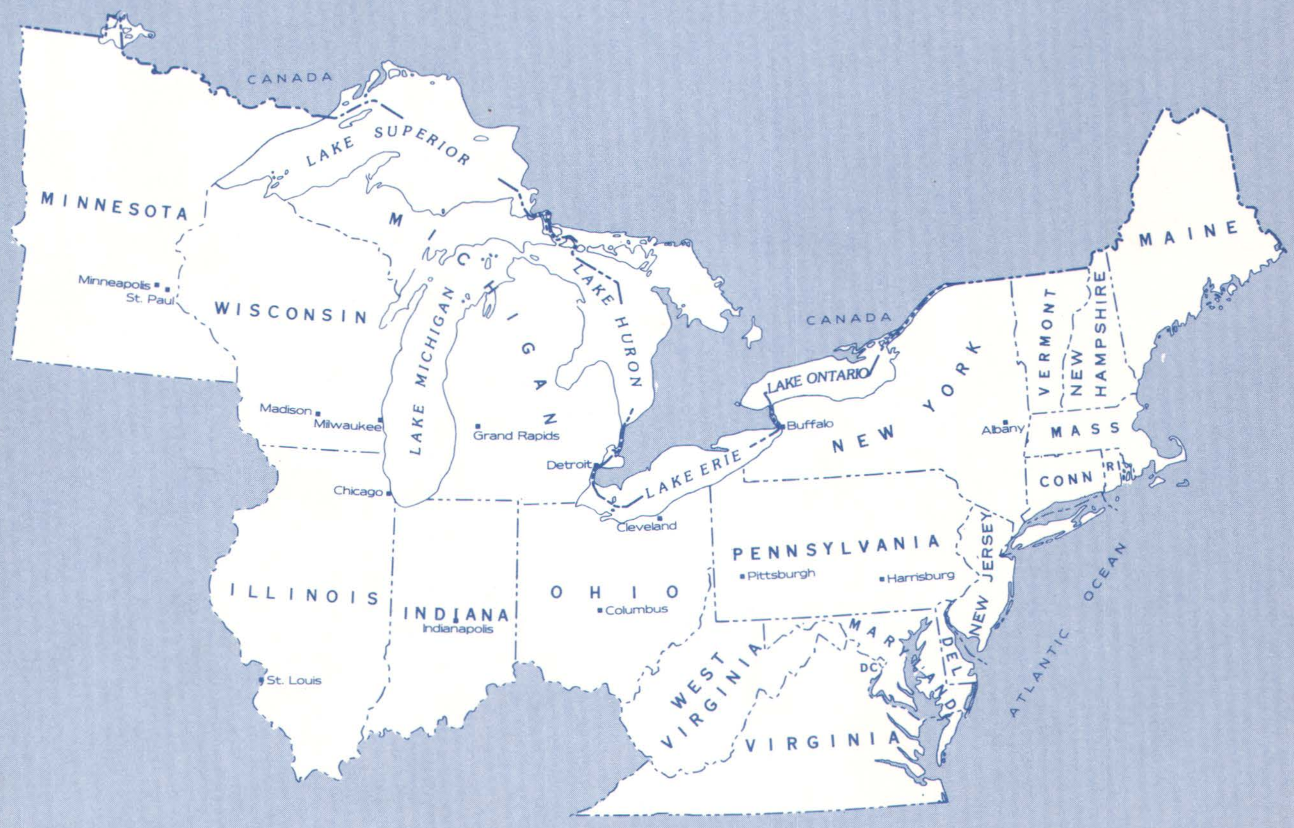
Chemical Composition of Bulk Precipitation in the North-Central and Northeastern United States, December 1980 Through February 1981



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Chemical Composition of Bulk Precipitation in the North-Central and Northeastern United States, December 1980 Through February 1981

By Norman E. Peters and Joseph E. Bonelli

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CONVERSION FACTORS AND ABBREVIATIONS

The following factors may be used to convert the International System (SI) of metric units of measure used in this report to inch-pound units.

Multiply SI units	by	To obtain inch-pound units
	Length	
micrometer (mm)	0.0000394	inch (in)
millimeter (mm)	.0394	inch (in)
centimeter (cm)	.394	inch (in)
meter (m)	3.28	foot (ft)
kilometer (km)	.6214	mile (mi)
	Area	
square kilometer (km^2)	0.3861	square mile (mi^2)
square meter (m^2)	10.76	square foot (ft^2)
	Volume	
liter (L)	0.2642	gallon (gal)
milliliter (mL)	.0610	cubic inches (in^3)
	Mass	
gram (g)	0.0353	ounces (oz)

Other abbreviations used in this report

meq/L, milliequivalent per liter
mmho/cm at 25°C, micromho per centimeter at 25° Celsius
mm/d, millimeter per day
mg/L, milligram per liter
mg/L, microgram per liter
mm, micrometer
mg/m^2, milligram per square meter
mg/m^2, microgram per square meter
mb, millibar

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Norman E. Peters and Joseph E. Bonelli

Abstract

Samples of bulk precipitation were collected at 179 sites in the North-Central and Northeastern United States for 3 months during the winter of 1980–81 to provide data on the distribution of chemical constituents. Concentrations and average daily loads of 29 dissolved constituents were determined. Sodium and chloride deposition was relatively high in coastal areas and adjacent to some urban centers. Regional patterns of the daily loads of hydrogen ion, nitrate, lead, and iron correlate well with one another and form a concentric pattern around a center of high deposition in eastern Ohio and western Pennsylvania, which suggests an urban-industrial source. Samples from this area had a low pH (<4.2), whereas samples from southern Minnesota and Illinois had a more neutral pH (>5.6). The latter samples had high concentrations of both calcium and total inorganic carbon, which suggests pH control by soil-derived carbonate minerals. Deposition patterns of ammonium, nitrate, and sulfate display regional highs in Illinois, Indiana, and southwestern Michigan, which suggest agricultural sources such as fertilizer. Median loads of zinc, iron, and lead were lower than reported in previous studies for North America. The apparent decrease in lead from earlier levels throughout the area studied may be attributed to reduced consumption of leaded fuels and to lower deposition in winter.

INTRODUCTION

Much has been written about "acid rain" and its effects in the Northeastern United States and elsewhere, and many hypotheses have been formulated about both its sources and its geographic distribution (Likens, 1976; Babich and others, 1980; Hileman, 1981). Most of the substances that contribute to acid rain are formed within the atmosphere through hydrolysis of the oxidized forms of nitrogen oxides and sulfur oxides (a major source of these is the combustion of fossil fuels) and are deposited with rain and snow (Galloway and others, 1976). Acid atmospheric precipitation has been defined as rain or snow having a pH of less than 5.6, the value of pure water in equilibrium with ambient levels of atmospheric carbon dioxide.

Considerable concern also has arisen over the release of other contaminants to the atmosphere and their subsequent deposition, particularly those that are known to be toxic. Regional patterns of chemical deposition can delineate major source areas of atmospheric contaminants and indicate the direction of transport from those sources.

Atmospheric deposition may be divided into two parts: the wet component and the dry component. The wet component includes rain, snow, dew, and hail; the dry component includes fine to intermediate particles that are deposited by impact on a surface, gases that are adsorbed or absorbed by surfaces, and relatively large or heavy particles that settle from the atmosphere by gravity and are commonly caught on horizontal surfaces. No commonly accepted methods exist for measuring the impaction load or the sorbed gases that are deposited on surfaces, but dustfall collectors have been used for many years to collect what is assumed to represent the gravity component of dry deposition (Galloway and Likens, 1978). This method has certain shortcomings, in that such collectors do not allow for resuspension of the dustfall in the manner of other surfaces and the dustfall frequently contains a high proportion of locally derived material that overwhelms the part transported from longer distances. This is especially true during the growing season. During winter, however, when the ground is frozen or covered by snow and deciduous plants have lost their leaves, dustfall contains lesser amounts of local litter and consists largely of material that has been transported longer distances.

In general, interpreting the composition of bulk precipitation (the combination of dustfall and wet deposition in an open container) is difficult because substances borne in the wet component cannot be distinguished from those borne in the dustfall. If the collectors receive much locally derived dry material, bulk precipitation is a poor source of data for determining areal deposition patterns. Yet, if it is infeasible to collect separate samples of wet deposition and dustfall, bulk precipitation may be the only recourse. If collection is done during winter, when the ground is frozen or covered with snow, the amount of locally derived dustfall will be minimal, and bulk-precipitation samples collected over a 3-month period should represent the composition of atmospheric deposition within the region. If the collectors are located according to uniform criteria, results should indicate areas in which the greatest loads of airborne chemical constituents are being deposited.

ACKNOWLEDGMENTS

The authors thank U.S. Geological Survey field-office personnel for continued cooperation and assistance, without which a project of this scope could not have been made. Thanks also are extended to personnel of the Atmospheric Sciences Research Center of the State University of New York at Albany for the collection of samples from the Whiteface Mountain event site, to personnel from the Rensselaer Polytechnic Institute, Troy, N.Y., for collection of samples from the Old Forge, N.Y., event site, and to personnel from Pennsylvania State University, State College, Pa., for collection of samples from the Pennsylvania event site.

Samples were processed and analyzed by the U.S. Geological Survey National Water Quality Laboratory in Denver, Colo. Herman Feltz, Northeastern Region staff member, coordinated the 1980-81 snow-chemistry study; Vance C. Kennedy and Howard E. Taylor, National Research Program, conceived the project and provided guidance.

To the many individuals whose work is represented here, we express our gratitude.

PURPOSE AND OBJECTIVES

The snow-chemistry reconnaissance was designed to provide information on the regional distribution of chemical constituents in bulk precipitation over the North-Central and Northeastern United States. In addition to collecting bulk precipitation, cores of the snowpack were taken at selected sites for comparison of their chemical composition with that of the bulk samples. All precipitation samples and snowpack cores were filtered, and the residue from select sites currently (1982) is being analyzed for chemical and mineral composition to determine its effect on the liquid fraction of the samples.

This report describes the areal distribution of some of the dissolved constituents in bulk-precipitation samples. Samples were collected throughout the North-Central and Northeastern United States from about December 1, 1980, through February 1981. Also, the report examines regional patterns of loading of selected constitutents in relation to possible source areas.

METHODS

COLLECTION OF SAMPLES

Samples of bulk precipitation as well as snowpack cores were collected during the winter of 1980–81. Primary bulk-precipitation collectors were installed at 189 sites from Maine to Minnesota and from the Canadian border south to the Ohio River valley (fig. 1). Each site represents about 6,500 km^2. At 21 of the sites, both a primary and a replicate collector were installed. At 15 of the sites, both a primary and an event collector were installed; 12 of these also had a replicate collector.

All collectors were installed on or about December 1, 1980, and the primary and replicate collectors were sampled on or about March 1, 1981. (Samples were recovered from only 179 sites because at the remaining 10 sites either collectors were vandalized or samples were lost.) The event collectors were sampled four times (every 3 weeks) during this period. Snow cores were to be taken at approximately 10 percent of the sites at the time of bulk-sample collection, but, on the collection date, snow cover was insufficient for sampling at all but five sites.

Collector Design

The collectors (fig. 2) consisted of a 170-cm length of relatively inexpensive thick-walled fiber tubing of 45.7-cm inside diameter, the type generally used as a form for concrete footings and pillars. The tube was enclosed in a 46.3-cm diameter polyethylene bag that was folded over the top of the tube and taped to the inside to

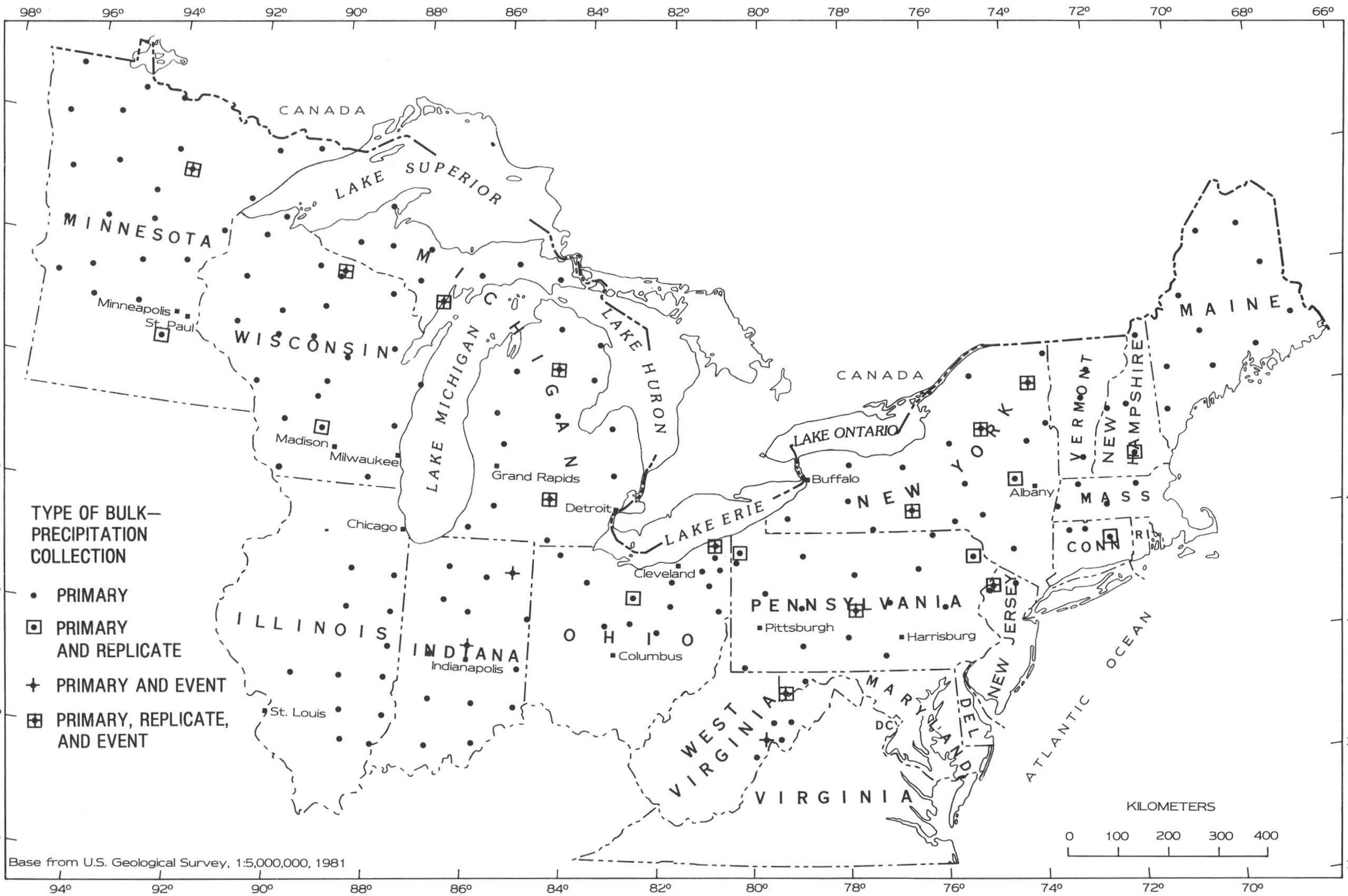


FIGURE 1.—Location of sampling sites, winter 1980–81.

FIGURE 2.—Typical bulk-precipitation collectors used in this study.

prevent moisture from softening and decomposing the fiber. Two polyethylene bags (one inside the other) were placed inside the tube, the inner for sample collection and the outer to retain the sample should the inner bag leak. A bird deterrent consisting of inverted garden-border fencing (vinyl-coated wire) was wrapped around the top of the collector with the prongs about 4 cm apart and extending 7 cm above the top of the collector. The assembly was mounted on a 50-cm square of 1.3-cm plywood and strapped between supporting metal fenceposts.

The snowpack was sampled with prewashed Adirondack snow-coring equipment consisting of a 150-cm depth-graduated fiberglass tube with a 16.7-cm diameter stainless steel cutting head and a spring scale calibrated for water content. Snow cores were taken on a 120-cm square sheet of 1.3-cm plywood that was covered with 0.152-mm polyethylene sheeting and placed on the ground 5 m upwind from the bulk collectors. The purpose of the sampling platform was to prevent contamination of the snowpack from underlying soils and vegetation.

Site Selection

Because the study was designed to assess the regional character of atmospheric deposition, considerable effort was made to avoid local contamination. A major criterion for site selection was to avoid proximity to sources such as highways, chimneys, barnyards, and vegetation. Most collectors were placed off seldom-traveled secondary paved roads at least 0.5 km downwind from any frequently used dirt road, 300 m from any known point source of contamination, and separated from the nearest vegetation by a distance equivalent to six times the height of the vegetation. Areas of excessive snow drifting were avoided to ensure uniform settling of the snow into the collector. Locations on northern slopes were sought to maximize snow cover and minimize melting, particularly in the southern part of the study area.

Regional site-selection criteria consisted simply of avoiding major contamination sources such as cities, industrial plants, and coal- and oil-fired powerplants; therefore, collectors were placed at least 25 km downwind from these sources. Because collection of local soil and organic particulates was to be avoided, collectors were located, if possible, where snow was expected to cover the ground for at least 60 percent of the collection period, based on long-term records. General characteristics of each site are listed in table 4 (following "References Cited").

Handling and Processing of Samples

Event sample bags were removed and replaced with new bags on three occasions at approximately 3-week intervals during the collection period. These samples were stored at a maximum temperature of 4°C until the final samples were collected. At the end of the collection period, bags containing the bulk samples and bags containing the snowpack cores were chilled and transported to field laboratories for processing. All samples were filtered under pressure through a 0.2-μm Nuclepore[1] polycarbonate "aerosol membrane" filter, a type chosen for its low trace-element content.

Many of the samples contained sufficient solid material to require more than one filter. A small part of the filtrate of each sample was used to rinse three precleaned 1-L polyethylene bottles and one 250-mL Teflon bottle. After the four bottles for each sample were filled, the remainder of the sample was filtered, weighed, and discarded. The four bottles from each site and the respective filters were shipped on ice to the Geological Survey's National Water Quality Laboratory in Denver, Colo. Before chemical analysis, the sample in the acid-rinsed polyethlyene bottle was acidified with 1.0 mL of concentrated (15.5 molar) ultrapure nitric acid. To minimize chemical changes during sample handling and storage, particularly those produced by biological activity, all samples were kept at 4°C.

Analytical determinations began approximately 2 months after the first samples were collected and processed. The acidified samples were analyzed for trace elements and metals; the unacidified samples were analyzed for other constituents or properties.

ANALYTICAL TECHNIQUES

All filtered liquid samples were analyzed for the suite of 28 constituents plus specific conductance and pH, provided sufficient sample was available. A variety of analytical techniques were used; the selection of techniques and methods for each determination was based on their suitability for concentration levels anticipated. Techniques and methods used for determining each constituent or property, the lower detection limits, and the published reference for each are given in table 1. These techniques and methods are generally those used daily in the Geological Survey's National Water Quality Laboratories.

[1]The use of brand names in this report is for identification purposes and does not imply endorsement by the U.S. Geological Survey.

COMPUTATIONS

Precipitation Quantity

The quantity of precipitation (rain, snow, and so forth) at each site during the collection period was estimated by summing the daily precipitation recorded at nearby precipitation gages of the National Weather Service (U.S. National Oceanic and Atmospheric Administration, 1980–81). If no precipitation gage was nearby, data from several adjacent National Weather Service gages at elevations comparable to those at the sampling site were averaged. Also, the volume of sample collected at many sites was inferred from the sample weight. Discrepancies between calculated and measured volume were treated as described below.

Analytical Data

Chemical concentrations were calculated from calibration curves generated with laboratory standards. Although field blanks were not obtained, possible contamination by the collection bags was estimated from blanks obtained by rinsing bags with reagent water. The concentrations of constitutents in the blank samples were almost always at or below the analytical limit of detection (table 2).

General estimates of the sampling precision associated with the collectors and the analytical precision associated with the respective determinations were calculated. For each site at which both a primary and a replicate sample were collected, the absolute value of the difference between the respective concentrations (above detection limit) was divided by the mean of the two and expressed as a percentage. Similarly, 43 of the samples were split and analyzed along with the other bulk samples; the splits were identified with different laboratory codes. Estimates of precision for these split determinations were calculated in the same way as those from the replicate collectors. These two precision estimates,

TABLE 1.—*Techniques and methods for chemical analysis of bulk-precipitation and snow-core samples*

Constituent or property	Technique*	Method†	Detection limit‡ (microgram per liter)	Reference
As	AA	h.g	0.1	Skougstad and others, 1979, p. 65
Ba	ICP	d.a	2	Garbarino and Taylor, 1979
Be	do	do	.5	Do.
Total inorganic carbon.	S	a	200	Do.
Ca	ICP	d.a	20	Do.
Cd	do	do	1	Do.
Cl	IC	d.i	50	Fishman and Pyen, 1979
Co	ICP	d.a	3	Garbarino and Taylor, 1979
Cu	do	do	10	Do.
F	IC	d.i	50	Fishman and Pyen, 1979
Fe	ICP	d.a	3	Garbarino and Taylor, 1979
H (pH)	E	g.e		Skougstad and others, 1979, p. 543
Hg	AA	c.v	.1	Skougstad and others, 1979, p. 197
K	do	d.a	100	Skougstad and others, 1979, p. 229
Li	ICP	do	4	Garbarino and Taylor, 1979
Mg	do	do	100	Do.
Mn	do	do	1	Do.
NH_4-N	S	c	10	Skougstad and others, 1979, p. 415
NO_3-N	do	do	100	Skougstad and others, 1979, p. 445
Na	ICP	d.a	200	Garbarino and Taylor, 1979
Ni	AA	c.e	1	Skougstad and others, 1979, p. 215
Pb	do	do	1	Skougstad and others, 1979, p. 167
Se	do	h.g	1	Skougstad and others, 1979, p. 237
Si (SiO_2)	ICP	d.a	9	Garbarino and Taylor, 1979
Specific conductance.	E	w.b		Skougstad and others, 1979, p. 545
Sr	ICP	d.a	.5	Garbarino and Taylor, 1979
SO_4	IC	d.i	100	Skougstad and others, 1979
V	ICP	d.a	6	Garbarino and Taylor, 1979
Zn	do	do	3	Do.

* AA Atomic absorption spectrometry.
E Electrometry.
IC Ion chromatography.
ICP Inductively coupled plasma atomic emission spectrometry.
S Spectrophotometry.

† a. Acidification, sparging, and nondispersive infrared spectrometry.
c. Colorimetry.
c.e. Chelation extraction for preconcentration before direct aspiration into flame.
c.v. Cold vapor.
d.a. Direct aspiration into flame or plasma.
d.i. Direct injection.
g.e. Low-conductivity glass electrode.
h.g. Automated hydride generation before thermal decomposition.
w.b. Wheatstone bridge.

‡ Detection limits are those specified in references attainable under prevailing analytical conditions.

one representing sampling plus analytical error and the other representing analytical error range from 0 to 200 depending on the constituent (table 2). Of these two potential sources of imprecision (sampling plus analytical and analytical), that associated with the analytical determinations was generally the lesser. In this report, contour maps are given only for those constituents from the primary collectors in which the median percentage error of both precision estimators was less than 50. The concentration intervals on the maps were chosen to reflect consideration of the two precision estimators.

In addition, an estimate of sampling precision associated with sample preservation was calculated. The constituent loads for event samples were summed for each site and compared with the loads of the primary collector in a manner analogous to the calculation of sampling and analytical precision; however, loads rather than concentrations were used. The median percentage error calculated from the sum of the event loadings and loadings from the primary bulk collections for the total period is slightly higher than the imprecision associated with collection and analysis. It is possible that the handling of the samples could produce minor perturbations in the composition of each sample and that these effects have been amplified by summing the values of each event. Before taking the absolute value of this error, however, a cursory review of the sign of this error term suggests that the event calculations neither consistently underestimate nor overestimate the loading as compared with

Table 2.—*Statistical summary of dissolved chemical concentrations in the bulk precipitation samples*

[Concentrations estimated to be below the limit of detection for a constituent (table 1) were set equal to zero]

Constituent	Concentration: Median	Concentration: Range	Skewness	Number of observations (detection limit): Above	Number of observations (detection limit): Below	Concen-tration of blank	Median[1] percent error in split samples	Median[1] percent error in replicate samples	Median[2] percent error in event samples
Ammonium as nitrogen (mg/L)	0.34	<0.01 - 3.7	3.6	172	7	<0.06	3 (42)	28 (19)	39 (11)
Arsenic (µg/L)	<.1	<.1 - 4	1.5	84	95	<.1	200 (25)	0 (8)	----
Barium (µg/L)	2	<2 - 30	4.4	97	82	<2	80 (25)	20 (8)	----
Beryllium (µg/L)	<.5	<.5 - .6	7.6	3	174	<.5	----	----	----
Cadmium (µg/L)	<1	<1 -191	5.9	87	92	1	176 (27)	200 (11)	----
Calcium (mg/L)	.6	.05 - 41	6.7	179	0	<.02	13 (43)	26 (20)	65 (11)
Chloride (mg/L)	.44	.07 - 3.0	2.1	179	0	.05	24 (43)	36 (20)	55 (11)
Cobalt (µg/L)	<3	<3 - 4	3.4	13	166	<3	200 (6)	200 (8)	----
Copper (µg/L)	<10	<10 -120	4.1	50	129	<10	200 (17)	200 (10)	----
Fluoride (mg/L)	.07	.01 - .64	4.3	179	0	<.05	40 (43)	46 (20)	36 (11)
Hydrogen ion (mg/L)	.040	.000- .125	.6	178		--	23 (42)	23 (20)	36 (11)
Iron (µg/L)	25	<3 -128	1.4	178	1	<3	19 (43)	30 (20)	43 (11)
Lead (µg/L)	5	<1 - 78	5.5	172	7	1	35 (43)	32 (20)	22 (11)
Lithium (µg/L)	12	<4 - 59	.8	153	26	11	67 (43)	61 (17)	----
Magnesium (mg/L)	.1	<.14 - 3.4	4.7	110	69	<.1	67 (33)	83 (14)	----
Manganese (µg/L)	7	<1 - 91	2.8	176	3	<1	15 (43)	28 (19)	33 (11)
Mercury (µg/L)	<.1	<.1 - .3	3.0	28	151	<.1	150 (6)	200 (4)	----
Molybdenum (µg/L)	<10	<10	--	0	179	<10	----	----	----
Nickel (µg/L)	1	<1 - 34	7.0	111	68	<1	171 (39)	133 (14)	----
Nitrate as nitrogen (mg/L)	.7	.1 - 2.5	1.4	179	0	<.1	0 (43)	25 (20)	42 (11)
Potassium (mg/L)	.1	<.10 - 2.8	6.2	104	75	.1	28 (29)	200 (11)	----
Selenium (µg/L)	<.5	<.5	--	0	179	<.5	----	----	----
Silica (mg/L)	.17	<.009- 2.6	3.5	172	7	<.009	78 (43)	102 (20)	----
Sodium (mg/L)	.2	.2 - 1.6	1.6	122	57	<.2	0 (29)	28 (15)	14 (11)
Specific conductance (µmho/cm@25°C)	23	.3 -250	5.6	179		--	13 (43)	32 (19)	----
Strontium (µg/L)	3	<.5 - 81	6.6	178	1	<.5	23 (43)	42 (20)	43 (11)
Sulfate (mg/L)	2.9	.23 - 47	6.6	179	0	<.1	11 (43)	19 (20)	22 (11)
Total inorganic carbon (mg/L)	.4	.1 - 8.6	4.9	179	0	.1	0 (43)	0 (20)	12 (11)
Vanadium (µg/L)	<6	<6 - 7	13.3	1	178	<6	----	----	----
Zinc (µg/L)	13	<3 -592	7.7	144	35	<3	16 (37)	85 (18)	----

[1] Number in parentheses is the number of paired samples for which the percent error was determined.

