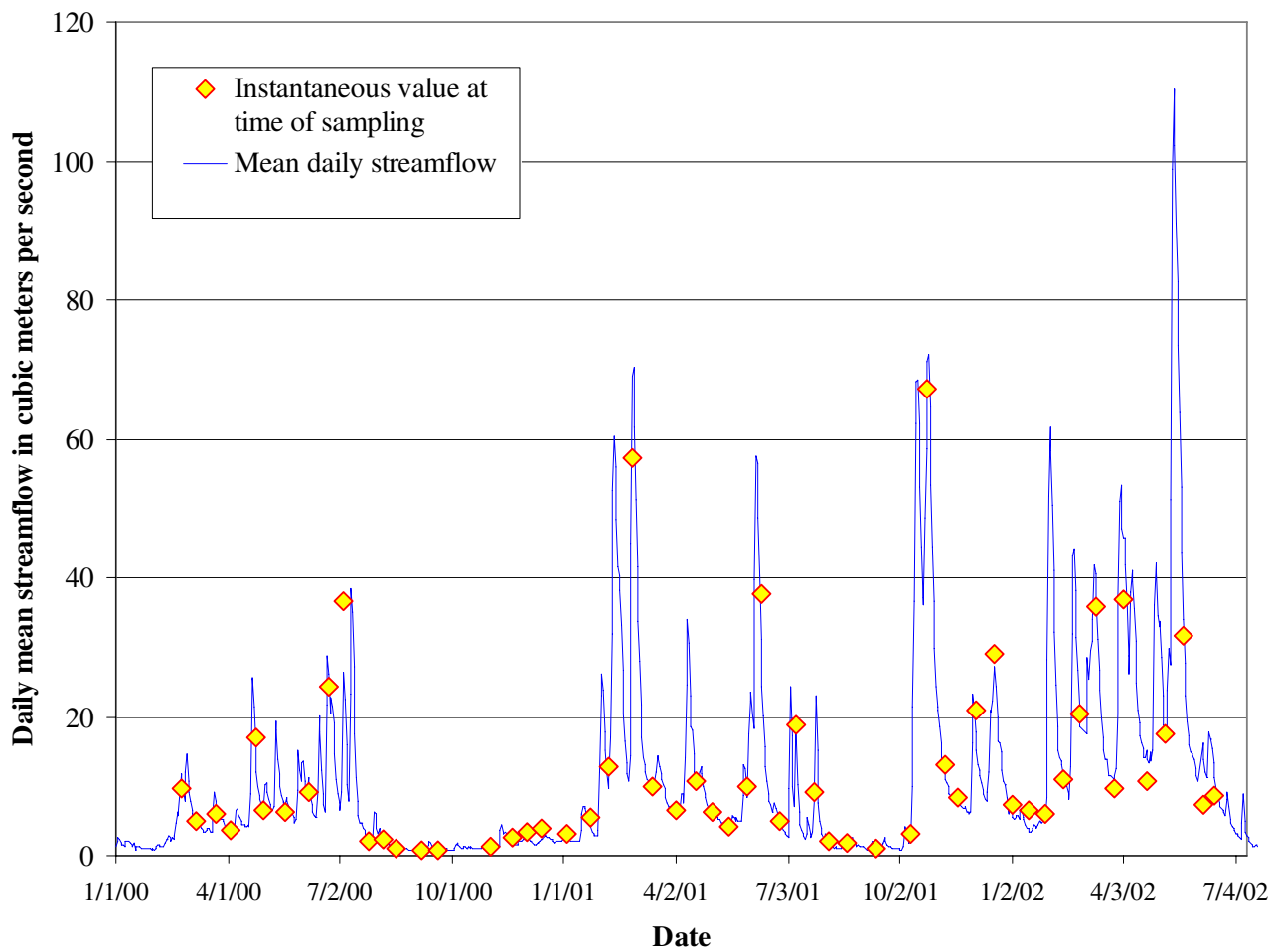


Figure 6. Mean daily streamflow and instantaneous discharge at the time of sampling for the Iroquois River at Foresman, Ind. (USGS station number 05524500)

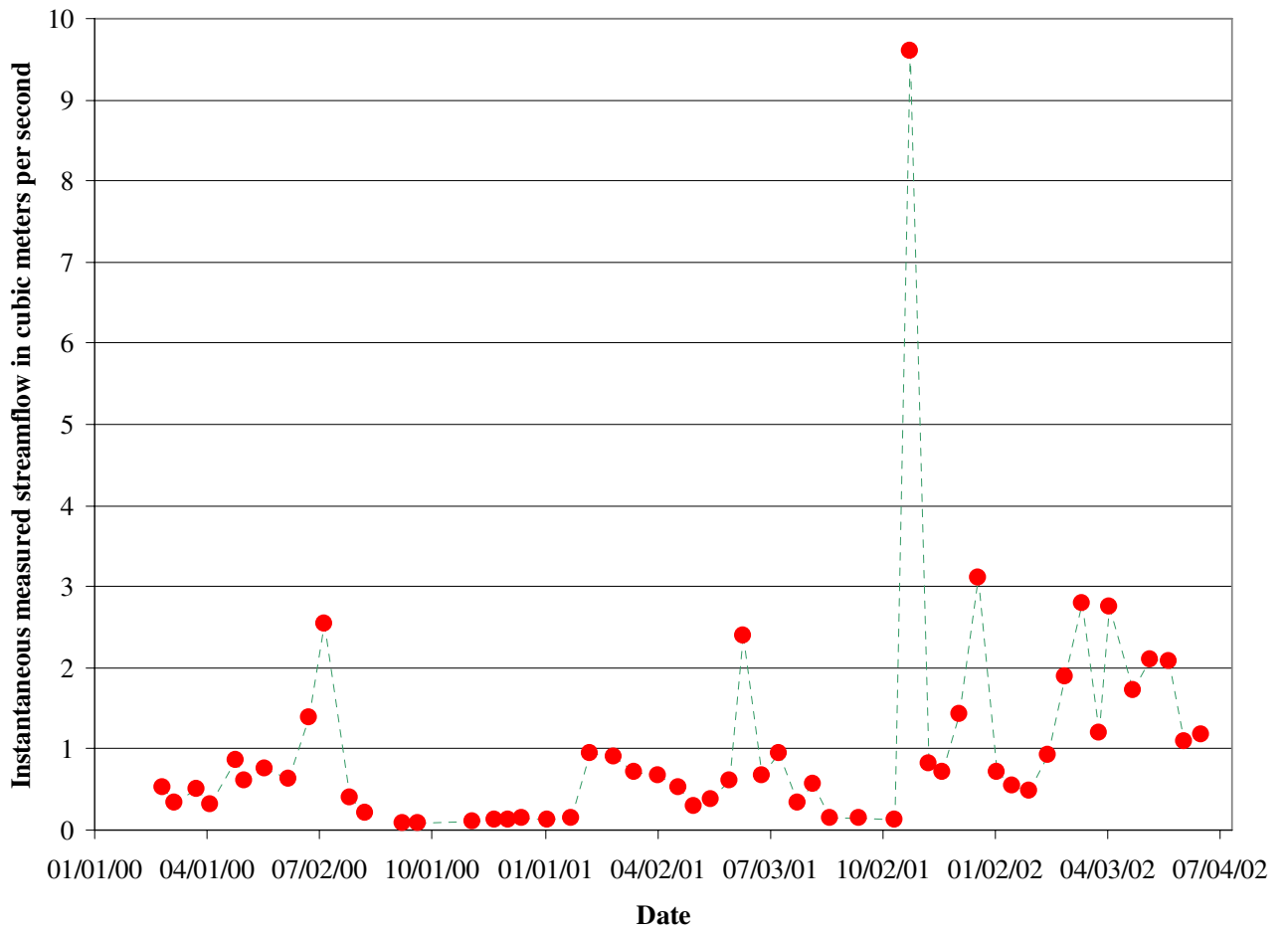


Figure 7. Instantaneous streamflow measurements at the time of sampling for Sugar Creek at the State Highway 71 bridge crossing, Indiana.

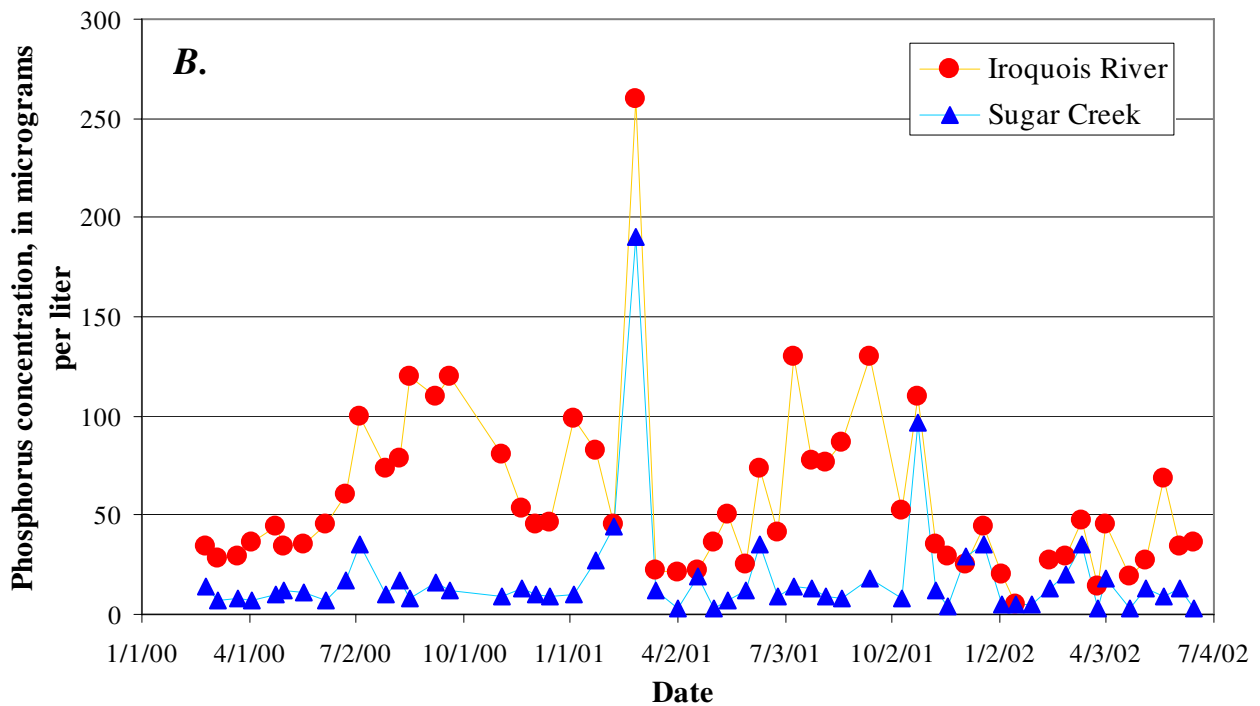
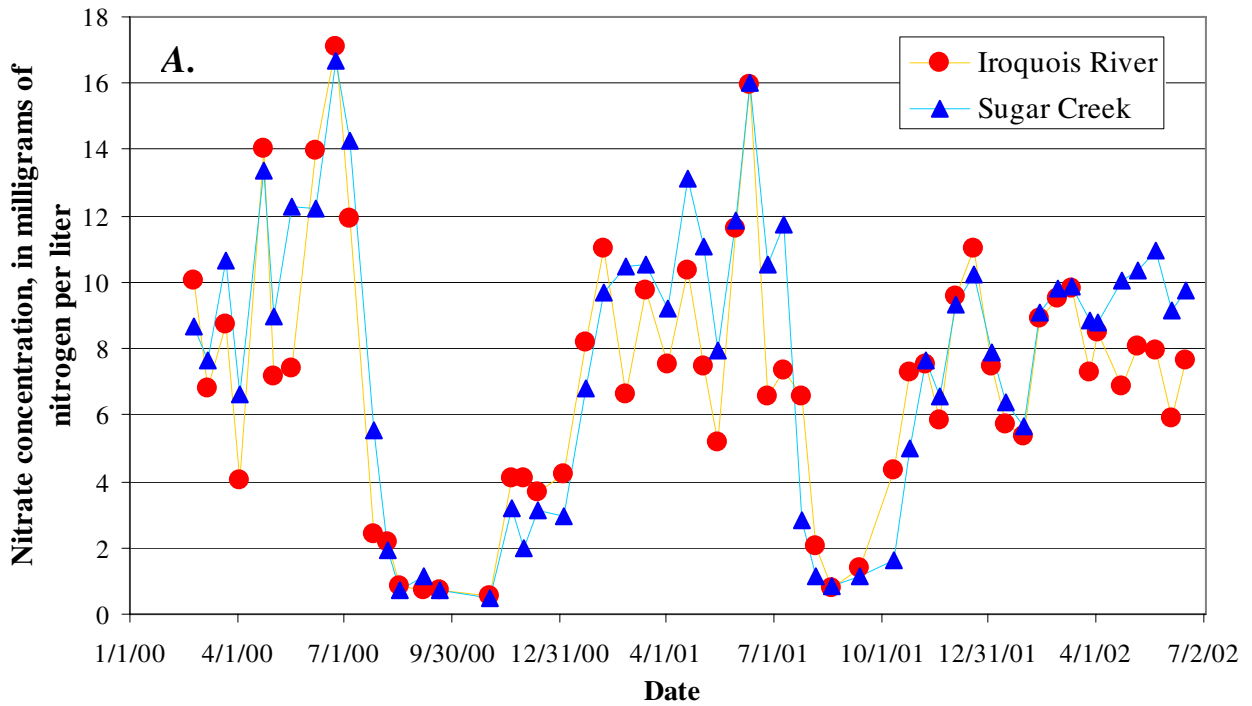


Figure 8. Representative nutrient concentrations for the Iroquois River at Foresman, Ind. (USGS station number 05524500) and Sugar Creek at the State highway 71 bridge. A) Nitrate; B) Phosphorus

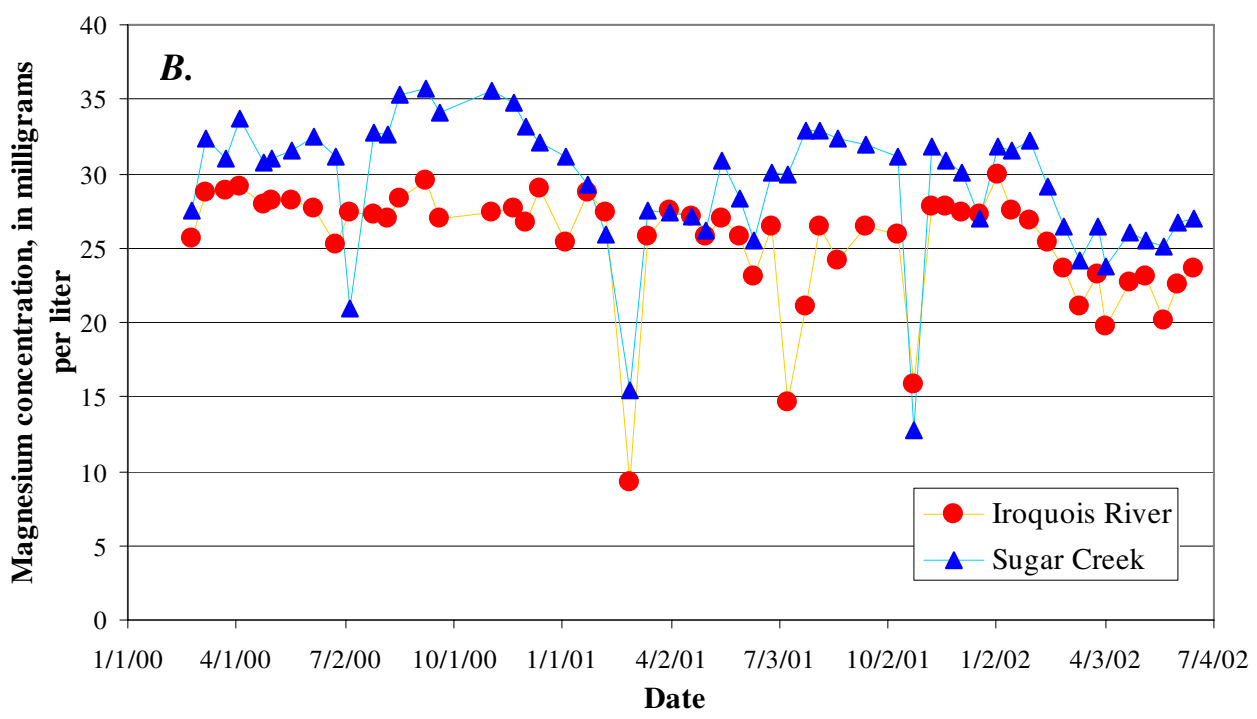
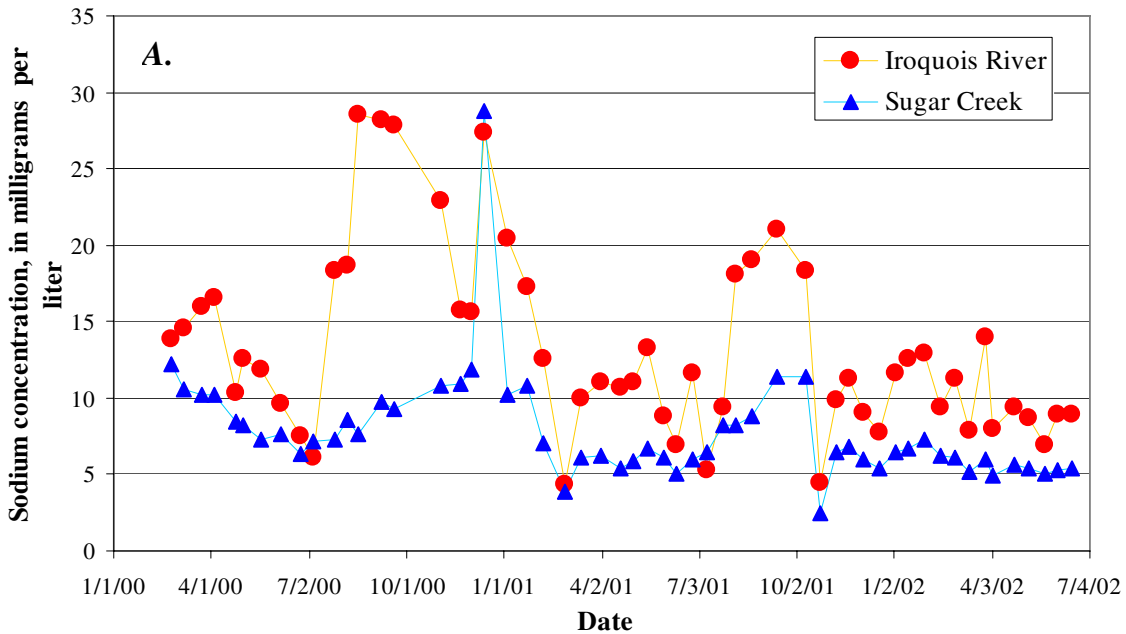


Figure 9. Representative major cation concentrations for the Iroquois River at Foresman, Ind. (USGS station number 05524500) and Sugar Creek at the State highway 71 bridge. A) Sodium; B) Magnesium.

Finally, figure 10 shows the concentrations of two trace elements, arsenic (fig. 10A) and lutetium, a rare-earth element (fig. 10B). For both of these elements, the Iroquois River had higher concentrations, and this, as a general rule, was the pattern for most elements: only magnesium and sulfate concentrations were normally higher in Sugar Creek than in the Iroquois River. Arsenic (figure 10A) shows a clear seasonal pattern in concentration, with highest values occurring in the fall. Other trace elements which showed a seasonal pattern on both drainages were antimony, boron, lithium, rubidium, selenium and vanadium, but the time of concentration maxima did not necessarily agree between constituents. Lutetium (fig. 10B) does not show any clear seasonality, and this was the case for most of the trace elements.

Summary

This report contains the results of analyses of water-quality data from a biweekly sampling program at one site each on the Iroquois River and Sugar Creek, two primarily agricultural drainages located in northwestern Indiana and northeastern Illinois. The sampling program spanned 28 months, beginning on February 24, 2000, and ending on June 17, 2002. During this time, 110 discrete samples were collected, 55 from each drainage. In addition, field parameters consisting of streamflow, air and water temperature, pH, specific conductance, and dissolved oxygen concentrations were made. In the later part of the study, photographs were taken at each sample site every time samples were collected. Samples were collected for nutrients, including nitrate, nitrite, ammonium, total dissolved nitrogen, and phosphorus, major inorganic constituents (excepting bicarbonate and carbonate), trace elements, suspended sediment, dissolved trace gases, and chlorophyll-*a* concentrations.

The data showed various patterns, but included the following features: 1) Streamflow was widely variable throughout the study, and although the sampling occurred during both high and low flows, peak flows were under-represented; 2) In general, concentrations tended to be higher on the Iroquois River than on Sugar Creek; 3) Several constituents, including nitrate, total dissolved nitrogen, sodium, potassium, antimony, arsenic, boron, lithium, rubidium, selenium and vanadium showed seasonal variations on both drainages, but the time of concentration maxima did not necessarily agree between constituents; and 4) The remainder of the constituents did not show seasonal patterns on both drainages, although a number showed (localized) increases or decreases caused by storm events.

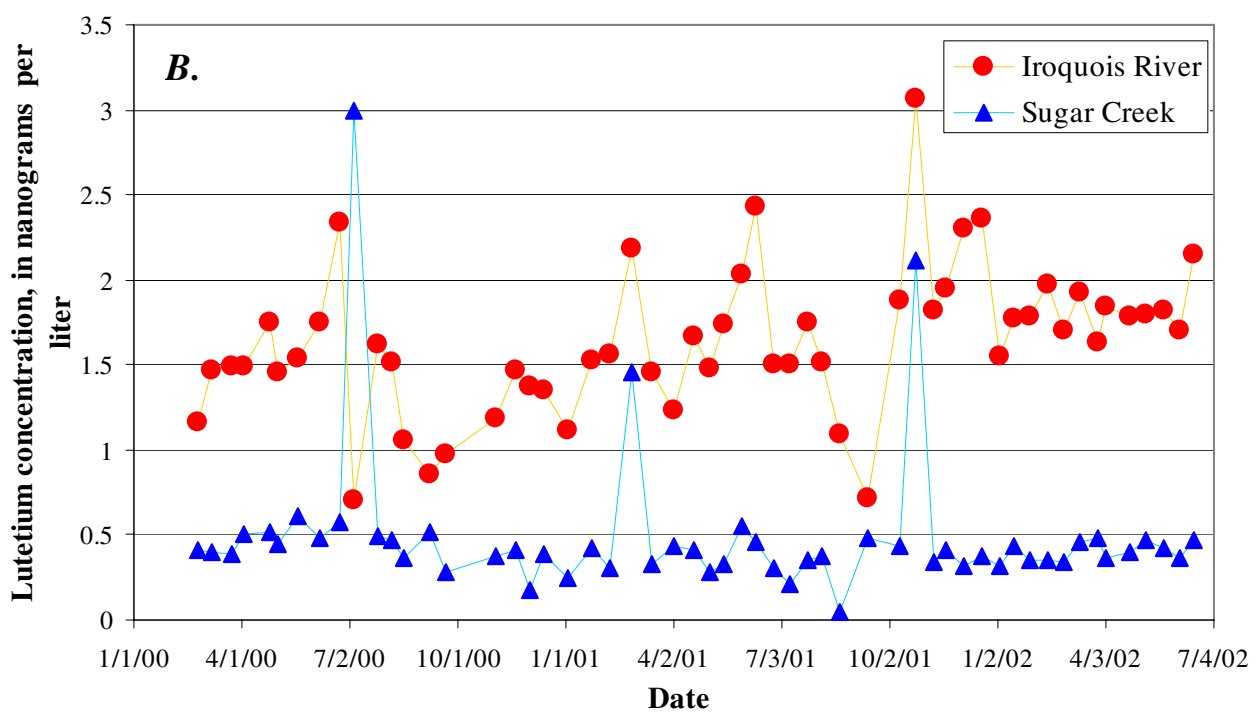
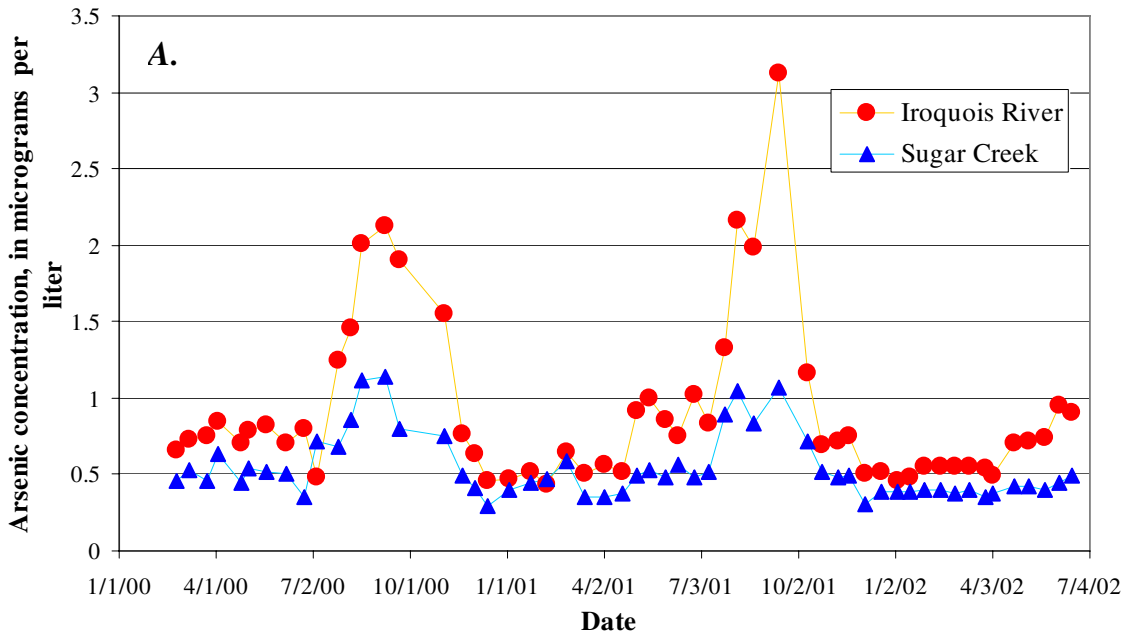


Figure 10. Representative trace element concentrations for the Iroquois River at Foresman, Ind. (USGS station number 05524500) and Sugar Creek at the State highway 71 bridge. A) Arsenic; B) Lutetium.

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Appendix A

Table A1. Field measurements for samples collected on the Iroquois River.

[cms, cubic meters per second; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; mg/L, milligrams per liter; $^{\circ}\text{C}$, degrees Celsius; %, percent; na, not available]

Date-Time	Discharge cms	Air temperature $^{\circ}\text{C}$	Water temperature $^{\circ}\text{C}$	pH	Specific conductance $\mu\text{S}/\text{cm}$ at 25°C	Dissolved oxygen concentration mg/L	Dissolved oxygen concentration % Saturation
02/24/00 12:25	10	17.0	7.2	7.48	664	12.5	104
03/06/00 14:15	4.9	20.0	10.7	7.80	730	10.5	97
03/23/00 10:45	6.0	17.5	10.5	7.61	674	8.5	77
04/03/00 17:45	3.7	13.0	12.2	7.74	723	9.1	95
04/24/00 12:00	17	18.0	11.3	7.73	691	9.1	83
05/01/00 18:10	6.5	14.0	14.9	7.82	680	8.8	89
05/18/00 09:35	6.4	15.5	16.3	7.96	682	8.0	82
06/06/00 10:05	9.2	19.0	14.6	7.88	679	8.3	82
06/23/00 09:55	24	26.5	20.8	7.60	655	6.7	75
07/05/00 13:15	37	30.0	22.5	7.48	548	4.8	56
07/26/00 11:50	2.1	27.5	21.9	7.83	691	7.1	81
08/07/00 09:35	2.3	25.5	22.0	7.83	623	6.9	79
08/17/00 11:15	1.1	21.0	21.6	7.91	719	6.3	72
09/07/00 09:30	0.69	22.5	18.3	7.83	748	6.8	72
09/20/00 13:00	0.86	19.5	19.8	7.99	748	6.9	76
11/02/00 10:30	1.3	18.5	13.7	7.67	658	8.7	84
11/20/00 11:40	2.6	-4.5	1.1	7.77	736	13.5	96
12/01/00 11:30	3.3	1.5	3.2	7.85	720	13.0	97
12/13/00 15:00	4.0	-11.0	0.0	7.86	797	14.0	96
01/03/01 11:20	3.2	-5.0	0.1	8.09	749	12.7	87
01/22/01 13:00	5.4	-4.5	0.1	7.17	850	13.6	93
02/06/01 13:30	13	6.0	1.4	7.68	724	13.2	94
02/26/01 12:00	57	0.0	3.8	7.40	303	10.8	82
03/14/01 11:30	10	6.0	4.0	7.70	751	7.3	98
04/02/01 11:50	6.5	15.0	7.2	7.34	646	12.0	99
04/19/01 11:50	11	20.5	9.7	6.87	679	11.2	99
05/02/01 12:20	6.3	26.5	18.5	7.33	683	7.5	80
05/15/01 12:10	4.2	33.5	16.5	7.94	689	9.0	92
05/30/01 10:48	10	22.0	15.6	7.76	686	9.1	92
06/11/01 10:30	38	29.5	19.6	7.37	658	6.7	73
06/26/01 10:05	4.9	26.5	21.7	7.60	689	8.0	91
07/10/01 10:20	19	29.5	22.3	7.53	402	6.2	71
07/25/01 10:15	9.3	29.5	25.0	7.51	558	6.6	80
08/06/01 09:50	2.0	27.5	24.1	7.74	667	7.2	85
08/20/01 10:35	1.7	23.3	18.8	7.79	658	7.4	80
09/13/01 08:30	1.0	19.0	19.3	8.20	675	6.8	74

Table A1. Field measurements for samples collected on the Iroquois River -- continued

[cms, cubic meters per second; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; mg/L, milligrams per liter; $^{\circ}\text{C}$, degrees Celsius; %, percent; na, not available]

Date-Time	Discharge cms	Air temperature $^{\circ}\text{C}$	Water temperature $^{\circ}\text{C}$	pH	Specific conductance $\mu\text{S}/\text{cm}$ at 25°C	Dissolved oxygen concentration mg/L	Dissolved oxygen concentration % Saturation
10/11/01 10:15	3.0	15.0	14.2	7.65	734	7.4	72
10/24/01 11:05	67	18.5	15.1	7.31	451	5.3	52
11/08/01 10:20	13	12.5	10.6	7.80	696	9.4	84
11/19/01 10:45	8.5	10.0	12.0	7.90	687	9.5	88
12/03/01 12:05	21	14.1	7.7	7.82	661	10.5	88
12/19/01 11:30	29	3.0	6.8	7.73	652	10.4	86
01/03/02 11:25	7.4	-3.5	0.0	7.75	753	13.5	93
01/15/02 11:30	6.6	0.7	2.4	8.16	707	12.5	91
01/29/02 11:35	5.9	4.9	5.5	8.25	696	11.7	93
02/13/02 10:55	11	1.8	3.1	8.03	681	10.2	76
02/27/02 12:00	20	-5.0	1.6	8.14	652	9.1	65
03/12/02 11:40	36	9.1	3.8	7.62	576	10.7	81
03/27/02 11:30	9.6	4.0	1.3	8.13	652	15.0	107
04/03/02 11:05	37	na	5.7	7.87	544	13.7	109
04/23/02 10:00	11	10.5	8.5	8.20	621	11.0	94
05/07/02 08:55	18	11.5	15.9	7.96	617	8.9	91
05/22/02 10:00	32	13.5	12.0	7.86	561	8.9	83
06/04/02 09:45	7.3	27.5	20.0	7.80	620	8.0	89
06/17/02 10:00	8.5	20.5	19.0	7.90	640	8.0	86

Table A2. Field measurements for samples collected on Sugar Creek.

[cms, cubic meters per second; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; mg/L, milligrams per liter; $^{\circ}\text{C}$, degrees Celsius; %, percent; na, not available]

Date-Time	Discharge cms	Air temperature $^{\circ}\text{C}$	Water temperature $^{\circ}\text{C}$	pH	Specific conductance $\mu\text{S}/\text{cm}$ at 25°C	Dissolved oxygen concentration mg/L	Dissolved oxygen concentration % Saturation
02/24/00 15:55	0.53	16.0	11.6	7.71	612	12.5	115
03/06/00 16:30	0.34	14.0	13.3	8.05	680	13.1	128
03/23/00 12:50	0.51	18.2	14.2	7.85	603	11.4	111
04/03/00 16:00	0.31	14.0	12.3	8.03	676	13.2	128
04/24/00 14:30	0.86	19.0	15.0	8.16	647	12.1	120
05/01/00 16:00	0.61	15.0	14.1	7.86	655	9.9	99
05/18/00 11:40	0.76	16.5	17.6	8.15	661	9.8	102
06/06/00 12:40	0.62	23.0	17.5	8.17	674	11.3	118
06/23/00 12:20	1.4	29.5	20.1	7.92	660	9.6	106
07/05/00 12:10	2.5	30.0	20.5	7.80	620	4.1	46
07/26/00 13:05	0.39	30.5	24.0	8.12	679	na	na
08/07/00 10:25	0.20	27.5	23.0	7.93	629	10.6	124
08/17/00 13:10	na	29.5	21.3	7.84	729	9.0	102
09/07/00 11:00	0.091	27.0	19.4	7.84	734	8.9	97
09/20/00 12:00	0.076	21.0	18.8	7.63	709	8.8	95
11/02/00 13:00	0.099	19.5	13.7	7.71	668	9.5	92
11/20/00 13:30	0.13	-3.5	0.4	8.00	747	14.4	100
12/01/00 14:00	0.12	1.0	3.9	7.93	697	14.5	110
12/13/00 12:20	0.15	-14.0	0.2	7.83	814	13.0	89
01/03/01 13:00	0.12	-4.0	0.3	7.76	733	12.6	87
01/22/01 15:00	0.14	2.0	2.0	7.63	765	16.1	117
02/06/01 15:00	0.94	5.5	4.1	7.79	636	13.1	101
02/26/01 13:30	0.90	2.0	4.2	7.40	425	12.1	93
03/14/01 13:45	0.71	10.5	8.0	7.85	522	3.8	84
04/02/01 13:20	0.68	15.5	9.2	7.64	613	14.5	126
04/19/01 14:00	0.52	21.0	12.0	7.58	623	11.6	108
05/02/01 13:40	0.30	29.0	19.0	7.98	654	12.1	131
05/15/01 13:20	0.37	33.0	20.5	8.11	669	12.3	137
05/30/01 10:30	0.62	22.0	16.5	7.96	656	11.8	121
06/11/01 11:50	2.4	32.0	17.9	7.54	646	8.8	93
06/26/01 11:55	0.67	30.5	21.5	7.76	682	10.9	123
07/10/01 11:40	0.94	30.5	21.5	7.67	676	9.8	111
07/25/01 11:50	0.34	31.0	25.4	7.73	669	10.0	122
08/06/01 11:05	0.57	32.0	23.2	7.77	666	9.9	117
08/20/01 12:20	0.15	25.0	20.7	7.90	688	13.4	150
09/12/01 11:20	0.15	na	na	na	na	na	na

Table A2. Field measurements for samples collected on Sugar Creek -- continued

[cms, cubic meters per second; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; mg/L, milligrams per liter; $^{\circ}\text{C}$, degrees Celsius; %, percent; na, not available]

Date-Time	Discharge cms	Air temperature $^{\circ}\text{C}$	Water temperature $^{\circ}\text{C}$	pH	Specific conductance $\mu\text{S}/\text{cm}$ at 25°C	Dissolved oxygen concentration mg/L	Dissolved oxygen concentration % Saturation
10/11/01 12:45	0.12	14.0	14.3	7.43	681	9.1	89
10/24/01 13:35	9.6	20.0	14.7	7.41	338	7.6	75
11/08/01 11:30	0.82	12.0	11.8	8.00	680	10.4	96
11/19/01 13:10	0.72	9.5	11.5	8.10	689	11.3	103
12/03/01 13:30	1.4	12.0	9.9	8.10	639	12.0	106
12/19/01 13:15	3.1	3.0	7.8	7.87	607	10.6	90
01/03/02 13:50	0.71	-2.5	2.4	8.10	693	14.0	103
01/15/02 14:40	0.55	0.5	4.0	8.33	687	14.5	111
01/29/02 14:10	0.48	5.5	6.8	8.33	686	13.3	109
02/13/02 13:10	0.92	4.0	4.9	8.16	669	10.2	80
02/27/02 14:40	1.9	-6.0	2.6	8.20	628	9.0	66
03/12/02 14:45	2.8	9.0	7.2	7.81	581	10.7	89
03/27/02 14:30	1.2	2.5	6.5	8.25	621	15.7	128
04/04/02 09:15	2.8	na	5.0	8.03	571	na	na
04/23/02 13:45	1.7	18.0	11.4	8.20	619	13.0	118
05/07/02 11:15	2.1	16.5	13.5	8.00	612	10.4	100
05/22/02 12:45	2.1	18.5	12.9	8.21	603	11.4	108
06/04/02 11:40	1.1	30.5	19.6	8.10	626	11.4	120
06/17/02 12:55	1.2	19.5	18.1	8.50	634	12.4	130

Table A3. Concentrations of nutrients, dissolved trace gases, chlorophyll-a, and suspended sediment in samples collected on the Iroquois River.

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg N/L, milligrams per liter as nitrogen; µg N/L, micrograms per liter as nitrogen; µg C/L, micrograms per liter as carbon; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	NO ₃	NO ₂	NH ₄	TDN	P		N ₂ O		CH ₄		Chlorophyll- <i>a</i>	Suspended Sediment
	mg N/L	µg N/L	µg N/L	mg N/L	µg/L		µg N/L		µg C/L		µg/L	mg/L
	Value	Value	Value	Value	Avg	SD	Avg	SD	Avg	SD	Value	Value
02/24/00 12:25	10.0	41	159	10.4	34	5	2.4	0.1	na	na	0.1	22
03/06/00 14:15	6.8	28	94	6.6	29	5	na	na	na	na	2.8	18
03/23/00 10:45	8.7	34	71	8.6	29	5	1.4	0.1	na	na	4.5	30
04/03/00 17:45	4.0	66	89	4.4	36	2	na	na	na	na	na	16
04/24/00 12:00	14.0	60	145	13.6	45	5	4.1	0.1	na	na	2.2	8
05/01/00 18:10	7.2	41	99	7.3	34	6	na	na	na	na	na	19
05/18/00 09:35	7.4	37	na	8.2	35	4	1.1	0.0	na	na	3.1	40
06/06/00 10:05	14.0	69	80	13.7	46	7	2.9	0.6	na	na	4.7	55
06/23/00 09:55	17.1	84	147	17.4	60	2	6.8	0.2	na	na	2.5	16
07/05/00 13:15	11.9	60	27	12.5	100	0	6.5	0.1	na	na	0.9	12
07/26/00 11:50	2.4	27	117	2.8	73	2	0.6	0.1	na	na	1.2	38
08/07/00 09:35	2.2	31	109	2.4	78	2	0.9	0.1	na	na	6.1	33
08/17/00 11:15	0.84	10	126	1.1	120	0	0.3	0.0	na	na	na	9
09/07/00 09:30	0.75	8	111	0.9	110	0	0.4	0.0	na	na	5.5	32
09/20/00 13:00	0.70	83	195	1.0	120	0	0.7	0.0	na	na	4.0	36
11/02/00 10:30	0.57	< 5	< 2	0.7	81	2	0.6	0.1	na	na	8.0	26
11/20/00 11:40	4.1	26	na	4.4	53	2	1.1	0.0	na	na	0.2	7
12/01/00 11:30	4.1	23	na	4.3	46	1	0.8	na	6.9	na	1.6	10
12/13/00 15:00	3.6	27	109	4.7	46	2	2.1	na	14	na	0.2	17
01/03/01 11:20	4.2	94	322	4.8	98	18	1.7	0.1	1.2	0.3	2.4	6
01/22/01 13:00	8.2	42	273	9.1	83	1	2.9	0.0	4.7	0.2	< 0.1	8
02/06/01 13:30	11.0	44	192	11.5	45	4	2.3	0.0	4.6	0.4	0.1	7
02/26/01 12:00	6.6	24	270	7.6	260	100	2.3	0.0	1.1	0.1	< 0.1	23
03/14/01 11:30	9.7	29	94	10.3	22	6	2.0	0.2	3.9	0.4	2.4	15
04/02/01 11:50	7.5	39	28	7.1	21	2	0.9	0.0	4.3	0.1	0.2	22
04/19/01 11:50	10.4	28	34	11.1	22	5	1.1	0.2	6.9	0.8	0.2	14
05/02/01 12:20	7.5	82	146	8.2	36	4	0.6	0.0	2.4	0.1	0.4	31
05/15/01 12:10	5.2	49	102	5.7	50	11	0.6	0.0	4.5	0.0	0.1	21
05/30/01 10:48	11.6	44	64	12.4	25	3	1.0	0.0	3.3	0.2	7.7	50
06/11/01 10:30	15.9	120	149	16.5	74	10	4.0	0.0	2.7	0.1	4.6	14
06/26/01 10:05	6.6	32	108	7.1	41	1	0.7	0.0	12	0	4.8	36
07/10/01 10:20	7.3	43	454	8.0	130	20	1.0	0.0	4.5	2.3	7.5	87
07/25/01 10:15	6.6	30	100	6.9	77	1	0.7	0.0	8.5	0.0	7.8	22
08/06/01 09:50	2.1	25	132	2.6	77	2	0.6	0.0	19	0	9.4	26
08/20/01 10:35	0.80	23	170	1.2	87	20	0.4	0.0	17	0	8.6	11

Table A3. Concentrations of nutrients, dissolved trace gases, chlorophyll-a, and suspended sediment in samples collected on the Iroquois River -- continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg N/L, milligrams per liter as nitrogen; µg N/L, micrograms per liter as nitrogen; µg C/L, micrograms per liter as carbon; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	NO ₃	NO ₂	NH ₄	TDN	P		N ₂ O		CH ₄		Chlorophyll- <i>a</i>	Suspended Sediment
	mg N/L	µg N/L	µg N/L	mg N/L	µg/L		µg N/L		µg C/L		µg/L	mg/L
	Value	Value	Value	Value	Avg	SD	Avg	SD	Avg	SD	Value	Value
09/13/01 08:30	1.4	18	62	1.8	130	20	0.4	0.0	23	0	6.1	78
10/11/01 10:15	4.3	74	242	4.7	53	1	0.9	0.0	10	0	5.5	5
10/24/01 11:05	7.3	64	36	7.5	110	10	3.3	0.0	1.7	0.2	1.4	< 5
11/08/01 10:20	7.5	32	70	7.9	35	1	1.2	0.1	4.2	0.9	< 0.1	4
11/19/01 10:45	5.8	22	54	6.3	30	1	0.7	0.0	5.0	0.1	4.2	< 2
12/03/01 12:05	9.5	26	64	9.9	25	1	1.6	0.0	5.6	2.6	2.9	11
12/19/01 11:30	11.0	21	72	11.4	45	na	2.1	0.1	2.8	0.2	2.1	6
01/03/02 11:25	7.5	17	145	7.8	20	5	1.8	0.1	15	0	0.4	< 2
01/15/02 11:30	5.7	18	60	6.0	< 10	0	0.8	0.0	5.6	0.0	0.8	4
01/29/02 11:35	5.4	11	34	5.4	na	na	0.7	0.0	3.7	0.1	5.3	10
02/13/02 10:55	8.9	11	147	8.7	27	6	0.9	0.0	2.5	0.3	1.0	< 2
02/27/02 12:00	9.5	13	59	9.7	29	7	1.4	0.0	2.7	0.3	0.7	6
03/12/02 11:40	9.8	14	347	10.1	47	3	2.0	0.0	1.7	0.0	1.3	9
03/27/02 11:30	7.3	9	46	7.3	14	4	1.1	0.0	4.3	0.3	0.7	3
04/03/02 11:05	8.5	20	40	9.8	45	6	2.4	0.0	3.0	0.1	0.1	9
04/23/02 10:00	6.8	26	77	7.1	19	1	1.0	0.0	2.9	0.1	1.6	9
05/07/02 08:55	8.1	38	95	8.2	27	4	1.2	0.0	2.0	0.0	5.6	21
05/22/02 10:00	8.0	64	na	8.1	68	4	1.9	0.0	3.2	0.1	1.2	7
06/04/02 09:45	5.9	42	112	6.1	34	2	0.7	0.0	6.7	0.1	4.4	34
06/17/02 10:00	7.6	33	na	7.6	37	4	0.7	0.0	3.6	0.3	2.0	21

Table A4. Concentrations of nutrients, dissolved trace gases, chlorophyll-a, and suspended sediment in samples collected on Sugar Creek.

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg N/L, milligrams per liter as nitrogen; µg N/L, micrograms per liter as nitrogen; µg C/L, micrograms per liter as carbon; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	NO ₃	NO ₂	NH ₄	TDN	P		N ₂ O		CH ₄		Chlorophyll- <i>a</i>	Suspended Sediment
	mg N/L	µg N/L	µg N/L	mg N/L	µg/L		µg N/L		µg C/L		µg/L	mg/L
	Value	Value	Value	Value	Avg	SD	Avg	SD	Avg	SD	Value	Value
02/24/00 15:55	8.7	32	na	8.9	14	4	1.6	0.3	na	na	0.1	5
03/06/00 16:30	7.6	24	72	7.7	7	4	na	na	na	na	2.7	10
03/23/00 12:50	10.7	22	16	10.5	8	6	1.3	0.1	na	na	0.4	< 2
04/03/00 16:00	6.6	25	na	6.5	7	5	na	na	na	na	na	5
04/24/00 14:30	13.4	26	38	13.1	10	4	1.4	0.0	na	na	2.1	10
05/01/00 16:00	9.0	35	49	8.9	12	4	na	na	na	na	na	4
05/18/00 11:40	12.3	30	na	11.8	12	3	0.7	0.2	na	na	2.9	10
06/06/00 12:40	12.2	23	15	11.8	7	3	1.1	0.1	na	na	0.9	2
06/23/00 12:20	16.7	23	na	16.1	17	4	2.0	0.1	na	na	1.5	12
07/05/00 12:10	14.3	15	na	14.1	36	1	1.9	0.3	na	na	1.7	21
07/26/00 13:05	5.5	27	149	5.6	10	0	1.0	0.0	na	na	1.6	< 2
08/07/00 10:25	1.9	18	20	1.9	17	1	0.8	0.1	na	na	3.2	< 2
08/17/00 13:10	0.70	< 5	19	0.6	8	1	0.8	0.1	na	na	na	< 15
09/07/00 11:00	1.1	85	na	1.2	16	1	0.8	0.1	na	na	na	7
09/20/00 12:00	0.72	< 5	28	0.6	12	2	0.4	0.0	na	na	na	7
11/02/00 13:00	0.48	< 5	19	0.4	9	1	0.5	0.1	na	na	5.7	46
11/20/00 13:30	3.2	20	na	3.2	13	2	0.8	0.0	na	na	na	7
12/01/00 14:00	2.0	15	na	1.9	10	0	0.6	na	5.1	0.0	0.2	5
12/13/00 12:20	3.1	23	73	3.3	9	1	1.0	na	1.0	0.0	0.2	8
01/03/01 13:00	3.0	40	119	3.6	10	4	1.1	0.0	1.4	0.0	1.2	2
01/22/01 15:00	6.8	40	76	7.1	27	8	1.0	0.0	0.8	0.1	0.1	21
02/06/01 15:00	9.7	25	217	9.5	45	7	1.0	0.0	1.3	0.1	0.1	6
02/26/01 13:30	10.5	14	151	10.2	190	70	3.1	0.1	0.5	0.3	0.5	81
03/14/01 13:45	10.6	17	63	10.5	12	5	1.0	0.1	0.4	0.1	0.3	< 2
04/02/01 13:20	9.2	29	na	9.8	< 7	2	1.0	0.1	0.5	0.3	0.1	14
04/19/01 14:00	13.1	16	na	13.3	20	4	1.2	0.1	1.5	0.4	0.1	9
05/02/01 13:40	11.1	45	na	10.8	< 7	5	0.8	0.0	1.2	0.2	0.2	19
05/15/01 13:20	8.0	45	17	8.6	7	3	1.0	0.0	1.4	0.0	0.2	15
05/30/01 10:30	11.8	42	33	12.2	12	3	1.4	0.0	1.3	0.0	4.6	19
06/11/01 11:50	16.0	34	na	16.4	35	6	2.0	0.1	1.2	0.3	1.6	24
06/26/01 11:55	10.5	35	na	10.9	9	4	1.0	0.0	0.9	0.1	3.4	16
07/10/01 11:40	11.7	27	31	12.1	14	7	1.1	0.0	1.1	0.0	2.1	19
07/25/01 11:50	2.8	26	na	2.9	13	6	0.5	0.0	1.2	0.2	6.2	5
08/06/01 11:05	1.2	15	27	2.5	9	3	0.9	0.0	2.0	0.1	8.2	7
08/20/01 12:20	0.83	8	na	0.9	8	0	0.4	0.0	1.6	0.3	na	4

Table A4. Concentrations of nutrients, dissolved trace gases, chlorophyll-a, and suspended sediment in samples collected on Sugar Creek -- continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg N/L, milligrams per liter as nitrogen; µg N/L, micrograms per liter as nitrogen; µg C/L, micrograms per liter as carbon; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	NO ₃	NO ₂	NH ₄	TDN	P		N ₂ O		CH ₄		Chlorophyll- <i>a</i>	Suspended Sediment
	mg N/L	µg N/L	µg N/L	mg N/L	µg/L		µg N/L		µg C/L		µg/L	mg/L
	Value	Value	Value	Value	Avg	SD	Avg	SD	Avg	SD	Value	Value
09/12/01 11:20	1.1	19	45	1.3	18	2	0.5	0.0	5.4	0.1	4.8	6
10/11/01 12:45	1.6	7	na	1.7	8	2	0.6	0.0	1.7	0.0	1.3	< 2
10/24/01 13:35	5.0	5	na	5.3	96	27	1.3	0.0	0.2	0.2	2.3	76
11/08/01 11:30	7.6	14	21	7.7	13	1	0.8	0.0	1.8	0.6	0.6	< 2
11/19/01 13:10	6.6	18	na	6.3	4	2	0.6	0.0	0.7	0.0	2.9	< 5
12/03/01 13:30	9.3	11	53	9.3	30	2	1.0	0.1	1.0	0.0	na	< 2
12/19/01 13:15	10.3	9	43	10.3	36	na	1.4	0.1	2.4	0.1	4.1	13
01/03/02 13:50	7.9	11	40	7.9	< 10	0	0.9	0.0	2.5	0.1	0.6	< 2
01/15/02 14:40	6.4	14	30	6.5	< 10	0	0.7	0.0	1.7	0.1	1.1	5
01/29/02 14:10	5.6	15	na	5.6	< 10	na	0.7	0.0	2.0	0.3	7.6	7
02/13/02 13:10	9.1	6	21	8.6	13	6	0.9	0.1	1.8	0.2	0.2	2
02/27/02 14:40	9.8	< 5	na	9.5	20	5	1.1	0.0	0.8	0.1	na	< 2
03/12/02 14:45	9.8	< 5	na	9.8	35	2	1.2	0.1	1.1	0.6	0.6	16
03/27/02 14:30	8.8	8	na	8.7	< 6	6	0.9	0.0	1.5	0.0	0.5	< 2
04/04/02 09:15	8.8	7	20	10.1	18	3	1.4	0.0	1.3	0.1	na	18
04/23/02 13:45	10.1	10	48	9.9	< 6	2	1.0	0.0	1.4	0.1	1.6	10
05/07/02 11:15	10.3	9	na	10.2	13	5	0.9	0.0	0.5	0.1	1.4	21
05/22/02 12:45	11.0	9	14	10.8	9	1	1.2	0.1	0.7	0.1	0.2	8
06/04/02 11:40	9.1	24	26	8.9	13	2	1.0	0.0	0.6	0.0	2.5	3
06/17/02 12:55	9.7	24	5	9.5	< 6	4	0.8	0.0	0.7	0.2	4.7	7

Table A5. Concentrations of dissolved major cations and anions (excepting carbonate and bicarbonate) and silica in samples collected on the Iroquois River.