[2] The number in parenthesesis as in footnote 1. This error was determined by comparing the constituents loads for the events (summed) with the total load from the primary collectors for constituents with an analytical and sampling plus analytical error 50 percent or less. Loads for samples that had concentrations below the respective limit of analytical detection were calculated from concentrations set equal to the detection limit.

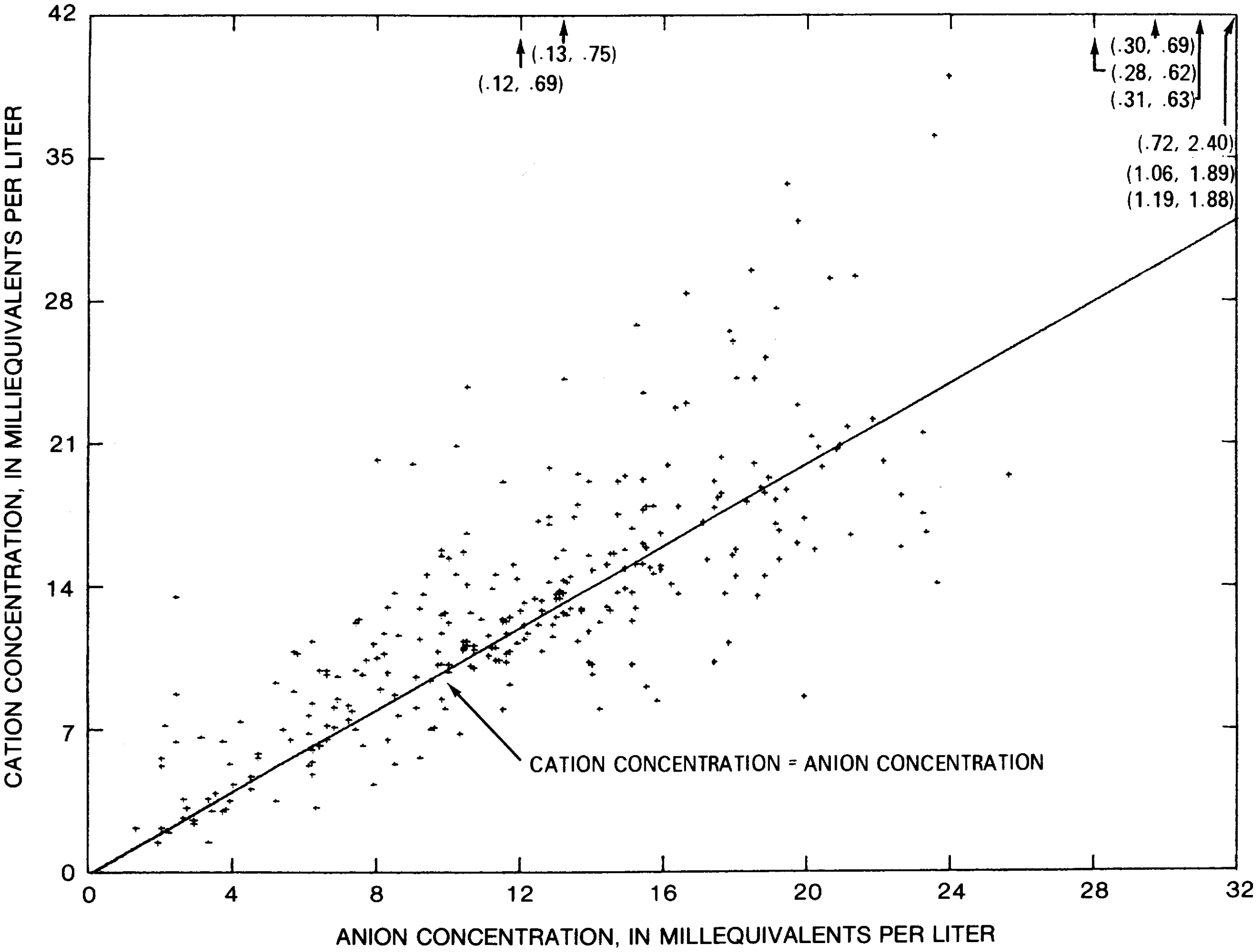


FIGURE 3.—Cation vs. anion equivalents of all bulk-precipitation samples.

the total bulk collection. Therefore, the changes that may have developed in either the primary sample while it was in the field or the event samples between collection and analysis were minor and apparently random.

As a further check on the precision of the analytical data, a comparison of the total milliequivalents of cations and anions was made. Calcium, magnesium, potassium, sodium, ammonium, and hydrogen ions were included in the cation sum. The anion sum included chloride, sulfate, and nitrate (see fig. 3; table 5 following "References Cited"). As indicated by the graph of cations against anions in figure 3, some samples appear to contain an excess of cations. Although carbonate bicarbonate alkalinity was not determined, the few samples having very high cation excesses also had high pH and contained relatively large amounts of calcium and total inorganic carbon. The contribution of carbonate bicarbonate to the anion sum of these samples may be significant, but, in general, the lower pH of most samples suggests little carbonate bicarbonate contribution.

The discrepancy observed here is not unique; results from other studies indicate the same anion deficiency (McColl, 1980; Natural Resources Ecology Laboratory, 1978–81). A cursory review of the data from the National Atmospheric Deposition Program (National Resources Ecology Laboratory, 1978–81) indicates a slight anion excess in the Eastern United States trending to a large cation excess in the Midwest. Acidification of the samples for determining cation concentrations could release additional cations from particulates not removed by filtration. Although discrepancies were noted in various samples for the cation-anion balance, no determinations were deleted. The analytical data presented in table 5 (following "References Cited") and interpreted herein are complete.

Constituent Loads

Data on concentration of dissolved constituents provide a means of discerning and comparing their spatial distributions. However, the slight differences in length of the collection period from site to site, combined with the unequal distribution of precipitation over the region during collection, suggest a need for normalization of data to enable valid comparisons among the individual sites. Therefore, average daily constituent loadings, expressed as mass daily deposition per unit area (microgram per square meter or milligram per square meter), were computed for each sample. The loads were computed by multiplying the concentration by the precipitation quantity (from National Weather Service data) and dividing the result by both the number of sampling days and the area of the collector opening.

The distributions of both concentrations and loads are generally postively skewed, which means that the distributions are asymmetrical, with most observations clustered at low values. To offset this effect, median concentrations were chosen to represent the data populations. Further data analysis that would relate these concentrations from bulk precipitation to geochemical abundance in atmospheric deposition should employ data transformation such as the log-normal distributions of Krige (1960) and Sichel (1952). These methods should take into account the loss of data through censoring or truncation, as would be appropriate for constituent concentrations that were below detection limits (Cohen, 1959).

Because precipitation quantity was a factor in calculating daily constituent loadings, the reported quantity was compared with the collected

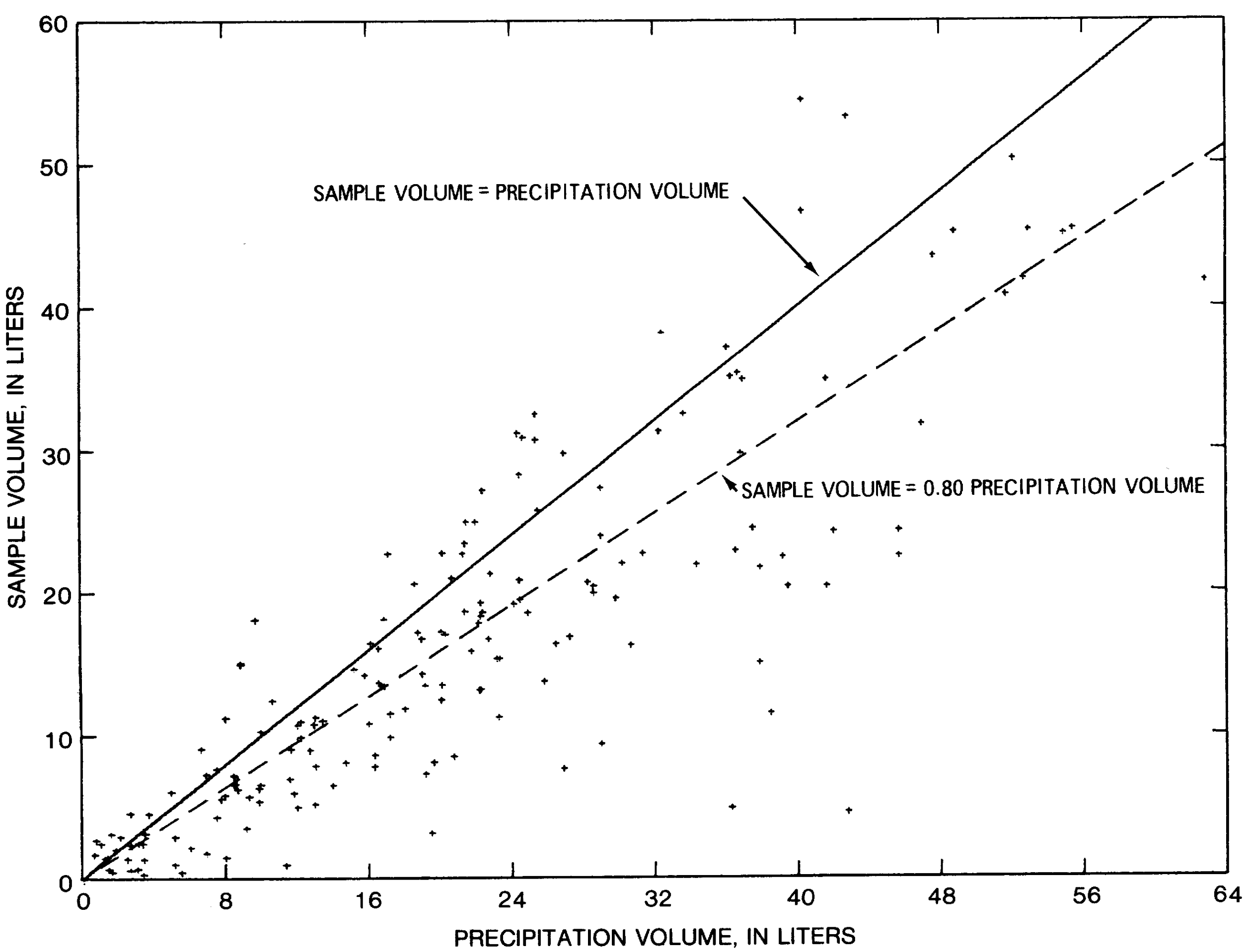


FIGURE 4.—Precipitation quantity recorded at the National Weather Service gages vs. quantity actually collected.

amounts. A graph of reported quantity against collected quantity is shown in figure 4; the relation was calculated from a linear least-squares technique wherein the collected value was the independent variable. Results yield a slope of 0.8 (a slope of 1 would suggest that the amount of water estimated was equivalent to the amount collected), which indicates either that the collectors did not collect the precipitation as efficiently as the rain gages or that they lost some of their collected water through sublimation, evaporation, and (or) leakage.

Although some water loss was probably due to evaporation or sublimation, many of the sample bags leaked. Also, some of the incoming precipitation, particularly snow, may have been lost through wind turbulence (Galloway and Likens, 1978). Although the size of the opening and the depth of the collector suggest that the efficiency of snow collection was similar to that of the weighing-bucket rain gages at the National Weather Service sites, the opening may, in fact, have been smaller than assumed. To calculate precipitation volume from the National Weather Service data, a collector diameter of 45.7 cm (that of the fiber tube) was used. However, because a plastic bag was wrapped over the edge of the collector and taped to the inside and two bags were suspended within the container and wrapped over the outside, the effective diameter was slightly less than that used in the calculation. A 1.25-cm reduction in diameter would reduce by about 5 percent the calculated quantity intercepted, and a 2.5-cm reduction would diminish the quantity by 10 percent. Because the amount of water lost from the collectors by evaporation or sublimation is not known, neither the constituent concentrations nor the loads have been adjusted for this factor. Where evaporative losses occurred, the constituent loads are slightly overestimated.

RESULTS AND DISCUSSION

METEOROLOGIC CONDITIONS

Meteorologic conditions during the study were generally atypical. Low-level air from the Atlantic Ocean or the Gulf of Mexico provided the dominant source of moisture, particularly in February. Although this pattern is normal, the occurrence, intensity, and duration of storms were unusual. December 1980 in the Northeast was colder and dryer than normal, and January 1981 was much colder and drier than normal. In contrast, February was much warmer and wetter than normal. (See temperature and precipitation maps for these months, fig. 5.)

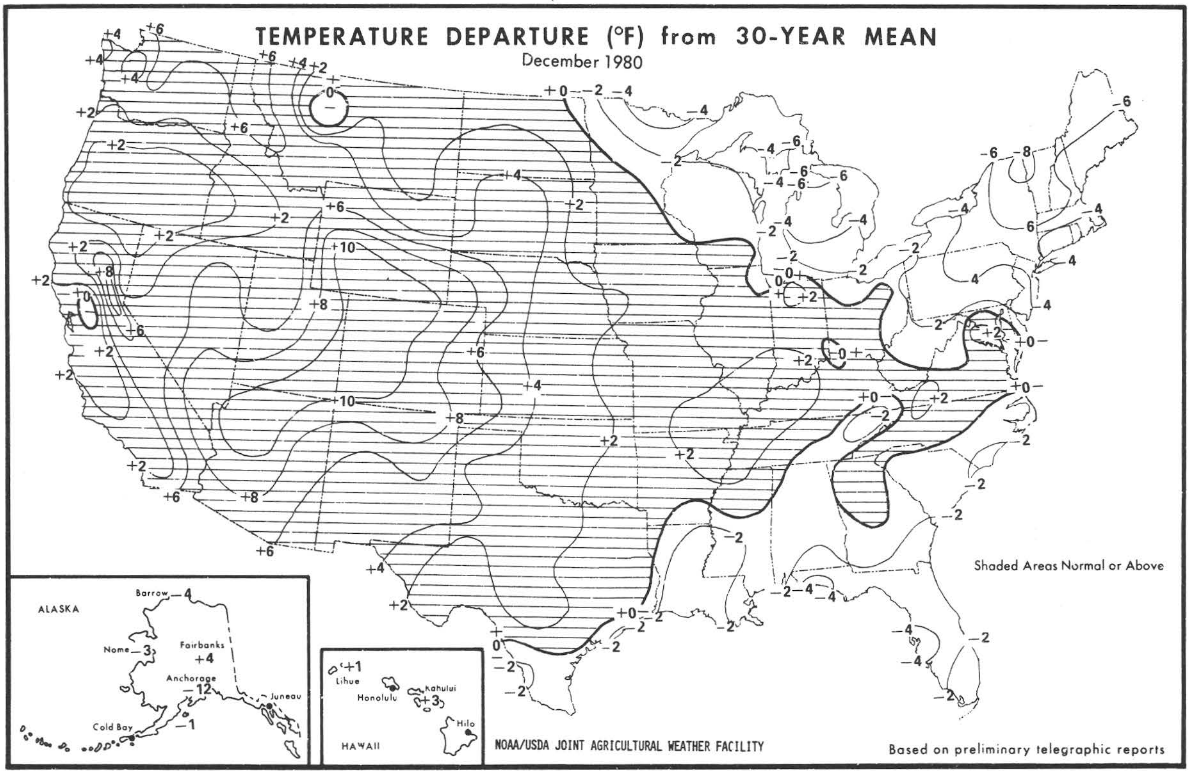
As a consequence, the requirement that snow cover prevail at least 60 percent of the collection time was not met at most sites. Some precipitation fell as rain, particularly in the southern part of the area, and, during February, many of the samples melted in the collector. Also, only five snow cores—one-quarter of the number expected—could be obtained.

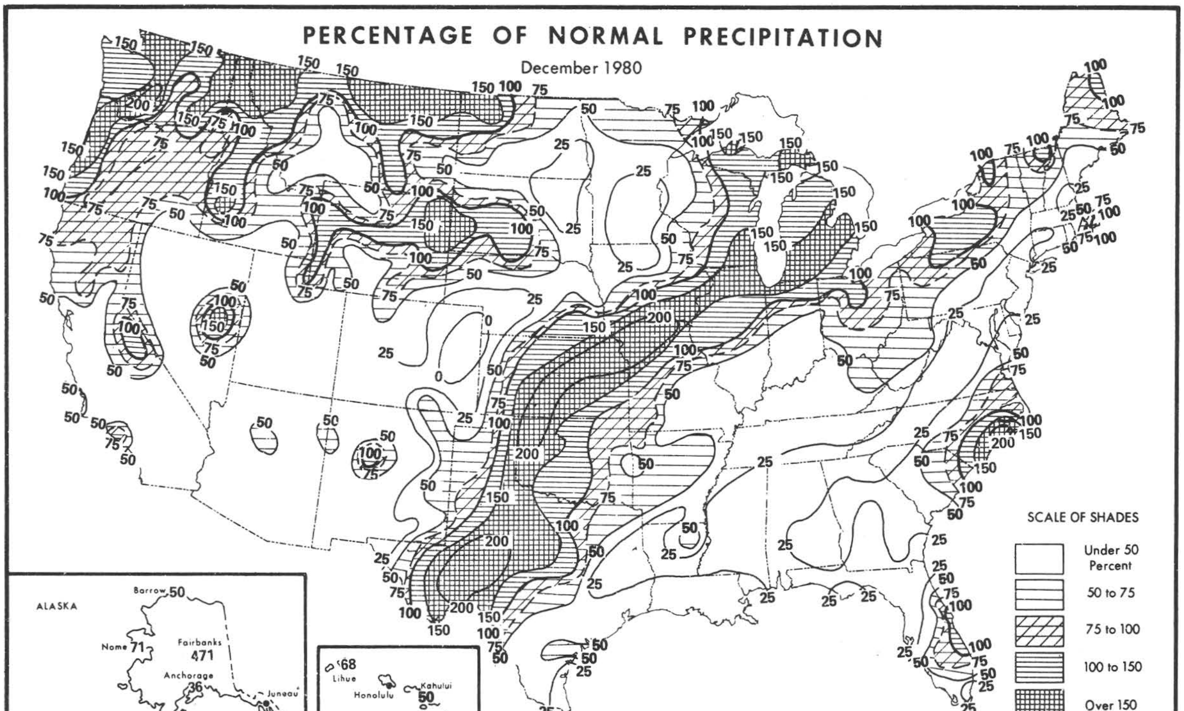
To determine the sources of trace constituents in samples after each storm would require a detailed meteorologic analysis beyond the scope of this study. However, the general circulation pattern of air over the Northern Hemisphere and the movement of low-pressure systems that cause precipitation are depicted in maps of the mean monthly 700-mb pressure surface for December 1980 through February 1981 in figure 6. The synoptic scale winds characteristic of the general circulation of the atmosphere move approximately parallel with the height contours of the 700-mb pressure surface, which is from the northwest and west in December and January with a more southerly component in February. These winds result from the combination of the Coriolis and pressure-gradient forces. The low-level air from the south and east, which was the dominant source of moisture during the study, generally followed the west-to-east circulation pattern but had a more southerly component. Mean monthly velocity and direction of surface winds in each State indicate the same general west-to-east transport of air as synoptic scale winds (fig. 7). A more detailed discussion of weather and air circulation is given in Taubensee (1981), Wagner (1981), and Dickson, (1981).

SPATIAL DISTRIBUTION OF CONSTITUENT DEPOSITION

Locations of the major urban centers of the area studied are shown in figure 1; the distribution of precipitation is shown in figure 8. Of the 29 constituents analyzed including hydrogen ion, 13 had an analytical and sampling plus analytical precision of 50 percent or less. The areal distribution of concentrations and loads of 12 of these constituents (sodium, chloride, calcium, fluoride, sulfate, hydrogen ion, nitrate, lead, iron, ammonium, strontium, and manganese) are summarized in figures 9 through 20. Because the concentrations are not normalized to account for the variation in length of collection period and

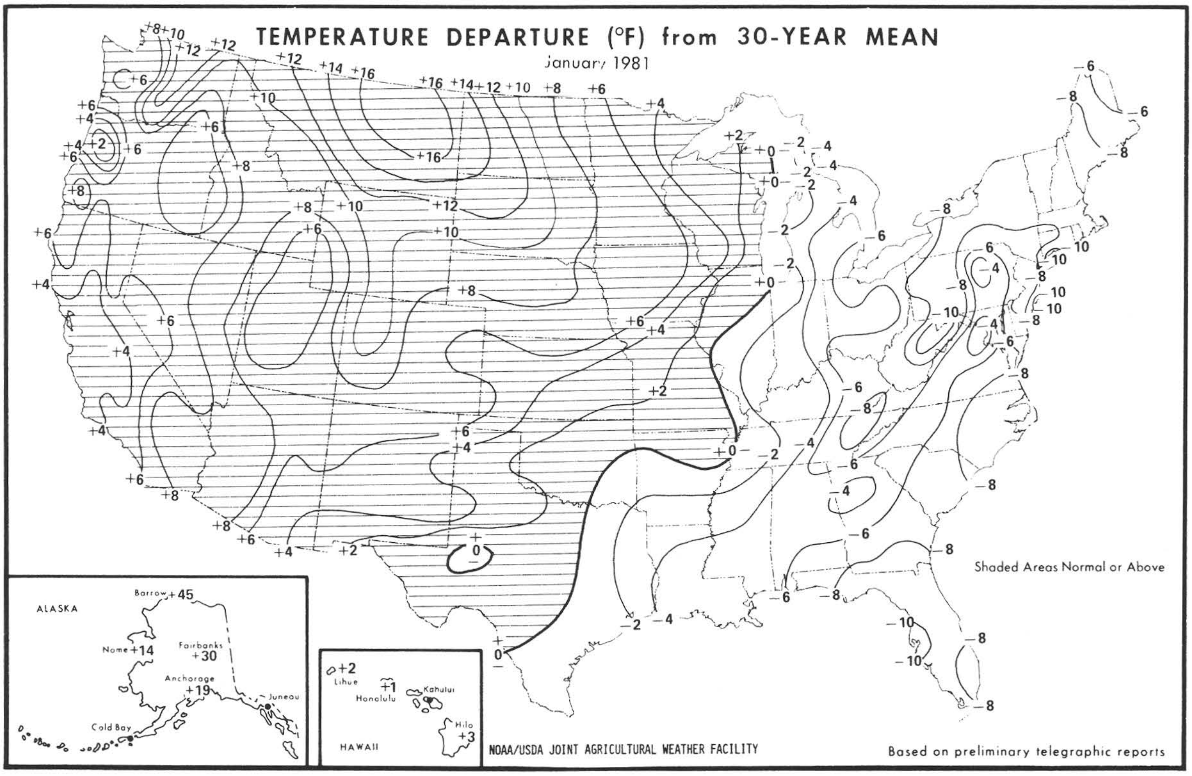
FIGURE 5.—Air-temperature departures and percentage of normal precipitation (from U.S. National Oceanic and Atmospheric Administration and U.S. Department of Agriculture, 1981).

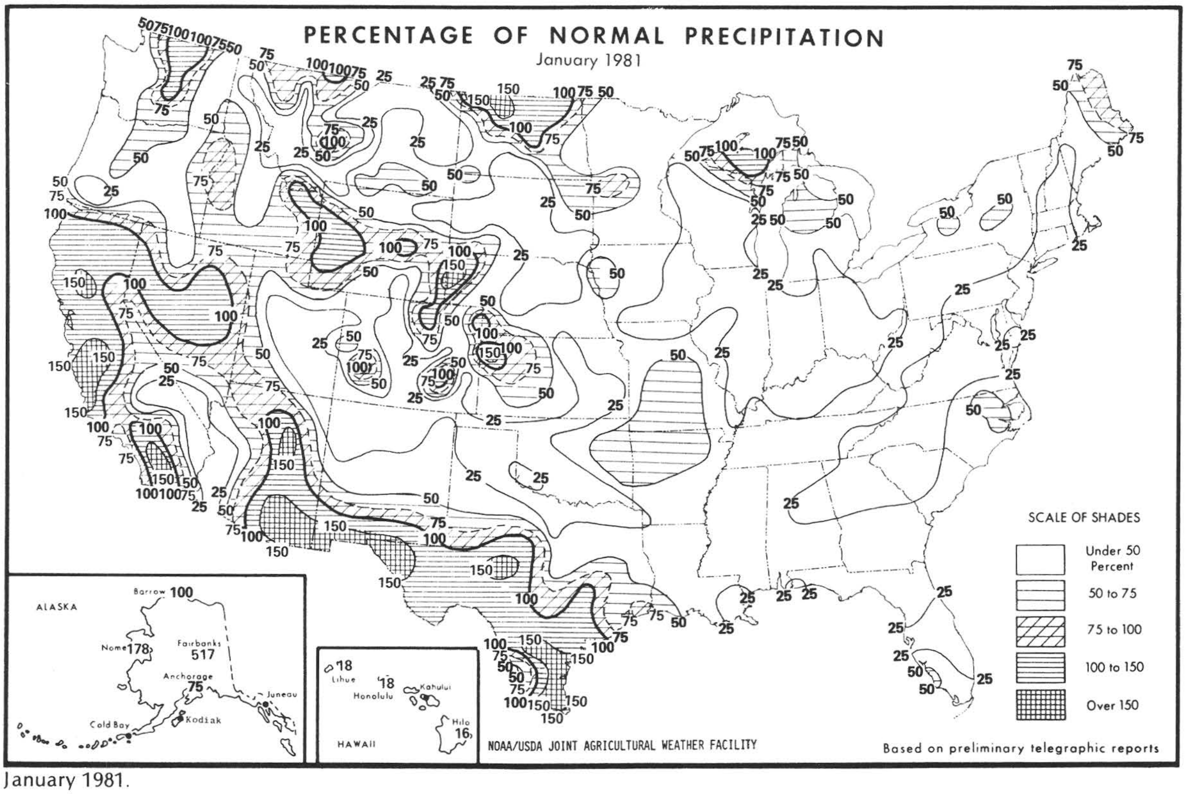




A, December 1980.