[mg/L, milligrams per liter; µg/L, micrograms per liter; Avg, average; SD, standard deviation; na, not available]

Date-Time	Cl		SO ₄		Br		Na		K		Mg		Ca		SiO ₂	
	mg/L		mg/L		µg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
	Value	Value	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	35	109	14	1	14	0	3.1	0.1	26	0	90	3	6.5	0.1		
03/06/00 14:15	34	106	12	1	15	1	2.6	0.1	29	0	96	1	4.0	0.2		
03/23/00 10:45	40	114	8.0	0.2	16	0	2.6	0.0	29	1	99	4	4.5	0.1		
04/03/00 17:45	33	91	10	1	17	1	2.5	0.0	29	1	89	5	2.8	0.1		
04/24/00 12:00	33	86	8.9	0.3	10	0	2.7	0.0	28	0	90	1	8.3	0.5		
05/01/00 18:10	32	86	9.1	0.3	13	0	2.0	0.0	28	1	86	1	4.5	0.1		
05/18/00 09:35	27	69	8.6	0.6	12	1	1.9	0.0	28	1	92	1	5.8	0.2		
06/06/00 10:05	31	67	8.6	1.0	9.6	0.6	2.3	0.0	28	1	88	1	7.3	0.3		
06/23/00 09:55	28	58	9.1	0.4	7.5	0.1	3.8	0.0	25	0	86	0	11	0		
07/05/00 13:15	23	39	7.9	1.0	6.1	0.0	1.3	0.0	27	1	69	1	9.8	0.1		
07/26/00 11:50	40	78	12	0	18	1	2.4	0.0	27	0	86	0	7.4	0.1		
08/07/00 09:35	41	70	14	1	19	0	3.2	0.1	27	0	85	0	9.7	0.1		
08/17/00 11:15	54	74	15	0	28	0	3.4	0.1	28	1	83	1	9.8	0.2		
09/07/00 09:30	53	77	24	2	28	1	3.6	0.1	29	1	80	0	13	0		
09/20/00 13:00	54	80	20	2	28	2	4.9	0.1	27	1	83	0	12	0		
11/02/00 10:30	45	81	17	1	23	1	3.8	0.1	27	0	86	0	6.9	0.0		
11/20/00 11:40	39	99	14	2	16	0	3.2	0.0	28	0	99	2	10	0		
12/01/00 11:30	39	94	13	1	16	0	3.2	0.0	27	0	96	0	8.2	0.1		
12/13/00 15:00	49	78	14	1	27	1	3.0	0.0	29	0	100	0	7.2	0.0		
01/03/01 11:20	47	90	13	1	20	2	2.4	0.3	25	3	93	3	9.6	0.7		
01/22/01 13:00	46	103	11	1	17	1	2.4	0.1	29	0	100	0	8.7	0.3		
02/06/01 13:30	37	83	10	1	13	0	2.4	0.0	27	0	96	3	7.7	0.0		
02/26/01 12:00	17	22	5.6	0.3	4.4	0.1	4.7	0.3	9.3	0.5	31	3	4.9	0.3		
03/14/01 11:30	32	87	10	1	10	0	2.5	0.0	26	0	92	2	5.5	0.3		
04/02/01 11:50	34	86	10	1	11	0	2.1	0.0	27	0	89	4	1.9	0.1		
04/19/01 11:50	35	75	11	1	11	0	1.9	0.0	27	1	91	2	4.0	0.1		
05/02/01 12:20	35	75	10	1	11	0	1.9	0.0	26	0	81	2	4.3	0.2		
05/15/01 12:10	35	76	9.1	0.2	13	0	1.8	0.1	27	1	87	1	5.7	0.2		
05/30/01 10:48	33	80	9.7	0.6	8.8	0.0	2.0	0.1	26	2	92	5	7.6	0.6		
06/11/01 10:30	28	57	8.5	0.3	6.9	0.2	3.0	0.1	23	1	81	2	9.0	0.4		
06/26/01 10:05	33	71	11	1	12	0	2.1	0.1	26	0	89	3	6.2	0.1		
07/10/01 10:20	17	27	7.1	0.1	5.2	0.2	3.1	0.2	15	0	49	0	6.7	0.0		
07/25/01 10:15	26	41	9.0	1.8	9.4	0.1	2.9	0.0	21	1	66	1	10	0		
08/06/01 09:50	42	64	13	1	18	1	3.5	0.1	26	1	80	2	11	0		
08/20/01 10:35	40	67	14	0	19	1	3.5	0.2	24	0	74	3	12	0		
09/13/01 08:30	32	67	13	1	21	0	4.9	0.2	26	0	82	1	12	0		

Table A5. Concentrations of dissolved major cations and anions (excepting carbonate and bicarbonate) and silica in samples collected on the Iroquois River -- continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; Avg, average; SD, standard deviation; na, not available]

Date-Time	Cl		SO ₄		Br		Na		K		Mg		Ca		SiO ₂	
	mg/L		mg/L		µg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
	Value	Value	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	44	82	12	1	18	1	3.9	0.2	26	0	86	7	7.8	0.1		
10/24/01 11:05	18	36	6.7	1.1	4.5	0.1	5.0	0.0	16	0	53	3	9.1	0.3		
11/08/01 10:20	30	78	8.0	0.6	9.8	0.1	2.7	0.0	28	0	98	0	10	0		
11/19/01 10:45	31	81	8.4	0.4	11	0	2.8	0.0	28	0	99	0	7.6	0.1		
12/03/01 12:05	30	72	10	1	9.0	0.0	2.6	0.0	27	0	89	6	7.3	0.6		
12/19/01 11:30	29	60	11	1	7.8	0.1	2.7	0.0	27	0	81	na	9.2	na		
01/03/02 11:25	32	82	12	1	12	0	2.0	0.0	30	1	93	4	9.3	0.5		
01/15/02 11:30	33	83	12	1	13	0	2.2	0.0	27	1	85	12	8.4	1.5		
01/29/02 11:35	33	86	12	0	13	1	2.1	0.0	27	2	na	na	na	na		
02/13/02 10:55	29	78	11	0	9.4	0.1	2.1	0.0	25	0	92	0	7.8	0.1		
02/27/02 12:00	32	67	10	0	11	0	2.1	0.0	24	0	84	0	7.6	0.0		
03/12/02 11:40	26	58	9.1	0.3	7.8	0.2	2.7	0.1	21	0	74	0	7.9	0.0		
03/27/02 11:30	35	70	10	0	14	0	1.9	0.0	23	0	82	0	5.7	0.0		
04/03/02 11:05	25	48	8.5	0.1	8.0	0.2	2.4	0.0	20	0	68	0	6.4	0.1		
04/23/02 10:00	27	66	9.8	0.0	9.3	0.1	2.1	0.0	23	0	81	1	6.6	0.1		
05/07/02 08:55	26	61	12	0	8.7	0.2	1.8	0.1	23	0	80	0	5.1	0.1		
05/22/02 10:00	22	54	9.3	0.9	6.9	0.2	2.9	0.0	20	0	73	0	7.6	0.1		
06/04/02 09:45	25	63	10	0	8.9	0.1	2.0	0.0	23	0	79	0	4.5	0.1		
06/17/02 10:00	26	60	11	0	8.9	0.0	1.9	0.0	24	0	83	1	7.5	0.0		

Table A6. Concentrations of dissolved major cations and anions (excepting carbonate and bicarbonate) and silica in samples collected on Sugar Creek.

[mg/L, milligrams per liter; µg/L, micrograms per liter; Avg, average; SD, standard deviation; na, not available]

Date-Time	Cl		SO ₄		Br		Na		K		Mg		Ca		SiO ₂	
	mg/L		mg/L		µg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
	Value	Value	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	30	89	12	1	12	1	1.6	0.0	28	1	85	4	6.5	0.2		
03/06/00 16:30	25	83	9.1	0.2	11	0	1.4	0.0	32	1	81	2	3.5	0.1		
03/23/00 12:50	29	75	6.6	0.4	10	0	1.1	0.0	31	1	84	1	4.9	0.1		
04/03/00 16:00	25	88	7.4	0.1	10	0	1.3	0.0	34	1	79	3	2.8	0.1		
04/24/00 14:30	26	63	7.2	0.4	8.5	0.3	0.92	0.01	31	1	81	1	6.8	0.4		
05/01/00 16:00	23	72	6.5	0.6	8.2	0.2	1.0	0.0	31	0	77	1	4.4	0.2		
05/18/00 11:40	23	63	7.1	0.6	7.2	0.1	0.98	0.03	32	0	87	6	5.5	0.1		
06/06/00 12:40	23	63	7.2	0.9	7.6	0.3	0.94	0.01	32	1	88	3	6.0	0.1		
06/23/00 12:20	22	49	8.1	0.7	6.3	0.4	0.96	0.04	31	0	86	1	9.0	0.2		
07/05/00 12:10	21	44	7.3	0.4	7.1	0.3	4.0	0.1	21	1	80	1	10	0		
07/26/00 13:05	19	88	7.9	0.2	7.3	0.0	1.3	0.0	33	1	90	0	5.0	0.1		
08/07/00 10:25	19	102	11	3	8.6	0.4	1.6	0.1	33	0	91	0	6.9	0.1		
08/17/00 13:10	16	135	8.3	0.2	7.6	0.1	1.7	0.0	35	1	98	1	8.2	0.1		
09/07/00 11:00	18	118	12	1	9.8	1.1	2.1	0.1	36	0	95	0	8.8	0.1		
09/20/00 12:00	17	116	9.5	0.6	9.3	0.7	2.0	0.2	34	0	92	0	7.6	0.1		
11/02/00 13:00	17	118	9.8	1.0	11	0	2.0	0.1	36	0	96	1	7.0	0.1		
11/20/00 13:30	22	120	11	1	11	0	1.6	0.1	35	1	100	0	7.0	0.2		
12/01/00 14:00	22	111	9.4	0.4	12	0	1.7	0.1	33	0	92	0	4.0	0.1		
12/13/00 12:20	59	88	10	1	29	0	1.9	0.1	32	0	93	0	4.7	0.1		
01/03/01 13:00	24	114	8	1	10	1	1.4	0.2	31	3	95	0	7.7	0.2		
01/22/01 15:00	31	104	8	1	11	1	1.4	0.2	29	0	89	0	7.1	2.3		
02/06/01 15:00	26	67	7.6	0.4	7.0	0.0	1.3	0.0	26	0	80	3	7.2	0.0		
02/26/01 13:30	17	36	5.5	0.6	3.9	0.0	2.3	0.1	15	1	48	5	7.5	0.3		
03/14/01 13:45	23	72	9.1	0.3	6.2	0.2	0.99	0.01	27	2	81	8	6.2	0.3		
04/02/01 13:20	22	72	8.7	1.0	6.2	0.3	0.9	0.0	27	1	76	4	3.2	0.1		
04/19/01 14:00	22	57	8.6	0.4	5.4	0.1	1.1	0.0	27	1	81	1	6.2	0.2		
05/02/01 13:40	23	70	8.3	1.3	5.8	0.3	1.0	0.1	26	0	76	1	1.9	0.1		
05/15/01 13:20	20	72	7.0	0.2	6.7	0.0	1.1	0.0	31	1	87	1	4.3	0.1		
05/30/01 10:30	22	68	8.9	0.9	6.2	0.3	0.93	0.07	28	1	80	1	6.6	0.4		
06/11/01 11:50	20	55	8.3	1.3	5.1	0.1	1.3	0.0	25	1	78	0	8.6	0.3		
06/26/01 11:55	20	72	8.7	0.2	6.0	0.2	1.1	0.0	30	0	86	1	5.4	0.1		
07/10/01 11:40	21	61	9.3	0.1	6.4	0.5	1.1	0.1	30	1	85	8	9.0	0.3		
07/25/01 11:50	19	91	7.5	0.1	8.3	0.1	1.6	0.0	33	1	91	8	8.6	0.2		
08/06/01 11:05	18	108	9.8	0.6	8.3	0.2	1.7	0.1	33	0	85	1	7.6	0.3		
08/20/01 12:20	18	113	8.9	0.5	8.9	0.3	1.7	0.1	32	1	82	2	4.4	0.1		
09/12/01 11:20	16	107	14	0	11	0	2.3	0.0	32	0	88	2	8.7	0.2		

Table A6. Concentrations of dissolved major cations and anions (excepting carbonate and bicarbonate) and silica in samples collected on Sugar Creek -- continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; Avg, average; SD, standard deviation; na, not available]

Date-Time	Cl		SO ₄		Br		Na		K		Mg		Ca		SiO ₂	
	mg/L		mg/L		µg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
	Value	Value	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	24	102	8.0	0.9	11	0	2.8	0.0	31	1	85	6	7.5	0.2		
10/24/01 13:35	10	17	4.8	1.2	2.4	0.1	3.2	0.0	13	0	39	4	8.7	0.1		
11/08/01 11:30	20	66	6.5	0.6	6.5	0.4	1.2	0.0	32	0	93	0	8.3	0.1		
11/19/01 13:10	20	73	6.9	0.6	6.8	0.0	1.2	0.0	31	2	91	0	4.8	0.3		
12/03/01 13:30	22	51	8	0	6.0	0.0	1.0	0.0	30	0	86	5	9.1	0.8		
12/19/01 13:15	21	41	8	0	5.4	0.0	1.3	0.0	27	2	76	na	9.1	na		
01/03/02 13:50	20	70	9	1	6.4	0.1	1.1	0.0	32	1	90	6	7.8	0.6		
01/15/02 14:40	20	77	9	0	6.7	0.1	1.1	0.0	32	1	88	3	5.5	0.4		
01/29/02 14:10	20	84	9	1	7.3	0.0	1.2	0.0	32	0	86	na	3.5	na		
02/13/02 13:10	20	65	9.0	0.0	6.3	0.2	1.0	0.0	29	0	89	1	7.9	0.1		
02/27/02 14:40	20	56	9.3	2.8	6.1	0.1	0.97	0.07	27	0	81	0	8.0	0.0		
03/12/02 14:45	19	49	7.8	0.6	5.1	0.1	1.2	0.0	24	0	75	0	8.0	0.1		
03/27/02 14:30	20	59	8.2	0.1	6.0	0.2	0.93	0.01	26	0	80	1	6.5	0.1		
04/04/02 09:15	17	46	7.2	0.1	5.0	0.2	1.1	0.0	24	0	73	0	7.4	0.1		
04/23/02 13:45	19	52	7.9	0.7	5.6	0.1	0.89	0.05	26	0	80	0	7.1	0.0		
05/07/02 11:15	18	54	8.3	0.3	5.4	0.2	0.98	0.02	26	0	78	0	6.8	0.1		
05/22/02 12:45	17	52	8.4	0.6	5.1	0.1	1.00	0.03	25	0	77	1	7.0	0.1		
06/04/02 11:40	17	61	8.3	0.4	5.3	0.0	0.97	0.03	27	0	80	1	3.0	0.0		
06/17/02 12:55	18	55	9.2	0.5	5.4	0.1	0.95	0.06	27	0	82	1	5.5	0.1		

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River.

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Al		As		B		Ba		Be		Bi		Cd	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	1.6	0.0	0.66	0.01	32	2	61	1	< 0.005	0.002	< 0.002	0.000	0.048	0.001
03/06/00 14:15	1.6	0.1	0.73	0.01	46	3	66	1	< 0.005	0.002	< 0.002	0.000	0.021	0.005
03/23/00 10:45	1.5	0.1	0.76	0.03	38	5	67	1	< 0.005	0.001	0.002	0.001	0.031	0.001
04/03/00 17:45	1.8	0.1	0.85	0.01	53	1	63	3	< 0.005	0.002	0.002	0.001	0.019	0.004
04/24/00 12:00	1.8	0.0	0.70	0.01	36	4	61	1	< 0.005	0.002	0.002	0.002	0.017	0.001
05/01/00 18:10	1.7	0.1	0.79	0.03	44	2	61	1	< 0.005	0.002	0.002	0.001	0.038	0.004
05/18/00 09:35	1.5	0.1	0.82	0.01	48	6	65	0	< 0.005	0.001	< 0.002	0.000	0.017	0.001
06/06/00 10:05	1.3	0.1	0.70	0.02	40	4	64	1	< 0.005	0.001	0.003	0.001	0.022	0.002
06/23/00 09:55	< 1	10	0.79	0.04	45	1	67	1	< 0.01	0.00	< 0.002	0.001	0.012	0.001
07/05/00 13:15	< 1	14	0.48	0.05	49	1	54	1	< 0.01	0.01	< 0.002	0.000	0.008	0.004
07/26/00 11:50	< 0.2	1.0	1.2	0.0	85	0	73	0	< 0.005	0.005	< 0.001	0.001	< 0.002	0.001
08/07/00 09:35	2.0	0.1	1.5	0.0	94	1	74	2	< 0.01	0.00	< 0.002	0.001	0.006	0.002
08/17/00 11:15	< 0.2	0.3	2.0	0.0	120	0	79	0	0.006	0.005	< 0.001	0.000	0.003	0.001
09/07/00 09:30	1.7	0.3	2.1	0.0	170	0	80	5	< 0.01	0.01	< 0.002	0.001	< 0.001	0.000
09/20/00 13:00	1.7	0.1	1.9	0.0	140	0	87	2	< 0.01	0.01	< 0.002	0.000	0.005	0.002
11/02/00 10:30	2.9	0.2	1.5	0.1	120	10	83	0	< 0.01	0.01	< 0.002	0.001	0.003	0.002
11/20/00 11:40	0.08	0.15	0.76	0.05	67	1	74	4	< 0.01	0.01	< 0.002	0.000	0.035	0.005
12/01/00 11:30	< 0.06	0.58	0.63	0.03	64	2	72	2	< 0.01	0.01	< 0.002	0.002	0.020	0.000
12/13/00 15:00	< 0.06	0.71	0.46	0.09	65	4	73	3	< 0.01	0.00	< 0.002	0.000	0.046	0.004
01/03/01 11:20	< 0.6	6.5	0.47	0.02	62	9	67	0	< 0.01	0.01	0.004	0.0026	0.043	0.031
01/22/01 13:00	< 0.6	5.3	0.52	0.04	45	14	67	1	< 0.01	0.01	0.002	0.0007	0.020	0.003
02/06/01 13:30	4.7	0.0	0.44	0.02	38	1	59	1	< 0.02	0.00	< 0.002	0.000	0.012	0.004
02/26/01 12:00	14	0	0.64	0.05	18	3	27	1	0.01	0.01	< 0.001	0.000	0.021	0.002
03/14/01 11:30	2.5	0.1	0.50	0.02	38	0	61	1	< 0.02	0.00	< 0.002	0.000	< 0.002	0.001
04/02/01 11:50	2.2	0.1	0.57	0.04	45	2	61	1	< 0.02	0.01	0.003	0.001	< 0.002	0.003
04/19/01 11:50	2.0	0.2	0.52	0.03	40	1	56	1	< 0.02	0.00	0.002	0.001	0.008	0.003
05/02/01 12:20	1.8	0.0	0.92	0.06	47	2	64	2	< 0.01	0.01	< 0.001	0.000	0.008	0.004
05/15/01 12:10	1.4	0.2	0.99	0.04	58	0	66	1	< 0.01	0.00	0.001	0.000	0.014	0.003
05/30/01 10:48	1.4	0.0	0.86	0.06	43	3	67	2	< 0.01	0.01	< 0.001	0.000	0.016	0.001
06/11/01 10:30	3.0	0.1	0.75	0.08	39	0	59	5	< 0.01	0.00	< 0.001	0.001	0.018	0.003
06/26/01 10:05	1.7	0.0	1.0	0.0	54	1	68	7	0.01	0.01	< 0.001	0.000	0.012	0.002
07/10/01 10:20	6.4	0.2	0.83	0.04	42	1	40	1	< 0.02	0.00	< 0.002	0.001	0.014	0.005
07/25/01 10:15	3.0	0.1	1.3	0.1	58	2	58	2	< 0.01	0.00	< 0.001	0.000	0.010	0.003
08/06/01 09:50	2.3	0.2	2.2	0.1	85	1	75	0	< 0.01	0.01	< 0.001	0.000	0.022	0.001
08/20/01 10:35	1.7	0.0	2.0	0.0	84	1	70	3	< 0.01	0.01	< 0.001	0.000	0.029	0.002
09/13/01 08:30	< 0.3	0.8	3.1	0.1	100	0	69	2	< 0.05	0.07	< 0.002	0.001	< 0.006	0.005