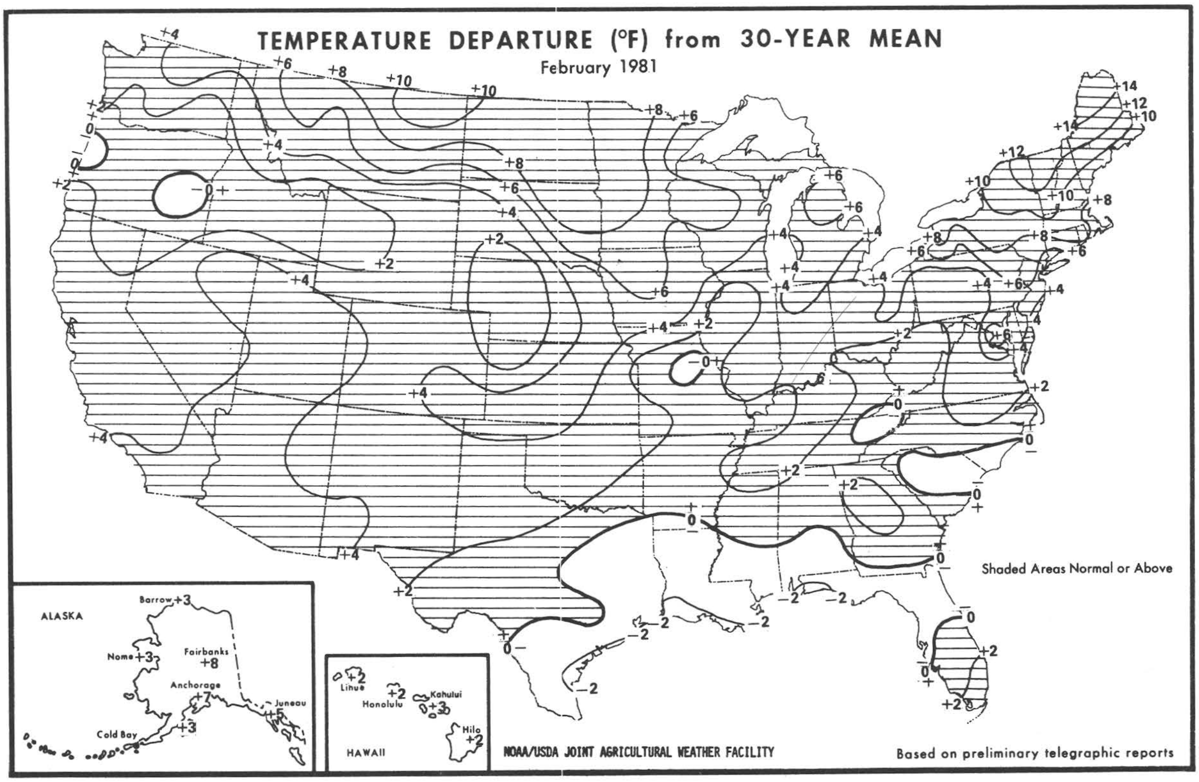
FIGURE 5.—Air-temperature departures and percentage of normal precipitation (from U.S. National Oceanic and Atmospheric Administration and U.S. Department of Agriculture, 1981).—Continued

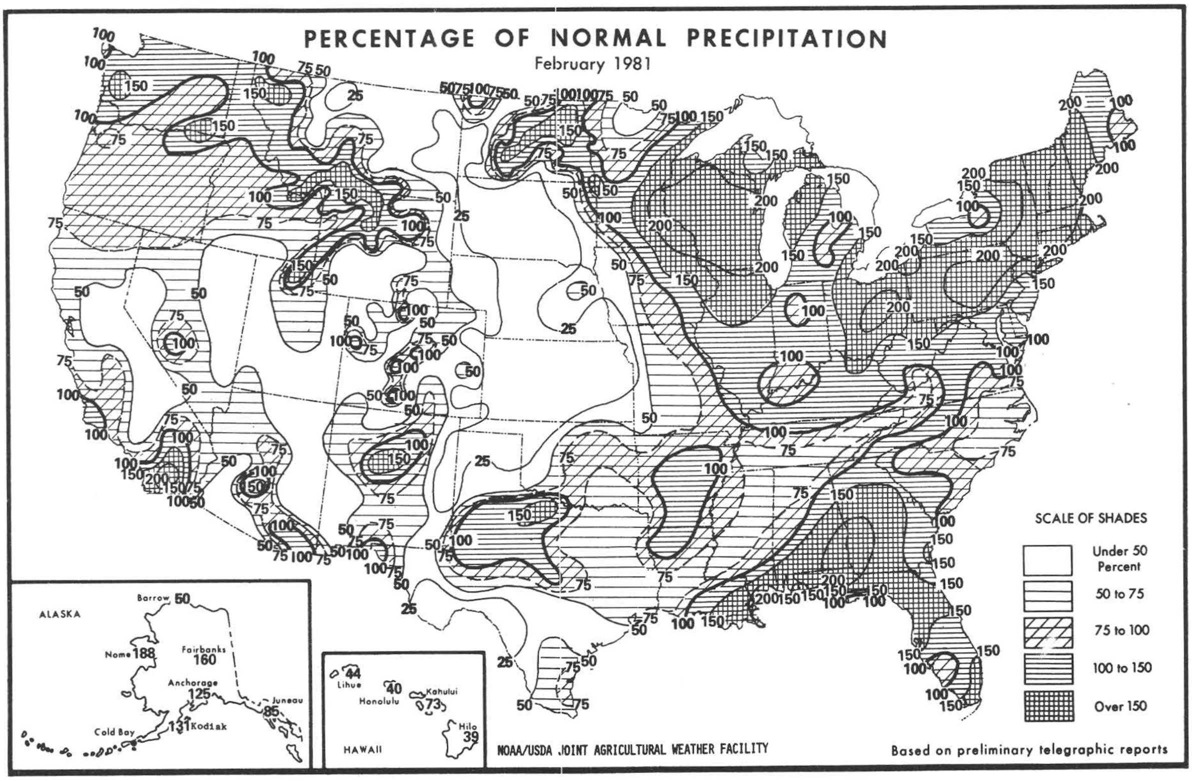




B, January 1981.

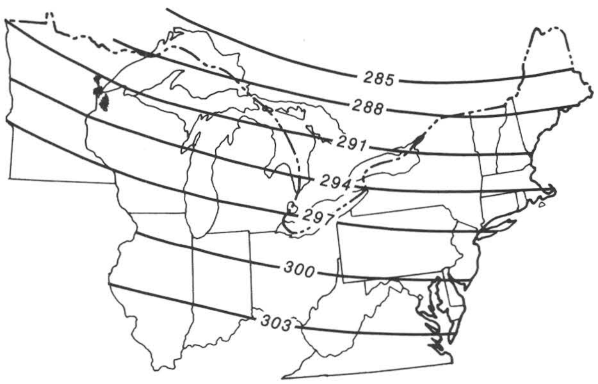
FIGURE 5.—Air-temperature departures and percentage of normal precipitation (from U.S. National Oceanic and Atmospheric Administration and U.S. Department of Agriculture, 1981).—Continued



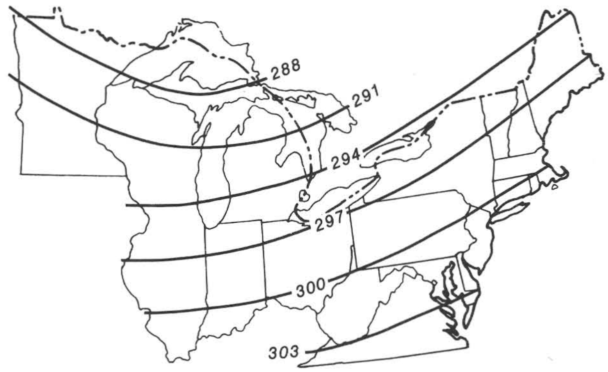


C, February 1981.

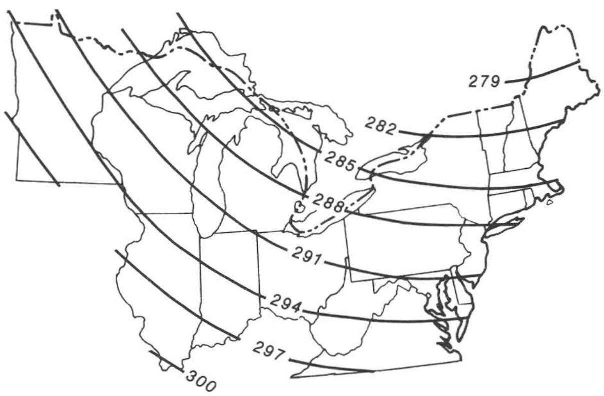
FIGURE 6.—Mean monthly 700-millibar surface pressure.



A, December 1980 (from Wagner, 1981).



C, February 1981 (from Dickson, 1981).



B, January 1981 (from Taubensee, 1981).

precipitation quantity, the following discussion refers mainly to average daily loadings (microgram per square meter or milligram per square meter), which are easier to interpret than concentration. Despite the limitations associated with the collection procedures and the minor analytical uncertainties, clear geographic patterns of concentrations and loads are evident in figures 9 through 20.

The maps reveal both regional and local patterns. By ignoring the local deviations, one can discern regional patterns. Although it is beyond the scope of this report to discuss the local pattern deviations or relate local deviations to plausible source areas, most of the local highs seem to be downwind from urban centers.

Regional Patterns

Two main distribution patterns of regional bulk precipitation are evident in figures 9 through 18: a banded pattern and a concentric pattern. The banded one has two subpatterns: an even transition from high to low and a series of alternating highs and lows.

Precipitation, Sodium, and Chloride

The maps of precipitation distribution (fig. 8) and sodium (fig. 9*B*) and chloride (fig 10*B*) loads display a banded pattern. Each shows high deposition along the coastal region that decreases first sharply, then more gradually, to the west. This pattern of chloride deposition and concentration was reported by Jackson (1905) for New York and New England and subsequently by many other investigators. Because both sodium and chloride closely follow this regional pattern, the source is probably sea salt. The general pattern of low loading inland is obscured by local highs near urban centers; these highs may be caused by the cycling of salt used for snow and ice removal.

The band of high precipitation along the east shore of Lake Michigan and extending northward through the Upper Peninsula of Michigan is probably caused by evaporation from Lake Michigan.

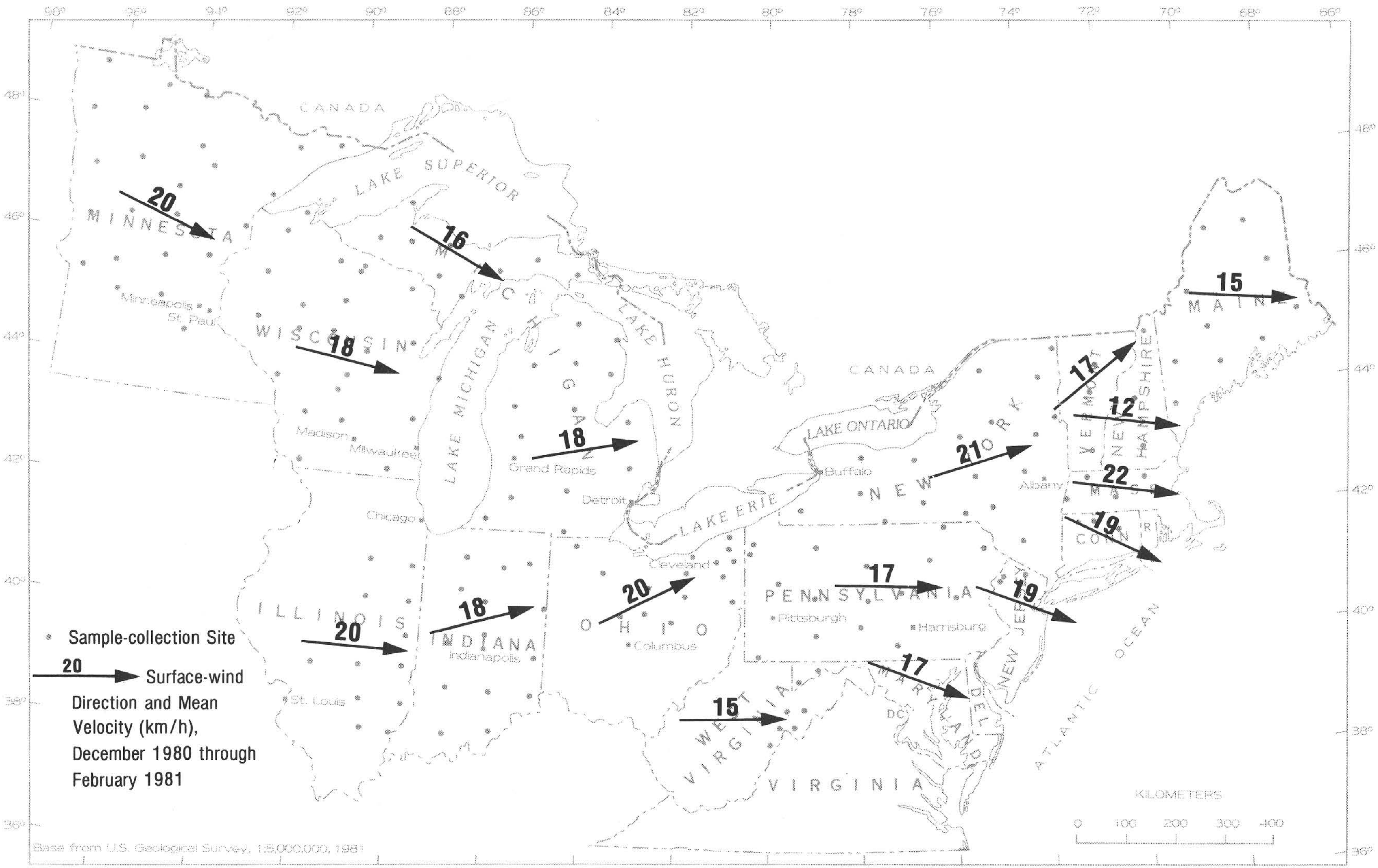


FIGURE 7.—Average surface-wind patterns over the North-Central and Northeastern United States, December 1980 through February 1981.

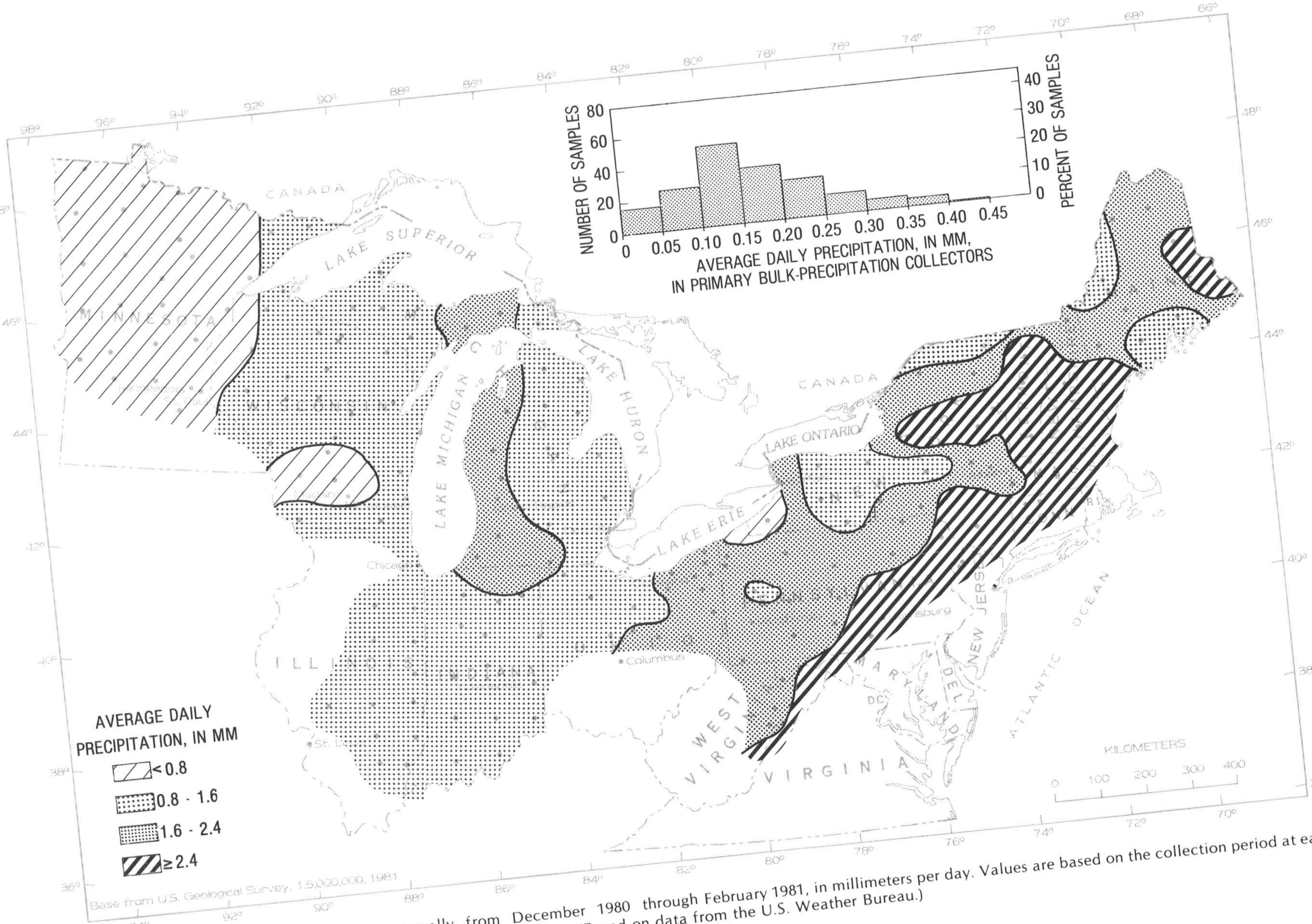


FIGURE 8.—Distribution of precipitation, generally from December 1980 through February 1981, in millimeters per day. Values are based on the collection period at each of 179 sites. (Based on data from the U.S. Weather Bureau.)

Both the distribution maps and the general meteorologic trends (fig. 7) indicate an eastward transport of both moisture and dissolved constituents in the midwest. This eastward transport is probably obscured in coastal areas by moisture from the ocean.

Calcium

The distribution of calcium deposition (fig. 11) shows an area of high daily loads (⩾2.0 mg/m²) that extends from western Minnesota through Illinois and southern Indiana. The gradient to lower loading in northeastern Minnesota is much steeper than the one trailing out to the east. The low to the east (<0.5 mg/m²) is similar to that of northeastern Minnesota but begins along the New York–New England border, considerably farther from the regional high than that of Minnesota.

Samples from areas of the highest calcium loading also have the highest concentration of total inorganic carbon and the highest pH (fig. 14*A*), which suggests a chemical control on the solution by carbonate mineral equilibria; soils are possible sources of carbonate minerals in these areas of high loading.

Fluoride

Fluoride distribution displays a regional series of bands (fig. 12). A region of medium to high daily loads (0.1–0.3 mg/m²) with a north-south trend is indicated in New England. A low is depicted in Maine, and another extends from north-central New York through northeastern Pennsylvania and northern New Jersey. The next band of highs begins just east of the Twin Cities in Minnesota and runs southeast through southern Michigan, eastern Ohio, and southwestern Pennsylvania. The highest loads of this system (⩾0.3 mg/m²) form peaks immediately east (downwind) of several urban centers such as Madison, Minneapolis–St. Paul, Grand Rapids, Cleveland, and Pittsburgh. The association of high loads with urban areas suggests local sources. Atmospheric mixing and transport away from the sources could produce a wider distribution of high loading, similar to the regional pattern. Urban sources of fluoride include chemical plants, the electronics industry, and the aluminum and steel industries. (See "Iron".)

Sulfate

The distribution of sulfate deposition over the Northeastern United States (fig. 13) is depicted as a banded pattern. The highest loads (⩾8.0 mg/m²) occur generally in the southern one-half of the area, whereas lows (<2.0 mg/m²) are indicated only in northern Minnesota and northern Maine.

The sulfate loads reported here are similar to those reported from wet-deposition data over most of the area from November 1979 through March 1980 by Glass and Brydges (in press). The greater detail in U.S. Geological Survey data results from a higher sampling density; figure 13*B* reveals several areas of high and low loadings that are not evident in the map by Glass and Brydges (in press). The local variations in figure 13*B* may be the result of a combination of sources such as soil particulates, gaseous uptake and subsequent oxidation in solution of sulfur dioxide, and washout of sulfate.

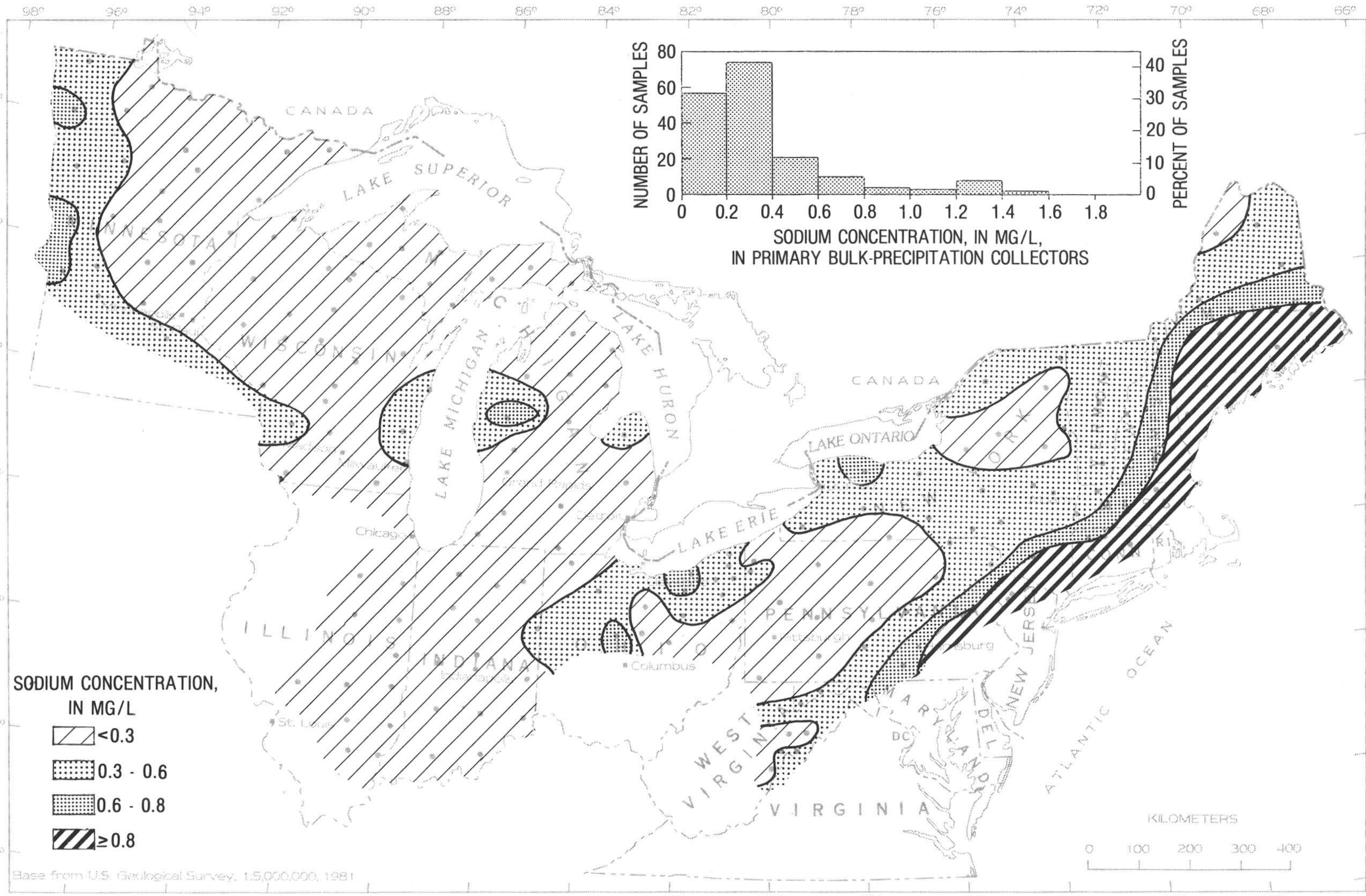
Hydrogen Ion

Concentric regional patterns of constituent loadings are displayed for hydrogen ion (fig. 14*B*) and also for nitrate (fig. 15*B*), lead (fig 16*B*), ammonium (fig, 17*B*), and iron (fig. 18*B*). The main center of the high daily loads (⩾0.15 mg/m²) is in eastern Ohio and western Pennsylvania; another peak is centered over northern New York. The gradient to the west of the main high is less steep than that to the northeast. Minnesota, Wisconsin, Illinois, and a large part of Indiana receive the lowest daily loads (<0.05 mg/m²), with the westernmost part (Minnesota and western Wisconsin) receiving the lowest loads (<0.001 mg/m²). Although these data are similar to those reported by Glass and Brydges (in press), caution should be exercised in concluding that these data reflect the acidity of bulk atmospheric deposition. The conditions under which the samples were taken and processed, the complex chemical equilibria involved, and the difficulties associated with accurate measurement of pH together cause uncertainity as to the accuracy of individual measurements.

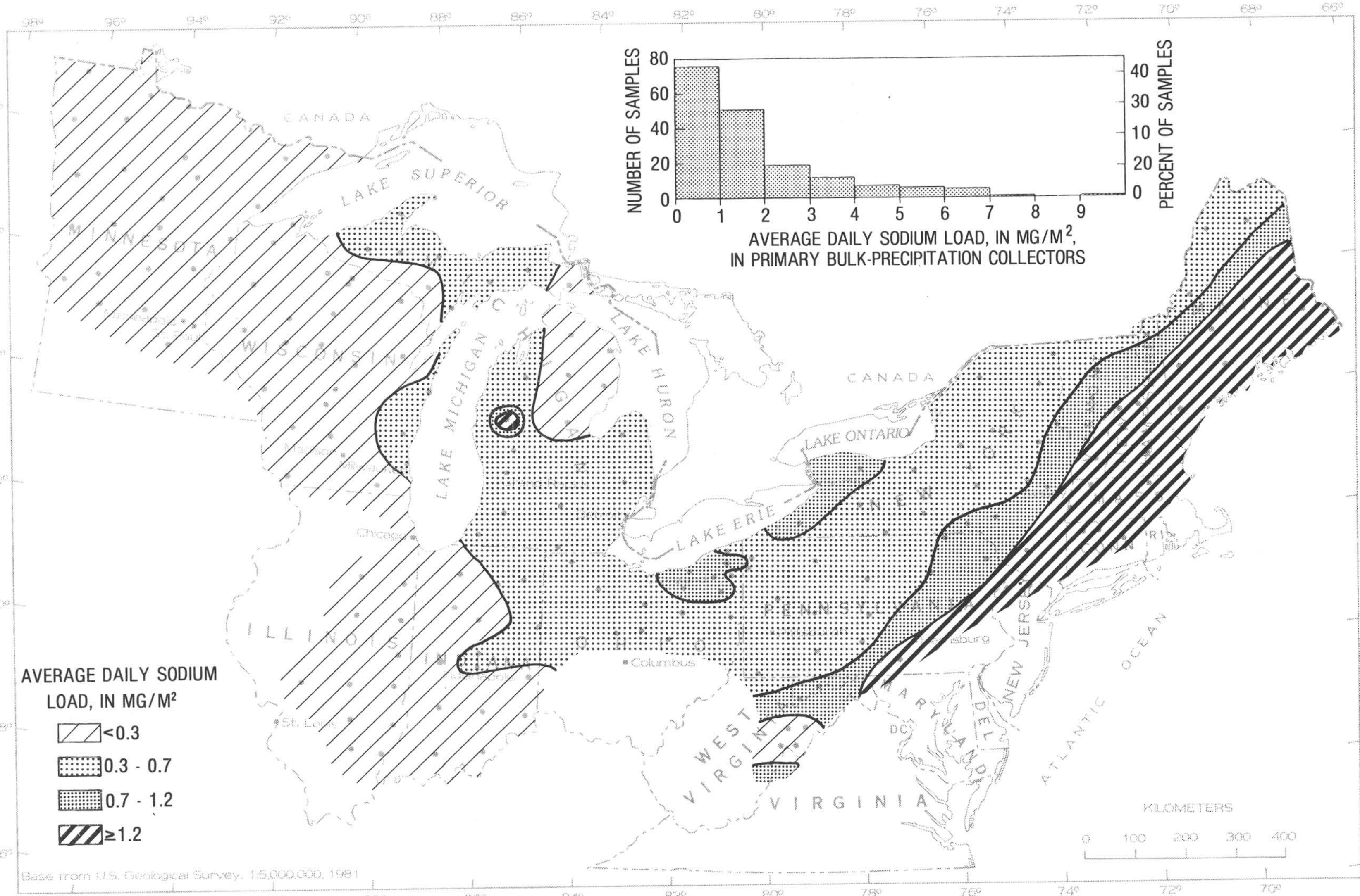
Nitrate and Lead

These and iron are the only constituents mapped that have distribution patterns (figs. 15, 16) similar to that of hydrogen ion (fig. 14). Each of these constituents has a center of high loading

FIGURE 9.—Distribution of sodium deposition, December 1980 through February 1981.