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Al		As		B		Ba		Be		Bi		Cd	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	1.0	0.1	1.2	0.1	73	5	80	2	< 0.01	0.01	< 0.001	0.000	0.015	0.006
10/24/01 11:05	8.9	0.6	0.69	0.04	34	1	45	1	< 0.01	0.01	< 0.001	0.001	0.022	0.003
11/08/01 10:20	2.0	0.1	0.71	0.05	51	9	68	4	< 0.01	0.01	< 0.001	0.000	0.007	0.003
11/19/01 10:45	1.6	0.0	0.75	0.03	59	9	71	3	< 0.01	0.01	< 0.001	0.001	0.005	0.005
12/03/01 12:05	< 0.1	0.3	0.51	0.01	48	9	62	3	0.013	0.005	< 0.001	0.001	0.017	0.003
12/19/01 11:30	2.3	0.2	0.52	0.02	37	na	57	2	< 0.007	0.003	< 0.002	0.001	0.016	0.006
01/03/02 11:25	1.0	0.2	0.46	0.02	50	11	67	0	< 0.007	0.004	< 0.002	0.001	0.013	0.001
01/15/02 11:30	1.1	0.2	0.49	0.01	36	10	66	2	< 0.007	0.004	< 0.002	0.001	0.010	0.003
01/29/02 11:35	0.5	0.5	0.55	0.07	na	na	68	0	< 0.007	0.004	< 0.002	0.001	0.010	0.003
02/13/02 10:55	2.4	0.1	0.56	0.04	38	2	57	1	< 0.01	0.01	< 0.002	0.001	< 0.003	0.004
02/27/02 12:00	2.7	0.0	0.55	0.01	32	1	51	0	< 0.01	0.00	< 0.002	0.000	< 0.003	0.000
03/12/02 11:40	5.3	0.1	0.55	0.01	28	0	47	0	< 0.01	0.00	0.002	0.001	< 0.003	0.002
03/27/02 11:30	1.9	0.0	0.55	0.00	36	0	52	0	< 0.01	0.01	< 0.002	0.001	< 0.003	0.003
04/03/02 11:05	4.8	0.1	0.49	0.00	26	1	43	0	< 0.01	0.00	0.004	0.004	0.006	0.002
04/23/02 10:00	1.9	0.1	0.71	0.02	39	1	53	0	< 0.01	0.00	< 0.002	0.001	< 0.003	0.002
05/07/02 08:55	2.1	0.1	0.72	0.01	40	0	53	1	< 0.01	0.00	0.002	0.001	< 0.003	0.002
05/22/02 10:00	4.7	0.1	0.74	0.02	35	0	51	0	< 0.01	0.01	< 0.002	0.001	< 0.003	0.002
06/04/02 09:45	2.2	0.1	0.95	0.01	47	2	62	1	< 0.01	0.00	< 0.002	0.001	< 0.003	0.001
06/17/02 10:00	1.6	0.0	0.90	0.00	50	2	61	0	< 0.01	0.01	< 0.002	0.000	< 0.003	0.001

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ce		Co		Cr		Cs		Cu		Dy	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	0.015	0.001	< 0.001	0.009	< 0.1	0.0	0.005	0.003	< 0.06	0.19	0.0040	0.0005
03/06/00 14:15	0.025	0.000	0.017	0.019	< 0.1	0.0	0.002	0.001	< 0.06	0.07	0.0047	0.0004
03/23/00 10:45	0.023	0.001	0.008	0.013	< 0.1	0.0	0.002	0.001	< 0.06	0.26	0.0046	0.0000
04/03/00 17:45	0.031	0.000	0.005	0.007	< 0.1	0.1	0.019	0.011	< 0.06	0.15	0.0049	0.0004
04/24/00 12:00	0.016	0.000	< 0.001	0.010	< 0.1	0.0	0.002	0.000	< 0.06	0.17	0.0053	0.0003
05/01/00 18:10	0.014	0.001	< 0.001	0.029	< 0.1	0.0	0.001	0.000	< 0.06	0.12	0.0039	0.0002
05/18/00 09:35	0.020	0.001	< 0.001	0.022	< 0.1	0.0	0.003	0.001	< 0.06	0.01	0.0049	0.0005
06/06/00 10:05	0.019	0.000	< 0.001	0.010	< 0.1	0.1	0.017	0.001	< 0.06	0.08	0.0055	0.0003
06/23/00 09:55	0.018	0.001	< 0.002	0.003	< 0.6	0.1	< 0.1	0.0	< 0.3	0.1	0.0062	0.0003
07/05/00 13:15	0.019	0.001	< 0.002	0.008	< 0.6	0.1	< 0.1	0.0	< 0.3	0.2	0.0043	0.0006
07/26/00 11:50	0.022	0.000	0.002	0.015	< 0.3	0.3	< 0.009	0.007	0.83	0.01	0.0039	0.0000
08/07/00 09:35	0.020	0.001	< 0.004	0.028	< 0.2	0.1	< 0.02	0.01	0.77	0.07	0.0045	0.0000
08/17/00 11:15	0.026	0.000	0.065	0.001	< 0.3	0.1	-0.009	0.009	0.91	0.00	0.0046	0.0002
09/07/00 09:30	0.020	0.002	< 0.004	0.016	< 0.2	0.1	< 0.02	0.03	0.46	0.03	0.0038	0.0003
09/20/00 13:00	0.019	0.001	< 0.004	0.039	< 0.2	0.1	< 0.02	0.03	0.69	0.09	0.0045	0.0001
11/02/00 10:30	0.025	0.002	< 0.004	0.024	< 0.2	0.1	< 0.02	0.02	0.41	0.07	0.0039	0.0006
11/20/00 11:40	0.011	0.001	< 0.004	0.050	< 0.2	0.1	< 0.02	0.02	0.71	0.03	0.0037	0.0002
12/01/00 11:30	0.0094	0.0005	< 0.004	0.021	< 0.2	0.0	< 0.02	0.01	0.65	0.06	0.0029	0.0006
12/13/00 15:00	0.0086	0.0005	< 0.004	0.016	< 0.2	0.0	< 0.02	0.01	0.85	0.10	0.0026	0.0005
01/03/01 11:20	0.0061	0.0005	< 0.003	0.003	< 0.4	1.1	< 0.01	0.01	1.4	0.2	0.0021	0.0004
01/22/01 13:00	0.012	0.001	< 0.003	0.004	< 0.4	0.7	< 0.01	0.01	1.5	0.1	0.0034	0.0004
02/06/01 13:30	0.020	0.001	< 0.002	0.015	< 0.1	0.1	0.030	0.029	1.4	0.0	0.0046	0.0003
02/26/01 12:00	0.18	0.00	0.056	0.018	< 0.2	0.1	< 0.008	0.004	1.9	0.1	0.023	0.001
03/14/01 11:30	0.015	0.001	< 0.002	0.015	< 0.1	0.0	0.003	0.002	0.71	0.08	0.0045	0.0004
04/02/01 11:50	0.033	0.000	< 0.002	0.013	< 0.1	0.1	0.031	0.015	0.58	0.06	0.0047	0.0006
04/19/01 11:50	0.022	0.000	< 0.002	0.008	< 0.1	0.0	0.009	0.005	0.67	0.04	0.0047	0.0004
05/02/01 12:20	0.038	0.000	< 0.002	0.023	< 0.2	0.1	< 0.008	0.010	0.57	0.09	0.0064	0.0003
05/15/01 12:10	0.025	0.001	< 0.002	0.045	< 0.2	0.1	< 0.008	0.005	0.53	0.06	0.0045	0.0004
05/30/01 10:48	0.022	0.002	< 0.002	0.034	< 0.2	0.2	< 0.008	0.008	0.67	0.02	0.0066	0.0003
06/11/01 10:30	0.020	0.001	< 0.002	0.036	< 0.2	0.2	< 0.008	0.006	1.1	0.1	0.0062	0.0011
06/26/01 10:05	0.023	0.001	< 0.002	0.000	< 0.2	0.1	0.022	0.019	1.0	0.0	0.0043	0.0007
07/10/01 10:20	0.048	0.001	< 0.002	0.008	< 0.1	0.0	< 0.003	0.001	1.4	0.0	0.0087	0.0005
07/25/01 10:15	0.025	0.001	< 0.002	0.041	< 0.2	0.1	< 0.008	0.011	1.4	0.1	0.0066	0.0006
08/06/01 09:50	0.024	0.002	< 0.002	0.045	< 0.2	0.1	< 0.008	0.007	0.95	0.15	0.0052	0.0004
08/20/01 10:35	0.018	0.002	< 0.002	0.034	< 0.2	0.1	< 0.008	0.008	0.67	0.03	0.0034	0.0004
09/13/01 08:30	0.015	0.000	< 0.005	0.017	< 0.3	0.9	< 0.01	0.01	0.95	0.04	0.0014	0.0009

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ce		Co		Cr		Cs		Cu		Dy	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	0.019	0.001	< 0.002	0.033	< 0.2	0.0	0.010	0.009	0.61	0.05	0.0041	0.0009
10/24/01 11:05	0.097	0.001	< 0.002	0.030	< 0.2	0.2	< 0.008	0.005	1.8	0.1	0.020	0.003
11/08/01 10:20	0.017	0.002	< 0.002	0.041	0.4	0.1	< 0.008	0.003	0.78	0.02	0.0061	0.0005
11/19/01 10:45	0.017	0.001	< 0.002	0.014	1.0	0.4	< 0.008	0.006	0.73	0.06	0.0041	0.0006
12/03/01 12:05	0.016	0.000	< 0.003	0.009	< 0.2	0.1	< 0.003	0.002	1.3	0.0	0.0059	0.0005
12/19/01 11:30	0.022	0.001	< 0.006	0.003	< 0.08	0.04	< 0.003	0.001	1.2	0.0	0.0080	0.0007
01/03/02 11:25	0.0065	0.0005	< 0.006	0.009	< 0.08	0.03	< 0.003	0.001	0.79	0.03	0.0030	0.0006
01/15/02 11:30	0.010	0.001	< 0.006	0.016	< 0.08	0.06	< 0.003	0.001	0.86	0.10	0.0038	0.0003
01/29/02 11:35	0.017	0.001	< 0.006	0.009	< 0.08	0.10	0.005	0.001	0.88	0.06	0.0046	0.0009
02/13/02 10:55	0.015	0.001	0.14	0.01	< 0.2	0.1	< 0.004	0.003	1.0	0.0	0.0048	0.0004
02/27/02 12:00	0.017	0.000	0.13	0.01	< 0.2	0.1	< 0.004	0.002	1.2	0.0	0.0061	0.0007
03/12/02 11:40	0.043	0.001	0.16	0.03	< 0.2	0.1	< 0.004	0.001	1.6	0.0	0.0077	0.0003
03/27/02 11:30	0.018	0.000	0.18	0.00	< 0.2	0.2	< 0.004	0.002	1.3	0.0	0.0047	0.0008
04/03/02 11:05	0.038	0.001	0.13	0.00	< 0.2	0.1	< 0.004	0.003	2.4	0.0	0.0088	0.0006
04/23/02 10:00	0.016	0.001	0.20	0.02	< 0.2	0.1	0.004	0.001	1.1	0.0	0.0052	0.0010
05/07/02 08:55	0.024	0.001	0.17	0.00	< 0.2	0.2	< 0.004	0.004	1.4	0.0	0.0061	0.0002
05/22/02 10:00	0.034	0.000	0.15	0.00	< 0.2	0.0	< 0.004	0.002	1.8	0.0	0.0075	0.0004
06/04/02 09:45	0.024	0.001	0.17	0.01	< 0.2	0.1	< 0.004	0.001	0.81	0.02	0.0053	0.0003
06/17/02 10:00	0.021	0.001	0.15	0.01	< 0.2	0.1	< 0.004	0.002	0.90	0.03	0.0056	0.0003

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Er		Eu		Fe		Gd		Ho		La	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	0.0038	0.0002	0.0084	0.0015	18	1	0.0061	0.0005	0.0011	0.0001	0.013	0.000
03/06/00 14:15	0.0046	0.0002	0.011	0.000	40	1	0.0078	0.0004	0.0012	0.0001	0.017	0.001
03/23/00 10:45	0.0053	0.0007	0.012	0.001	32	1	0.0080	0.0012	0.0012	0.0002	0.015	0.002
04/03/00 17:45	0.0048	0.0005	0.010	0.001	67	4	0.0093	0.0003	0.0013	0.0001	0.019	0.001
04/24/00 12:00	0.0057	0.0002	0.010	0.001	19	1	0.0084	0.0006	0.0013	0.0001	0.014	0.001
05/01/00 18:10	0.0042	0.0008	0.0099	0.0022	10	1	0.0062	0.0005	0.0011	0.0001	0.011	0.000
05/18/00 09:35	0.0052	0.0006	0.014	0.000	26	0	0.0086	0.0003	0.0014	0.0002	0.015	0.001
06/06/00 10:05	0.0049	0.0005	0.0083	0.0009	11	1	0.0072	0.0002	0.0014	0.0001	0.013	0.001
06/23/00 09:55	0.0070	0.0001	0.0015	0.0004	14	1	0.0060	0.0008	0.0019	0.0001	0.015	0.001
07/05/00 13:15	0.0030	0.0005	0.0019	0.0002	17	1	0.0061	0.0006	0.0012	0.0002	0.017	0.000
07/26/00 11:50	0.0043	0.0006	0.0002	0.0007	24	0	0.0090	0.0002	0.0011	0.0001	0.015	0.000
08/07/00 09:35	0.0038	0.0002	0.0027	0.0009	17	0	0.0068	0.0008	0.0010	0.0000	0.013	0.000
08/17/00 11:15	0.0048	0.0003	0.0011	0.0021	27	0	0.0089	0.0002	0.0011	0.0000	0.015	0.000
09/07/00 09:30	0.0032	0.0003	0.0030	0.0004	14	0	0.0049	0.0003	0.0009	0.0001	0.013	0.000
09/20/00 13:00	0.0033	0.0001	0.0010	0.0012	13	1	0.0039	0.0004	0.0009	0.0002	0.012	0.001
11/02/00 10:30	0.0044	0.0002	0.0023	0.0008	41	0	0.0058	0.0001	0.0009	0.0000	0.015	0.000
11/20/00 11:40	0.0048	0.0003	0.0022	0.0010	38	0	0.010	0.000	0.0009	0.0001	0.0092	0.0003
12/01/00 11:30	0.0038	0.0000	0.0021	0.0003	26	1	0.0035	0.0004	0.0008	0.0000	0.0072	0.0002
12/13/00 15:00	0.0036	0.0001	0.0013	0.0014	14	1	0.0043	0.0002	0.0007	0.0001	0.0065	0.0002
01/03/01 11:20	0.0029	0.0004	0.0010	0.0019	24	2	0.0030	0.0003	0.0007	0.0001	0.0049	0.0003
01/22/01 13:00	0.0043	0.0004	0.0016	0.0013	36	0	0.0045	0.0004	0.0010	0.0001	0.0087	0.0005
02/06/01 13:30	0.0048	0.0002	0.0005	0.0009	31	0	0.0050	0.0002	0.0013	0.0001	0.016	0.001
02/26/01 12:00	0.013	0.001	0.0057	0.0004	50	0	0.028	0.001	0.0044	0.0003	0.11	0.01
03/14/01 11:30	0.0045	0.0000	0.0011	0.0003	29	2	0.0054	0.0013	0.0011	0.0001	0.012	0.000
04/02/01 11:50	0.0046	0.0002	0.0003	0.0007	93	6	0.0070	0.0007	0.0012	0.0000	0.022	0.000
04/19/01 11:50	0.0051	0.0004	0.0004	0.0005	48	2	0.0064	0.0006	0.0014	0.0002	0.017	0.000
05/02/01 12:20	0.0055	0.0009	0.0005	0.0016	59	0	0.0063	0.0005	0.0015	0.0001	0.023	0.002
05/15/01 12:10	0.0053	0.0005	0.0011	0.0031	43	3	0.0060	0.0009	0.0011	0.0003	0.016	0.001
05/30/01 10:48	0.0064	0.0007	0.0013	0.0006	26	1	0.0052	0.0004	0.0017	0.0001	0.016	0.001
06/11/01 10:30	0.0065	0.0009	0.0015	0.0021	14	1	0.0059	0.0005	0.0018	0.0003	0.018	0.000
06/26/01 10:05	0.0050	0.0011	<0.0003	0.0002	31	1	0.0059	0.0008	0.0014	0.0001	0.016	0.002
07/10/01 10:20	0.0065	0.0005	0.0014	0.0006	20	0	0.0094	0.0008	0.0017	0.0001	0.030	0.001
07/25/01 10:15	0.0049	0.0012	0.0007	0.0005	11	0	0.0063	0.0012	0.0011	0.0001	0.018	0.002
08/06/01 09:50	0.0046	0.0010	0.0004	0.0011	16	2	0.0084	0.0010	0.0012	0.0003	0.016	0.001
08/20/01 10:35	0.0031	0.0008	<0.0003	0.0000	19	2	0.0047	0.0005	0.0009	0.0002	0.011	0.001
09/13/01 08:30	0.001	0.001	<0.0008	0.0007	14	1	0.004	0.001	0.0004	0.0004	0.010	0.000

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Er		Eu		Fe		Gd		Ho		La	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	0.0053	0.0008	0.0009	0.0001	22	0	0.0058	0.0005	0.0011	0.0002	0.012	0.000
10/24/01 11:05	0.015	0.001	0.0058	0.0016	38	1	0.023	0.001	0.0043	0.0000	0.074	0.001
11/08/01 10:20	0.0073	0.0017	0.0003	0.0001	22	0	0.0053	0.0018	0.0013	0.0001	0.013	0.001
11/19/01 10:45	0.0059	0.0006	0.0011	0.0021	43	1	0.0059	0.0013	0.0013	0.0001	0.013	0.001
12/03/01 12:05	0.0068	0.0003	0.0012	0.0001	38	3	0.0063	0.0002	0.0021	0.0001	0.014	0.000
12/19/01 11:30	0.0084	0.0001	0.0019	0.0001	17	na	0.0076	0.0009	0.0017	0.0000	0.018	0.002
01/03/02 11:25	0.0040	0.0003	<0.0002	0.0005	15	2	0.0040	0.0002	0.0011	0.0002	0.0064	0.0002
01/15/02 11:30	0.0042	0.0006	0.0009	0.0008	3.4	0.7	0.0045	0.0002	0.0009	0.0003	0.0085	0.0006
01/29/02 11:35	0.0050	0.0002	0.0013	0.0004	na	na	0.0055	0.0005	0.0011	0.0001	0.013	0.001
02/13/02 10:55	0.0047	0.0001	<0.0003	0.0001	30	0	0.0068	0.0009	0.0014	0.0004	0.012	0.001
02/27/02 12:00	0.0060	0.0004	<0.0003	0.0002	23	0	0.0082	0.0005	0.0015	0.0003	0.015	0.001
03/12/02 11:40	0.0066	0.0005	0.0020	0.0020	25	0	0.011	0.001	0.0021	0.0003	0.031	0.002
03/27/02 11:30	0.0049	0.0001	0.0005	0.0013	51	1	0.0077	0.0004	0.0011	0.0000	0.014	0.001
04/03/02 11:05	0.0063	0.0000	0.0011	0.0006	16	1	0.0089	0.0011	0.0021	0.0002	0.029	0.000
04/23/02 10:00	0.0056	0.0015	0.0012	0.0016	49	1	0.0058	0.0006	0.0014	0.0003	0.013	0.001
05/07/02 08:55	0.0054	0.0010	0.0009	0.0005	36	0	0.0071	0.0001	0.0016	0.0004	0.018	0.000
05/22/02 10:00	0.0081	0.0006	0.0024	0.0001	34	0	0.0098	0.0011	0.0020	0.0004	0.025	0.001
06/04/02 09:45	0.0061	0.0012	0.0011	0.0015	31	0	0.0072	0.0005	0.0015	0.0001	0.016	0.001
06/17/02 10:00	0.0060	0.0009	0.0009	0.0028	21	0	0.0074	0.0009	0.0014	0.0001	0.015	0.001

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Li		Lu		Mn		Mo		Nd		Ni	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	3.1	0.1	0.0012	0.0002	58	0	3.8	0.0	0.016	0.001	4.6	0.4
03/06/00 14:15	4.1	0.1	0.0015	0.0002	88	0	4.8	0.0	0.022	0.002	5.5	1.1
03/23/00 10:45	3.6	0.1	0.0015	0.0001	60	1	4.5	0.0	0.019	0.001	5.4	0.5
04/03/00 17:45	4.7	0.1	0.0015	0.0001	64	0	4.9	0.0	0.022	0.001	4.6	0.4
04/24/00 12:00	3.1	0.1	0.0018	0.0001	23	0	3.8	0.0	0.018	0.001	4.6	0.9
05/01/00 18:10	3.9	0.2	0.0015	0.0001	47	0	4.7	0.0	0.013	0.001	4.8	0.8
05/18/00 09:35	3.9	0.1	0.0015	0.0000	29	1	4.4	0.0	0.018	0.001	6.2	0.6
06/06/00 10:05	3.4	0.1	0.0017	0.0000	18	0	3.4	0.0	0.017	0.001	3.8	0.2
06/23/00 09:55	2.7	0.0	0.0023	0.0003	8.7	0.2	2.8	0.0	0.021	0.001	0.62	0.35
07/05/00 13:15	2.9	0.1	0.0007	0.0002	20	1	2.4	0.1	0.019	0.001	0.02	0.33
07/26/00 11:50	5.0	0.1	0.0016	0.0002	111	3	4.8	0.2	0.019	0.001	1.9	0.1
08/07/00 09:35	5.3	0.2	0.0015	0.0001	77	0	4.7	0.1	0.018	0.002	0.62	0.15
08/17/00 11:15	6.7	0.0	0.0011	0.0003	125	3	5.4	0.0	0.021	0.000	1.2	0.1
09/07/00 09:30	9.5	0.1	0.0009	0.0002	160	10	4.7	0.3	0.015	0.002	0.64	0.12
09/20/00 13:00	7.3	0.3	0.0010	0.0001	140	0	4.5	0.1	0.015	0.001	0.50	0.34
11/02/00 10:30	7.0	0.3	0.0012	0.0002	140	0	4.2	0.2	0.018	0.001	0.62	0.18
11/20/00 11:40	4.6	0.2	0.0015	0.0001	25	1	3.9	0.2	0.011	0.001	0.12	0.35
12/01/00 11:30	4.4	0.3	0.0014	0.0001	25	1	3.8	0.1	0.0081	0.0009	0.30	0.15
12/13/00 15:00	4.8	0.2	0.0014	0.0002	31	2	3.7	0.2	0.0081	0.0004	0.11	0.19
01/03/01 11:20	4.3	0.3	0.0011	0.0001	48	1	3.3	0.2	0.0082	0.0009	1.1	0.1
01/22/01 13:00	3.5	0.1	0.0015	0.0002	30	1	3.5	0.1	0.0089	0.0002	1.2	0.2
02/06/01 13:30	2.9	0.2	0.0016	0.0000	35	0	3.1	0.1	0.018	0.000	2.2	0.1
02/26/01 12:00	0.75	0.04	0.0022	0.0001	21	1	1.4	0.1	0.14	0.00	1.0	0.0
03/14/01 11:30	2.8	0.2	0.0015	0.0003	38	0	3.9	0.0	0.015	0.001	1.1	0.1
04/02/01 11:50	3.4	0.2	0.0012	0.0001	42	0	4.1	0.0	0.024	0.001	1.2	0.1
04/19/01 11:50	3.0	0.1	0.0017	0.0000	33	0	3.7	0.0	0.018	0.000	1.0	0.2
05/02/01 12:20	3.8	0.3	0.0015	0.0002	34	2	4.4	0.1	0.028	0.000	1.1	0.2
05/15/01 12:10	4.4	0.3	0.0017	0.0001	36	1	4.7	0.1	0.020	0.001	1.1	0.1
05/30/01 10:48	3.5	0.1	0.0020	0.0002	15	1	3.9	0.1	0.018	0.001	1.2	0.2
06/11/01 10:30	2.5	0.1	0.0024	0.0002	7.4	0.5	3.5	0.3	0.025	0.003	1.1	0.1
06/26/01 10:05	4.2	0.2	0.0015	0.0002	28	2	4.9	0.1	0.021	0.001	1.2	0.2
07/10/01 10:20	1.8	0.1	0.0015	0.0000	12	0	2.5	0.0	0.040	0.003	1.1	0.0
07/25/01 10:15	3.3	0.2	0.0018	0.0003	14	1	3.7	0.1	0.025	0.002	1.4	0.0
08/06/01 09:50	5.8	0.0	0.0015	0.0003	60	0	5.3	0.1	0.022	0.005	1.3	0.0
08/20/01 10:35	5.9	0.2	0.0011	0.0000	71	0	4.4	0.1	0.017	0.001	1.2	0.1
09/13/01 08:30	6.0	0.3	0.0007	0.0003	58	1	4.6	0.1	0.009	0.001	1.4	0.1

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Li		Lu		Mn		Mo		Nd		Ni	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	5.1	0.2	0.0019	0.0001	69	1	4.2	0.2	0.015	0.002	1	0
10/24/01 11:05	1.6	0.1	0.0031	0.0001	7.9	0.6	2.0	0.1	0.11	0.01	1	0
11/08/01 10:20	3.3	0.2	0.0018	0.0001	44	1	3.8	0.1	0.020	0.000	1.3	0.1
11/19/01 10:45	3.8	0.2	0.0020	0.0003	34	1	4.1	0.0	0.016	0.002	1.5	0.1
12/03/01 12:05	3.0	0.0	0.0023	0.0001	18	0	3.3	0.0	0.020	0.001	0.20	0.07
12/19/01 11:30	2.6	1.0	0.0024	0.0001	13	0	2.7	0.0	0.024	0.002	0.61	0.04
01/03/02 11:25	3.5	0.8	0.0015	0.0001	60	0	3.6	0.1	0.0083	0.0008	0.24	0.08
01/15/02 11:30	3.4	0.5	0.0018	0.0000	47	0	3.7	0.1	0.011	0.002	0.50	0.17
01/29/02 11:35	3.5	0.8	0.0018	0.0002	44	0	4.0	0.1	0.016	0.001	0.50	0.03
02/13/02 10:55	3.1	0.1	0.0020	0.0002	33	0	3.4	0.0	0.016	0.000	1.2	0.3
02/27/02 12:00	2.9	0.4	0.0017	0.0002	26	0	3.1	0.1	0.017	0.001	1.6	0.4
03/12/02 11:40	2.2	0.1	0.0019	0.0002	17	0	2.7	0.1	0.039	0.003	1.5	0.2
03/27/02 11:30	2.9	0.1	0.0016	0.0002	46	1	3.4	0.0	0.016	0.001	< 0.8	0.3
04/03/02 11:05	2.1	0.2	0.0018	0.0002	13	0	2.4	0.1	0.037	0.003	1.0	0.6
04/23/02 10:00	3.2	0.1	0.0018	0.0000	26	0	3.7	0.1	0.016	0.002	1.0	0.4
05/07/02 08:55	3.0	0.2	0.0018	0.0001	26	0	3.5	0.0	0.023	0.002	< 0.8	0.4
05/22/02 10:00	2.4	0.1	0.0018	0.0001	23	0	3.3	0.1	0.031	0.003	1.3	0.5
06/04/02 09:45	3.3	0.2	0.0017	0.0002	19	0	4.2	0.1	0.021	0.003	0.9	0.2
06/17/02 10:00	3.4	0.2	0.0022	0.0002	17	0	4.0	0.0	0.018	0.003	1.2	0.2

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Pb		Pr		Rb		Re		Sb		Se	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	0.032	0.005	0.0029	0.0001	0.84	0.01	0.022	0.001	0.12	0.01	1.6	0.0
03/06/00 14:15	0.048	0.005	0.0043	0.0003	0.82	0.02	0.018	0.001	0.12	0.00	1.2	0.0
03/23/00 10:45	0.047	0.004	0.0039	0.0003	0.78	0.00	0.022	0.000	0.13	0.00	1.5	0.1
04/03/00 17:45	0.076	0.001	0.0047	0.0000	0.91	0.02	0.011	0.001	0.12	0.00	0.88	0.02
04/24/00 12:00	0.024	0.005	0.0033	0.0002	0.84	0.01	0.015	0.001	0.13	0.00	1.6	0.1
05/01/00 18:10	0.034	0.005	0.0026	0.0001	0.74	0.01	0.020	0.001	0.13	0.01	1.1	0.0
05/18/00 09:35	0.029	0.001	0.0036	0.0001	0.70	0.01	0.019	0.000	0.12	0.00	0.98	0.02
06/06/00 10:05	0.028	0.003	0.0034	0.0000	0.78	0.00	0.019	0.000	0.12	0.00	1.1	0.1
06/23/00 09:55	0.027	0.004	0.0042	0.0002	1.1	0.0	0.020	0.000	0.15	0.00	1.2	0.1
07/05/00 13:15	0.025	0.005	0.0043	0.0004	0.44	0.01	0.014	0.001	0.12	0.00	1.3	0.1
07/26/00 11:50	0.034	0.001	0.0041	0.0001	1.1	0.0	0.015	0.000	0.13	0.00	0.41	0.06
08/07/00 09:35	0.034	0.008	0.0032	0.0004	1.4	0.0	0.0038	0.0006	0.14	0.00	0.2	0.0
08/17/00 11:15	0.052	0.001	0.0041	0.0001	1.5	0.0	0.015	0.001	0.15	0.00	0.30	0.00
09/07/00 09:30	0.035	0.009	0.0032	0.0001	1.5	0.1	0.013	0.001	0.13	0.00	0.2	0.2
09/20/00 13:00	0.057	0.011	0.0031	0.0001	2.0	0.0	0.013	0.001	0.15	0.00	0.2	0.0
11/02/00 10:30	0.071	0.007	0.0039	0.0001	1.5	0.0	0.013	0.001	0.11	0.01	<0.1	0.2
11/20/00 11:40	0.040	0.001	0.0021	0.0001	1.1	0.0	0.019	0.001	0.10	0.00	0.4	0.3
12/01/00 11:30	0.033	0.005	0.0019	0.0003	1.1	0.0	0.019	0.000	0.10	0.00	0.5	0.1
12/13/00 15:00	0.040	0.007	0.0016	0.0002	0.99	0.05	0.019	0.000	0.096	0.004	0.5	0.2
01/03/01 11:20	0.043	0.011	0.0014	0.0002	1.0	0.0	0.017	0.000	0.083	0.003	0.54	0.09
01/22/01 13:00	0.042	0.005	0.0019	0.0001	0.80	0.03	0.022	0.001	0.097	0.004	1.2	0.1
02/06/01 13:30	0.066	0.008	0.0038	0.0000	0.70	0.02	0.020	0.001	0.098	0.002	1.5	0.2
02/26/01 12:00	0.13	0.07	0.033	0.000	0.77	0.01	0.0057	0.0003	0.097	0.009	0.8	0.2
03/14/01 11:30	0.021	0.004	0.0032	0.0001	0.70	0.01	0.020	0.001	0.11	0.00	1.0	0.1
04/02/01 11:50	0.055	0.004	0.0056	0.0002	0.69	0.02	0.017	0.000	0.11	0.00	0.87	0.08
04/19/01 11:50	0.049	0.006	0.0041	0.0001	0.57	0.01	0.019	0.000	0.10	0.00	1.0	0.1
05/02/01 12:20	0.081	0.002	0.0062	0.0003	0.85	0.02	0.018	0.001	0.11	0.00	0.9	0.3
05/15/01 12:10	0.087	0.017	0.0043	0.0006	0.77	0.01	0.017	0.001	0.12	0.00	0.9	0.2
05/30/01 10:48	0.056	0.017	0.0038	0.0004	0.70	0.02	0.022	0.001	0.13	0.01	1.2	0.5
06/11/01 10:30	0.026	0.001	0.0050	0.0004	0.99	0.00	0.016	0.002	0.13	0.01	1.1	0.4
06/26/01 10:05	0.056	0.010	0.0042	0.0001	0.88	0.01	0.017	0.001	0.12	0.00	0.7	0.1
07/10/01 10:20	0.030	0.004	0.0082	0.0001	0.91	0.01	0.0092	0.0006	0.12	0.00	0.50	0.05
07/25/01 10:15	0.052	0.004	0.0050	0.0007	1.0	0.0	0.013	0.001	0.15	0.00	0.5	0.5
08/06/01 09:50	0.066	0.011	0.0039	0.0007	1.4	0.1	0.017	0.001	0.15	0.01	0.5	0.2
08/20/01 10:35	0.065	0.009	0.0033	0.0007	1.6	0.0	0.014	0.001	0.13	0.00	0.6	0.2
09/13/01 08:30	<0.02	0.01	0.0024	0.0003	1.6	0.0	0.012	0.001	0.15	0.00	<0.8	1.5

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Pb		Pr		Rb		Re		Sb		Se	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	0.061	0.012	0.0035	0.0002	1.7	0.0	0.019	0.000	0.13	0.00	0.4	0.3
10/24/01 11:05	0.10	0.00	0.025	0.002	1.0	0.0	0.012	0.000	0.13	0.01	0.7	0.5
11/08/01 10:20	0.031	0.009	0.0036	0.0004	0.86	0.01	0.020	0.001	0.13	0.00	1.2	0.1
11/19/01 10:45	0.040	0.008	0.0032	0.0003	0.96	0.01	0.019	0.001	0.12	0.00	0.7	0.4
12/03/01 12:05	0.042	0.012	0.0040	0.0001	0.77	0.00	0.020	0.001	0.12	0.01	1.0	0.2
12/19/01 11:30	0.032	0.009	0.0051	0.0002	0.73	0.02	0.017	0.001	0.11	0.00	1.0	0.0
01/03/02 11:25	0.025	0.005	0.0014	0.0002	0.76	0.01	0.015	0.002	0.088	0.002	0.86	0.05
01/15/02 11:30	0.035	0.017	0.0024	0.0006	0.77	0.01	0.018	0.000	0.086	0.002	0.77	0.05
01/29/02 11:35	0.039	0.003	0.0030	0.0002	0.76	0.01	0.016	0.001	0.094	0.007	0.77	0.05
02/13/02 10:55	0.021	0.001	0.0034	0.0004	0.64	0.01	0.016	0.001	0.095	0.004	0.9	0.0
02/27/02 12:00	0.019	0.001	0.0040	0.0002	0.55	0.01	0.015	0.000	0.092	0.001	0.9	0.1
03/12/02 11:40	0.026	0.001	0.0090	0.0001	0.60	0.01	0.013	0.002	0.10	0.00	0.9	0.1
03/27/02 11:30	0.026	0.001	0.0037	0.0003	0.60	0.00	0.015	0.000	0.086	0.000	0.8	0.1
04/03/02 11:05	0.021	0.001	0.0087	0.0002	0.57	0.01	0.011	0.000	0.11	0.00	0.9	0.1
04/23/02 10:00	0.033	0.001	0.0034	0.0004	0.77	0.01	0.014	0.000	0.10	0.00	0.7	0.1
05/07/02 08:55	0.041	0.002	0.0050	0.0002	0.76	0.01	0.014	0.000	0.11	0.01	0.7	0.1
05/22/02 10:00	0.12	0.00	0.0068	0.0004	0.87	0.01	0.012	0.000	0.13	0.00	0.6	0.1
06/04/02 09:45	0.038	0.001	0.0040	0.0004	0.91	0.01	0.014	0.000	0.12	0.00	0.6	0.1
06/17/02 10:00	0.029	0.001	0.0043	0.0000	0.80	0.02	0.013	0.000	0.12	0.00	0.6	0.1

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Sm		Sr		Ta		Tb		Te		Th	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	0.0036	0.0005	281	3	< 0.001	0.000	0.0006	0.0001	0.019	0.002	0.0018	0.0001
03/06/00 14:15	0.0043	0.0001	308	1	< 0.001	0.000	0.0007	0.0001	0.023	0.001	0.0016	0.0002
03/23/00 10:45	0.0047	0.0003	311	1	< 0.001	0.000	0.0007	0.0001	0.020	0.005	0.0016	0.0003
04/03/00 17:45	0.0043	0.0001	310	0	< 0.001	0.001	0.0008	0.0001	0.023	0.002	0.0023	0.0003
04/24/00 12:00	0.0046	0.0002	265	3	0.002	0.001	0.0006	0.0000	0.024	0.008	0.0023	0.0003
05/01/00 18:10	0.0034	0.0002	279	1	< 0.001	0.001	0.0005	0.0001	0.021	0.002	0.0013	0.0003
05/18/00 09:35	0.0036	0.0005	268	6	< 0.001	0.000	0.0007	0.0001	0.024	0.004	0.0013	0.0005
06/06/00 10:05	0.0035	0.0004	240	2	< 0.001	0.000	0.0007	0.0001	0.020	0.003	0.0015	0.0004
06/23/00 09:55	0.005	0.001	220	0	< 0.001	0.001	0.0009	0.0002	< 0.02	0.01	0.0025	0.0001
07/05/00 13:15	0.005	0.000	140	0	< 0.001	0.001	0.0006	0.0001	< 0.02	0.01	0.0019	0.0001
07/26/00 11:50	0.0042	0.0002	314	8	-0.0005	0.0001	0.0006	0.0000	0.014	0.002	0.0014	0.0000
08/07/00 09:35	0.0034	0.0003	310	10	< 0.002	0.001	0.0007	0.0001	< 0.006	0.003	0.0016	0.0003
08/17/00 11:15	0.0048	0.0010	391	0	-0.0005	0.0002	0.0008	0.0000	0.020	0.002	0.0021	0.0005
09/07/00 09:30	0.0038	0.0005	450	0	< 0.002	0.001	0.0007	0.0002	< 0.006	0.002	0.0012	0.0001
09/20/00 13:00	0.0037	0.0007	410	10	< 0.002	0.001	0.0006	0.0001	< 0.006	0.002	0.0015	0.0002
11/02/00 10:30	0.0044	0.0001	400	0	< 0.002	0.001	0.0005	0.0001	< 0.006	0.003	0.0016	0.0002
11/20/00 11:40	0.0020	0.0005	340	10	< 0.002	0.001	0.0005	0.0001	< 0.006	0.003	0.0016	0.0003
12/01/00 11:30	0.0024	0.0004	330	20	< 0.002	0.002	0.0004	0.0000	< 0.006	0.003	0.0010	0.0003
12/13/00 15:00	0.0021	0.0002	330	10	< 0.002	0.001	0.0004	0.0000	< 0.006	0.001	0.0009	0.0001
01/03/01 11:20	0.0020	0.0005	300	10	< 0.001	0.000	0.0003	0.0001	< 0.009	0.004	0.0014	0.0005
01/22/01 13:00	0.0027	0.0006	310	10	< 0.001	0.001	0.0007	0.0001	< 0.009	0.004	0.0036	0.0011
02/06/01 13:30	0.0033	0.0007	260	0	< 0.003	0.000	0.0005	0.0000	0.02	0.01	0.0022	0.0002
02/26/01 12:00	0.036	0.000	71	1	< 0.001	0.000	0.0039	0.0002	< 0.01	0.01	0.019	0.001
03/14/01 11:30	0.0033	0.0005	250	0	< 0.003	0.001	0.0006	0.0001	< 0.01	0.01	0.0013	0.0001
04/02/01 11:50	0.0049	0.0005	260	0	< 0.003	0.001	0.0008	0.0002	0.02	0.00	0.0021	0.0002
04/19/01 11:50	0.0042	0.0003	230	0	< 0.003	0.001	0.0006	0.0001	< 0.01	0.00	0.0013	0.0003
05/02/01 12:20	0.0062	0.0012	260	0	< 0.001	0.001	0.0008	0.0003	0.02	0.02	0.0023	0.0009
05/15/01 12:10	0.0038	0.0002	280	0	< 0.001	0.001	0.0009	0.0004	< 0.01	0.00	0.0014	0.0001
05/30/01 10:48	0.0047	0.0009	280	10	< 0.001	0.000	0.0007	0.0002	0.02	0.01	0.0023	0.0002
06/11/01 10:30	0.0062	0.0010	210	10	< 0.001	0.002	0.0008	0.0001	0.01	0.01	0.0032	0.0003
06/26/01 10:05	0.0045	0.0012	280	10	< 0.001	0.000	0.0006	0.0001	0.01	0.01	0.0019	0.0004
07/10/01 10:20	0.0078	0.0010	120	0	< 0.003	0.000	0.0013	0.0001	< 0.01	0.01	0.0057	0.0001
07/25/01 10:15	0.0059	0.0013	200	10	< 0.001	0.002	0.0008	0.0001	0.01	0.01	0.0025	0.0004
08/06/01 09:50	0.0047	0.0010	320	10	< 0.001	0.001	0.0007	0.0002	0.01	0.00	0.0014	0.0004
08/20/01 10:35	0.0035	0.0006	330	10	< 0.001	0.001	0.0005	0.0001	< 0.01	0.00	0.0016	0.0002
09/13/01 08:30	< 0.002	0.001	340	0	0.018	0.003	< 0.0004	0.0001	< 0.04	0.05	0.0010	0.0003

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Sm		Sr		Ta		Tb		Te		Th	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	0.0038	0.0011	320	10	< 0.001	0.000	0.0007	0.0001	0.01	0.01	0.0011	0.0004
10/24/01 11:05	0.026	0.003	130	0	< 0.001	0.001	0.0032	0.0001	< 0.01	0.00	0.013	0.001
11/08/01 10:20	0.0046	0.0009	260	0	< 0.001	0.001	0.0008	0.0002	0.02	0.01	0.0013	0.0002
11/19/01 10:45	0.0045	0.0007	270	0	< 0.001	0.001	0.0007	0.0002	0.01	0.01	0.0018	0.0004
12/03/01 12:05	0.0036	0.0007	240	0	0.0004	0.0002	0.0008	0.0001	< 0.01	0.00	0.0022	0.0001
12/19/01 11:30	0.0046	0.0002	220	10	< 0.003	0.002	0.0009	0.0002	0.008	0.003	0.004	0.001
01/03/02 11:25	0.0018	0.0001	290	0	< 0.003	0.001	0.0004	0.0001	0.018	0.005	0.001	0.000
01/15/02 11:30	0.0025	0.0013	280	0	< 0.003	0.001	0.0006	0.0002	0.014	0.004	0.003	0.002
01/29/02 11:35	0.0029	0.0009	290	10	< 0.003	0.001	0.0006	0.0002	0.011	0.002	0.003	0.000
02/13/02 10:55	0.0038	0.0004	240	0	< 0.0004	0.0002	0.0007	0.0001	0.019	0.007	0.0075	0.0013
02/27/02 12:00	0.0042	0.0002	210	0	< 0.0004	0.0000	0.0009	0.0001	0.016	0.002	0.0092	0.0044
03/12/02 11:40	0.0097	0.0011	180	0	< 0.0004	0.0001	0.0013	0.0000	0.015	0.005	0.0082	0.0019
03/27/02 11:30	0.0049	0.0009	220	0	< 0.0004	0.0003	0.0007	0.0001	0.023	0.002	0.0064	0.0026
04/03/02 11:05	0.0085	0.0010	160	0	0.0005	0.0004	0.0011	0.0001	0.008	0.003	0.0077	0.0030
04/23/02 10:00	0.0041	0.0009	220	0	< 0.0004	0.0002	0.0005	0.0000	0.020	0.005	0.0056	0.0017
05/07/02 08:55	0.0038	0.0000	210	0	< 0.0004	0.0001	0.0007	0.0001	0.020	0.006	0.0068	0.0008
05/22/02 10:00	0.0072	0.0009	180	0	< 0.0004	0.0002	0.0011	0.0001	0.017	0.002	0.0068	0.0021
06/04/02 09:45	0.0046	0.0009	230	0	< 0.0004	0.0004	0.0007	0.0002	0.023	0.008	0.0035	0.0009
06/17/02 10:00	0.0045	0.0012	230	0	< 0.0004	0.0003	0.0007	0.0002	0.025	0.011	0.0047	0.0017

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ti		Tl		Tm		U		V	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	< 0.1	0.1	0.006	0.001	0.0006	0.0001	2.4	0.1	0.20	0.02
03/06/00 14:15	< 0.1	0.3	0.004	0.000	0.0009	0.0001	2.6	0.0	0.30	0.06
03/23/00 10:45	< 0.1	0.1	0.009	0.001	0.0008	0.0000	2.7	0.0	0.25	0.01
04/03/00 17:45	< 0.1	0.2	0.008	0.002	0.0007	0.0001	2.4	0.1	0.25	0.01
04/24/00 12:00	< 0.1	0.2	0.016	0.000	0.0010	0.0001	2.3	0.0	0.31	0.03
05/01/00 18:10	< 0.1	0.2	0.012	0.003	0.0007	0.0001	2.5	0.1	0.37	0.04
05/18/00 09:35	< 0.1	0.3	0.007	0.000	0.0010	0.0000	2.4	0.0	0.50	0.01
06/06/00 10:05	< 0.1	0.2	0.011	0.001	0.0011	0.0002	2.3	0.0	0.42	0.02
06/23/00 09:55	< 0.2	0.2	0.012	0.000	0.0013	0.0002	1.8	0.1	0.3	0.1
07/05/00 13:15	< 0.2	0.2	0.0097	0.0037	0.0005	0.0001	1.9	0.1	0.4	0.0
07/26/00 11:50	< 0.09	0.02	0.015	0.001	0.0007	0.0001	1.9	0.0	0.58	0.05
08/07/00 09:35	< 0.09	0.12	< 0.01	0.00	0.0007	0.0000	1.8	0.0	0.76	0.04
08/17/00 11:15	< 0.09	0.00	0.015	0.005	0.0007	0.0000	1.4	0.0	0.90	0.07
09/07/00 09:30	< 0.09	0.03	< 0.01	0.00	0.0006	0.0001	0.97	0.05	1.2	0.1
09/20/00 13:00	< 0.09	0.07	< 0.01	0.00	0.0005	0.0000	1.1	0.0	1.1	0.0
11/02/00 10:30	< 0.09	0.10	< 0.01	0.00	0.0006	0.0000	1.2	0.0	0.52	0.05
11/20/00 11:40	< 0.09	0.08	< 0.01	0.00	0.0008	0.0001	2.3	0.1	< 0.06	0.04
12/01/00 11:30	< 0.09	0.02	< 0.01	0.00	0.0008	0.0000	2.4	0.0	< 0.06	0.05
12/13/00 15:00	< 0.09	0.12	< 0.01	0.00	0.0007	0.0001	2.6	0.0	< 0.06	0.06
01/03/01 11:20	< 0.2	0.3	< 0.01	0.01	0.0007	0.0001	2.5	0.0	< 0.2	0.1
01/22/01 13:00	< 0.2	0.2	< 0.01	0.00	0.0008	0.0001	3.1	0.1	< 0.2	0.0
02/06/01 13:30	< 0.3	0.4	0.005	0.000	0.0008	0.0000	2.7	0.0	0.17	0.01
02/26/01 12:00	0.8	0.0	0.008	0.006	0.0019	0.0004	0.62	0.03	0.60	0.15
03/14/01 11:30	< 0.3	0.3	0.008	0.004	0.0009	0.0000	2.4	0.1	0.11	0.03
04/02/01 11:50	< 0.3	0.3	0.005	0.001	0.0008	0.0000	2.3	0.0	0.13	0.03
04/19/01 11:50	< 0.3	0.2	0.006	0.002	0.0008	0.0001	2.2	0.0	0.20	0.03
05/02/01 12:20	< 0.3	0.4	0.008	0.003	0.0010	0.0002	2.4	0.0	0.49	0.12
05/15/01 12:10	< 0.3	0.2	0.010	0.003	0.0008	0.0001	2.5	0.1	0.48	0.01
05/30/01 10:48	< 0.3	0.4	0.012	0.008	0.0011	0.0000	2.5	0.0	0.48	0.12
06/11/01 10:30	< 0.3	0.3	0.010	0.001	0.0011	0.0001	2.0	0.1	0.57	0.10
06/26/01 10:05	< 0.3	0.4	0.009	0.005	0.0008	0.0001	2.2	0.1	0.61	0.02
07/10/01 10:20	< 0.3	0.2	0.008	0.002	0.0011	0.0000	0.87	0.01	0.89	0.02
07/25/01 10:15	< 0.3	0.3	0.013	0.002	0.0008	0.0002	1.5	0.1	1.1	0.1
08/06/01 09:50	< 0.3	0.4	0.011	0.002	0.0007	0.0001	1.7	0.1	1.2	0.1
08/20/01 10:35	< 0.3	0.0	0.010	0.001	0.0004	0.0001	1.2	0.0	0.99	0.18
09/13/01 08:30	< 0.3	0.1	< 0.004	0.002	< 0.0003	0.0001	1.1	0.0	1.0	0.1