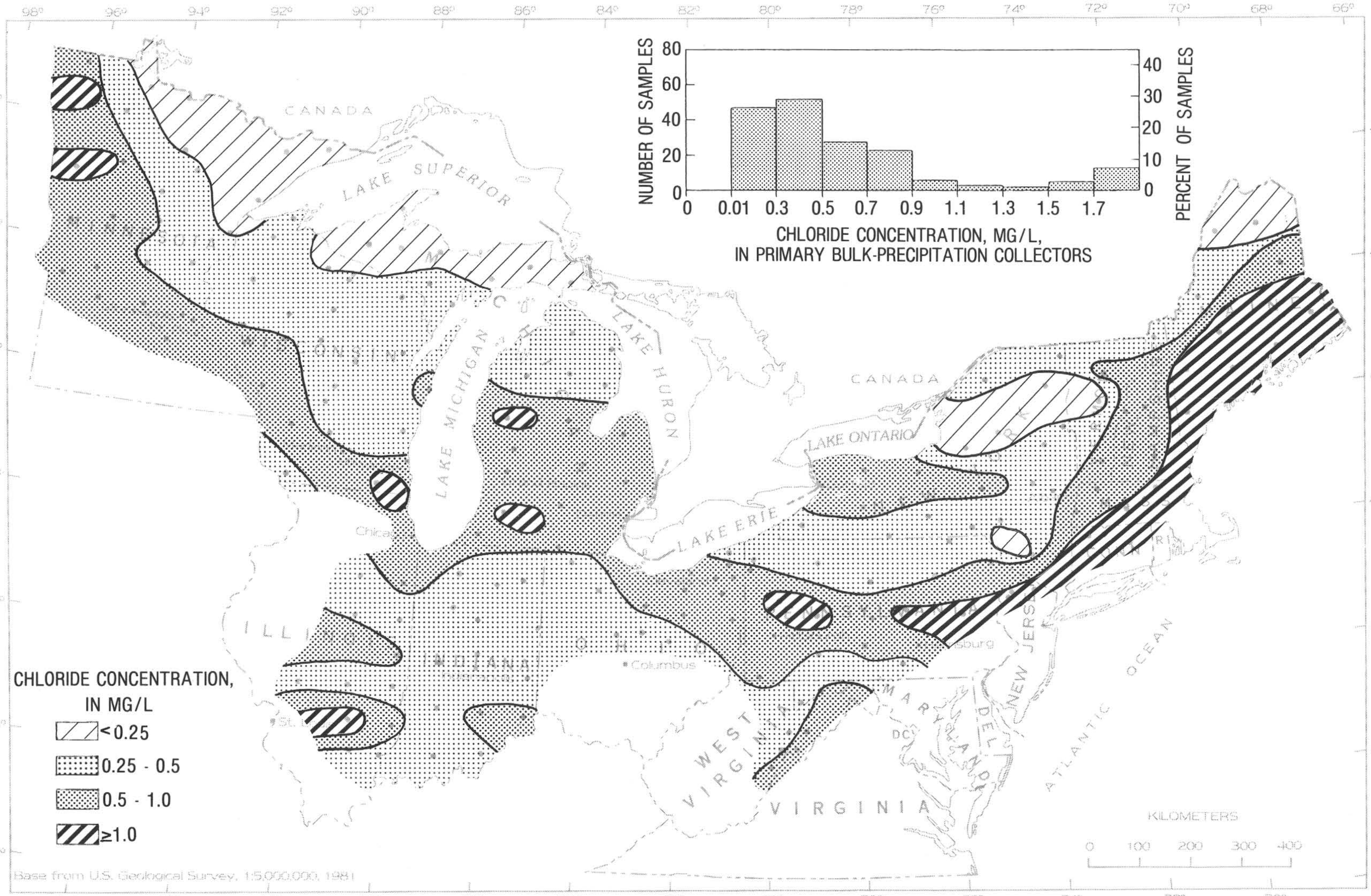


A, Concentration in milligrams per liter.

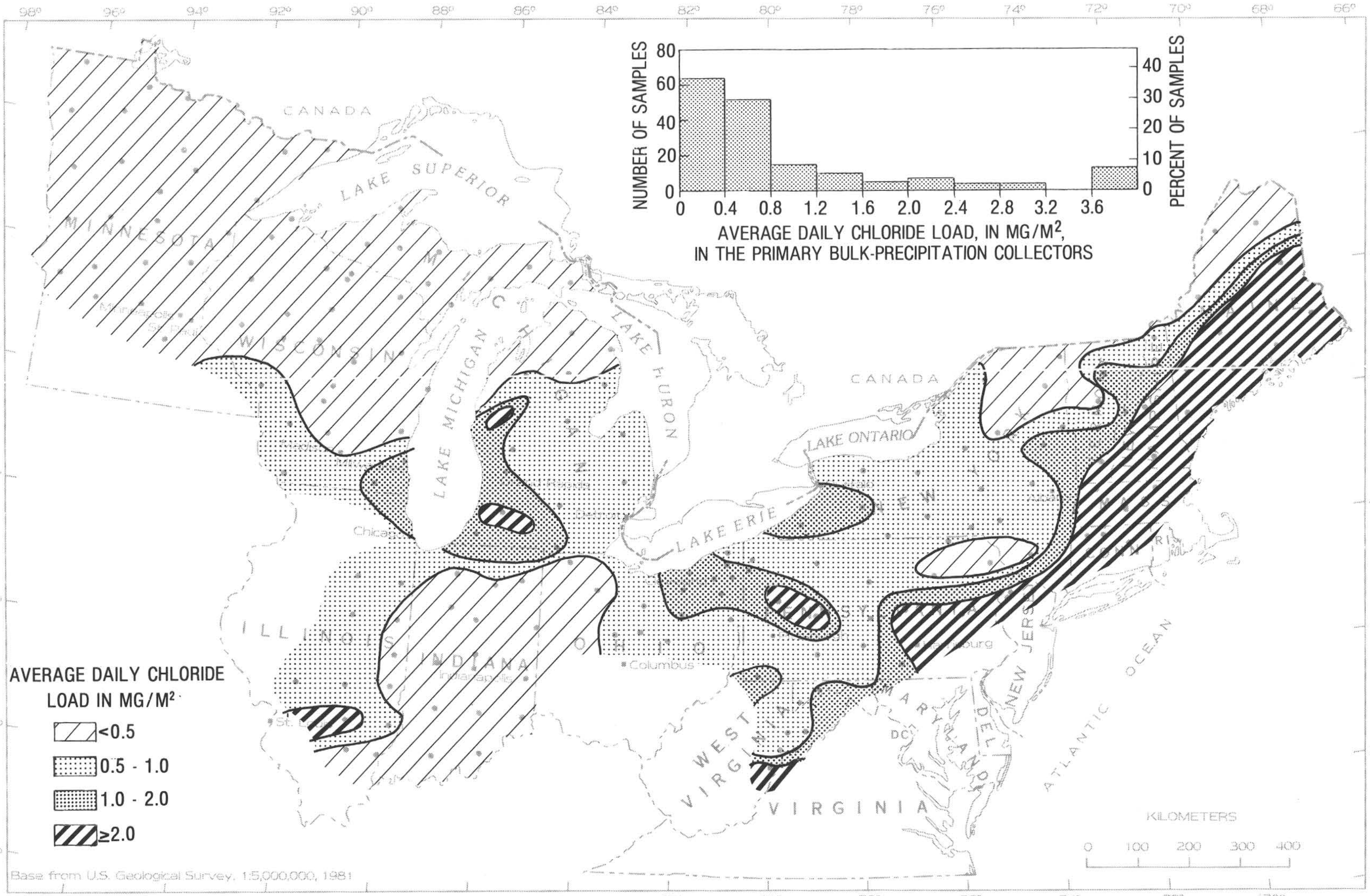


B, Daily loads in milligrams per square meter.

FIGURE 10.—Distribution of chloride deposition, December 1980 through February 1981.

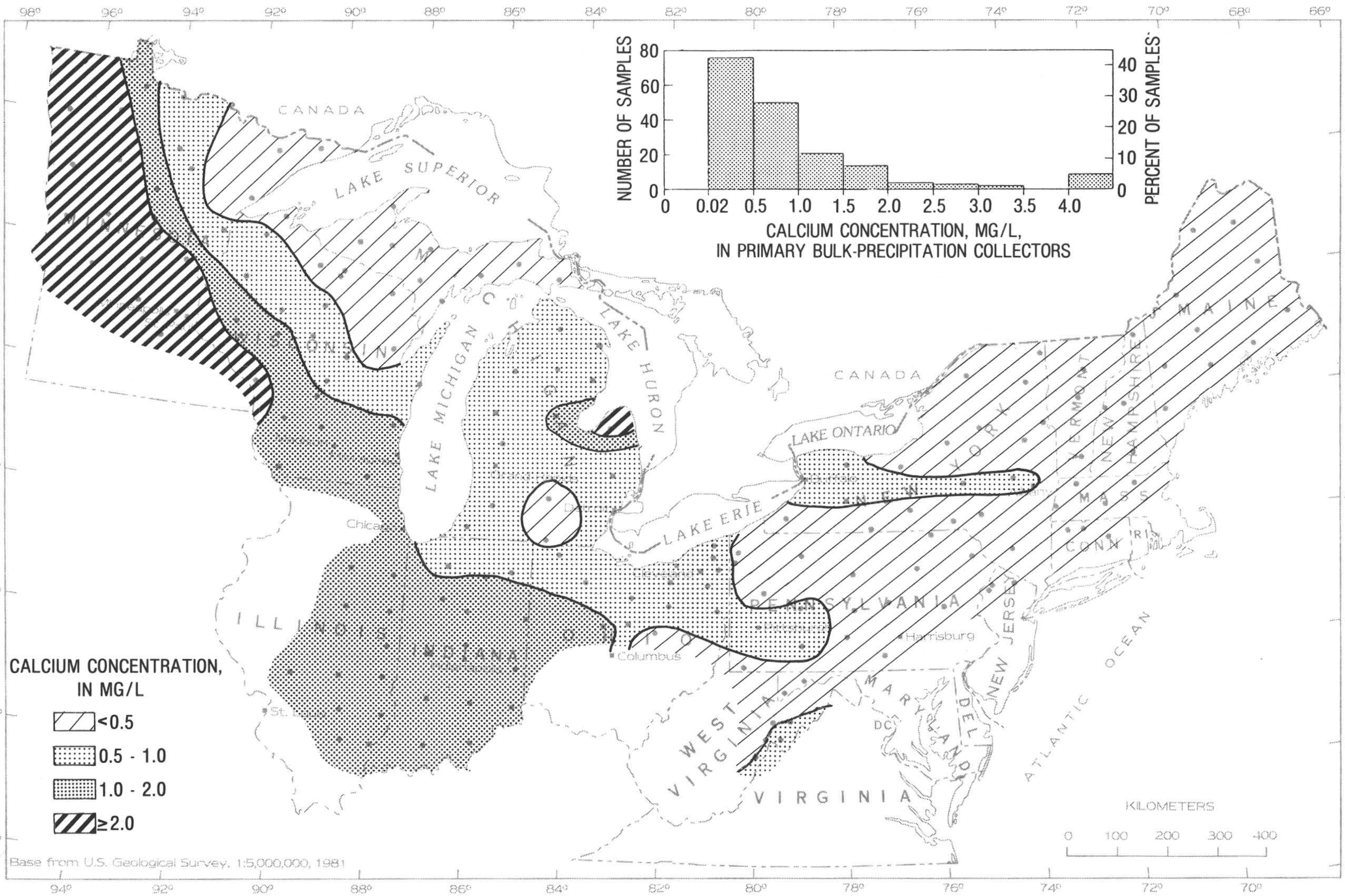


A, Concentration in milligrams per liter.

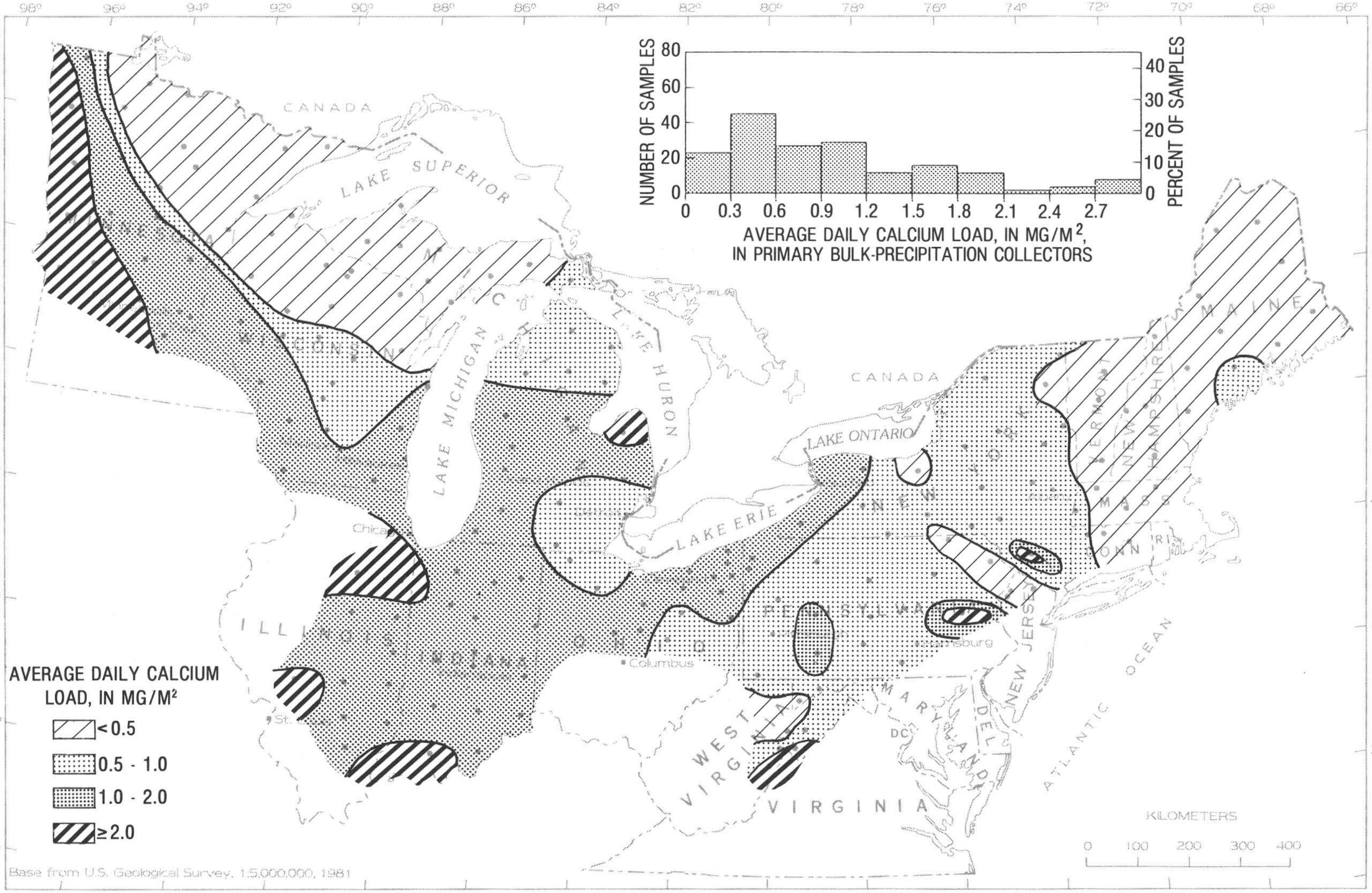


B, Daily loads in milligrams per square meter.

FIGURE 11.—Distribution of calcium deposition, December 1980 through February 1981.

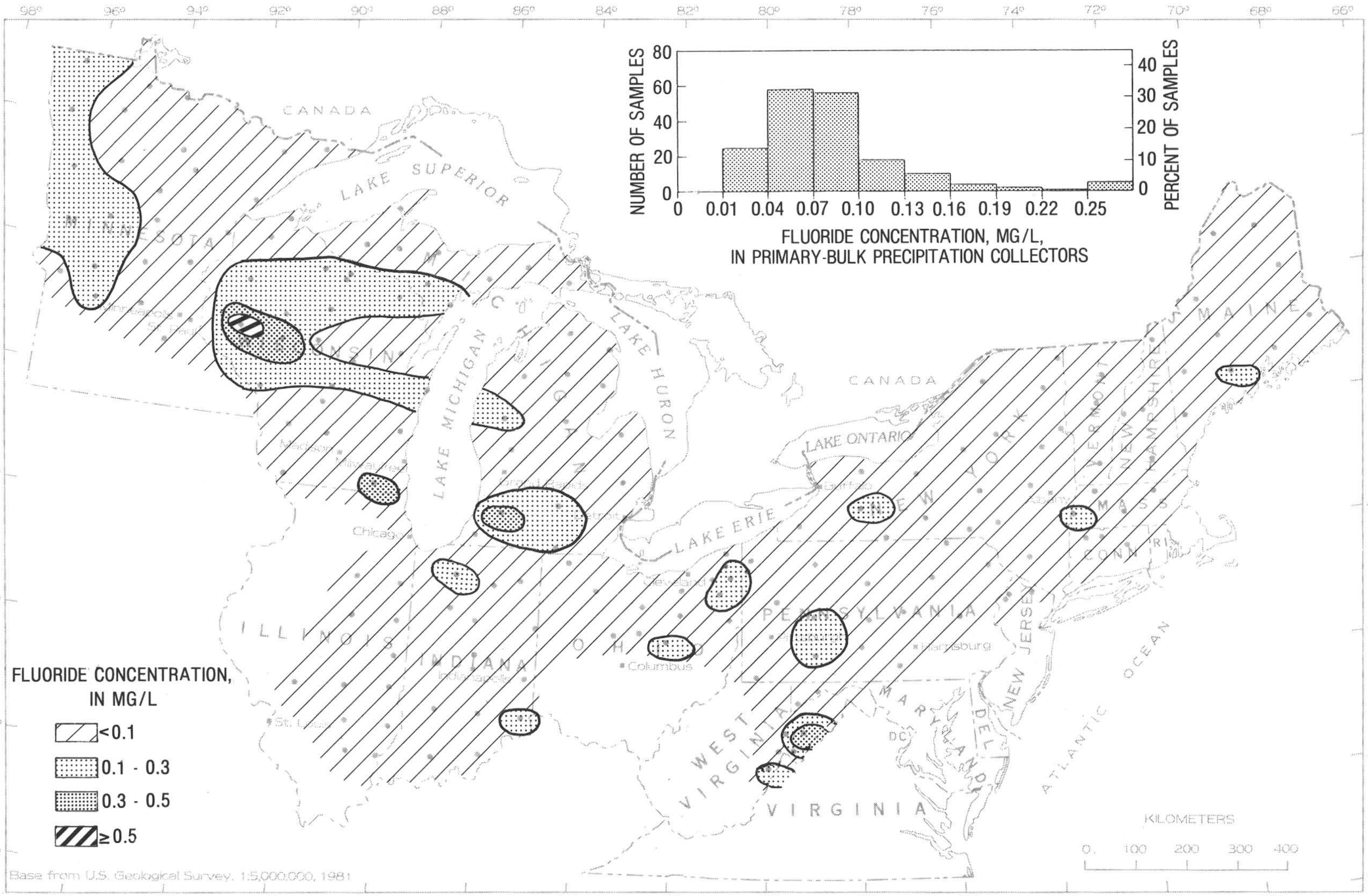


A, Concentration in milligrams per liter.

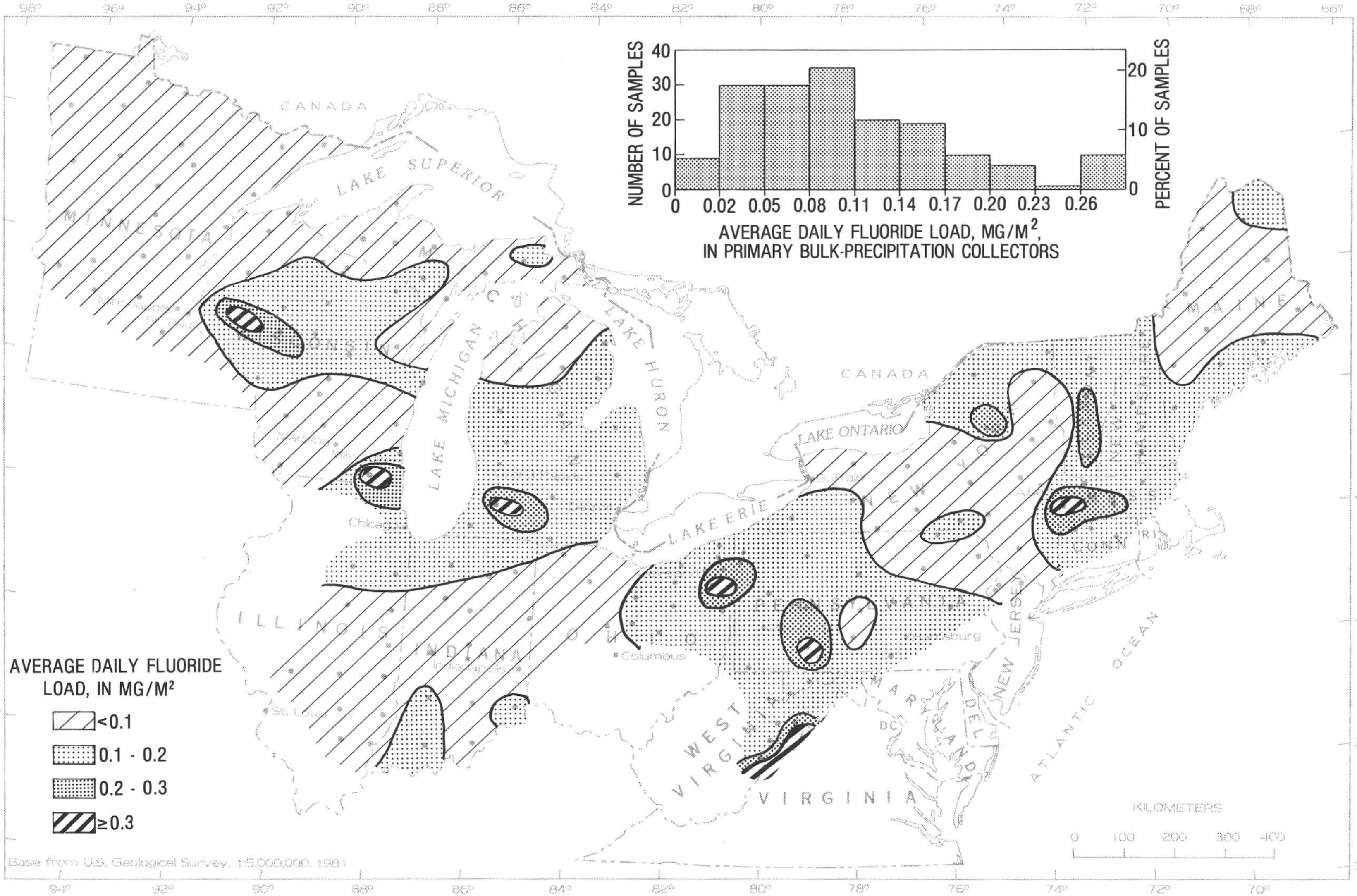


B, Daily loads in milligrams per square meter.

FIGURE 12.—Distribution of flouride deposition, December 1980 through February 1981.

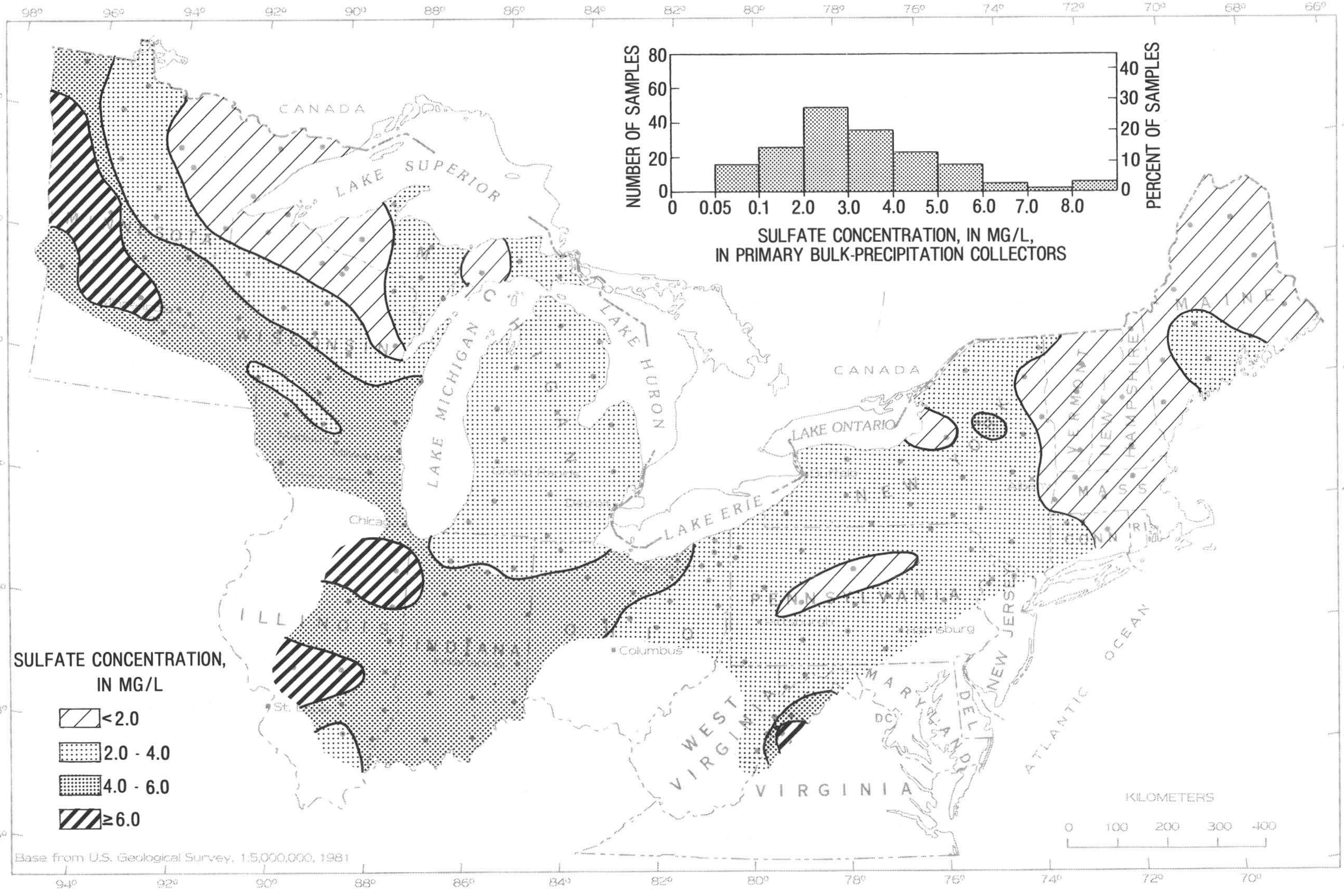


A, Concentration in milligrams per liter.

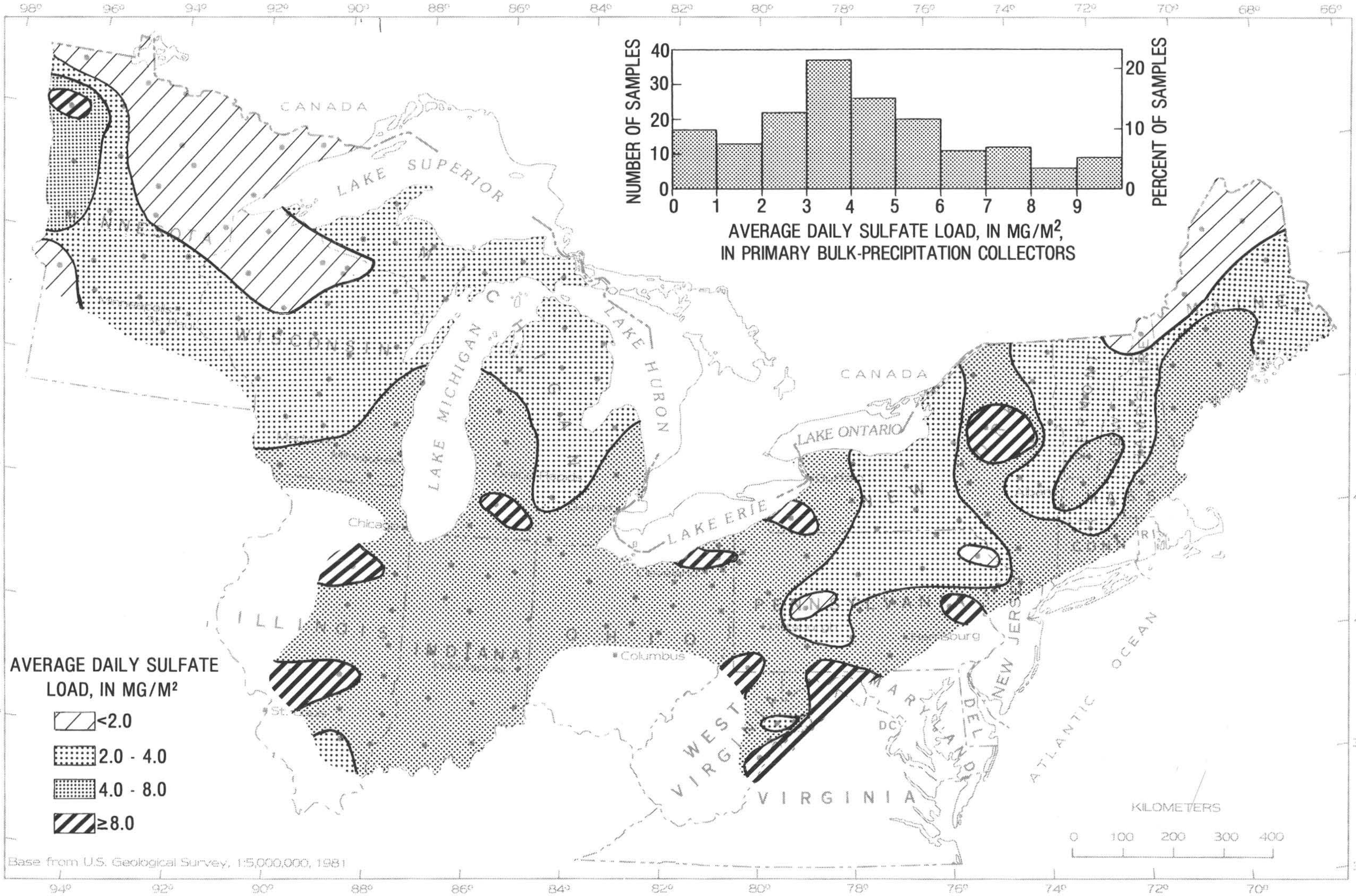


B, Daily loads in milligrams per square meter.

FIGURE 13.—Distribution of sulfate deposition, December 1980 through February 1981.

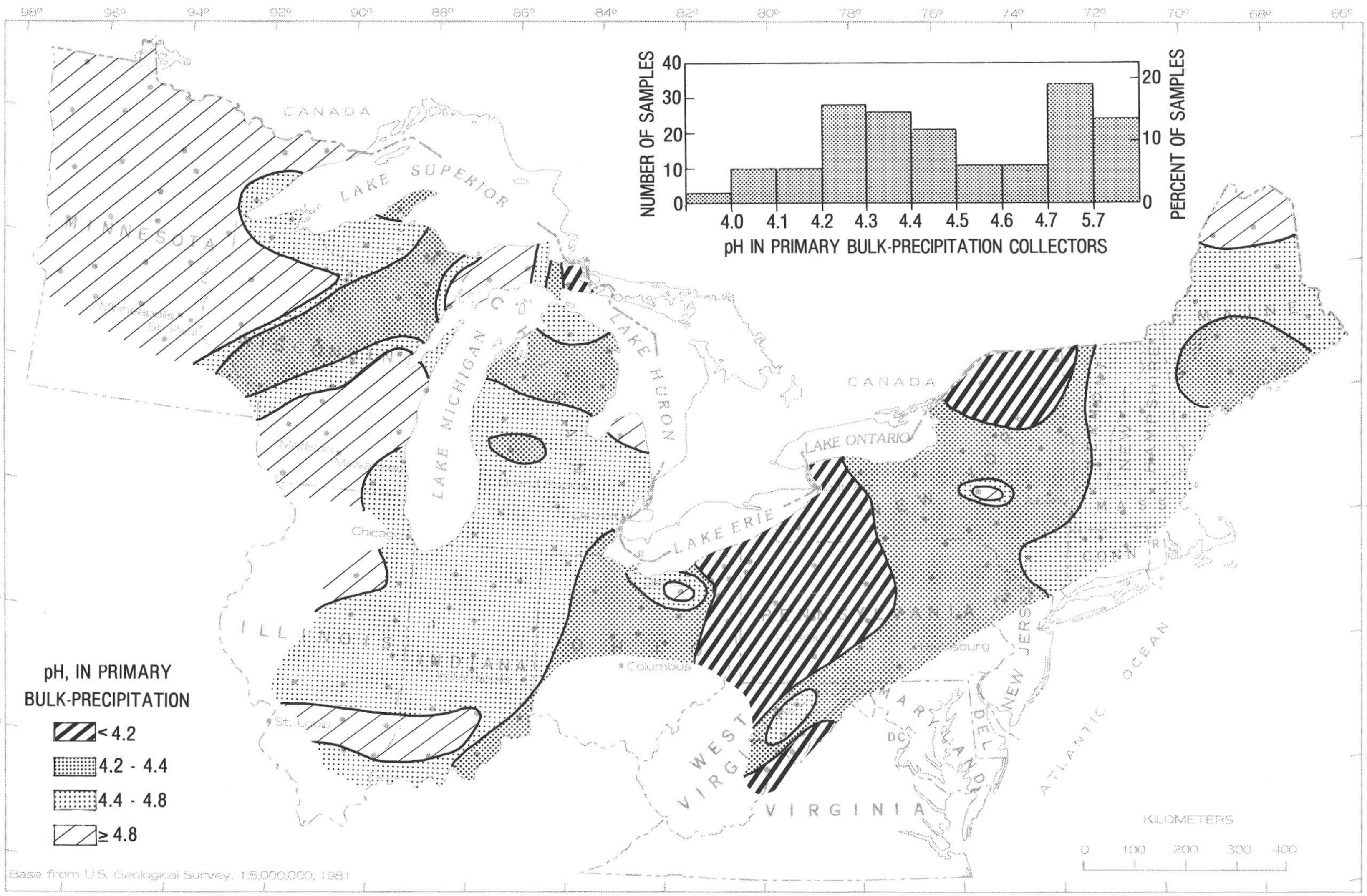


A, Concentration in milligrams per liter.

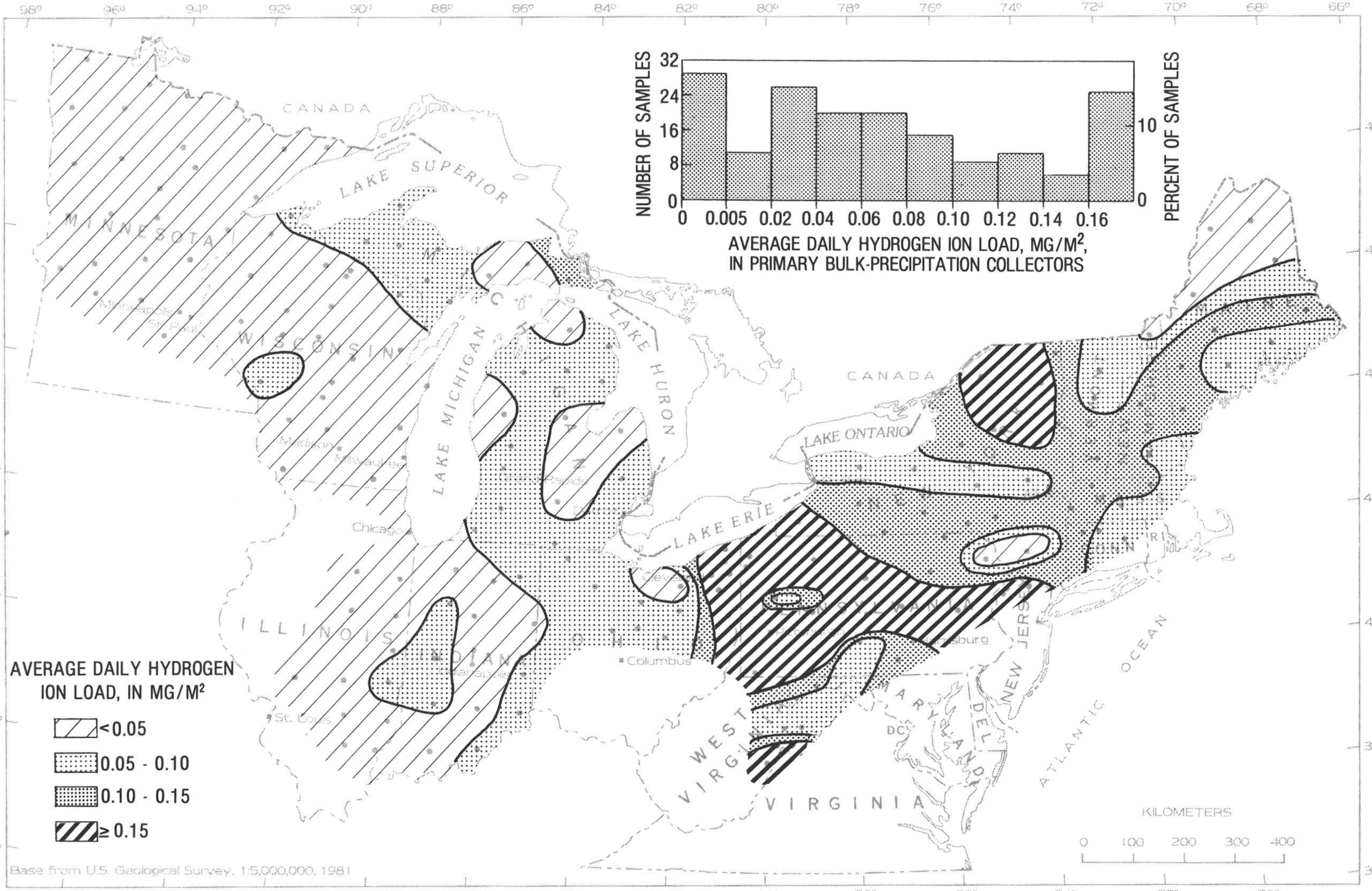


B, Daily loads in milligrams per square meter.

FIGURE 14.—Distribution of hydrogen ion deposition, December 1980 through February 1981.

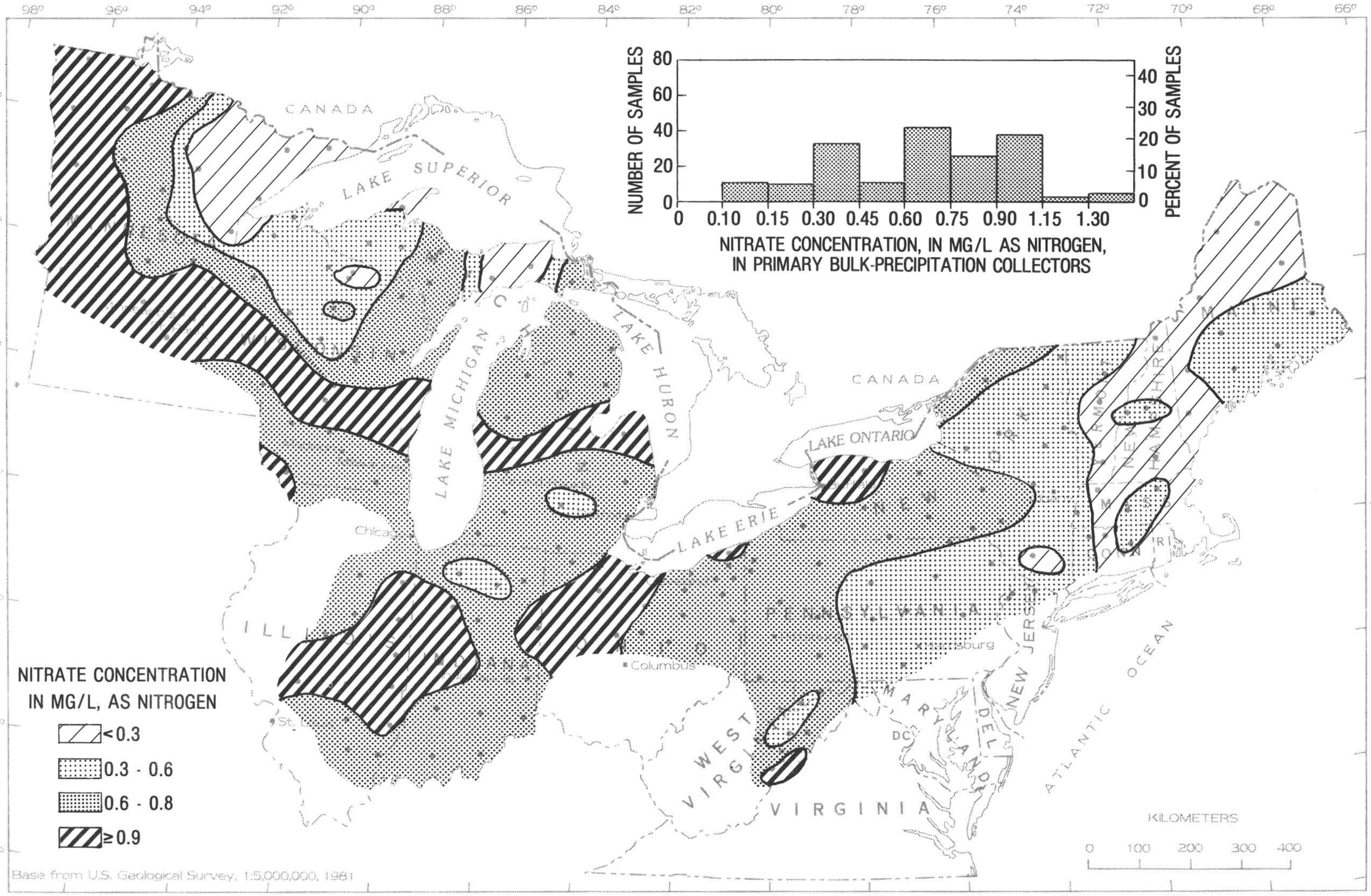


A, pH.

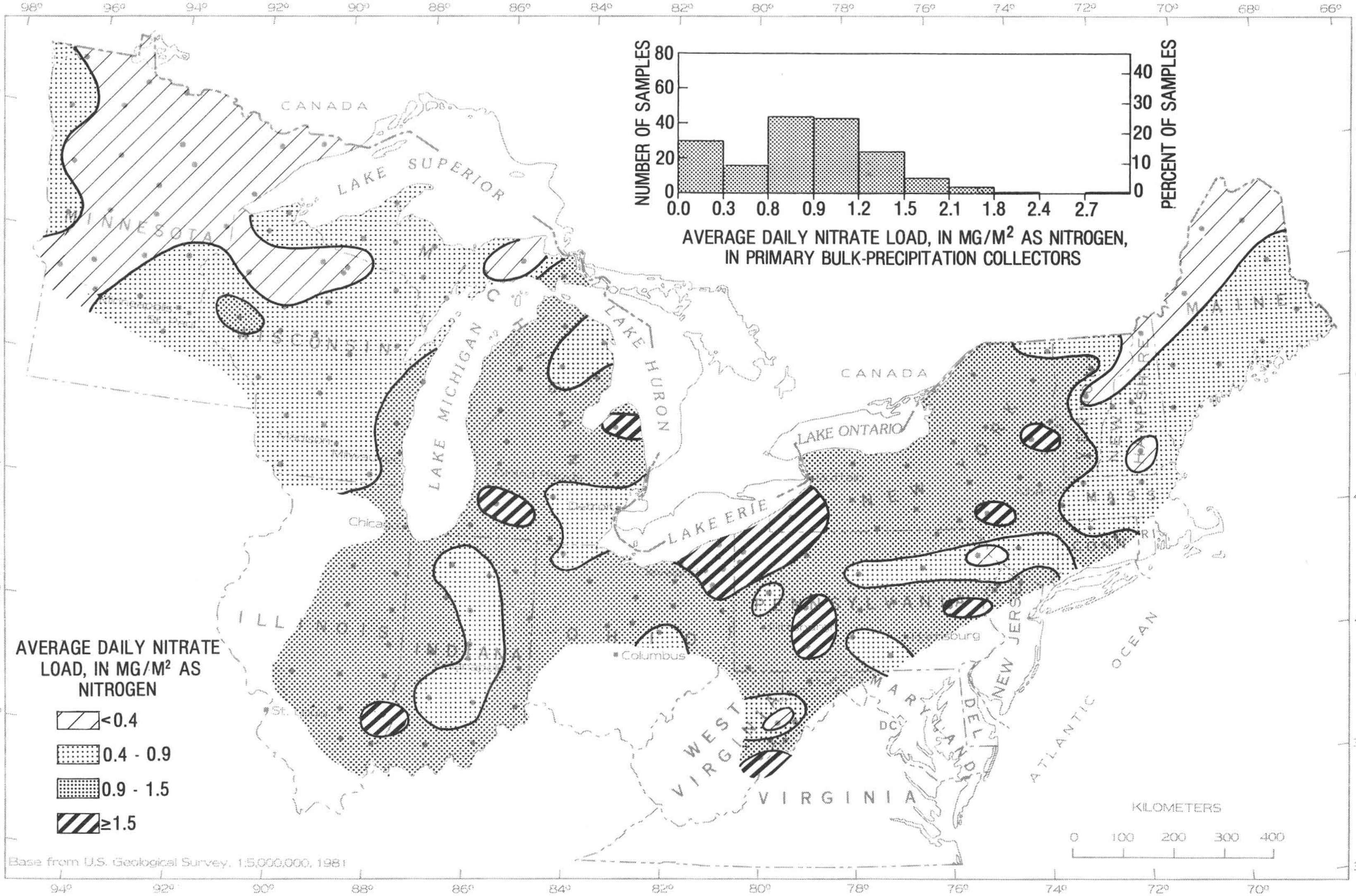


B, Daily loads in milligrams per square meter.

FIGURE 15.—Distribution of nitrate deposition, December 1980 through February 1981.

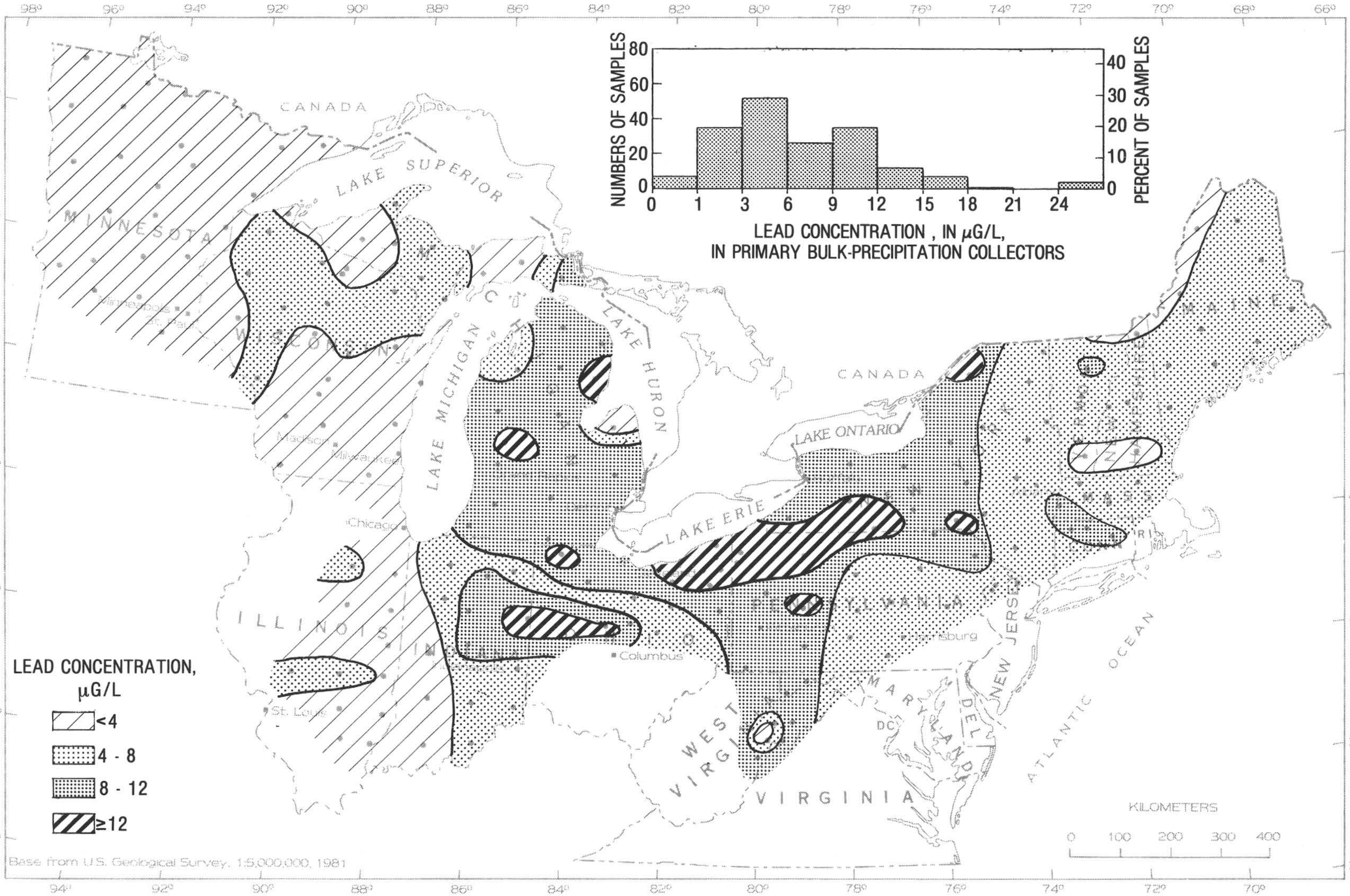


A, Concentration as nitrogen in milligrams per liter.

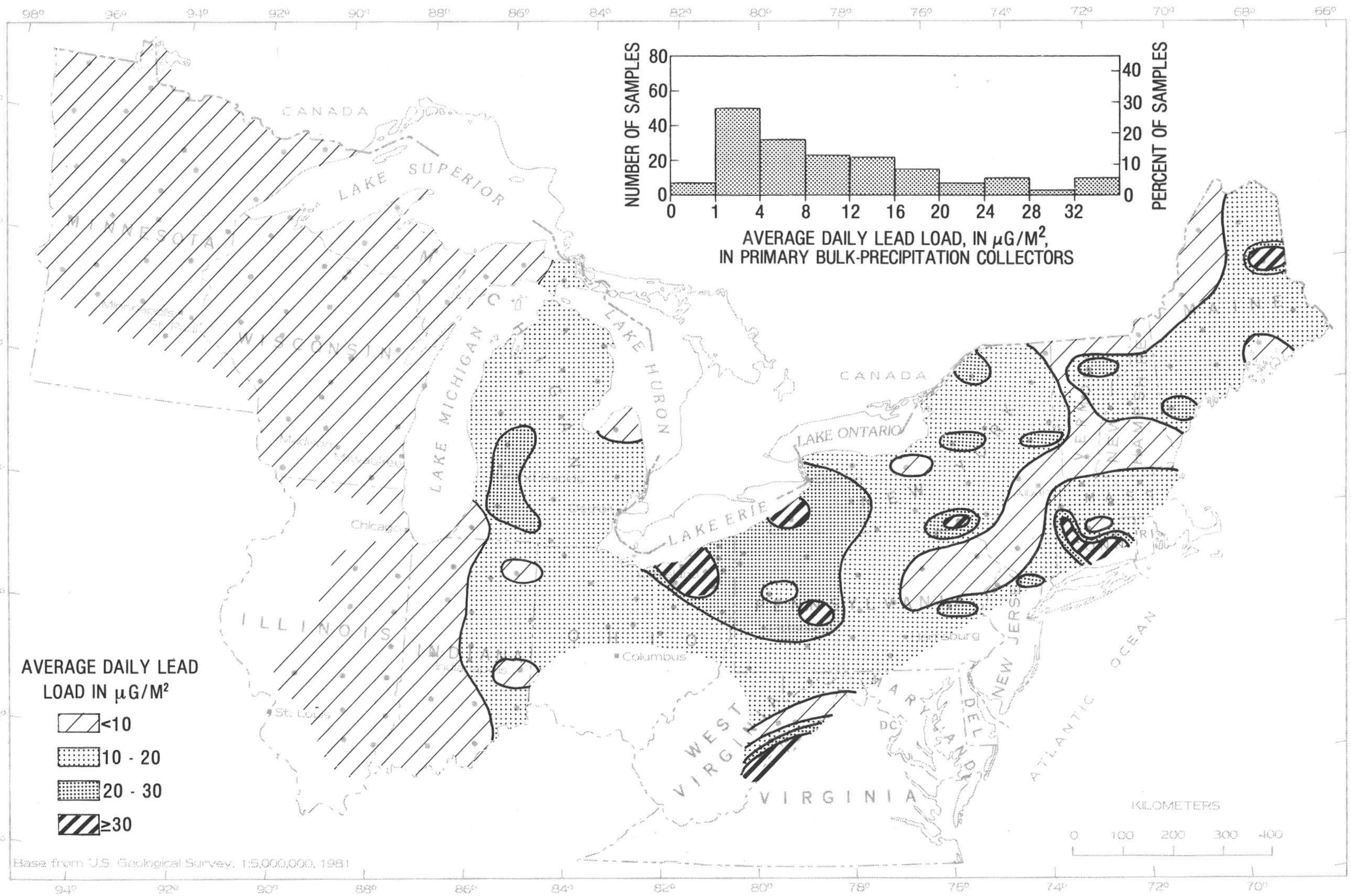


B, Daily loads as nitrogen in milligrams per square meter.