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ti		Tl		Tm		U		V	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	< 0.3	0.4	< 0.004	0.002	0.0009	0.0000	2.1	0.1	0.52	0.12
10/24/01 11:05	< 0.3	0.2	0.010	0.005	0.0023	0.0003	1.2	0.1	0.64	0.11
11/08/01 10:20	< 0.2	0.3	0.008	0.006	0.0012	0.0000	2.8	0.0	0.31	0.19
11/19/01 10:45	< 0.2	0.2	0.008	0.006	0.0007	0.0001	2.5	0.0	0.23	0.13
12/03/01 12:05	< 0.2	0.1	0.013	0.005	0.0013	0.0000	2.6	0.1	0.2	0.0
12/19/01 11:30	< 0.2	na	0.008	0.002	0.0014	0.0001	2.4	0.0	0.4	0.1
01/03/02 11:25	< 0.2	0.1	0.005	0.000	0.0007	0.0001	2.7	0.0	< 0.2	0.1
01/15/02 11:30	< 0.2	0.1	0.005	0.000	0.0008	0.0001	2.6	0.0	< 0.2	0.0
01/29/02 11:35	na	na	0.004	0.000	0.0008	0.0000	2.7	0.0	< 0.2	0.1
02/13/02 10:55	< 0.3	0.0	0.009	0.004	0.0009	0.0001	2.5	0.0	0.31	0.10
02/27/02 12:00	< 0.3	0.1	0.008	0.004	0.0011	0.0001	2.3	0.0	0.39	0.03
03/12/02 11:40	< 0.3	0.0	0.008	0.001	0.0014	0.0001	1.8	0.0	0.39	0.04
03/27/02 11:30	< 0.3	0.2	0.008	0.002	0.0013	0.0001	2.1	0.0	0.27	0.01
04/03/02 11:05	< 0.6	0.0	0.009	0.002	0.0011	0.0001	1.7	0.0	0.38	0.00
04/23/02 10:00	< 0.6	0.1	0.009	0.003	0.0009	0.0001	2.0	0.1	0.30	0.04
05/07/02 08:55	< 0.6	0.2	0.011	0.001	0.0012	0.0001	2.0	0.0	0.45	0.00
05/22/02 10:00	< 0.6	0.1	0.009	0.001	0.0013	0.0001	1.8	0.0	0.45	0.02
06/04/02 09:45	< 0.6	0.2	0.010	0.002	0.0010	0.0001	1.9	0.0	0.54	0.03
06/17/02 10:00	< 0.6	0.1	0.009	0.002	0.0011	0.0001	1.8	0.0	0.57	0.04

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	W		Y		Yb		Zn		Zr	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 12:25	0.0039	0.0020	0.039	0.001	0.0055	0.0003	2.3	0.0	0.11	0.00
03/06/00 14:15	0.0019	0.0005	0.050	0.001	0.0068	0.0001	1.1	0.0	0.10	0.01
03/23/00 10:45	0.0024	0.0006	0.046	0.001	0.0073	0.0004	1.9	0.2	0.11	0.00
04/03/00 17:45	0.0025	0.0016	0.046	0.001	0.0072	0.0002	2.1	0.3	0.10	0.00
04/24/00 12:00	0.0017	0.0011	0.045	0.001	0.0077	0.0005	1.6	0.4	0.12	0.00
05/01/00 18:10	0.0034	0.0018	0.040	0.002	0.0072	0.0002	1.9	0.2	0.087	0.002
05/18/00 09:35	0.0023	0.0009	0.046	0.001	0.0082	0.0002	0.9	0.2	0.075	0.001
06/06/00 10:05	0.0025	0.0008	0.042	0.000	0.0091	0.0005	1.0	0.3	0.097	0.002
06/23/00 09:55	0.003	0.001	0.046	0.001	0.012	0.000	1.3	0.7	0.13	0.00
07/05/00 13:15	0.004	0.001	0.040	0.000	0.0027	0.0002	1.8	0.7	0.070	0.013
07/26/00 11:50	0.0037	0.0008	0.041	0.001	0.0067	0.0006	0.9	0.2	0.077	0.001
08/07/00 09:35	0.004	0.003	0.043	0.003	0.0066	0.0005	1.4	0.1	0.086	0.002
08/17/00 11:15	0.0045	0.0004	0.046	0.000	0.0054	0.0001	1.0	0.0	0.088	0.003
09/07/00 09:30	0.004	0.002	0.042	0.001	0.0042	0.0010	0.90	0.09	0.085	0.002
09/20/00 13:00	0.005	0.003	0.043	0.000	0.0047	0.0006	1.4	0.1	0.092	0.007
11/02/00 10:30	< 0.002	0.002	0.039	0.001	0.0046	0.0003	1.2	0.1	0.084	0.002
11/20/00 11:40	0.004	0.002	0.035	0.000	0.0071	0.0005	3.4	0.1	0.099	0.003
12/01/00 11:30	0.003	0.003	0.031	0.001	0.0075	0.0001	2.5	0.1	0.076	0.006
12/13/00 15:00	0.005	0.004	0.029	0.002	0.0064	0.0006	2.5	0.3	0.078	0.003
01/03/01 11:20	< 0.01	0.00	0.021	0.001	0.0047	0.0005	3.0	0.6	0.17	0.11
01/22/01 13:00	< 0.01	0.00	0.031	0.001	0.0070	0.0009	2.0	0.3	0.083	0.009
02/06/01 13:30	< 0.003	0.002	0.037	0.001	0.0063	0.0014	3.5	0.1	0.062	0.004
02/26/01 12:00	0.010	0.002	0.11	0.00	0.012	0.001	1.5	0.0	0.18	0.01
03/14/01 11:30	< 0.003	0.004	0.039	0.001	0.0071	0.0010	1.2	0.2	0.065	0.003
04/02/01 11:50	< 0.003	0.001	0.044	0.001	0.0060	0.0005	1.3	0.5	0.068	0.004
04/19/01 11:50	< 0.003	0.001	0.043	0.001	0.0076	0.0003	2.4	0.1	0.060	0.004
05/02/01 12:20	< 0.003	0.004	0.042	0.001	0.0090	0.0010	1.4	0.1	0.064	0.001
05/15/01 12:10	< 0.003	0.001	0.039	0.002	0.0079	0.0005	2.1	0.1	0.13	0.00
05/30/01 10:48	< 0.003	0.001	0.047	0.001	0.011	0.001	1.2	0.2	0.088	0.001
06/11/01 10:30	0.004	0.002	0.049	0.003	0.010	0.001	1.3	0.0	0.095	0.002
06/26/01 10:05	< 0.003	0.004	0.043	0.001	0.0081	0.0007	1.2	0.2	0.065	0.003
07/10/01 10:20	0.005	0.002	0.048	0.000	0.0076	0.0009	1.4	0.1	0.095	0.002
07/25/01 10:15	< 0.003	0.001	0.043	0.003	0.0083	0.0005	0.9	0.1	0.084	0.004
08/06/01 09:50	0.005	0.003	0.045	0.002	0.0073	0.0010	1.1	0.1	0.069	0.003
08/20/01 10:35	0.004	0.004	0.033	0.001	0.0042	0.0003	1.1	0.1	0.067	0.003
09/13/01 08:30	0.96	0.03	0.020	0.001	0.003	0.001	0.8	0.1	0.093	0.003

Table A7. Concentrations of dissolved trace elements in samples collected on the Iroquois River -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	W		Y		Yb		Zn		Zr	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 10:15	< 0.003	0.001	0.040	0.000	0.0081	0.0003	1.3	0.1	0.072	0.005
10/24/01 11:05	< 0.003	0.003	0.12	0.01	0.016	0.000	2.2	0.1	0.19	0.01
11/08/01 10:20	< 0.003	0.002	0.046	0.002	0.0089	0.0001	1.1	0.1	0.089	0.006
11/19/01 10:45	< 0.003	0.002	0.042	0.000	0.0082	0.0009	1.4	0.2	0.085	0.002
12/03/01 12:05	< 0.002	0.001	0.049	0.002	0.010	0.001	1.2	0.0	0.12	0.01
12/19/01 11:30	0.002	0.002	0.057	0.002	0.011	0.000	1.5	0.1	0.069	0.001
01/03/02 11:25	0.002	0.002	0.035	0.000	0.0068	0.0011	1.8	0.0	0.065	0.002
01/15/02 11:30	0.003	0.002	0.036	0.002	0.0070	0.0014	1.6	0.3	0.054	0.003
01/29/02 11:35	0.002	0.001	0.042	0.001	0.0069	0.0001	1.0	0.0	0.050	0.004
02/13/02 10:55	0.003	0.001	0.048	0.002	0.0094	0.0005	1.5	0.1	0.096	0.000
02/27/02 12:00	< 0.002	0.000	0.051	0.002	0.0088	0.0010	1.5	0.0	0.095	0.004
03/12/02 11:40	0.003	0.001	0.065	0.002	0.010	0.001	2.1	0.0	0.16	0.00
03/27/02 11:30	0.002	0.001	0.047	0.001	0.0083	0.0013	1.5	0.0	0.080	0.003
04/03/02 11:05	0.004	0.001	0.059	0.002	0.0099	0.0007	1.7	0.1	0.13	0.01
04/23/02 10:00	0.002	0.001	0.047	0.002	0.0090	0.0003	1.5	0.0	0.095	0.003
05/07/02 08:55	0.003	0.000	0.052	0.000	0.0090	0.0014	1.2	0.1	0.090	0.006
05/22/02 10:00	0.003	0.001	0.060	0.001	0.0091	0.0004	1.4	0.0	0.14	0.00
06/04/02 09:45	< 0.002	0.001	0.045	0.001	0.0091	0.0009	1.8	0.1	0.088	0.001
06/17/02 10:00	0.002	0.001	0.048	0.001	0.011	0.001	1.3	0.0	0.089	0.003

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek.

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Al		As		B		Ba		Be		Bi		Cd	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.9	0.1	0.46	0.01	30	1	43	1	< 0.005	0.001	0.002	0.001	0.091	0.007
03/06/00 16:30	1.4	0.4	0.53	0.01	39	2	44	1	< 0.005	0.001	< 0.002	0.002	0.020	0.004
03/23/00 12:50	0.9	0.0	0.46	0.02	29	0	46	0	< 0.005	0.001	< 0.002	0.001	0.032	0.001
04/03/00 16:00	0.9	0.0	0.63	0.00	41	1	45	1	< 0.005	0.004	< 0.002	0.001	0.027	0.008
04/24/00 14:30	0.4	0.0	0.44	0.02	27	2	47	1	< 0.005	0.004	< 0.002	0.001	0.015	0.004
05/01/00 16:00	0.7	0.1	0.54	0.02	33	1	44	1	< 0.005	0.003	0.003	0.003	0.020	0.001
05/18/00 11:40	1.1	0.2	0.52	0.01	36	4	53	1	< 0.005	0.004	0.004	0.001	0.012	0.007
06/06/00 12:40	0.2	0.4	0.51	0.02	37	6	52	0	< 0.005	0.002	< 0.002	0.000	0.015	0.004
06/23/00 12:20	< 1	5	0.36	0.03	39	1	54	1	< 0.01	0.01	< 0.002	0.000	0.008	0.005
07/05/00 12:10	< 1	2	0.71	0.02	43	2	57	1	0.01	0.00	0.003	0.001	0.017	0.003
07/26/00 13:05	< 0.2	1.1	0.68	0.01	58	2	57	0	< 0.005	0.003	< 0.001	0.001	0.024	0.003
08/07/00 10:25	1.1	0.0	0.85	0.05	67	5	56	2	0.01	0.01	< 0.002	0.001	0.016	0.002
08/17/00 13:10	-0.2	1.4	1.1	0.0	68	1	54	3	< 0.005	0.002	-0.001	0.000	< 0.002	0.002
09/07/00 11:00	0.69	0.07	1.1	0.1	83	4	56	1	< 0.01	0.01	< 0.002	0.001	0.002	0.001
09/20/00 12:00	0.66	0.03	0.80	0.03	76	1	50	1	< 0.01	0.00	< 0.002	0.002	0.003	0.000
11/02/00 13:00	0.49	0.02	0.75	0.01	83	4	50	1	< 0.01	0.00	< 0.002	0.001	0.007	0.002
11/20/00 13:30	< 0.06	0.14	0.49	0.03	62	3	50	1	< 0.01	0.01	< 0.002	0.001	0.052	0.003
12/01/00 14:00	0.10	0.32	0.41	0.00	69	2	48	1	< 0.01	0.01	< 0.002	0.001	0.016	0.000
12/13/00 12:20	2.2	0.4	0.30	0.04	64	1	53	1	< 0.01	0.00	< 0.002	0.000	0.012	0.003
01/03/01 13:00	< 0.6	5.2	0.40	0.01	64	3	47	1	< 0.01	0.00	0.0012	0.0009	0.007	0.004
01/22/01 15:00	< 0.6	5.2	0.44	0.04	47	17	49	3	< 0.01	0.01	0.0008	0.0008	< 0.004	0.002
02/06/01 15:00	5.7	0.2	0.47	0.02	31	1	46	2	< 0.02	0.01	< 0.002	0.000	0.012	0.006
02/26/01 13:30	94	0	0.58	0.04	20	4	36	1	0.01	0.01	0.003	0.000	0.049	0.001
03/14/01 13:45	1.1	0.1	0.35	0.04	32	3	46	1	< 0.02	0.00	< 0.002	0.000	< 0.002	0.001
04/02/01 13:20	1.0	0.0	0.35	0.01	33	1	46	1	< 0.02	0.01	< 0.002	0.000	0.035	0.003
04/19/01 14:00	1.1	0.1	0.37	0.04	32	0	46	1	< 0.02	0.01	< 0.002	0.001	0.010	0.004
05/02/01 13:40	1.6	0.0	0.50	0.05	35	1	46	3	< 0.01	0.00	< 0.001	0.001	0.019	0.003
05/15/01 13:20	0.87	0.13	0.53	0.05	46	0	49	1	< 0.01	0.01	0.002	0.002	0.021	0.002
05/30/01 10:30	0.89	0.08	0.48	0.02	41	1	47	1	< 0.01	0.01	< 0.001	0.000	0.014	0.000
06/11/01 11:50	1.8	0.0	0.57	0.07	37	1	48	2	< 0.01	0.00	< 0.001	0.000	0.018	0.002
06/26/01 11:55	0.82	0.04	0.49	0.03	46	0	50	3	< 0.01	0.00	0.001	0.000	0.012	0.002
07/10/01 11:40	1.1	0.1	0.51	0.00	46	1	52	0	< 0.01	0.01	< 0.001	0.000	0.061	0.003
07/25/01 11:50	1.3	0.0	0.89	0.03	65	5	56	0	< 0.01	0.01	< 0.001	0.000	0.009	0.004
08/06/01 11:05	1.1	0.1	1.1	0.0	63	1	52	1	< 0.01	0.02	< 0.001	0.000	0.009	0.005
08/20/01 12:20	1.3	0.2	0.83	0.04	64	1	48	2	< 0.01	0.01	< 0.001	0.000	0.016	0.004
09/12/01 11:20	0.4	0.0	1.1	0.0	73	1	51	1	< 0.03	0.01	< 0.001	0.000	< 0.007	0.004

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Al		As		B		Ba		Be		Bi		Cd	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	0.42	0.07	0.72	0.02	65	1	50	1	< 0.01	0.01	< 0.001	0.000	0.056	0.004
10/24/01 13:35	9.0	0.2	0.52	0.03	30	3	33	1	< 0.01	0.01	0.002	0.000	0.018	0.002
11/08/01 11:30	0.68	0.09	0.48	0.06	47	6	53	2	< 0.01	0.01	0.002	0.000	0.007	0.000
11/19/01 13:10	0.73	0.05	0.49	0.03	43	2	50	2	0.01	0.01	< 0.001	0.000	0.007	0.001
12/03/01 13:30	< 0.1	0.8	0.30	0.01	40	7	51	0	< 0.006	0.007	< 0.001	0.000	0.019	0.004
12/19/01 13:15	1.4	0.4	0.38	0.02	31	na	47	0	< 0.007	0.002	< 0.002	0.003	0.017	0.004
01/03/02 13:50	0.5	0.5	0.38	0.01	40	3	51	0	< 0.007	0.001	< 0.002	0.000	0.013	0.004
01/15/02 14:40	< 0.1	0.3	0.38	0.02	42	5	50	1	< 0.007	0.003	< 0.002	0.000	0.011	0.002
01/29/02 14:10	3.8	0.1	0.40	0.02	52	na	51	1	< 0.007	0.003	< 0.002	0.000	0.011	0.005
02/13/02 13:10	0.57	0.06	0.40	0.01	34	2	48	1	< 0.01	0.00	0.002	0.002	< 0.003	0.001
02/27/02 14:40	0.75	0.04	0.37	0.04	30	1	44	0	< 0.01	0.00	0.002	0.002	< 0.003	0.002
03/12/02 14:45	1.7	0.0	0.40	0.02	27	1	42	0	< 0.01	0.01	< 0.002	0.002	< 0.003	0.001
03/27/02 14:30	0.50	0.02	0.35	0.01	30	1	42	0	< 0.01	0.00	< 0.002	0.002	< 0.003	0.001
04/04/02 09:15	1.2	0.0	0.37	0.01	26	1	41	0	< 0.01	0.01	< 0.002	0.001	< 0.003	0.001
04/23/02 13:45	0.62	0.03	0.43	0.01	30	2	44	0	< 0.01	0.01	< 0.002	0.002	< 0.003	0.001
05/07/02 11:15	1.8	0.0	0.43	0.00	34	1	44	0	< 0.01	0.00	< 0.002	0.000	0.006	0.000
05/22/02 12:45	1.0	0.0	0.39	0.01	33	1	43	0	< 0.01	0.00	< 0.002	0.001	< 0.003	0.000
06/04/02 11:40	1.1	0.0	0.45	0.00	39	1	46	0	< 0.01	0.00	< 0.002	0.002	< 0.003	0.000
06/17/02 12:55	0.79	0.06	0.49	0.01	39	1	48	0	< 0.01	0.01	< 0.002	0.000	< 0.003	0.000

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ce		Co		Cr		Cs		Cu		Dy	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.013	0.000	< 0.001	0.011	< 0.1	0.0	0.002	0.003	< 0.06	0.16	0.0036	0.0006
03/06/00 16:30	0.020	0.000	< 0.001	0.013	< 0.1	0.0	0.048	0.043	< 0.06	0.07	0.0030	0.0001
03/23/00 12:50	0.021	0.000	< 0.001	0.025	< 0.1	0.0	0.003	0.002	< 0.06	0.15	0.0038	0.0004
04/03/00 16:00	0.039	0.000	< 0.001	0.015	< 0.1	0.0	0.003	0.003	< 0.06	0.14	0.0044	0.0004
04/24/00 14:30	0.018	0.001	< 0.001	0.036	< 0.1	0.0	0.046	0.030	< 0.06	0.11	0.0042	0.0002
05/01/00 16:00	0.022	0.000	< 0.001	0.004	< 0.1	0.0	0.025	0.029	< 0.06	0.12	0.0044	0.0001
05/18/00 11:40	0.024	0.000	< 0.001	0.002	< 0.1	0.0	0.003	0.002	< 0.06	0.04	0.0045	0.0004
06/06/00 12:40	0.024	0.000	< 0.001	0.037	< 0.1	0.1	0.002	0.001	< 0.06	0.01	0.0047	0.0008
06/23/00 12:20	0.017	0.000	< 0.002	0.006	< 0.6	0.2	< 0.1	0.0	< 0.3	0.2	0.0042	0.0006
07/05/00 12:10	0.032	0.002	< 0.002	0.015	< 0.6	0.3	0.2	0.0	< 0.3	0.1	0.0094	0.0001
07/26/00 13:05	0.019	0.000	< 0.002	0.005	< 0.3	0.4	< 0.009	0.007	0.56	0.00	0.0044	0.0002
08/07/00 10:25	0.018	0.001	< 0.004	0.043	< 0.2	0.1	< 0.02	0.02	0.54	0.03	0.0038	0.0006
08/17/00 13:10	0.014	0.001	< 0.002	0.011	< 0.3	0.1	< 0.009	0.003	0.66	0.01	0.0025	0.0001
09/07/00 11:00	0.020	0.001	< 0.004	0.039	< 0.2	0.1	< 0.02	0.01	0.32	0.05	0.0037	0.0005
09/20/00 12:00	0.012	0.001	< 0.004	0.032	< 0.2	0.1	< 0.02	0.01	0.33	0.02	0.0031	0.0005
11/02/00 13:00	0.015	0.000	< 0.004	0.033	< 0.2	0.1	< 0.02	0.01	0.26	0.03	0.0028	0.0006
11/20/00 13:30	0.011	0.001	< 0.004	0.022	< 0.2	0.1	< 0.02	0.02	0.50	0.03	0.0023	0.0003
12/01/00 14:00	0.0098	0.0005	< 0.004	0.036	< 0.2	0.0	< 0.02	0.00	0.61	0.08	0.0020	0.0004
12/13/00 12:20	0.013	0.001	< 0.004	0.021	< 0.2	0.1	< 0.02	0.00	0.69	0.08	0.0026	0.0002
01/03/01 13:00	0.0073	0.0011	< 0.003	0.003	< 0.4	0.3	< 0.01	0.01	0.74	0.21	0.0015	0.0002
01/22/01 15:00	0.011	0.001	< 0.003	0.013	< 0.4	0.2	< 0.01	0.01	0.86	0.08	0.0022	0.0001
02/06/01 15:00	0.021	0.001	< 0.002	0.007	< 0.1	0.0	0.007	0.008	0.95	0.03	0.0043	0.0004
02/26/01 13:30	0.22	0.00	< 0.002	0.036	0.2	0.1	< 0.008	0.004	2.0	0.1	0.019	0.000
03/14/01 13:45	0.011	0.000	< 0.002	0.011	< 0.1	0.0	0.006	0.007	0.60	0.02	0.0025	0.0004
04/02/01 13:20	0.019	0.000	< 0.002	0.007	< 0.1	0.0	0.003	0.001	0.55	0.02	0.0034	0.0007
04/19/01 14:00	0.011	0.000	< 0.002	0.006	< 0.1	0.0	0.004	0.005	0.57	0.01	0.0028	0.0006
05/02/01 13:40	0.027	0.000	< 0.002	0.039	< 0.2	0.3	0.011	0.007	0.44	0.07	0.0041	0.0005
05/15/01 13:20	0.015	0.001	< 0.002	0.028	< 0.2	0.1	< 0.008	0.011	0.47	0.06	0.0032	0.0001
05/30/01 10:30	0.015	0.001	< 0.002	0.015	< 0.2	0.1	< 0.008	0.005	0.37	0.06	0.0037	0.0004
06/11/01 11:50	0.017	0.001	< 0.002	0.032	< 0.2	0.1	< 0.008	0.006	0.60	0.09	0.0038	0.0008
06/26/01 11:55	0.015	0.001	< 0.002	0.054	< 0.2	0.2	< 0.008	0.005	0.41	0.09	0.0034	0.0005
07/10/01 11:40	0.013	0.000	< 0.002	0.037	< 0.2	0.2	< 0.008	0.007	0.72	0.09	0.0035	0.0003
07/25/01 11:50	0.018	0.002	< 0.002	0.047	< 0.2	0.0	< 0.008	0.006	0.33	0.08	0.0036	0.0008
08/06/01 11:05	0.023	0.001	< 0.002	0.032	< 0.2	0.2	< 0.008	0.004	0.15	0.06	0.0034	0.0005
08/20/01 12:20	0.021	0.001	< 0.002	0.033	< 0.2	0.1	< 0.008	0.006	0.08	0.06	0.0028	0.0002
09/12/01 11:20	0.012	0.001	< 0.002	0.020	< 0.04	0.02	< 0.009	0.004	0.39	0.03	0.0028	0.0002