FIGURE 16.—Distribution of lead deposition, December 1980 through February 1981.



A, Concentration in micrograms per liter.



B, Daily loads in micrograms per square meter.

near the main center of high hydrogen ion loads. Patterns of nitrate loads (fig. 15*B*) are similar to those of hydrogen ion northeast of the high in western Pennsylvania. Although the nitrate loads generally decrease to the west, they do not correlate with hydrogen ion patterns there. Lead distribution (fig. 16) shows the same westward decline as hydrogen ion but has more numerous local highs and lows to the northeast.

Deposition of nitrate is low (<0.4 mg/m² as nitrogen) in Minnesota northwest of a line extending from the northwest shore of Lake Superior southwest through Minnesota. In addition, values are low in a band parallel to the line in Minnosota but extending from the Detroit area in Michigan to the southwest corner of Indiana. This low is followed by a band of highs centered 200 km to the northwest; the ridge extends from St. Louis through the Lower Peninsula of Michigan.

The distribution of nitrate concentrations (fig. 15*A*) is similar to those reported by Junge (1958) for wetfall samples collected from January to March 1957; Junge did not report the zone of high concentrations in Illinois and Indiana, however. In the areas of high nitrate concentration (fig. 15*A*) that coincide with those of Junge (1958), concentrations are twice as high as those reported by Junge. Although the similarities between the patterns of hyrdogen ion (fig. 14*A*), nitrate (fig. 15*A*), and lead (fig. 16*A*) may be coincidental, other explanations are possible.

The association between hydrogen ion and nitrate rather than hydrogen ion and sulfate is puzzling. Galloway and Likens (1981) have suggested the increasing importance of nitric acid as a contribution to acid rain in recent years; this may account for the associations observed here.

The apparent correlation between lead and hydrogen ion may reflect the higher dissolution rate and higher solubility of lead in acidic solutions. The distribution of dissolved lead loads (fig. 16*B*) correlates with the laboratory pH of the primary bulk samples (fig. 14*A*); the lower pH of these bulk samples could cause more lead to be leached from intercepted dustfall.

Ammonium

Ammonium load (fig. 17*B*) shows the same concentric pattern as hydrogen ion (fig. 14*B*), nitrate (fig. 15*B*), and lead (fig. 16*B*) but with a center in southern Illinois and western Indiana. The gradients toward lower loads are steeper to the north and west than to the east. However, the area of high loading (≥0.9 mg/m² as nitrogen) correlates closely with the nitrate band.

The distribution of ammonium concentration noted by Junge (1958) is also similar to that in figure 17*A* except in the zone of high concentration in Illinois and Indiana, where Junge found low concentrations. The concentrations reported by Junge (1958) are one-third of those found in this study.

The alternating bands of high and low nitrate loads west of the center of high loading warrant discussion because they do not correlate with the observed distribution of lead or hydrogen ion in that area. Possible explanations are use of nitrogen fertilizer for farming or release and subsequent oxidation of ammonia from alkaline soils. Both are exemplified by the distribution of ammonium load (fig. 17*B*).

Iron

The distribution of iron loads (fig. 18*B*) is also concentric, with a center of high load in the same general vicinity as the high hydrogen ion, (fig. 14*B*), nitrate (fig. 15*B*), and lead (fig. 16*B*) loads. The association of iron with hydrogen ion could be caused by dissolution of iron from soil particulates in more acidic solutions. Also, although fluoride (fig. 12*B*) shows other areas of high loading, high fluoride loads correlate well with the high iron loads (fig. 18*B*) in eastern Ohio, western Pennsylvania, and southern Michigan.

Fluoride is a component of the flux used in smelting iron and could be released to the atmosphere with iron during the smelting and handling processes. Processing of primary metals in the Northeastern United States is centered in the same areas as production of fabricated metal products (U.S. Geological Survey, 1970). These areas include the southern one-third of the western shore of Lake Michigan, southeastern part of Michigan, and areas in eastern Ohio and western Pennsylvania. Eastward transport from the western shore of Lake Michigan, southwestward transport from southern Michigan, and deposition adjacent to sources in Ohio and Pennsylvania could produce the pattern depicted for iron and fluoride.

The dominant fluoride mineral used by these industries is fluorspar (CaF_2). Approximately 50 percent of the total consumption of fluorspar in the United States occurs in the Northeast—13 percent in Ohio; 10.5 percent in Pennsylvania; approximately 4 percent in each of Illinois, Indiana, Michigan, and West Virginia; and 10 percent in New Jersey and southern New England (U.S. Bureau of Mines, 1977.) Of the total fluorspar consumption, 44 percent was consumed by the iron and steel industry and 40 percent by the chemical industry (U.S. Bureau of Mines, 1977).

Strontium

The distribution of strontium loads (fig. 19*B*) shows no distinct pattern. A region of high values with peaks and depressions extends from southern New England to southeastern Indiana; loads diminish to the north and west of this region. The strontium data are notable because the concentration was determined precisely and shows variations in abundance in rocks, soils, and vegetation. These facts may provide a basis for investigating the types and quantities of materials collected.

Manganese

The distribution of manganese (fig. 20*B*) shows a center of high load similar to that of iron (fig. 18*B*) in eastern Ohio and western Pennsylvania, but, west of this area, the patterns are dissimilar. In general, the pattern of manganese loading indicates a decrease from the southwestern part of the area to the north and northeast, which correlates with the pattern of sulfate (fig. 13*B*).

TRACE-METAL LOADS

The pattern of deposition of selected trace metals in this study compares well with data compiled from many studies for North America by Jeffries and Snyder (1981); the minimum and maximum daily loadings of lead, copper, nickel, zinc, cadmium, and manganese presented herein generally bracket the ranges given in their study (table 3). The only constituent having a greater maximum load in this study than in that of Jeffries and Snyder is iron.

A comparison of the median loads in both studies reveals major differences (table 3); the median values of most of the trace metals are lower in this study. The filtration of samples before analysis in this study could have caused the values to be lower than those of Jeffries and Snyder (1981); however, median loads of all trace metals, except lead and iron, in unfiltered samples from a rural site in south-central Ontario adjacent to the area described in this study are comparable to or slightly lower than those reported here. The median iron load reported here is lower by more than an order of magnitude than that reported by Jeffries and Snyder (1981), and the median load of lead reported here is also about 5 times smaller than that reported by them (table 3). These differences may result partly from the extremely low daily loads observed throughout Minnesota, Wisconsin, and Illinois during the 1981 winter (fig. 14*B*). Also, the lead load estimates of Jeffries and Snyder may not reflect the temporal decrease in lead associated with the reduced production and consumption of leaded fuels. Troutman and Peters (1982) reported annual daily loads of total lead (unfiltered acidified samples) in three basins in the southwestern Adirondack Mountains of New York for 1978 to 1979 to be 50 $\mu g/m^2$. Siccama and Smith (1978) reported annual daily average load (total) of 87 $\mu g/m^2$ in 1975 at the Hubbard Brook Experimental Forest of New Hampshire. Both studies indicate a greater rate of deposition in summer than in winter. Lazrus and others (1970) report daily lead deposition to range from 10 $\mu g/m^2$ at a site in Minnesota to 460 $\mu g/m^2$ in downtown Chicago, based on pooled monthly bulk samples collected predominantly from urban sites from September 1966 through March 1967.

The relatively low median value reported in this study suggests a reduction of lead loading, possibly from a combination of seasonally low deposition of lead in winter and a general

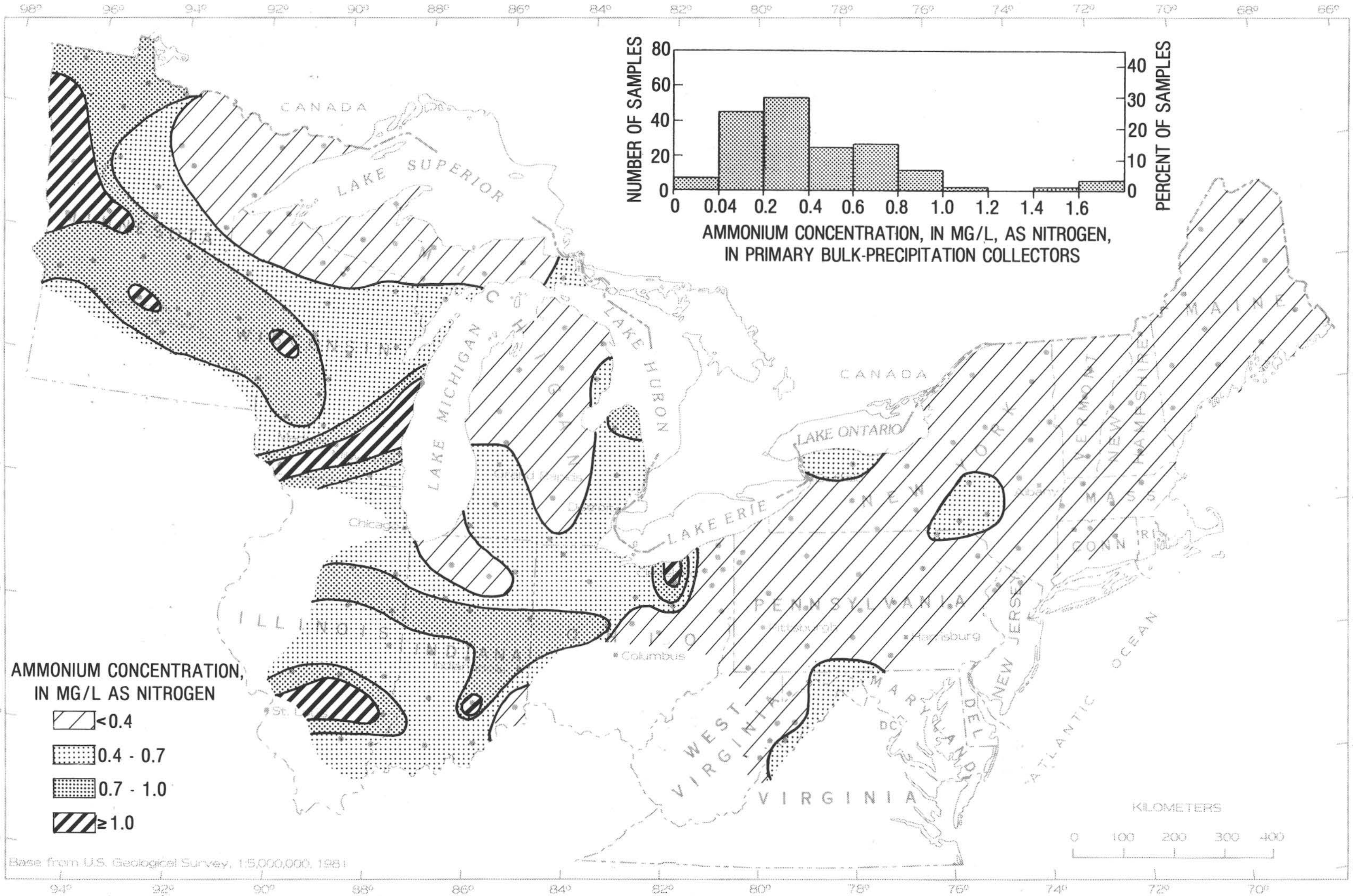
TABLE 3.—*Deposition of lead, copper, nickel, zinc, cadmium, manganese, and iron in bulk precipitation*

	Daily deposition (microgram per square meter)			
	North America*		North-Central and Northeastern United States†	
Element	Range	Median	Range	Median
Lead	12 - 87	44	0.2 -180	9
Copper	4 - 22	10	1.2 -230	15
Nickel	<4 - 13	—	.04- 55	2
Zinc	25 - 266	130	.5 -880	18
Cadmium	.3- 2.4	1.8	.2 -370	2
Manganese	6.6- 29	8.2	.2 -220	8
Iron	4.1-1,800	600	1.3 -240	34

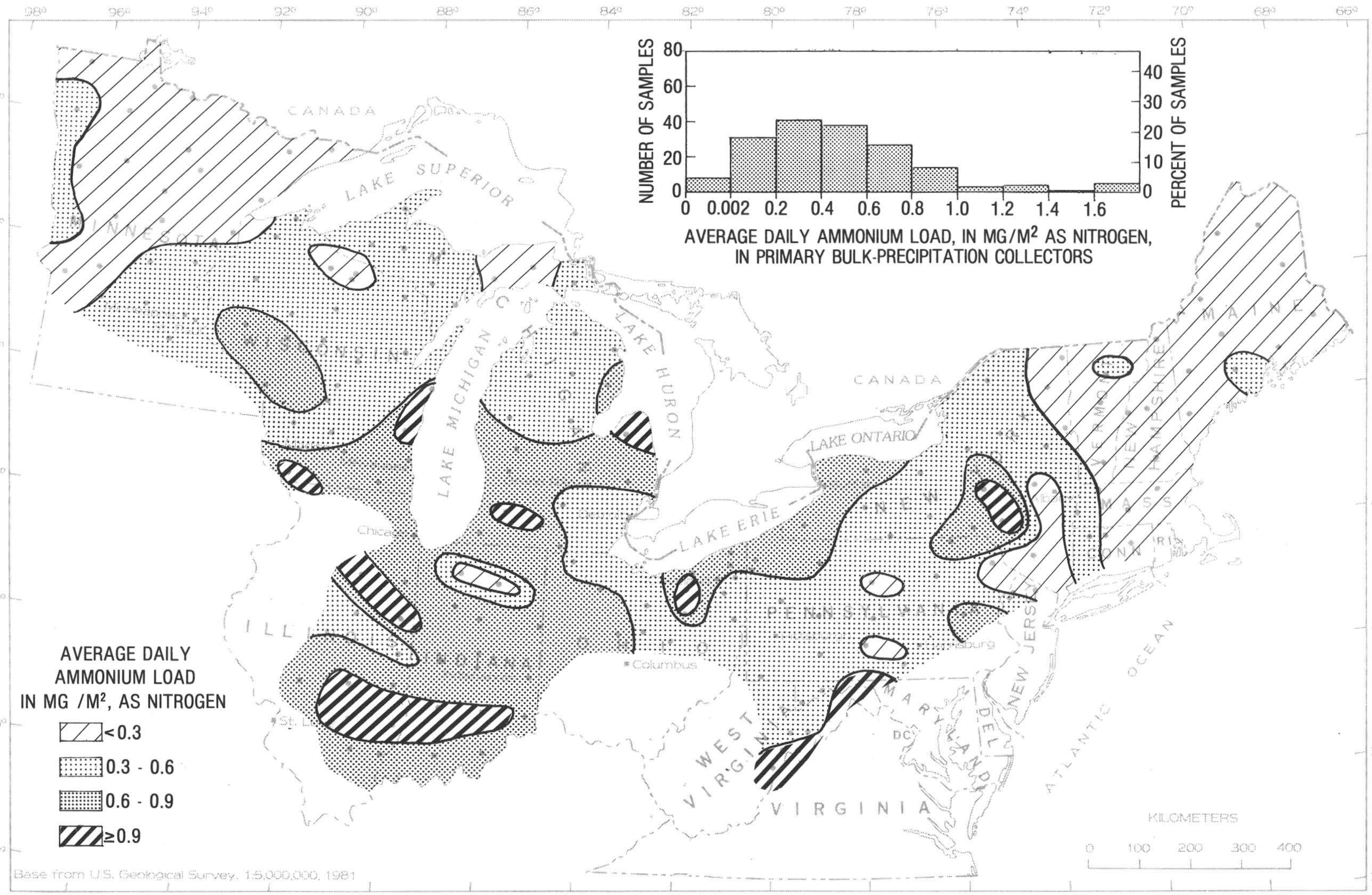
* Values are for annual average daily loads from Jeffries and Snyder (1981).

† From primary collectors in this study.

FIGURE 17.—Distribution of ammonium deposition, December 1980 through February 1981.

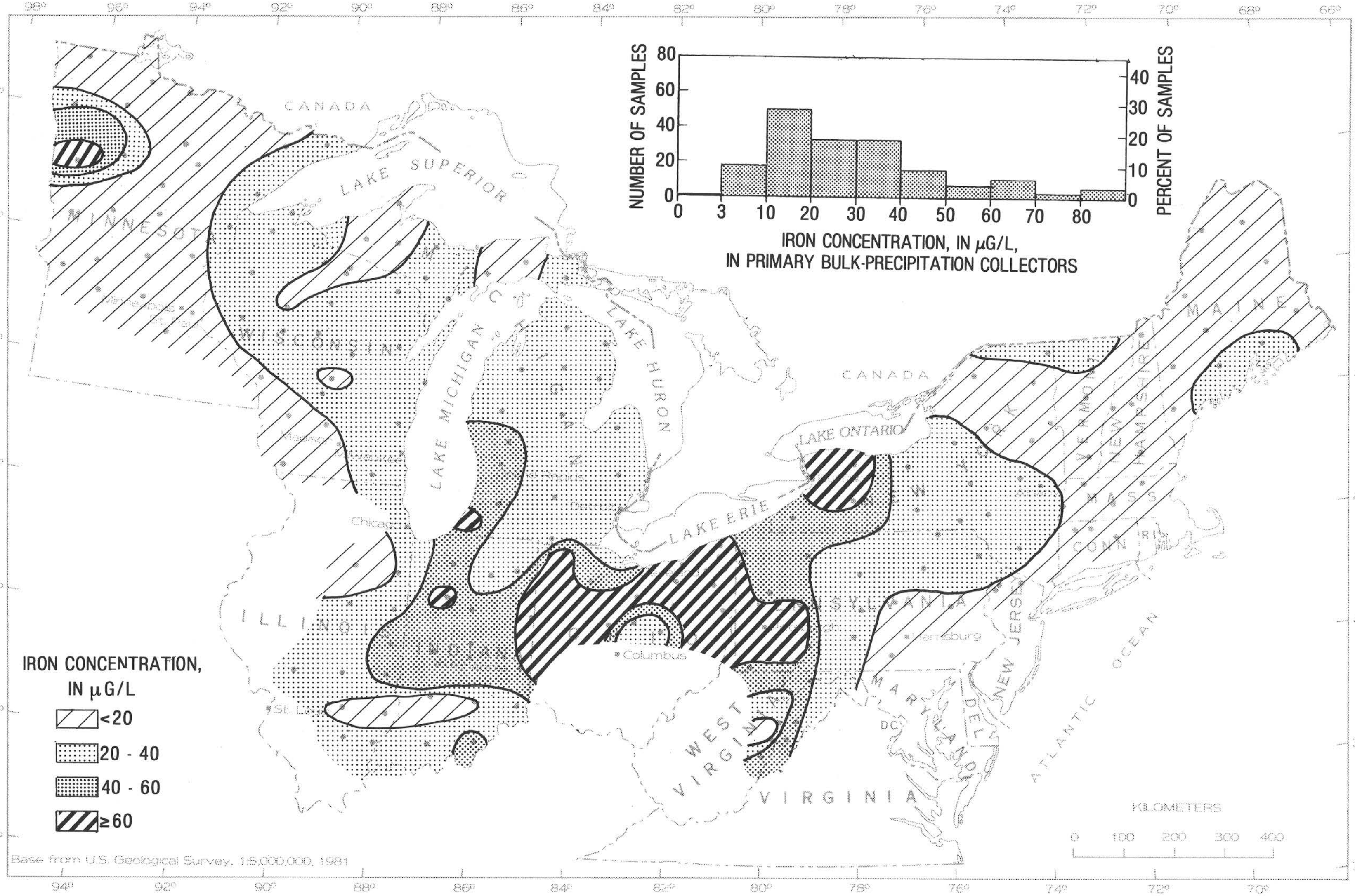


A, Concentration as nitrogen in milligrams per liter.

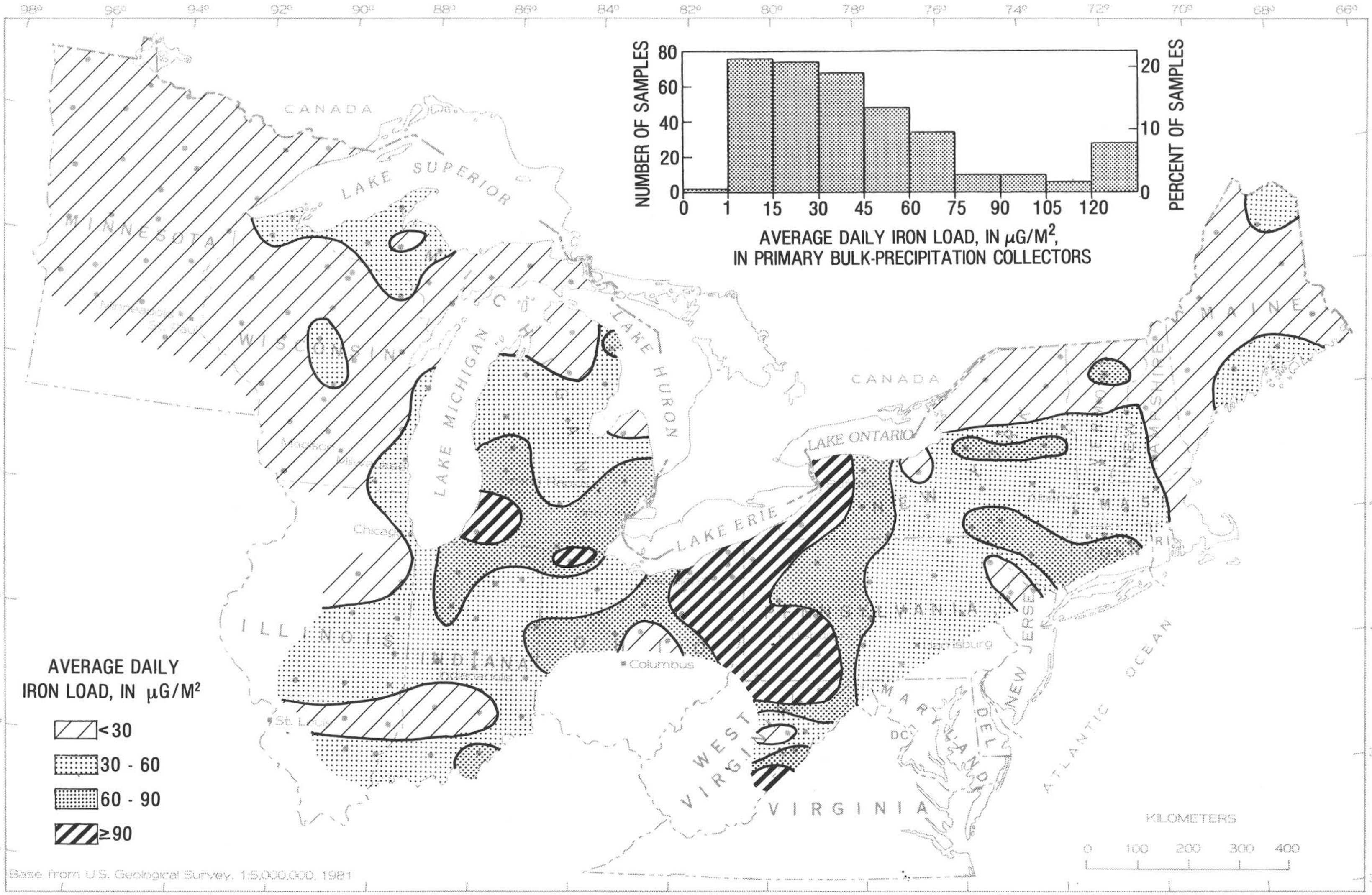


B, Daily loads as nitrogen in milligrams per square meter.

FIGURE 18.—Distribution of iron deposition, December 1980 thorugh February 1981.

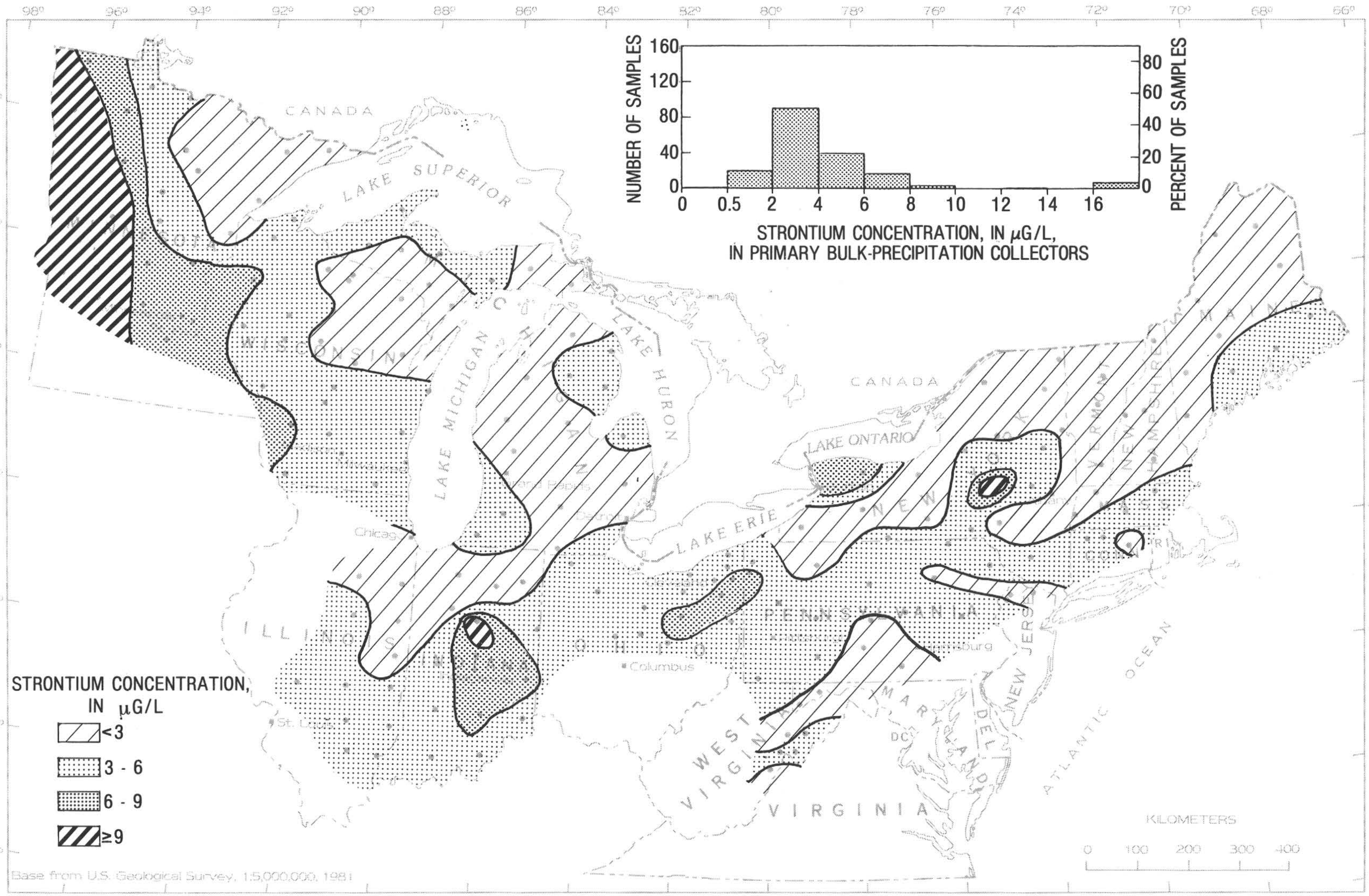


A, Concentration in micrograms per liter.