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ce		Co		Cr		Cs		Cu		Dy	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	0.0074	0.0003	< 0.002	0.046	< 0.2	0.1	0.008	0.011	0.10	0.06	0.0021	0.0003
10/24/01 13:35	0.19	0.00	< 0.002	0.021	< 0.2	0.0	< 0.008	0.009	1.7	0.1	0.032	0.001
11/08/01 11:30	0.010	0.001	< 0.002	0.039	0.4	0.2	< 0.008	0.007	0.32	0.04	0.0027	0.0010
11/19/01 13:10	0.013	0.001	< 0.002	0.025	1.1	0.4	< 0.008	0.002	0.32	0.02	0.0026	0.0005
12/03/01 13:30	0.011	0.000	< 0.003	0.001	< 0.2	0.4	< 0.003	0.001	0.69	0.03	0.0037	0.0001
12/19/01 13:15	0.017	0.002	< 0.006	0.017	< 0.08	0.05	0.003	0.003	0.87	0.06	0.0041	0.0002
01/03/02 13:50	0.0084	0.0004	< 0.006	0.008	< 0.08	0.03	< 0.003	0.002	0.40	0.03	0.0034	0.0007
01/15/02 14:40	0.012	0.001	< 0.006	0.012	< 0.08	0.13	< 0.003	0.002	0.47	0.05	0.0030	0.0000
01/29/02 14:10	0.010	0.000	< 0.006	0.008	< 0.08	0.07	< 0.003	0.001	0.43	0.01	0.0025	0.0003
02/13/02 13:10	0.012	0.000	0.075	0.005	< 0.2	0.1	< 0.004	0.002	0.44	0.02	0.0035	0.0003
02/27/02 14:40	0.012	0.001	0.083	0.021	< 0.2	0.0	< 0.004	0.005	0.49	0.00	0.0035	0.0004
03/12/02 14:45	0.019	0.001	0.12	0.01	< 0.2	0.1	< 0.004	0.005	0.91	0.02	0.0036	0.0003
03/27/02 14:30	0.0089	0.0008	0.084	0.011	< 0.2	0.1	< 0.004	0.002	0.67	0.01	0.0030	0.0002
04/04/02 09:15	0.016	0.000	0.060	0.008	< 0.2	0.1	< 0.004	0.002	0.72	0.01	0.0041	0.0003
04/23/02 13:45	0.012	0.000	0.13	0.00	< 0.2	0.0	< 0.004	0.003	0.47	0.02	0.0039	0.0008
05/07/02 11:15	0.021	0.001	0.081	0.002	< 0.2	0.1	0.009	0.001	0.55	0.02	0.0051	0.0012
05/22/02 12:45	0.012	0.000	0.072	0.003	< 0.2	0.1	< 0.004	0.003	0.56	0.00	0.0032	0.0001
06/04/02 11:40	0.023	0.001	0.12	0.02	< 0.2	0.1	< 0.004	0.002	0.55	0.01	0.0047	0.0007
06/17/02 12:55	0.019	0.000	0.079	0.004	< 0.2	0.1	< 0.004	0.002	0.68	0.02	0.0051	0.0006

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Er		Eu		Fe		Gd		Ho		La	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.0025	0.0001	0.0071	0.0009	5.1	0.1	0.0057	0.0004	0.0007	0.0001	0.011	0.001
03/06/00 16:30	0.0027	0.0000	0.0074	0.0010	30	0	0.0062	0.0006	0.0008	0.0001	0.016	0.000
03/23/00 12:50	0.0026	0.0002	0.0078	0.0013	21	1	0.0070	0.0009	0.0009	0.0001	0.015	0.001
04/03/00 16:00	0.0031	0.0005	0.0072	0.0012	76	3	0.0083	0.0003	0.0010	0.0001	0.026	0.000
04/24/00 14:30	0.0027	0.0002	0.0070	0.0005	14	1	0.0070	0.0005	0.0009	0.0000	0.014	0.000
05/01/00 16:00	0.0030	0.0003	0.0079	0.0003	29	0	0.0059	0.0001	0.0008	0.0001	0.016	0.000
05/18/00 11:40	0.0034	0.0004	0.0095	0.0011	15	1	0.0076	0.0005	0.0011	0.0001	0.019	0.000
06/06/00 12:40	0.0033	0.0009	0.0092	0.0016	27	0	0.0075	0.0005	0.0010	0.0001	0.019	0.000
06/23/00 12:20	0.0037	0.0006	0.0022	0.0010	3	0	0.0052	0.0008	0.0009	0.0001	0.016	0.000
07/05/00 12:10	0.0085	0.0006	0.0031	0.0009	5	1	0.0082	0.0002	0.0023	0.0001	0.025	0.000
07/26/00 13:05	0.0029	0.0001	< 0.0002	0.0006	18	0	0.0057	0.0010	0.0009	0.0001	0.016	0.000
08/07/00 10:25	0.0027	0.0002	0.0017	0.0003	17	0	0.0046	0.0000	0.0006	0.0001	0.014	0.000
08/17/00 13:10	0.0016	0.0001	0.0010	0.0029	24	0	0.0052	0.0000	0.0007	0.0001	0.0088	0.0004
09/07/00 11:00	0.0022	0.0002	0.0004	0.0006	24	2	0.0045	0.0009	0.0006	0.0001	0.013	0.000
09/20/00 12:00	0.0022	0.0002	0.0012	0.0008	17	0	0.0024	0.0001	0.0006	0.0001	0.0088	0.0004
11/02/00 13:00	0.0018	0.0000	0.0012	0.0009	34	0	0.0035	0.0003	0.0004	0.0001	0.0096	0.0005
11/20/00 13:30	0.0022	0.0003	0.0010	0.0002	45	1	0.0035	0.0003	0.0005	0.0001	0.0079	0.0001
12/01/00 14:00	0.0014	0.0001	0.0012	0.0003	57	0	0.0024	0.0004	0.0003	0.0001	0.0075	0.0002
12/13/00 12:20	0.0017	0.0002	0.0012	0.0006	29	1	0.0033	0.0002	0.0004	0.0001	0.0087	0.0001
01/03/01 13:00	0.0013	0.0002	0.0002	0.0003	37	0	0.0020	0.0005	0.0005	0.0001	0.0062	0.0005
01/22/01 15:00	0.0020	0.0003	0.0008	0.0016	35	11	0.0034	0.0005	0.0006	0.0001	0.0090	0.0003
02/06/01 15:00	0.0027	0.0007	< 0.0002	0.0002	15	1	0.0053	0.0008	0.0008	0.0001	0.016	0.001
02/26/01 13:30	0.011	0.001	0.0061	0.0018	96	3	0.024	0.001	0.0038	0.0004	0.12	0.00
03/14/01 13:45	0.0027	0.0004	0.0005	0.0012	11	1	0.0040	0.0012	0.0005	0.0001	0.012	0.001
04/02/01 13:20	0.0028	0.0003	0.0009	0.0008	40	1	0.0043	0.0003	0.0010	0.0001	0.017	0.001
04/19/01 14:00	0.0024	0.0002	< 0.0002	0.0003	3.9	2.1	0.0038	0.0007	0.0007	0.0001	0.012	0.000
05/02/01 13:40	0.0021	0.0005	0.0028	0.0017	32	1	0.0060	0.0003	0.0010	0.0003	0.023	0.002
05/15/01 13:20	0.0025	0.0007	0.0005	0.0017	18	1	0.0038	0.0005	0.0009	0.0001	0.012	0.001
05/30/01 10:30	0.0030	0.0009	0.0004	0.0017	20	14	0.0044	0.0013	0.0008	0.0002	0.012	0.002
06/11/01 11:50	0.0026	0.0003	0.0007	0.0018	4.8	0.9	0.0060	0.0007	0.0008	0.0001	0.015	0.000
06/26/01 11:55	0.0018	0.0004	0.0011	0.0017	14	1	0.0044	0.0008	0.0008	0.0002	0.014	0.001
07/10/01 11:40	0.0035	0.0013	0.0021	0.0019	4	0	0.0043	0.0006	0.0007	0.0000	0.012	0.001
07/25/01 11:50	0.0024	0.0003	0.0018	0.0007	13	1	0.0047	0.0007	0.0010	0.0001	0.014	0.002
08/06/01 11:05	0.0022	0.0007	0.0009	0.0013	25	2	0.0044	0.0010	0.0008	0.0001	0.015	0.002
08/20/01 12:20	0.0017	0.0009	0.0006	0.0015	40	3	0.0039	0.0003	0.0008	0.0001	0.014	0.000
09/12/01 11:20	0.002	0.001	< 0.0004	0.0006	13	1	0.0044	0.0004	0.0009	0.0001	0.0090	0.0004

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Er		Eu		Fe		Gd		Ho		La	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	0.0015	0.0009	< 0.0003	0.0012	14	0	0.0035	0.0002	0.0006	0.0001	0.0061	0.0006
10/24/01 13:35	0.016	0.002	0.0096	0.0015	32	0	0.033	0.001	0.0052	0.0000	0.14	0.01
11/08/01 11:30	0.0026	0.0004	0.0013	0.0017	5.5	0.1	0.0052	0.0012	0.0008	0.0002	0.012	0.000
11/19/01 13:10	0.0021	0.0003	0.0010	0.0013	16	1	0.0044	0.0006	0.0008	0.0003	0.012	0.001
12/03/01 13:30	0.0029	0.0002	0.0008	0.0011	19	3	0.0045	0.0003	0.0010	0.0000	0.012	0.000
12/19/01 13:15	0.0028	0.0003	0.0011	0.0008	5.4	na	0.0055	0.0005	0.0010	0.0002	0.016	0.000
01/03/02 13:50	0.0018	0.0003	0.0005	0.0009	6.1	0.7	0.0048	0.0012	0.0006	0.0001	0.0083	0.0007
01/15/02 14:40	0.0027	0.0003	0.0006	0.0008	15	1	0.0041	0.0002	0.0007	0.0001	0.010	0.000
01/29/02 14:10	0.0021	0.0007	< 0.0002	0.0006	25	na	0.0036	0.0002	0.0006	0.0002	0.0096	0.0002
02/13/02 13:10	0.0028	0.0006	0.0003	0.0003	4.3	0.2	0.0064	0.0008	0.0009	0.0000	0.011	0.000
02/27/02 14:40	0.0025	0.0003	< 0.0003	0.0006	2.7	0.3	0.0040	0.0002	0.0007	0.0001	0.013	0.000
03/12/02 14:45	0.0024	0.0006	0.0037	0.0000	4.0	0.2	0.0071	0.0009	0.0009	0.0003	0.019	0.000
03/27/02 14:30	0.0019	0.0010	< 0.0003	0.0007	6.3	0.5	0.0039	0.0001	0.0007	0.0001	0.0099	0.0008
04/04/02 09:15	0.0019	0.0008	0.0009	0.0004	3.1	0.3	0.0050	0.0004	0.0008	0.0001	0.014	0.000
04/23/02 13:45	0.0023	0.0002	0.0018	0.0015	3.1	0.1	0.0066	0.0003	0.0009	0.0002	0.012	0.001
05/07/02 11:15	0.0034	0.0006	< 0.0003	0.0004	3.9	0.7	0.0065	0.0016	0.0011	0.0001	0.021	0.001
05/22/02 12:45	0.0023	0.0002	0.0010	0.0018	2.7	0.8	0.0059	0.0002	0.0009	0.0002	0.013	0.001
06/04/02 11:40	0.0027	0.0006	0.0031	0.0017	25	0	0.0082	0.0010	0.0009	0.0001	0.021	0.001
06/17/02 12:55	0.0039	0.0003	0.0006	0.0012	6.6	0.5	0.0070	0.0005	0.0012	0.0002	0.016	0.000

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Li		Lu		Mn		Mo		Nd		Ni	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	3.5	0.1	0.0004	0.0001	27	0	4.1	0.0	0.013	0.000	4.0	0.4
03/06/00 16:30	4.5	0.1	0.0004	0.0000	41	0	4.7	0.1	0.018	0.001	3.9	0.6
03/23/00 12:50	3.9	0.2	0.0004	0.0001	35	0	3.7	0.0	0.018	0.001	4.0	1.0
04/03/00 16:00	5.3	0.2	0.0005	0.0001	49	1	5.0	0.0	0.028	0.000	3.8	0.2
04/24/00 14:30	3.5	0.1	0.0005	0.0000	30	0	3.3	0.0	0.014	0.000	4.0	0.9
05/01/00 16:00	4.2	0.1	0.0004	0.0000	53	0	3.9	0.0	0.018	0.000	4.1	0.2
05/18/00 11:40	4.0	0.0	0.0006	0.0001	36	1	3.7	0.0	0.021	0.001	4.2	1.1
06/06/00 12:40	4.2	0.1	0.0005	0.0000	25	0	3.7	0.0	0.021	0.002	4.0	1.3
06/23/00 12:20	3.3	0.1	0.0006	0.0001	23	2	2.6	0.0	0.016	0.001	< 0.02	0.21
07/05/00 12:10	2.4	0.1	0.0030	0.0001	9.4	0.2	2.6	0.0	0.032	0.001	0.91	0.33
07/26/00 13:05	5.3	0.0	0.0005	0.0000	35	1	5.0	0.0	0.019	0.001	1.0	0.0
08/07/00 10:25	5.8	0.1	0.0005	0.0001	55	1	5.9	0.3	0.015	0.002	0.10	0.35
08/17/00 13:10	5.7	0.1	0.0004	0.0000	159	2	6.2	0.1	0.010	0.000	1.6	0.8
09/07/00 11:00	6.5	0.1	0.0005	0.0002	69	0	6.6	0.2	0.013	0.001	0.05	0.47
09/20/00 12:00	6.6	0.2	0.0003	0.0001	52	2	5.6	0.2	0.0091	0.0011	< 0.01	0.28
11/02/00 13:00	7.3	0.2	0.0004	0.0001	58	1	5.2	0.1	0.011	0.001	< 0.01	0.32
11/20/00 13:30	6.0	0.0	0.0004	0.0001	33	1	4.6	0.1	0.010	0.001	< 0.01	0.24
12/01/00 14:00	6.3	0.0	0.0002	0.0001	42	0	4.6	0.1	0.0083	0.0014	< 0.01	0.43
12/13/00 12:20	5.8	0.2	0.0004	0.0001	32	1	4.4	0.1	0.011	0.000	0.49	0.37
01/03/01 13:00	5.6	0.3	0.0002	0.0000	50	0	4.3	0.2	0.0069	0.0011	0.52	0.00
01/22/01 15:00	4.5	0.5	0.0004	0.0001	25	1	4.0	0.2	0.012	0.001	1.0	0.6
02/06/01 15:00	3.2	0.2	0.0003	0.0002	35	1	3.0	0.0	0.021	0.000	1.0	0.1
02/26/01 13:30	1.5	0.0	0.0015	0.0001	13	1	1.9	0.1	0.14	0.00	2.9	0.0
03/14/01 13:45	3.5	0.1	0.0003	0.0001	39	1	3.3	0.1	0.013	0.001	0.6	0.3
04/02/01 13:20	3.7	0.2	0.0004	0.0001	28	0	3.6	0.0	0.019	0.001	0.3	0.1
04/19/01 14:00	2.9	0.2	0.0004	0.0001	25	0	2.8	0.1	0.013	0.001	0.5	0.1
05/02/01 13:40	4.0	0.3	0.0003	0.0001	27	2	3.8	0.1	0.027	0.003	0.5	0.1
05/15/01 13:20	4.7	0.2	0.0003	0.0001	27	1	4.3	0.2	0.012	0.001	0.7	0.1
05/30/01 10:30	4.3	0.2	0.0006	0.0000	21	1	3.7	0.1	0.016	0.002	0.4	0.1
06/11/01 11:50	3.1	0.0	0.0005	0.0002	26	1	3.0	0.1	0.018	0.001	0.6	0.1
06/26/01 11:55	4.3	0.3	0.0003	0.0001	22	1	4.2	0.1	0.015	0.002	0.6	0.1
07/10/01 11:40	3.8	0.1	0.0002	0.0001	17	1	3.8	0.1	0.015	0.001	0.6	0.1
07/25/01 11:50	6.0	0.1	0.0004	0.0001	42	1	6.1	0.2	0.015	0.001	0.8	0.1
08/06/01 11:05	6.6	0.4	0.0004	0.0002	68	3	6.6	0.2	0.016	0.003	0.7	0.1
08/20/01 12:20	6.8	0.0	< 0.0001	0.0002	54	0	6.0	0.1	0.016	0.001	3.4	3.9
09/12/01 11:20	6.1	0.0	0.0005	0.0001	68	1	5.6	0.0	0.009	0.001	1.3	0.2

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Li		Lu		Mn		Mo		Nd		Ni	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	6.0	0.2	0.0004	0.0001	42	3	5.2	0.1	0.0087	0.0005	1	0
10/24/01 13:35	1.2	0.1	0.0021	0.0002	7.1	0.5	1.1	0.1	0.19	0.00	1.1	0.0
11/08/01 11:30	3.9	0.3	0.0003	0.0001	29	1	3.3	0.1	0.015	0.000	0.4	0.3
11/19/01 13:10	4.9	0.1	0.0004	0.0001	28	1	3.8	0.1	0.014	0.002	0.7	0.1
12/03/01 13:30	3.0	0.1	0.0003	0.0001	14	0	2.6	0.0	0.014	0.001	< 0.01	0.24
12/19/01 13:15	2.4	0.9	0.0004	0.0001	9.9	0.2	2.0	0.0	0.019	0.001	0.07	0.16
01/03/02 13:50	3.9	0.8	0.0003	0.0000	42	0	3.3	0.0	0.010	0.001	< 0.01	0.15
01/15/02 14:40	4.1	0.9	0.0004	0.0001	37	1	3.7	0.1	0.011	0.002	< 0.01	0.08
01/29/02 14:10	4.4	0.8	0.0004	0.0000	44	0	4.0	0.0	0.0100	0.0001	< 0.01	0.09
02/13/02 13:10	3.9	0.2	0.0004	0.0001	31	1	3.0	0.1	0.013	0.002	< 0.8	0.5
02/27/02 14:40	3.6	0.5	0.0003	0.0002	28	0	2.6	0.2	0.013	0.001	1.2	0.0
03/12/02 14:45	2.9	0.2	0.0005	0.0002	18	0	2.3	0.1	0.021	0.000	< 0.8	0.5
03/27/02 14:30	3.3	0.2	0.0005	0.0001	32	0	2.7	0.1	0.011	0.001	< 0.8	0.5
04/04/02 09:15	2.5	0.0	0.0004	0.0001	16	0	2.3	0.2	0.018	0.001	< 0.8	0.3
04/23/02 13:45	3.3	0.1	0.0004	0.0001	21	0	2.7	0.0	0.013	0.001	< 0.8	0.3
05/07/02 11:15	3.3	0.1	0.0005	0.0001	22	0	2.8	0.0	0.024	0.002	0.9	0.0
05/22/02 12:45	3.2	0.1	0.0004	0.0001	25	0	2.8	0.0	0.015	0.001	< 0.8	0.5
06/04/02 11:40	3.8	0.1	0.0004	0.0001	21	0	3.5	0.0	0.025	0.002	< 0.8	0.1
06/17/02 12:55	3.7	0.2	0.0005	0.0001	15	0	3.4	0.1	0.019	0.001	< 0.8	0.5

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Pb		Pr		Rb		Re		Sb		Se	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.016	0.002	0.0029	0.0001	0.52	0.01	0.020	0.000	0.11	0.00	3.4	0.0
03/06/00 16:30	0.042	0.003	0.0037	0.0002	0.55	0.02	0.018	0.001	0.093	0.005	2.5	0.1
03/23/00 12:50	0.028	0.001	0.0038	0.0000	0.44	0.00	0.018	0.001	0.087	0.003	2.8	0.1
04/03/00 16:00	0.075	0.004	0.0065	0.0001	0.55	0.01	0.013	0.000	0.087	0.003	1.9	0.0
04/24/00 14:30	0.038	0.003	0.0035	0.0003	0.36	0.00	0.012	0.000	0.086	0.005	2.5	0.0
05/01/00 16:00	0.045	0.004	0.0038	0.0003	0.53	0.00	0.017	0.000	0.099	0.004	1.8	0.1
05/18/00 11:40	0.021	0.003	0.0045	0.0001	0.40	0.01	0.016	0.000	0.089	0.003	1.7	0.1
06/06/00 12:40	0.032	0.005	0.0047	0.0005	0.41	0.00	0.015	0.001	0.086	0.005	1.6	0.0
06/23/00 12:20	0.014	0.004	0.0034	0.0001	0.39	0.00	0.015	0.000	0.099	0.004	1.5	0.1
07/05/00 12:10	0.038	0.001	0.0070	0.0003	0.96	0.01	0.015	0.001	0.14	0.00	0.9	0.1
07/26/00 13:05	0.019	0.001	0.0036	0.0002	0.68	0.00	0.017	0.000	0.11	0.00	0.91	0.05
08/07/00 10:25	0.055	0.003	0.0036	0.0003	0.84	0.01	0.018	0.001	0.11	0.01	0.4	0.2
08/17/00 13:10	0.018	0.005	0.0018	0.0000	0.88	0.00	0.021	0.001	0.095	0.003	0.38	0.01
09/07/00 11:00	0.036	0.010	0.0030	0.0003	1.4	0.0	0.020	0.000	0.10	0.00	0.4	0.2
09/20/00 12:00	0.027	0.007	0.0020	0.0001	0.92	0.03	0.017	0.001	0.085	0.001	0.2	0.1
11/02/00 13:00	0.035	0.010	0.0023	0.0002	1.0	0.0	0.015	0.000	0.067	0.003	0.2	0.2
11/20/00 13:30	0.030	0.008	0.0022	0.0001	0.71	0.02	0.020	0.001	0.072	0.002	1.0	0.1
12/01/00 14:00	0.035	0.005	0.0017	0.0002	0.75	0.02	0.016	0.001	0.068	0.002	0.6	0.2
12/13/00 12:20	0.026	0.006	0.0025	0.0002	0.79	0.04	0.016	0.001	0.082	0.005	0.9	0.2
01/03/01 13:00	0.028	0.003	0.0014	0.0001	0.72	0.02	0.016	0.000	0.054	0.004	0.94	0.10
01/22/01 15:00	0.020	0.002	0.0025	0.0005	0.52	0.04	0.018	0.000	0.070	0.000	2.1	0.0
02/06/01 15:00	0.027	0.003	0.0041	0.0001	0.54	0.00	0.015	0.001	0.090	0.004	1.9	0.0
02/26/01 13:30	0.17	0.01	0.033	0.001	0.54	0.01	0.0097	0.0011	0.35	0.02	1.5	0.4
03/14/01 13:45	0.011	0.008	0.0028	0.0001	0.36	0.00	0.016	0.000	0.070	0.001	1.5	0.0
04/02/01 13:20	0.032	0.003	0.0044	0.0000	0.40	0.01	0.016	0.000	0.072	0.002	1.3	0.1
04/19/01 14:00	0.014	0.002	0.0030	0.0000	0.35	0.00	0.013	0.000	0.078	0.006	1.3	0.1
05/02/01 13:40	0.072	0.005	0.0059	0.0003	0.48	0.02	0.014	0.001	0.088	0.003	1.3	0.8
05/15/01 13:20	0.044	0.009	0.0027	0.0002	0.60	0.01	0.014	0.000	0.092	0.002	1.3	0.4
05/30/01 10:30	0.030	0.011	0.0033	0.0007	0.52	0.00	0.016	0.001	0.085	0.001	1.3	0.2
06/11/01 11:50	0.029	0.016	0.0036	0.0004	0.44	0.01	0.013	0.000	0.11	0.01	1.4	0.4
06/26/01 11:55	0.044	0.014	0.0035	0.0003	0.58	0.01	0.015	0.002	0.12	0.00	0.8	0.3
07/10/01 11:40	0.024	0.005	0.0031	0.0003	0.54	0.01	0.014	0.001	0.094	0.000	0.8	0.6
07/25/01 11:50	0.030	0.003	0.0035	0.0006	0.96	0.01	0.017	0.001	0.12	0.00	0.8	0.3
08/06/01 11:05	0.053	0.020	0.0036	0.0006	1.0	0.0	0.018	0.001	0.13	0.00	0.9	0.6
08/20/01 12:20	0.053	0.007	0.0032	0.0007	0.96	0.00	0.019	0.001	0.093	0.002	0.7	0.4
09/12/01 11:20	0.05	0.01	0.0021	0.0003	1.0	0.0	0.017	0.001	0.10	0.00	0.8	0.2

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Pb		Pr		Rb		Re		Sb		Se	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	0.038	0.030	0.0016	0.0002	1.2	0.0	0.016	0.001	0.088	0.004	0.6	0.3
10/24/01 13:35	0.059	0.014	0.040	0.000	0.61	0.00	0.0053	0.0005	0.099	0.003	0.8	0.3
11/08/01 11:30	0.014	0.003	0.0029	0.0005	0.47	0.00	0.014	0.001	0.086	0.004	0.8	0.7
11/19/01 13:10	0.019	0.011	0.0031	0.0002	0.56	0.01	0.015	0.001	0.090	0.002	1.2	0.2
12/03/01 13:30	0.029	0.007	0.0030	0.0004	0.36	0.00	0.013	0.000	0.082	0.003	1.0	0.1
12/19/01 13:15	0.023	0.014	0.0040	0.0002	0.41	0.00	0.0099	0.0006	0.077	0.006	0.96	0.03
01/03/02 13:50	0.010	0.002	0.0019	0.0001	0.47	0.01	0.013	0.000	0.060	0.002	0.91	0.07
01/15/02 14:40	0.018	0.007	0.0025	0.0003	0.51	0.00	0.014	0.000	0.063	0.002	0.90	0.02
01/29/02 14:10	0.016	0.005	0.0022	0.0002	0.57	0.01	0.014	0.001	0.065	0.003	0.87	0.07
02/13/02 13:10	0.009	0.000	0.0029	0.0001	0.37	0.00	0.011	0.000	0.073	0.000	1.0	0.0
02/27/02 14:40	0.022	0.008	0.0029	0.0002	0.33	0.01	0.010	0.000	0.061	0.002	0.9	0.0
03/12/02 14:45	0.010	0.004	0.0046	0.0004	0.32	0.01	0.0099	0.0003	0.076	0.005	1.0	0.1
03/27/02 14:30	0.007	0.000	0.0023	0.0001	0.35	0.01	0.011	0.001	0.062	0.007	1.0	0.1
04/04/02 09:15	0.012	0.003	0.0038	0.0004	0.30	0.01	0.0090	0.0001	0.073	0.003	0.9	0.1
04/23/02 13:45	0.008	0.002	0.0028	0.0003	0.36	0.01	0.011	0.000	0.073	0.003	0.8	0.1
05/07/02 11:15	0.033	0.002	0.0055	0.0005	0.37	0.01	0.010	0.001	0.072	0.003	0.7	0.0
05/22/02 12:45	0.008	0.001	0.0029	0.0003	0.37	0.01	0.011	0.001	0.073	0.001	0.7	0.1
06/04/02 11:40	0.024	0.004	0.0049	0.0003	0.49	0.01	0.012	0.000	0.088	0.006	0.6	0.1
06/17/02 12:55	0.012	0.000	0.0042	0.0002	0.44	0.01	0.012	0.001	0.083	0.004	0.7	0.1

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Sm		Sr		Ta		Tb		Te		Th	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.0024	0.0001	190	2	< 0.001	0.001	0.0005	0.0001	0.018	0.002	0.0012	0.0002
03/06/00 16:30	0.0040	0.0007	199	4	< 0.001	0.001	0.0006	0.0001	0.029	0.005	0.0009	0.0001
03/23/00 12:50	0.0038	0.0003	185	2	< 0.001	0.001	0.0007	0.0000	0.031	0.006	0.0010	0.0002
04/03/00 16:00	0.0053	0.0012	208	3	< 0.001	0.001	0.0007	0.0001	0.022	0.001	0.0025	0.0008
04/24/00 14:30	0.0030	0.0003	170	1	< 0.001	0.000	0.0006	0.0001	0.031	0.004	0.0011	0.0004
05/01/00 16:00	0.0039	0.0007	182	2	< 0.001	0.001	0.0006	0.0001	0.027	0.006	0.0012	0.0004
05/18/00 11:40	0.0047	0.0002	178	4	< 0.001	0.001	0.0007	0.0001	0.024	0.006	0.0005	0.0002
06/06/00 12:40	0.0045	0.0005	180	3	< 0.001	0.001	0.0008	0.0001	0.036	0.002	0.0015	0.0003
06/23/00 12:20	0.003	0.001	160	0	< 0.001	0.001	0.0007	0.0001	< 0.02	0.00	0.0007	0.0001
07/05/00 12:10	0.008	0.001	170	0	< 0.001	0.001	0.0011	0.0002	< 0.02	0.00	0.0038	0.0010
07/26/00 13:05	0.0045	0.0012	205	3	< 0.0005	0.0001	0.0006	0.0001	0.017	0.001	0.0014	0.0004
08/07/00 10:25	0.0038	0.0007	210	10	< 0.002	0.001	0.0006	0.0001	< 0.006	0.003	0.0012	0.0001
08/17/00 13:10	0.0022	0.0002	203	0	< 0.0005	0.0003	0.0004	0.0001	0.018	0.003	0.0007	0.0001
09/07/00 11:00	0.0045	0.0000	220	0	< 0.002	0.001	0.0004	0.0000	< 0.006	0.004	0.0006	0.0001
09/20/00 12:00	0.0029	0.0010	210	10	< 0.002	0.004	0.0004	0.0000	0.012	0.002	0.0008	0.0001
11/02/00 13:00	0.0033	0.0001	240	0	< 0.002	0.000	0.0004	0.0000	0.006	0.008	0.0007	0.0002
11/20/00 13:30	0.0023	0.0007	240	10	< 0.002	0.001	0.0004	0.0001	< 0.006	0.003	0.0009	0.0004
12/01/00 14:00	0.0018	0.0003	240	0	< 0.002	0.001	0.0004	0.0002	0.008	0.006	0.0005	0.0003
12/13/00 12:20	0.0037	0.0014	240	10	< 0.002	0.001	0.0004	0.0000	0.007	0.003	0.0013	0.0001
01/03/01 13:00	0.0016	0.0009	230	10	< 0.001	0.001	0.0002	0.0001	0.011	0.005	0.0015	0.0008
01/22/01 15:00	0.0027	0.0012	210	10	0.002	0.002	0.0005	0.0001	0.010	0.002	0.0028	0.0018
02/06/01 15:00	0.0039	0.0007	160	0	< 0.003	0.000	0.0006	0.0002	0.01	0.00	0.0019	0.0005
02/26/01 13:30	0.025	0.000	89	2	0.002	0.002	0.0037	0.0001	< 0.01	0.00	0.028	0.002
03/14/01 13:45	0.0029	0.0008	170	0	< 0.003	0.001	0.0005	0.0001	0.02	0.01	0.0006	0.0003
04/02/01 13:20	0.0042	0.0005	170	0	< 0.003	0.001	0.0005	0.0000	0.02	0.00	0.0011	0.0002
04/19/01 14:00	0.0026	0.0004	150	0	< 0.003	0.001	0.0004	0.0001	0.02	0.01	0.0004	0.0001
05/02/01 13:40	0.0052	0.0011	170	0	< 0.001	0.002	0.0007	0.0002	0.02	0.02	0.0010	0.0004
05/15/01 13:20	0.0030	0.0012	190	10	< 0.001	0.001	0.0006	0.0002	0.03	0.01	0.0007	0.0001
05/30/01 10:30	0.0036	0.0009	180	10	< 0.001	0.000	0.0005	0.0001	0.04	0.03	0.0005	0.0003
06/11/01 11:50	0.0041	0.0004	150	0	< 0.001	0.000	0.0005	0.0002	0.02	0.02	0.0013	0.0005
06/26/01 11:55	0.0039	0.0007	180	10	< 0.001	0.001	0.0006	0.0001	0.03	0.01	0.0014	0.0000
07/10/01 11:40	0.0029	0.0017	170	0	< 0.001	0.001	0.0006	0.0002	0.01	0.01	0.0007	0.0003
07/25/01 11:50	0.0042	0.0014	210	0	< 0.001	0.000	0.0005	0.0003	0.03	0.01	0.0009	0.0000
08/06/01 11:05	0.0031	0.0011	220	10	< 0.001	0.002	0.0007	0.0003	0.02	0.01	0.0012	0.0003
08/20/01 12:20	0.0029	0.0009	210	10	< 0.001	0.001	0.0007	0.0002	0.02	0.01	0.0012	0.0002
09/12/01 11:20	0.003	0.000	200	0	< 0.002	0.000	0.0006	0.0001	0.03	0.02	0.0006	0.0001

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Sm		Sr		Ta		Tb		Te		Th	
	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	0.0024	0.0011	230	10	< 0.001	0.000	0.0004	0.0001	0.01	0.01	0.0005	0.0005
10/24/01 13:35	0.042	0.006	69	0	< 0.001	0.001	0.0054	0.0004	0.01	0.00	0.020	0.000
11/08/01 11:30	0.0030	0.0008	170	0	< 0.001	0.001	0.0006	0.0000	0.02	0.00	0.0008	0.0006
11/19/01 13:10	0.0029	0.0009	190	0	< 0.001	0.001	0.0006	0.0002	0.02	0.01	0.0009	0.0001
12/03/01 13:30	0.0024	0.0005	150	0	0.0006	0.0004	0.0006	0.0000	0.02	0.01	0.0010	0.0000
12/19/01 13:15	0.0031	0.0003	140	0	< 0.003	0.001	0.0006	0.0002	0.006	0.004	0.002	0.001
01/03/02 13:50	0.0016	0.0005	180	0	< 0.003	0.002	0.0003	0.0001	0.015	0.002	< 0.001	0.001
01/15/02 14:40	0.0023	0.0006	190	0	< 0.003	0.001	0.0004	0.0001	0.011	0.007	< 0.001	0.001
01/29/02 14:10	0.0027	0.0003	200	0	< 0.003	0.003	0.0002	0.0000	0.017	0.002	0.003	0.001
02/13/02 13:10	0.0028	0.0003	170	0	< 0.0004	0.0002	0.0006	0.0002	0.024	0.006	0.0067	0.0037
02/27/02 14:40	0.0031	0.0007	140	0	< 0.0004	0.0003	0.0005	0.0001	0.019	0.003	0.0070	0.0042
03/12/02 14:45	0.0045	0.0006	130	0	< 0.0004	0.0003	0.0007	0.0000	0.027	0.006	0.0048	0.0029
03/27/02 14:30	0.0027	0.0008	140	0	< 0.0004	0.0001	0.0004	0.0001	0.021	0.008	0.0040	0.0015
04/04/02 09:15	0.0037	0.0010	120	0	< 0.0004	0.0002	0.0006	0.0001	0.017	0.008	0.0042	0.0030
04/23/02 13:45	0.0026	0.0006	140	0	< 0.0004	0.0003	0.0005	0.0001	0.023	0.004	0.0043	0.0036
05/07/02 11:15	0.0035	0.0004	140	0	< 0.0004	0.0001	0.0008	0.0001	0.020	0.005	0.0034	0.0017
05/22/02 12:45	0.0035	0.0003	140	0	< 0.0004	0.0001	0.0005	0.0001	0.024	0.005	0.0035	0.0020
06/04/02 11:40	0.0046	0.0008	150	0	< 0.0004	0.0001	0.0007	0.0001	0.041	0.009	0.0021	0.0022
06/17/02 12:55	0.0043	0.0009	150	0	< 0.0004	0.0003	0.0009	0.0001	0.021	0.005	0.0028	0.0018

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ti		Tl		Tm		U		V	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	< 0.1	0.1	0.008	0.001	0.0003	0.0001	2.9	0.0	0.20	0.01
03/06/00 16:30	< 0.1	0.1	0.010	0.001	0.0004	0.0000	3.2	0.1	0.19	0.03
03/23/00 12:50	< 0.1	0.2	0.009	0.003	0.0004	0.0000	3.0	0.0	0.21	0.03
04/03/00 16:00	< 0.1	0.1	0.011	0.005	0.0004	0.0000	3.2	0.0	0.21	0.02
04/24/00 14:30	< 0.1	0.1	0.007	0.002	0.0004	0.0001	2.6	0.0	0.30	0.02
05/01/00 16:00	< 0.1	0.2	0.006	0.001	0.0003	0.0000	2.7	0.0	0.28	0.03
05/18/00 11:40	< 0.1	0.2	0.007	0.001	0.0005	0.0001	2.7	0.0	0.36	0.02
06/06/00 12:40	< 0.1	0.1	0.013	0.001	0.0005	0.0001	2.6	0.1	0.29	0.03
06/23/00 12:20	< 0.2	0.2	0.0081	0.0023	0.0005	0.0001	2.2	0.1	0.2	0.0
07/05/00 12:10	< 0.2	0.2	0.018	0.000	0.0013	0.0001	1.5	0.0	0.5	0.0
07/26/00 13:05	< 0.09	0.03	0.017	0.001	0.0004	0.0000	3.2	0.1	0.25	0.02
08/07/00 10:25	< 0.09	0.08	0.02	0.00	0.0004	0.0000	3.4	0.0	0.42	0.03
08/17/00 13:10	< 0.09	0.19	0.015	0.002	0.0002	0.0000	3.4	0.0	0.20	0.04
09/07/00 11:00	< 0.09	0.06	< 0.01	0.00	0.0003	0.0000	3.1	0.1	0.45	0.03
09/20/00 12:00	< 0.09	0.08	0.02	0.00	0.0002	0.0000	2.8	0.0	0.24	0.05
11/02/00 13:00	< 0.09	0.10	0.02	0.00	0.0002	0.0000	2.8	0.0	0.08	0.03
11/20/00 13:30	< 0.09	0.14	0.02	0.01	0.0004	0.0000	3.7	0.0	< 0.06	0.05
12/01/00 14:00	< 0.09	0.02	< 0.01	0.00	0.0002	0.0001	3.2	0.0	< 0.06	0.05
12/13/00 12:20	< 0.09	0.14	< 0.01	0.00	0.0003	0.0000	3.2	0.0	< 0.06	0.04
01/03/01 13:00	< 0.2	0.2	0.012	0.007	0.0002	0.0001	3.5	0.0	< 0.2	0.1
01/22/01 15:00	< 0.2	0.1	0.011	0.008	0.0003	0.0002	3.7	0.1	< 0.2	0.0
02/06/01 15:00	< 0.3	0.4	0.006	0.001	0.0003	0.0000	2.8	0.0	0.26	0.02
02/26/01 13:30	6.0	1.0	< 0.004	0.001	0.0015	0.0001	1.4	0.1	0.70	0.12
03/14/01 13:45	< 0.3	0.2	0.004	0.003	0.0002	0.0001	2.6	0.0	0.11	0.03
04/02/01 13:20	< 0.3	0.3	0.006	0.003	0.0003	0.0001	2.7	0.0	0.11	0.02
04/19/01 14:00	< 0.3	0.6	0.006	0.004	0.0004	0.0000	2.1	0.0	0.25	0.02
05/02/01 13:40	< 0.3	0.4	0.008	0.005	0.0003	0.0001	2.5	0.3	0.27	0.13
05/15/01 13:20	< 0.3	0.3	0.010	0.000	0.0003	0.0000	2.9	0.0	0.29	0.05
05/30/01 10:30	< 0.3	0.2	0.009	0.004	0.0004	0.0000	2.5	0.1	0.46	0.15
06/11/01 11:50	< 0.3	0.3	0.011	0.005	0.0004	0.0001	2.2	0.0	0.61	0.06
06/26/01 11:55	< 0.3	0.4	0.010	0.001	0.0003	0.0001	2.5	0.0	0.30	0.08
07/10/01 11:40	< 0.3	0.4	0.007	0.001	0.0002	0.0001	2.4	0.1	0.46	0.11
07/25/01 11:50	< 0.3	0.1	0.019	0.001	0.0005	0.0001	3.1	0.0	0.58	0.03
08/06/01 11:05	< 0.3	0.6	0.020	0.005	0.0005	0.0003	3.1	0.0	0.59	0.09
08/20/01 12:20	< 0.3	0.1	0.016	0.005	0.0003	0.0002	3.2	0.0	0.29	0.09
09/12/01 11:20	< 0.2	0.1	0.013	0.002	< 0.0003	0.0000	2.6	0.1	0.4	0.0

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	Ti		Tl		Tm		U		V	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	< 0.3	0.4	0.012	0.004	0.0002	0.0001	2.9	0.0	0.17	0.10
10/24/01 13:35	< 0.3	0.0	0.007	0.002	0.0023	0.0004	0.65	0.02	0.68	0.05
11/08/01 11:30	< 0.2	0.2	0.016	0.011	0.0004	0.0002	2.9	0.1	0.28	0.14
11/19/01 13:10	< 0.2	0.3	0.010	0.002	0.0005	0.0001	3.2	0.0	0.27	0.15
12/03/01 13:30	< 0.2	0.2	0.016	0.010	0.0004	0.0001	2.5	0.0	0.2	0.0
12/19/01 13:15	< 0.2	na	0.005	0.002	0.0004	0.0001	2.0	0.0	0.4	0.1
01/03/02 13:50	< 0.2	0.1	0.005	0.001	0.0004	0.0002	3.0	0.1	< 0.2	0.1
01/15/02 14:40	< 0.2	0.2	0.005	0.001	0.0003	0.0001	3.3	0.0	< 0.2	0.2
01/29/02 14:10	< 0.2	na	0.008	0.001	0.0002	0.0000	3.4	0.0	< 0.2	0.1
02/13/02 13:10	< 0.3	0.2	0.016	0.013	0.0004	0.0003	2.7	0.0	0.29	0.08
02/27/02 14:40	< 0.3	0.2	0.006	0.001	0.0003	0.0001	2.4	0.0	0.29	0.10
03/12/02 14:45	< 0.3	0.1	0.008	0.003	0.0004	0.0001	2.1	0.0	0.38	0.04
03/27/02 14:30	< 0.3	0.1	0.007	0.003	0.0004	0.0001	2.3	0.0	0.21	0.06
04/04/02 09:15	< 0.6	0.1	0.009	0.008	0.0005	0.0001	1.8	0.0	0.35	0.04
04/23/02 13:45	< 0.6	0.4	0.007	0.002	0.0004	0.0001	2.2	0.0	0.29	0.04
05/07/02 11:15	< 0.6	0.1	0.006	0.000	0.0005	0.0001	1.9	0.1	0.32	0.03
05/22/02 12:45	< 0.6	0.1	0.007	0.001	0.0002	0.0000	1.9	0.0	0.30	0.02
06/04/02 11:40	< 0.6	0.1	0.010	0.001	0.0003	0.0001	2.2	0.0	0.28	0.03
06/17/02 12:55	< 0.6	0.2	0.008	0.001	0.0006	0.0001	2.0	0.0	0.38	0.01

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	W		Y		Yb		Zn		Zr	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
02/24/00 15:55	0.0020	0.0001	0.033	0.001	0.0024	0.0004	2.7	0.2	0.049	0.002
03/06/00 16:30	0.0016	0.0008	0.037	0.002	0.0026	0.0001	< 0.6	0.3	0.038	0.001
03/23/00 12:50	0.0012	0.0003	0.037	0.000	0.0022	0.0002	1.2	0.4	0.046	0.003
04/03/00 16:00	0.0010	0.0002	0.041	0.002	0.0030	0.0001	1.4	0.1	0.041	0.002
04/24/00 14:30	0.0017	0.0007	0.040	0.001	0.0026	0.0001	0.6	0.4	0.035	0.002
05/01/00 16:00	0.0016	0.0004	0.037	0.001	0.0025	0.0004	1.0	0.4	0.034	0.003
05/18/00 11:40	0.0011	0.0007	0.048	0.000	0.0033	0.0002	0.8	0.5	0.028	0.002
06/06/00 12:40	0.0039	0.0024	0.049	0.001	0.0031	0.0004	< 0.6	0.2	0.041	0.000
06/23/00 12:20	0.002	0.001	0.039	0.000	0.0036	0.0005	0.9	0.6	0.037	0.003
07/05/00 12:10	0.003	0.001	0.059	0.003	0.013	0.001	2.1	1.8	0.13	0.00
07/26/00 13:05	0.0024	0.0010	0.037	0.000	0.0033	0.0001	0.6	0.1	0.029	0.001
08/07/00 10:25	< 0.002	0.000	0.037	0.000	0.0027	0.0004	0.54	0.00	0.029	0.003
08/17/00 13:10	0.0007	0.0002	0.028	0.000	0.0014	0.0000	0.4	0.1	0.029	0.000
09/07/00 11:00	0.003	0.002	0.032	0.002	0.0021	0.0003	0.71	0.04	0.029	0.006
09/20/00 12:00	< 0.002	0.000	0.025	0.000	0.0019	0.0001	0.49	0.09	0.024	0.004
11/02/00 13:00	< 0.002	0.001	0.026	0.000	0.0017	0.0002	0.59	0.14	0.022	0.001
11/20/00 13:30	< 0.002	0.001	0.026	0.000	0.0019	0.0004	2.1	0.1	0.040	0.003
12/01/00 14:00	< 0.002	0.001	0.020	0.001	0.0012	0.0002	1.1	0.1	0.021	0.001
12/13/00 12:20	0.005	0.002	0.022	0.001	0.0017	0.0003	1.3	0.1	0.035	0.000
01/03/01 13:00	< 0.01	0.00	0.017	0.001	0.0014	0.0003	0.8	0.2	0.021	0.005
01/22/01 15:00	< 0.01	0.00	0.026	0.002	0.0023	0.0005	0.5	0.2	0.046	0.004
02/06/01 15:00	< 0.003	0.002	0.033	0.000	0.0022	0.0002	1.5	0.1	0.034	0.003
02/26/01 13:30	0.006	0.004	0.11	0.01	0.011	0.001	3.8	0.4	0.22	0.02
03/14/01 13:45	< 0.003	0.002	0.032	0.000	0.0018	0.0003	0.6	0.0	0.019	0.002
04/02/01 13:20	< 0.003	0.002	0.031	0.001	0.0030	0.0001	1.3	0.0	0.019	0.001
04/19/01 14:00	< 0.003	0.001	0.032	0.001	0.0022	0.0001	2.5	0.1	0.022	0.001
05/02/01 13:40	< 0.003	0.002	0.039	0.002	0.0026	0.0003	1.5	0.2	0.026	0.000
05/15/01 13:20	< 0.003	0.001	0.033	0.002	0.0016	0.0007	2.1	0.2	0.019	0.003
05/30/01 10:30	< 0.003	0.003	0.035	0.003	0.0022	0.0007	0.7	0.1	0.017	0.002
06/11/01 11:50	< 0.003	0.002	0.034	0.005	0.0033	0.0003	0.8	0.1	0.033	0.001
06/26/01 11:55	< 0.003	0.002	0.035	0.003	0.0019	0.0003	0.7	0.3	0.017	0.000
07/10/01 11:40	< 0.003	0.003	0.036	0.001	0.0024	0.0003	0.9	0.2	0.032	0.002
07/25/01 11:50	< 0.003	0.000	0.036	0.003	0.0024	0.0002	0.7	0.0	0.023	0.003
08/06/01 11:05	< 0.003	0.004	0.034	0.002	0.0015	0.0002	0.5	0.1	0.024	0.003
08/20/01 12:20	0.004	0.006	0.029	0.002	0.0019	0.0007	11	15	0.024	0.001
09/12/01 11:20	0.006	0.003	0.027	0.001	0.0023	0.0003	0.9	0.1	0.027	0.002

Table A8. Concentrations of dissolved trace elements in samples collected on Sugar Creek -- continued

[µg/L, micrograms per liter; Avg, average; SD, standard deviation; <, less than; na, not available]

Date-Time	W		Y		Yb		Zn		Zr	
	µg/L		µg/L		µg/L		µg/L		µg/L	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
10/11/01 12:45	< 0.003	0.001	0.021	0.001	0.0015	0.0003	0.8	0.1	0.020	0.001
10/24/01 13:35	0.003	0.003	0.15	0.00	0.013	0.001	1.0	0.0	0.14	0.00
11/08/01 11:30	< 0.003	0.002	0.036	0.001	0.0027	0.0002	1.1	0.3	0.027	0.001
11/19/01 13:10	< 0.003	0.002	0.035	0.001	0.0024	0.0002	1.1	0.2	0.030	0.001
12/03/01 13:30	< 0.002	0.001	0.035	0.000	0.0034	0.0012	0.77	0.04	0.034	0.001
12/19/01 13:15	< 0.002	0.000	0.037	0.000	0.0034	0.0002	0.7	0.1	0.027	0.001
01/03/02 13:50	< 0.002	0.001	0.034	0.002	0.0028	0.0002	0.8	0.1	0.014	0.001
01/15/02 14:40	< 0.002	0.000	0.035	0.001	0.0018	0.0001	0.5	0.1	0.018	0.003
01/29/02 14:10	< 0.002	0.001	0.027	0.001	0.0018	0.0001	0.5	0.1	0.014	0.004
02/13/02 13:10	0.002	0.001	0.038	0.001	0.0026	0.0007	0.94	0.07	0.045	0.017
02/27/02 14:40	0.002	0.002	0.035	0.001	0.0022	0.0001	0.99	0.00	0.041	0.004
03/12/02 14:45	0.002	0.001	0.040	0.001	0.0029	0.0002	1.4	0.1	0.043	0.005
03/27/02 14:30	< 0.002	0.001	0.033	0.001	0.0018	0.0006	0.94	0.03	0.027	0.006
04/04/02 09:15	0.002	0.001	0.036	0.001	0.0029	0.0005	2.2	0.1	0.037	0.004
04/23/02 13:45	< 0.002	0.001	0.041	0.002	0.0025	0.0003	0.68	0.01	0.032	0.001
05/07/02 11:15	< 0.002	0.001	0.047	0.001	0.0028	0.0004	1.9	0.0	0.037	0.007
05/22/02 12:45	< 0.002	0.001	0.037	0.001	0.0029	0.0002	0.76	0.06	0.039	0.010
06/04/02 11:40	< 0.002	0.001	0.041	0.000	0.0026	0.0005	1.5	0.1	0.025	0.004
06/17/02 12:55	0.002	0.000	0.051	0.002	0.0036	0.0005	1.3	0.1	0.031	0.001