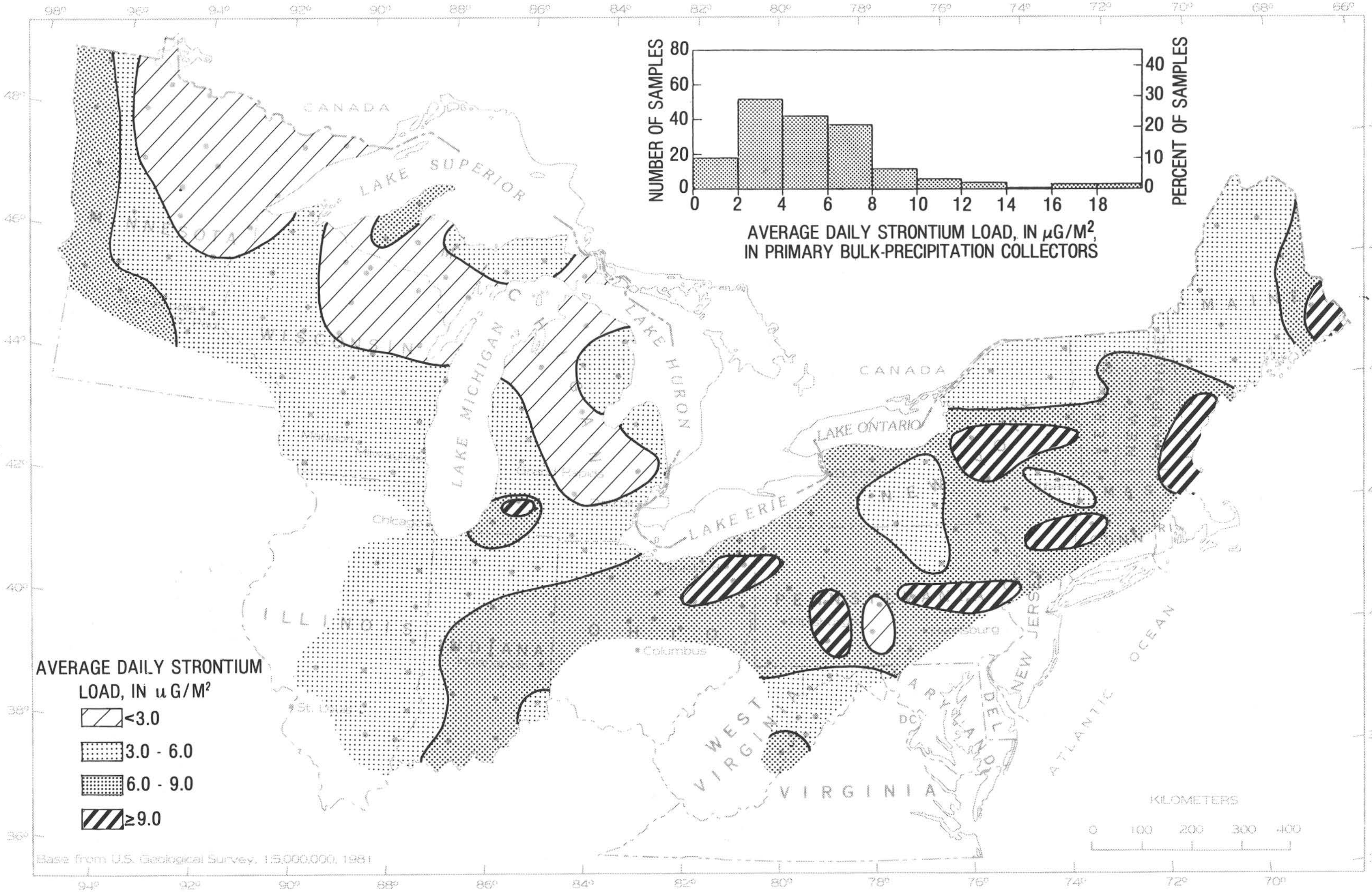


B, Daily loads in micrograms per square meter.

FIGURE 19.—Distribution of strontium deposition, December 1980 through February 1981.

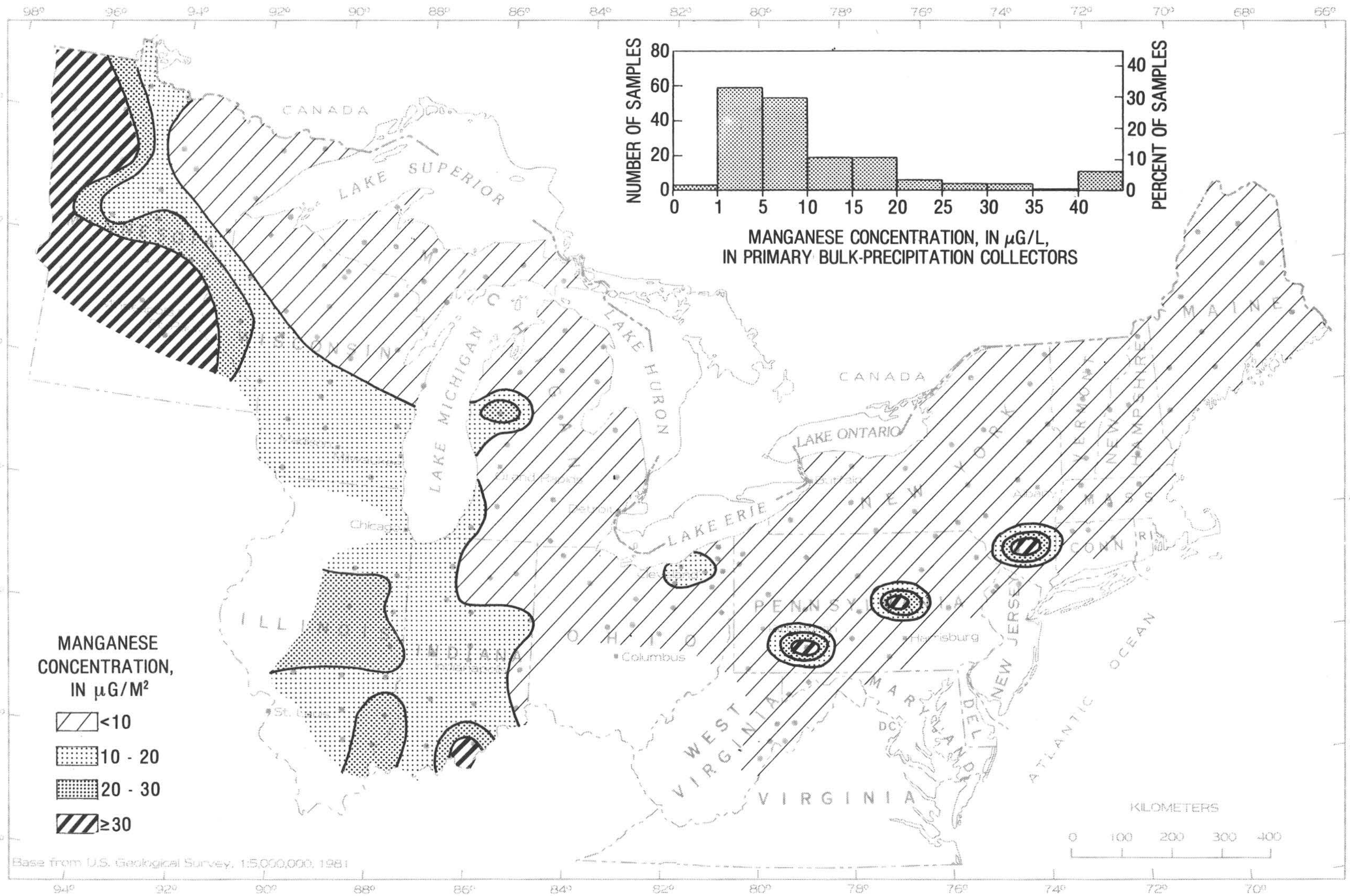


A, Concentration in micrograms per liter.

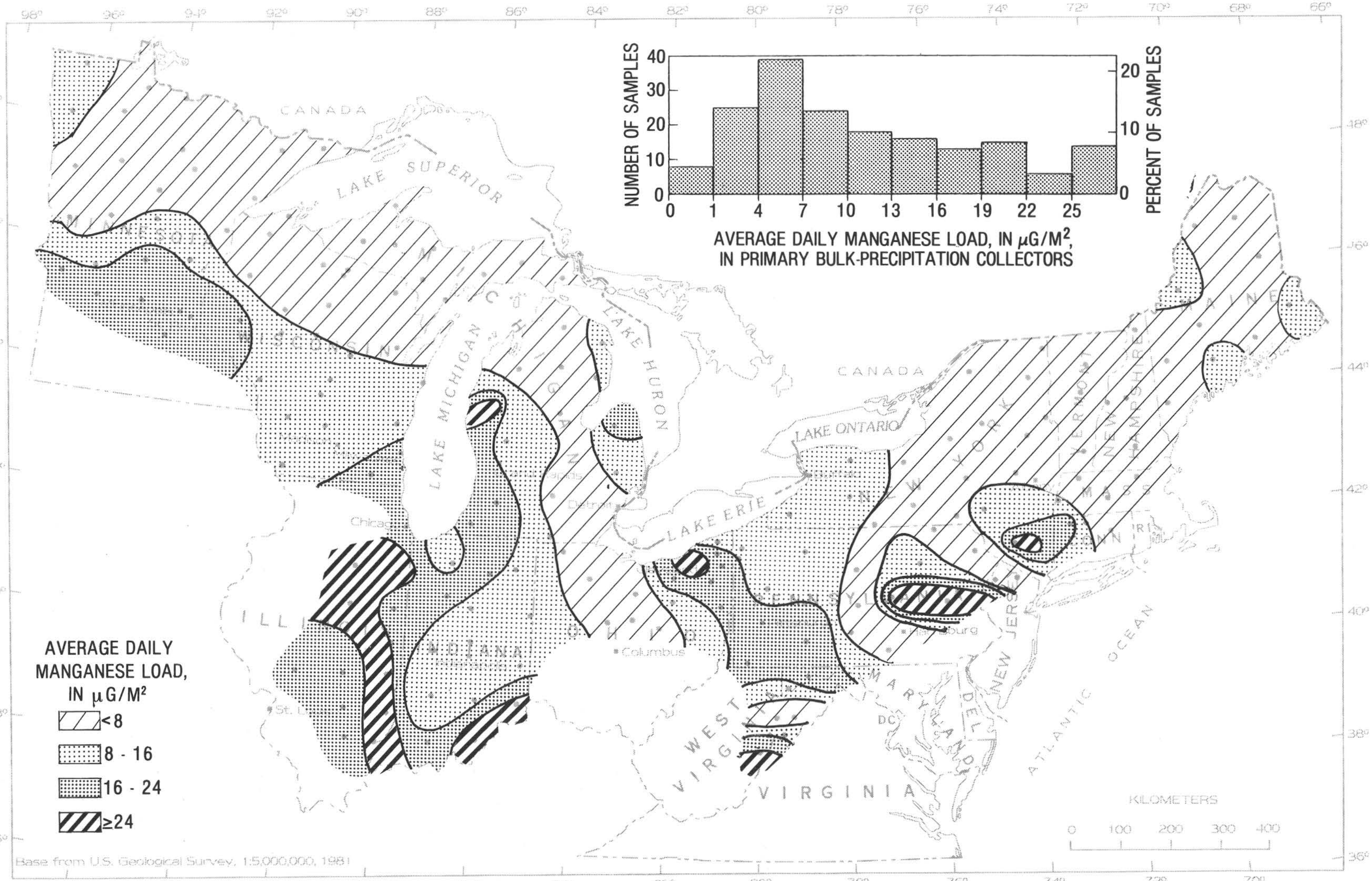


B, Daily loads in micrograms per square meter.

FIGURE 20.—Distribution of manganese deposition, December 1980 through February 1981.



A, Concentration in micrograms per liter.



B, Daily loads in micrograms per square meter.

national decrease in the consumption of leaded fuels.

SUMMARY

Bulk atmospheric deposition samples were collected at 179 sites from December 1980 through February 1981 in the Northeastern United States. Weather was atypical; both precipitation and air temperature were lower than average during the first 2 months and higher than normal during the last, when precipitation fell as rain in most of the area. The general air-circulation pattern during the period indicates that moisture was derived from the Atlantic Ocean and the Gulf of Mexico, with surface wind typically from west to east.

Concentrations and loads of the following dissolved constituents were determined for each sample: As, Ba, Be, total inorganic carbon, Ca, Cd, Cl, Co, Cu, F, Fe, H, Hg, K, Li, Mg, Mn, Mo, NH_4-N, NO_3-N, Na, Ni, Pb, Se, Si, Sr, SO_4, V, and Zn. Replicate samples were collected from an additional collector at 10 percent of the sites, and 43 samples splits also were analyzed. Of the 29 constituents, 13 had an analytical and sampling plus analytical precision of 50 percent or less. Contour maps and histograms depict concentrations and loads for the following 12 constituents: Na, Cl, Ca, SO_4, F, H, NO_3-N, Pb, Fe, NH_4-N, Sr, and Mn.

The maps of constituent loads display both banded and concentric regional distribution patterns. Sodium and chloride loads exemplify a simple banding pattern with a zone of high values along the coast, presumably a result of recycling of sea salt. The decrease to the northwest is steep initially but becomes gradual in the vicinity of Lake Michigan. This regional pattern is somewhat obscured by local highs near some major urban centers; these may reflect recycled highway salt.

Calcium and sulfate both show a general decrease from south to north. Fluoride, however, has a band of high loading with scattered peaks from Pennsylvania to east of the Twin Cities in Minnesota. These peaks are east (downwind) of major urban centers, and many of them correlate with the iron peaks.

Sites in western Pennsylvania and eastern Ohio had pH of less than 4.2 and large loads of hydrogen ion. The distribution pattern is concentric, with the highest pH in Minnesota and southern Illinois.

Distribution pattrerns of nitrate, lead, and iron loads are similar to that of hydrogen ion. All have a center of high loading in eastern Ohio and western Pennsylvania; however, west of this center, the nitrate pattern differs from that of hydrogen ion but parallels that of ammonium.

Median daily loads of lead (9 $\mu g/m^2$), zinc (18 $\mu g/m^2$), and iron (34 $\mu g/m^2$) are lower than those reported from rural sites in North America (Jeffries and Snyder, 1981). Lead deposition seems to have been decreasing with time, possibly as a result of decreased consumption of leaded fuels. The low lead value obtained during the winter of 1980-81 also may be related partly to seasonal lows, as reported by other researchers.

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TABLE 4.—Descriptions of bulk-precipitation-collection sites

Latitude	Longitude	County	State	Sample identification number	Sample1/ type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
451040	674630	Washington	ME	NE12	P	11-19-80	03-11-81	45.1	54.8	290	Fish hatchery
460310	682138	Aroostock	do.	NE17	P	12-01-80	03-18-81	20.4	41.6	760	Agricultural
444350	683936	Penobscot	do.	NE09	P	12-01-80	03-12-81	30.8	24.5	420	Rural residential
464426	684521	Aroostock	do.	NE18	P	12-02-80	03-20-81	20.4	39.3	840	Woodland
442736	694028	Kennebec	do.	NE11	P	12-01-80	03-05-81	24.9	21.3	250	Agricultural
464200	694259	Aroostook	do.	NE14	P	11-20-80	03-19-81	31.3	32.2	980	Woodland
450420	695412	Somerset	do.	NE13	P	12-02-80	03-10-81	22.7	31.3	485	Agricultural
453938	701612	do.	do.	NE15	P	11-21-80	03-10-81	24.9	21.9	1,360	Woodland
442950	704144	Oxford	do.	NE16	P	11-25-80	03-11-81	34.9	36.8	650	Do.
434835	704653	Cumberland	do.	NE10	P	11-28-80	02-26-81	40.8	51.6	280	Do.
450250	712300	Coos	NH	NE03	P	12-02-80	03-11-81	16.3	30.6	1,300	Do.
430912	713634	Merrimack	do.	NE02	P	11-28-80	03-06-81	44.9	40.2	350	Rural residential
430912	713634	do.	do.	NE01	R	11-28-80	03-06-81	44.9	40.2	350	Do.
423824	713919	Middlesex	MA	NE20	P	12-12-80	03-09-81	22.9	36.4	270	Airfield
435651	714230	Grafton	NH	NE06	P	12-01-80	03-10-81	45.4	52.8	760	Woodland
435422	720923	Orange	VT	NE08	P	12-05-80	03-12-81	37.2	36.0	440	Agricultural
414755	722056	Tolland	CN	NE22A	P	11-25-80	03-02-81	45.2	48.7	485	Do.
414755	722056	do.	do.	NE22B	R	11-25-80	03-02-81	45.2	48.7	485	Do.
421959	722104	Hampshire	MA	NE21	P	12-09-80	03-11-81	35.4	36.6	530	Woodland
443355	723431	Lamoille	VT	NE07	P	12-01-80	03-09-81	34.9	41.5	640	Agricultural
440620	724445	Washington	do.	NE04	P	12-01-80	03-09-81	43.5	47.5	1,100	Woodland
430725	724636	Windham	do.	NE05	P	12-01-80	03-09-81	45.4	55.3	1,100	Do.
415648	725017	Hartford	CN	NE23	P	11-26-80	03-02-81	53.2	42.7	325	Agricultural
424102	725659	Franklin	MA	NE19	P	12-10-80	03-12-81	42.0	52.5	1,500	Railroad switch yard
415823	731313	Litchfield	CN	NE24	P	11-26-80	03-02-81	41.8	62.7	1,335	Woodland
434310	732802	Washington	NY	NY14	P	12-04-80	03-02-81	29.8	36.7	350	Do.
445406	732930	Clinton	do.	NY06	P	11-21-80	03-03-81	23.5	21.3	210	Agricultural
422211	733010	Columbia	do.	NY05	P	12-03-80	03-19-81	22.5	39.1	1,330	Woodland
442405	735121	Essex	do.	NY20	P	11-20-80	03-03-81	24.3	45.5	2,050	Do.
442405	735121	do.	do.	NY25	R	11-20-80	03-03-81	22.5	45.5	2,050	Do.
442405	735121	do.	do.	NY37A	A	11-20-80	12-22-80	1.0	11.3	2,050	Do.
442405	735121	do.	do.	NY37B	B	12-22-80	01-12-81	.5	1.5	2,050	Do.
442405	735121	do.	do.	NY37C	C	01-12-81	02-02-81	.7	3.0	2,050	Do.
442405	735121	do.	do.	NY21	D	02-02-81	03-03-81	19.6	29.7	2,050	Do.
442405	735121	do.	do.	NY23	S	--	03-03-81	--	--	2,050	Do.
432715	740025	Warren	do.	NY13	P	11-30-80	03-01-81	50.3	52.0	1,600	Agricultural
424708	741955	Montgomery	do.	NY19	P	12-07-80	03-04-81	18.4	22.2	1,340	Do.
424708	741955	do.	do.	NY28	R	12-07-80	03-04-81	19.3	22.2	1,340	Do.
424708	741955	do.	do.	NY26	S	--	03-04-81	--	--	1,340	Do.
410921	742651	Sussex	NJ	NJ01	P	12-15-80	03-04-81	38.2	32.3	1,320	Woodland
414158	742714	Ulster	NY	NY09	P	11-25-80	03-06-81	4.6	42.7	1,250	Agricultural
434224	745428	Herkimer	do.	NY16	P	12-02-80	03-04-81	35.2	36.2	1,925	Woodland
434224	745428	do.	do.	NY24	R	12-02-80	03-04-81	4.9	36.2	1,925	Do.
410547	745800	Sussex	NJ	NJ02	P	12-24-80	03-03-81	30.7	25.3	400	Do.
410547	745800	do.	do.	NJ04	R	12-10-80	03-03-81	32.5	25.3	400	Do.
410547	745800	do.	do.	NJ05A	A	12-10-80	12-24-80	3.0	2.0	400	Do.
410547	745800	do.	do.	NJ05B	B	12-24-80	01-12-81	2.5	1.0	400	Do.
410547	745800	do.	do.	NJ05C	D	02-03-81	03-03-81	18.6	22.3	400	Do.

TABLE 4.—Descriptions of bulk-precipitation-collection sites—Continued

Latitude	Longitude	County	State	Sample identification number	Sample type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
410219	745945	Warren	NJ	NJ03	P	12-24-80	03-03-81	32.5	33.6	1,210	Woodland
421710	750538	Delaware	NY	NY10	P	11-26-80	03-05-81	24.3	42.0	1,880	Do.
443535	751353	St. Lawrence	do.	NY04	P	12-08-80	03-03-81	15.9	21.6	330	Wetland & Rural residential
413519	751954	Wayne	PA	PA18	P	11-20-80	03-02-81	--	38.18	2,809	Agricultural & Woodland
413519	751954	do.	do.	PA08	R	11-20-80	03-02-81	--	38.18	2,809	Do.
424854	752634	Madison	NY	NY07	P	12-15-80	03-02-81	3.2	19.4	1,200	Do.
421225	754242	Jefferson	do.	NY01	P	12-10-80	03-03-81	16.4	26.4	440	Agricultural
432842	754438	Lewis	do.	NY17	P	12-11-80	03-03-81	21.7	37.8	1,260	Do.
404826	760030	Schuylkill	PA	PA07	P	12-04-80	03-02-81	--	53.8	1,110	Woodland
420126	761318	Tioga	NY	NY02	P	12-11-80	03-02-81	20.9	24.3	1,610	Agricultural & Woodland
412821	763455	Sullivan	PA	PA10	P	11-28-80	03-02-81	--	30.2	1,170	Woodland
422358	763913	Tompkins	NY	NY11	P	12-16-80	03-02-81	22.7	20.0	1,700	Agricultural & Woodland
422358	763913	do.	do.	NY27	R	12-16-80	03-02-81	18.0	20.0	1,700	Do.
422358	763913	do.	do.	NY22A	A	12-16-80	12-22-80	0.7	1.4	1,700	Do.
422358	763913	do.	do.	NY22B	B	12-22-80	01-12-81	4.5	3.6	1,700	Do.
422358	763913	do.	do.	NY22C	C	01-12-81	02-03-81	0.4	5.4	1,700	Do.
422358	763913	do.	do.	NY22D	D	02-03-81	03-02-81	9.5	9.6	1,700	Do.
422358	763913	do.	do.	NY30	S	--	03-02-81	--	--	1,700	Do.
430653	764829	Wayne	do.	NY15	P	12-12-80	03-02-81	22.7	17.0	440	Do.
405452	771310	Union	PA	PA13	P	11-25-80	03-02-81	--	43.3	1,040	Woodland
400147	771741	Cumberland	do.	PA14	P	11-21-80	03-03-81	--	47.8	910	Do.
420630	773206	Steuben	NY	NY12	P	12-02-80	03-02-81	21.3	22.7	1,980	Agricultural & Woodland
412121	775532	Clinton	PA	PA09	P	11-25-80	03-02-81	--	33.6	850	Woodland
404718	775643	Centre	do.	PA15	P	11-24-80	03-02-81	--	33.6	1,300	Do.
404718	775643	do.	do.	PA11	R	11-24-80	03-02-81	--	33.6	1,300	Do.
404718	775643	do.	do.	PA16	A	11-24-80	12-22-80	--	6.4	1,300	Do.
404718	775643	do.	do.	PA20	B	12-22-80	01-12-81	--	3.5	1,300	Do.
404718	775643	do.	do.	PA17	C	01-12-80	02-02-80	--	2.8	1,300	Do.
404718	775643	do.	do.	PA19	D	02-02-80	03-02-80	--	20.8	1,300	Do.
431028	780108	Orleans	NY	NY03	P	12-08-80	03-02-81	18.1	16.8	670	Agricultural
423315	780435	Wyoming	do.	NY18	P	12-04-80	03-02-81	22.7	21.2	1,600	Woodland
402043	780639	Huntingdon	PA	PA12	P	11-20-80	03-03-81	--	22.8	1,600	Agricultural
414138	790322	Warren	do.	PA02	P	11-25-80	03-02-81	--	33.9	1,900	Do.
393621	790335	Garrett	MD	MD07	P	12-04-80	03-02-81	21.9	34.3	2,460	Do.
401210	790500	Somerset	PA	PA04	P	11-19-80	03-02-81	--	33.7	2,050	Do.
405008	790640	Indiana	do.	PA06	P	11-25-80	03-02-81	--	34.9	1,185	Do.
385754	792054	Grant	WV	WV02	P	12-16-80	03-04-81	--	10.7	3,980	Woodland
421835	792408	Chautaugua	NY	NY08	P	12-05-80	03-02-81	31.8	46.8	1,500	Agricultural & Woodland
392630	792704	Garrett	MD	MD05	P	11-25-80	03-02-81	27.3	28.9	2,500	Agricultural
392630	792704	do.	do.	MD06	R	11-25-80	03-02-81	9.1	28.9	2,500	Do.
392630	792704	do.	do.	MD01	A	11-25-80	12-23-80	7.7	7.4	2,500	Do.
392630	792704	do.	do.	MD02	B	12-23-80	02-03-81	6.4	9.8	2,500	Do.
392630	792704	do.	do.	MD04	C	02-03-81	02-09-81	1.7	0.6	2,500	Do.
392630	792704	do.	do.	MD03	D	02-09-81	03-02-81	12.5	10.5	2,500	Do.
384123	793230	Pendleton	WV	WV05	P	12-16-80	03-04-81	--	20.2	4,640	Woodland
385619	794316	Randolph	do.	WV03	P	12-15-80	03-04-81	--	26.3	3,850	Do.
410506	795327	Butler	PA	PA03	P	11-26-80	03-02-81	--	23.4	1,470	Agricultural

TABLE 4.—Descriptions of bulk-precipitation-collection sites—Continued

Latitude	Longitude	County	State	Sample identification number	Sample type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
384024	795348	Randolph	WV	WV01	P	12-17-80	03-02-81	--	26.6	3,935	Woodland
384024	795348	do.	do.	WV06A	B	12-17-80	01-12-81	--	6.3	3,935	Do.
384024	795348	do.	do.	WV06B	C	01-12-81	02-02-81	--	3.6	3,935	Do.
384024	795348	do.	do.	WV06C	D	02-02-81	03-03-81	--	15.8	3,935	Do.
382256	800503	Pocahontas	do.	WV04	P	12-17-80	03-03-81	--	45.1	4,010	Do.
394935	802100	Greene	PA	PA05	P	11-20-80	03-02-81	--	36.1	1,140	Agricultural
414444	802715	Crawford	do.	PA01A	P	11-26-80	03-03-81	--	34.4	1,160	Do.
414444	802715	do.	do.	PA01B	R	11-26-80	03-03-81	--	34.4	1,160	Do.
413446	803206	Ashtabula	OH	OI14	P	12-01-80	03-02-81	--	36.2	1,015	Do.
404800	805208	Columbiana	do.	OI10	P	12-01-80	03-03-81	--	28.5	1,140	Do.
412839	805327	Trumbull	do.	OI13	P	12-05-80	03-02-81	--	23.3	810	Agricultural & Wetlands
413629	805803	Ashtabula	do.	OI16	P	12-04-80	03-02-81	--	29.1	1,055	Agricultural & Wetlands
415128	805822	do.	do.	OI18	P	12-04-80	03-02-81	--	23.3	580	Open water
415128	805822	do.	do.	OI19	R	12-04-80	03-02-81	--	23.3	580	Do.
415128	805822	do.	do.	OI17A	A	12-04-80	12-22-80	--	3.6	580	Do.
415128	805822	do.	do.	OI17B	B	12-22-80	01-12-81	--	5.0	580	Do.
415128	805822	do.	do.	OI17C	C	01-12-81	02-02-81	--	1.8	580	Do.
415128	805822	do.	do.	OI17D	D	02-02-81	03-02-81	--	13.1	580	Do.
411233	810713	Portage	do.	OI11	P	12-05-80	03-03-81	--	29.2	1,120	Agricultural
413256	811613	Geauqa	do.	OI15	P	12-02-80	03-03-81	--	35.2	1,230	Agricultural & Rural residential
411530	815542	Medina	do.	OI03	P	12-10-80	03-02-81	--	23.3	795	Do.
405152	815631	Wayne	do.	OI12	P	12-05-80	03-03-81	--	20.5	1,170	Agricultural
402351	821658	Knox	do.	OI01	P	12-09-80	03-02-81	--	26.3	885	Do.
405743	824716	Crawford	do.	OI09	P	12-09-80	03-02-81	--	15.4	960	Do.
405743	824716	do.	do.	OI08	R	12-09-80	03-02-81	--	15.4	960	Do.
413232	824852	Ottawa	do.	OI05	P	12-10-80	03-02-81	--	15.3	580	Do.
403257	824906	Morrow	do.	OI06	P	12-09-80	03-02-81	--	21.8	1,095	Do.
425953	831058	Lapeer	MI	MI07	P	11-26-80	03-04-81	7.7	26.8	920	Do.
434549	831446	Huron	do.	MI19	P	12-08-80	03-03-81	10.8	15.9	650	Do.
403048	831545	Marion	OH	OI07	P	12-11-80	03-03-81	--	15.0	945	Do.
450829	833610	Alpena	MI	MI16	P	12-02-80	03-03-81	11.4	19.1	680	Do.
443212	834322	Alcona	do.	MI17	P	11-24-80	03-02-81	19.4	22.0	930	Do.
411254	834551	Wood	OH	OI02	P	12-11-80	03-03-81	--	14.7	700	Do.
413838	842141	Fulton	OH	OI04	P	12-10-80	03-03-81	--	15.6	790	Do.
435243	842818	Gladwin	MI	MI18	P	11-26-80	03-03-81	14.4	18.9	720	Agricultural & Woodland
444230	843026	Crawford	do.	MI08	P	11-20-80	03-01-81	18.3	20.0	1,180	Do.
444230	843026	do.	do.	MI09	R	11-20-80	03-01-81	12.5	20.0	1,180	Do.
444230	843026	do.	do.	MI10A	A	11-20-80	12-22-80	1.8	6.8	1,180	Do.
444230	843026	do.	do.	MI10B	B	12-22-80	01-12-81	2.9	5.0	1,180	Do.
444230	843026	do.	do.	MI10C	C	01-12-81	02-02-81	1.5	1.3	1,800	Do.
444230	843026	do.	do.	MI10D	D	02-02-81	03-01-81	7.3	6.8	1,180	Do.
452226	843054	Cheboygan	do.	MI15	P	11-26-80	03-03-81	20.6	18.5	750	Do.
423432	843523	Ingham	do.	MI01	P	11-26-80	03-03-81	19.5	24.4	910	Do.
423432	843523	do.	do.	MI02	R	11-26-80	03-03-81	19.5	24.4	910	Do.
423432	843523	do.	do.	MI03A	A	11-26-80	12-22-80	--	10.3	910	Do.
423423	843523	do.	do.	MI03B	B	12-22-80	01-12-81	--	5.7	910	Do.
423423	843523	do.	do.	MI03C	C	01-12-81	02-02-81	--	2.1	910	Do.
423423	843523	do.	do.	MI03D	D	02-02-81	03-08-81	--	6.2	910	Do.

TABLE 4.—Descriptions of bulk-precipitation-collection sites—Continued

Latitude	Longitude	County	State	Sample identification number	Sample type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
461222	843548	Chippewa	MI	MI28	P	12-02-80	03-03-81	8.2	19.5	660	Agricultural
415148	843622	Hillsdale	do.	MI04	P	11-25-80	03-03-81	20.0	28.5	1,150	Do.
403408	850054	Jay	IN	IN06	P	12-04-80	03-05-81	11.9	18.0	843	Agricultural & Woodland
394331	851155	Fayette	do.	IN09	P	11-21-80	03-09-81	16.8	22.6	1,025	Do.
390701	851322	Ripley	do.	IN12	P	11-20-80	03-09-81	25.7	25.4	970	Do.
411958	852235	Noble	do.	IN03	P	11-26-80	03-04-81	13.8	25.8	960	Woodland & Agricultural
411958	852235	do.	do.	IN15A	A	11-26-80	12-22-80	5.6	7.6	960	Do.
411958	852235	do.	do.	IN15B	B	12-22-80	01-12-81	1.4	7.9	960	Do.
411958	852235	do.	do.	IN15C	C	01-12-81	02-09-81	3.2	3.4	960	Do.
411958	852235	do.	do.	IN15D	D	02-09-81	03-04-81	7.3	6.8	960	Do.
443818	853110	Grandtravers	MI	MI14	P	11-25-80	03-04-81	29.8	26.8	760	Woodland
462459	853429	Luce	do.	MI30	P	12-02-80	03-05-81	15.1	37.8	810	Do.
462459	853429	do.	do.	MI31	S	--	03-05-81	--	--	810	Do.
432610	854000	Newaygo	do.	MI12	P	12-04-80	03-03-81	15.4	23.3	730	Agricultural
422121	854916	Van Buren	do.	MI06	P	11-24-80	03-02-81	24.5	37.4	800	Woodland & Agricultural
435640	855103	Lake	do.	MI13	P	11-25-80	03-03-81	20.9	28.2	900	Do.
411233	855616	Kosciusko	IN	IN02	P	11-25-80	03-04-81	19.2	24.0	835	Agricultural & Woodland
382805	860334	Washington	do.	IN14	P	11-18-80	03-11-81	23.9	28.9	760	Do.
390744	860641	Brown	do.	IN11	P	11-20-80	03-10-81	27.2	22.3	625	Woodland
400126	861855	Boone	do.	IN08	P	11-17-80	03-08-81	11.3	23.2	935	Agricultural
400126	861855	do.	do.	IN16A	A	11-17-80	12-22-80	9.1	6.5	935	Do.
400126	861855	do.	do.	IN16B	B	12-22-80	01-12-81	4.6	2.6	935	Do.
400126	861855	do.	do.	IN16C	C	01-12-81	02-02-81	3.2	1.5	935	Do.
400126	861855	do.	do.	IN16D	D	02-02-81	03-08-81	9.0	12.6	935	Do.
403707	861914	Cass	do.	IN05	P	12-04-80	03-07-81	14.3	15.7	750	Do.
420159	862009	Berrien	MI	MI05	P	11-24-80	03-02-81	20.4	28.5	730	Do.
461026	862518	Schoolcraft	do.	MI29	P	12-03-80	03-05-81	22.0	30.1	710	Woodland
411947	864703	La porte	IN	IN01	P	11-24-80	03-04-81	18.7	21.3	670	Agricultural
404859	865014	White	do.	IN04	P	12-03-80	03-07-81	13.6	20.0	885	Agricultural & Woodland
390929	870213	Greene	do.	IN10	P	11-20-80	03-10-81	31.1	24.3	515	Do.
382221	870324	Dubois	do.	IN13	P	11-19-80	03-11-81	28.3	24.3	495	Do.
395610	870605	Parke	do.	IN07	P	12-03-80	03-12-81	21.0	20.5	720	Woodland
454300	871115	Delta	MI	MI20	P	12-01-80	03-04-81	11.0	12.1	670	Woodland & Agricultural
454300	871115	do.	do.	MI21	R	12-01-80	03-04-81	9.9	12.1	670	Do.
454300	871115	do.	do.	MI22A	A	12-01-80	12-22-80	2.5	3.0	670	Do.
454300	871115	do.	do.	MI22B	B	12-22-80	01-12-81	2.0	1.8	670	Do.
454300	871115	do.	do.	MI22C	C	01-12-81	02-02-81	1.4	2.5	670	Do.
454300	871115	do.	do.	MI22D	D	02-02-81	03-04-81	6.1	4.8	670	Do.
441908	873449	Kewaunee	WI	WI28	P	12-04-80	03-04-81	9.9	17.1	755	Agricultural
463323	874128	Marquette	MI	MI26	P	11-26-80	03-05-81	17.2	18.7	1,440	Woodland
460121	875022	Dickinson	do.	MI27	P	11-26-80	03-04-81	13.5	16.6	1,120	Woodland & Agricultural
403312	875823	Iroquois	IL	IL10	P	12-02-80	03-01-81	13.5	19.1	680	Agricultural
400002	875827	Champaign	do.	IL15	P	12-01-80	03-01-81	14.7	15.1	685	Do.
410833	875835	Kankakee	do.	IL09	P	11-19-80	03-01-81	17.1	20.2	644	Do.
414225	875920	Cook	do.		P	12-01-80	--	--	--	--	Heavy industrial
384909	875931	Richland	do.	IL20	P	11-25-80	03-01-81	16.8	18.9	480	Agricultural
392743	880145	Coles	do.	IL16	P	11-25-80	03-01-81	8.5	20.6	770	Do.
422708	880228	Lake	do.		P	11-27-80	--	--	--	--	Do.

TABLE 4.—Descriptions of bulk-precipitation-collection sites—Continued

Latitude	Longitude	County	State	Sample identification number	Sample type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
382015	880455	Edwards	IL	IL21	P	11-28-80	03-01-81	13.2	22.1	408	Agricultural
433434	881116	Fond Du Lac	WI	WI27	P	12-04-80	03-04-81	6.5	13.9	990	Wetlands
444949	881831	Shawano	do.	WI09	P	12-02-80	03-02-81	7.8	16.3	825	Agricultural
454530	882748	Florence	do.	WI12	P	12-02-80	03-02-81	8.6	16.3	1,450	None
463453	883412	Baraga	do.	MI25	P	11-25-80	03-04-81	18.6	24.8	1,270	Agricultural & Woodland
471338	883744	Houghton	do.	MI24	P	11-25-80	03-05-81	15.4	23.1	630	Do.
424430	883746	Walworth	do.	WI26	P	12-03-80	03-04-81	16.2	16.5	910	Wetland
382138	884854	Jefferson	IL	IL22	P	11-28-80	03-01-81	--	17.8	545	Agricultural
385232	885401	Fayette	do.	IL19	P	11-25-80	03-01-81	11.7	19.1	595	Do.
400400	885450	Macon	do.		P	12-04-80	--	--	--	--	Do.
414505	885540	Dekalb	do.		P	11-28-80	--	--	--	--	Do.
411230	885551	Lasalle	do.	IL08	P	11-19-80	03-01-81	17.0	27.2	690	Do.
403412	885628	Mclean	do.	IL11	P	12-02-80	03-01-81	13.5	16.8	780	Do.
392535	885631	Shelby	do.	IL17	P	11-25-80	03-01-81	13.2	22.2	650	Agricultural & Woodland
421842	885912	Winnebago	do.		P	11-26-80	--	--	--	--	Agricultural
463339	891936	Ontonagon	MI	MI23	P	11-24-80	03-04-81	11.6	38.3	1,260	Agricultural & Woodland
443949	892020	Portage	WI	WI08	P	12-03-80	03-02-81	13.7	16.5	1,190	Do.
460307	893912	Vilas	do.	WI14	P	11-25-80	03-02-81	5.0	11.9	1,650	Woodland
460307	893912	do.	do.	WI15	R	11-25-80	03-02-81	10.8	11.9	1,650	Do.
460307	893912	do.	do.	WI16A	A	11-25-80	12-22-80	2.4	2.6	1,650	Do.
460307	893912	do.	do.	WI16B	B	12-22-80	01-12-81	2.7	2.5	1,650	Do.
460307	893912	do.	do.	WI16C	C	01-12-81	02-02-81	1.5	1.2	1,650	Do.
460307	893912	do.	do.	WI16D	D	02-02-81	03-02-81	4.3	7.4	1,650	Do.
460307	893912	do.	do.	WI17	S	11-25-80	03-02-81	4.9	--	1,650	Do.
455909	894058	do.	do.	WI13	P	12-01-80	03-02-81	6.0	11.7	1,630	Do.
432557	894358	Sank	do.	WI01	P	12-03-80	03-02-81	15.1	8.8	950	Do.
432557	894358	do.	do.	WI02	R	12-03-80	03-02-81	15.0	8.8	950	Do.
441257	894502	Adams	do.	WI07	P	12-03-80	03-02-81	11.0	13.3	1,030	Do.
403510	894826	Peoria	IL		P	12-02-80	--	--	--	--	Agricultural
415006	894827	Whiteside	do.		P	11-28-80	--	--	--	--	Do.
400335	895314	Menard	do.		P	12-02-80	--	--	--	--	Do.
410816	895452	Stark	do.		P	12-01-80	--	--	--	--	Do.
435732	895659	Green Lake	WI	WI06	P	12-05-80	02-26-81	11.2	7.9	760	Do.
392325	895836	Macoupin	IL	IL18	P	11-26-80	03-01-81	11.6	17.1	610	Do.
422508	895840	Jo Daviess	do.		P	12-01-80	--	--	--	--	Do.
452802	895846	Lincoln	WI	WI11	P	12-03-80	03-03-81	7.0	11.5	1,485	Do.
460743	901111	Iron	do.	WI18	P	12-01-80	03-02-81	5.2	12.9	1,575	Woodland
445528	901228	Marathon	do.	WI10	P	12-02-80	03-02-81	8.1	14.6	1,350	Agricultural
480235	902842	Cook	MN	MN21	P	12-09-80	03-10-81	--	13.0	1,889	Woodland
424413	903834	Grant	WI	WI04	P	12-03-80	03-02-81	11.3	12.9	700	Agricultural
433418	903853	Vernon	do.	WI05	P	12-04-80	03-03-81	6.6	9.9	800	Do.
465426	905351	Bayfield	do.	WI25	P	12-02-80	02-23-81	16.5	16.0	895	Woodland & Agricultural
452011	905814	Rusk	do.	WI22	P	12-01-80	03-03-81	--	13.9	1,145	Agricultural
444942	905857	Eau Claire	do.	WI20	P	12-01-80	03-02-81	9.1	11.5	1,045	Do.
440715	912140	Trempealeau	do.	WI19	P	12-03-80	03-02-81	7.9	12.9	770	Agricultural & Woodland
475800	912905	Lake	MN	MN20	P	12-02-80	03-10-81	--	13.5	1,660	Woodland
463207	913454	Douglas	WI	WI24	P	12-02-80	02-24-81	10.8	12.8	970	Do.
454920	915229	Washburn	do.	WI23	P	11-26-80	02-26-81	6.6	8.5	1,090	Agricultural

TABLE 4.—Descriptions of bulk-precipitation-collection sites—Continued

Latitude	Longitude	County	State	Sample identification number	Sample type	Installation date	Collection date	Sample volume (liters)	Estimated sample volume (liters)	Site elevation (feet)	Land use
450320	915606	Dunn	WI	WI21	P	12-01-80	03-02-81	--	14.3	930	Agricultural
470642	915911	St. Louis	MN	MN12	P	12-03-80	03-10-81	10.3	9.9	1,429	Do.
463113	923303	Carlton	do.	MN11	P	12-03-80	03-10-81	5.8	9.3	1,097	Woodland
455531	931726	Kanabec	do.	MN05	P	11-28-80	03-09-81	7.2	8.4	1,037	Field
472807	933153	Itasca	do.	MN26	P	11-25-80	03-02-81	--	5.4	1,400	Woodland
472807	933153	do.	do.	MN25	R	11-25-80	03-02-81	--	5.4	1,400	Do.
472807	933153	do.	do.	MN13A	A	11-25-80	12-22-80	--	2.2	1,400	Do.
472807	933153	do.	do.	MN13B	C	01-12-81	02-02-81	--	1.2	1,400	Do.
472807	933153	do.	do.	MN13C	D	02-02-81	03-02-81	--	1.5	1,400	Do.
472807	933153	do.	do.	MN27	S	--	03-02-81	--	--	1,400	Do.
444205	933927	Carver	do.	MN04	P	11-24-80	03-09-81	7.2	8.4	712	Agricultural & Woodland
444205	933927	do.	do.	MN28	R	11-24-80	03-09-81	7.2	8.4	712	Do.
483622	935147	Koochiching	do.	MN22	P	11-25-80	02-24-81	--	4.8	1,127	Agricultural
474607	935156	Itasca	do.	MN19	P	11-26-80	03-02-81	--	5.4	1,333	Do.
463254	941431	Crow Wing	do.	MN10	P	11-26-80	03-10-81	6.3	8.6	1,247	Do.
470251	941526	Cass	do.	MN14	P	11-26-80	03-02-81	--	3.6	1,368	Do.
451038	941800	Meeker	do.	MN03	P	11-21-80	03-09-81	5.4	9.8	1,020	Do.
455142	942130	Morrison	do.	MN06	P	11-26-80	03-11-81	5.9	7.9	1,090	Woodland
484307	945355	Lake	do.	MN23	P	11-25-80	02-24-81	--	3.2	1,090	Agricultural & Woodland
472610	951548	Clearwater	do.	MN15	P	11-24-80	02-26-81	--	4.3	1,540	Do.
463108	951654	Otter Tail	do.	MN09	P	11-24-80	02-25-81	1.3	3.4	1,391	Agricultural
451253	951934	Swift	do.	MN02	P	11-21-80	02-25-81	2.2	5.9	1,100	Do.
481545	952418	Beltrami	do.	MN18	P	11-24-80	02-26-81	--	2.4	1,214	Do.
453954	952633	Popoe	do.	MN07	P	11-24-80	02-25-81	2.4	3.3	1,254	Do.
453021	961234	Stevens	do.	MN01	P	11-21-80	02-25-81	1.0	5.0	1,165	Do.
462235	961455	Otter Tail	do.	MN08	P	11-24-80	02-25-81	0.6	2.6	1,160	Do.
471331	961746	Norman	do.	MN16	P	11-25-80	02-25-81	0.3	3.3	1,034	Do.
485804	962656	Kittson	do.	MN24	P	11-25-80	02-25-81	--	5.0	1,015	Agricultural & Woodland
480718	964005	Polk	do.	MN17	P	11-25-80	02-26-81	--	3.8	886	Agricultural

Latitude	Longitude	Laboratory identification number	Split sample identification number	Sample[1/] type	As (µg/L)	Ba (µg/L)	Be (µg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (µg/L)	Cl (mg/L)	Co (µg/L)	Cu (µg/L)	F (mg/L)	Fe (µg/L)	pH (µg/L)	Hg (µg/L)	K (mg/L)
451040	674630	NE12		P	< 0.1	< 2	< 0.5	0.2	0.18	1	1.50	< 3	< 10	0.03	9	4.4	< 0.1	0.1
460310	682138	NE17		P	< 0.1	< 2	< 0.5	0.4	0.11	8	0.98	< 3	< 10	0.03	7	4.4	< 0.1	0.1
444350	683936	NE09		P	< 0.1	< 2	< 0.5	0.4	0.17	2	2.10	< 3	< 10	0.07	32	4.3	< 0.1	0.1
464426	684521	NE18		P	< 0.1	< 2	< 0.5	0.4	0.10	3	0.15	< 3	< 10	0.07	15	4.9	< 0.1	< 0.1
442736	694028	NE11		P	< 0.1	< 2	< 0.5	0.4	0.38	1	2.90	< 3	< 10	0.13	30	4.3	< 0.1	0.1
464200	694259	NE14		P	< 0.1	< 2	< 0.5	0.4	0.05	1	0.11	< 3	< 10	0.01	4	4.8	< 0.1	< 0.1
464200	694259	NE25	NE14	Z	< 0.1	< 2	< 0.5	0.4	0.20	8	0.13	3	< 10	0.04	4	4.8	< 0.1	< 0.1
450420	695412	NE13		P	< 0.1	11	< 0.5	0.4	0.19	1	2.20	< 3	< 10	0.02	13	4.2	< 0.1	0.1
453938	701612	NE15		P	< 0.1	< 2	< 0.5	0.4	0.46	9	0.36	< 3	< 10	0.01	7	4.7	< 0.1	0.3
442950	704144	NE16		P	< 0.1	< 2	< 0.5	0.4	0.10	4	1.50	< 3	< 10	0.02	13	4.3	< 0.1	< 0.1
434835	704653	NE10		P	< 0.1	< 2	< 0.5	0.4	0.10	< 1	1.70	< 3	< 10	0.03	8	4.4	< 0.1	0.1
450250	712300	NE03		P	< 0.1	< 2	< 0.5	0.4	0.09	3	0.36	< 3	< 10	0.06	7	4.7	< 0.1	< 0.1
430912	713634	NE02		P	< 0.1	< 2	< 0.5	0.4	0.09	1	0.91	< 3	< 10	0.07	9	4.6	< 0.1	< 0.1
430912	713634	NE01		R	< 0.1	< 2	< 0.5	0.4	0.09	1	1.50	3	< 10	0.14	10	4.5	0.1	0.1
423824	713919	NE20		P	< 0.1	< 2	< 0.5	0.4	0.19	1	1.60	< 3	< 10	0.06	12	4.3	< 0.1	0.1
423824	713919	NE26	NE20	Z	< 0.1	< 2	< 0.5	0.2	0.21	16	1.60	< 3	30	0.05	13	3.9	< 0.1	0.1
435651	714230	NE06		P	< 0.1	< 2	< 0.5	0.4	0.10	2	0.75	< 3	< 10	0.05	6	4.4	< 0.1	< 0.1
435422	720923	NE08		P	< 0.1	< 2	< 0.5	0.4	0.21	1	0.74	< 3	< 10	0.05	17	4.6	< 0.1	< 0.1
435422	720923	NE27	NE08	Z	< 0.1	< 2	< 0.5	0.4	0.58	< 1	1.00	6	< 10	0.10	18	5.1	< 0.1	0.1
414755	722056	NE22A		P	< 0.1	< 2	< 0.5	0.4	0.13	7	1.70	< 3	< 10	0.03	22	4.5	0.1	0.1
414755	722056	NE22B		R	< 0.1	< 2	< 0.5	0.4	0.19	5	1.70	3	< 10	0.04	27	4.0	< 0.1	< 0.1
421959	722104	NE21		P	< 0.1	< 2	< 0.5	0.4	0.18	< 1	1.10	< 3	< 10	0.09	14	4.4	0.1	0.1
443355	723431	NE07		P	< 0.1	< 2	< 0.5	0.6	0.16	< 1	0.69	< 3	< 10	0.06	27	4.5	< 0.1	< 0.1
440620	724445	NE04		P	< 0.1	< 2	< 0.5	0.4	0.05	5	0.14	< 3	< 10	0.07	< 3	4.8	< 0.1	0.1
430725	724636	NE05		P	< 0.1	< 2	< 0.5	0.4	0.09	< 1	0.59	< 3	< 10	0.07	9	4.4	< 0.1	< 0.1
415648	725017	NE23		P	< 0.1	< 2	< 0.5	0.4	0.15	1	0.92	< 3	< 10	0.05	5	4.6	< 0.1	0.1
424102	725659	NE19		P	< 0.1	< 2	< 0.5	0.4	0.11	1	0.62	< 3	< 10	0.04	9	4.5	< 0.1	< 0.1
415823	731313	NE24		P	< 0.1	< 2	< 0.5	0.4	0.30	1	1.80	< 3	< 10	0.05	13	4.4	0.2	0.1
434310	732802	NY14		P	< 0.1	< 2	< 0.5	0.4	0.25	3	0.41	< 3	10	0.01	15	4.3	< 0.1	< 0.1
445406	732930	NY06		P	< 0.1	< 2	< 0.5	0.4	0.58	< 1	0.30	< 3	20	0.09	22	4.1	< 0.1	< 0.1
445406	732930	NY35	NY06	Z	< 0.1	2	< 0.5	0.4	0.65	4	0.30	< 3	10	0.05	20	4.2	< 0.1	< 0.1
422211	733010	NY05		P	< 0.1	< 2	< 0.5	0.4	0.38	< 1	0.52	< 3	< 10	0.24	21	4.3	0.1	0.1
442405	735121	NY20		P	< 0.1	< 2	< 0.5	0.4	0.22	5	0.16	< 3	20	0.03	9	4.3	< 0.1	< 0.1
442405	735121	NY25		R	< 0.1	< 2	< 0.5	0.4	0.21	6	0.23	< 3	10	0.01	14	4.2	< 0.1	< 0.1
442405	735121	NY37A		A	< 0.1	< 2	< 0.5	0.1	0.25	2	0.38	< 3	< 10	0.05	17	4.5	< 0.1	0.1
442405	735121	NY37B		B	--	2	< 0.5	0.3	0.43	6	0.51	< 3	< 10	0.07	< 3	5.7	--	0.2
442405	735121	NY37C		C	--	4	< 0.5	0.4	0.65	6	0.92	< 3	< 10	0.06	< 3	6.1	--	0.4
442405	735121	NY21		D	< 0.1	< 2	< 0.5	0.4	0.14	< 1	0.15	< 3	< 10	0.04	< 3	4.2	< 0.1	< 0.1
442405	735121	NY23		S	< 0.1	< 2	< 0.5	0.4	0.10	< 1	0.18	< 3	< 10	0.02	8	4.3	< 0.1	0.1
432715	740025	NY13		P	< 0.1	< 2	< 0.5	0.4	0.29	5	0.41	< 3	10	0.02	18	4.2	< 0.1	< 0.1
424708	741955	NY19		P	< 0.1	< 2	< 0.5	0.4	0.61	1	0.33	< 3	10	0.02	31	4.2	< 0.1	0.1
424708	741955	NY28		R	< 0.1	< 2	< 0.5	0.4	0.29	4	0.29	< 3	< 10	0.01	23	4.3	< 0.1	< 0.1
424708	741955	NY26		S	< 0.1	< 2	< 0.5	0.4	0.33	7	0.18	< 3	30	0.04	13	4.7	< 0.1	< 0.1
424708	741955	NY32	NY28	Z	< 0.1	< 2	< 0.5	0.4	0.31	7	0.33	< 3	30	0.04	21	4.2	< 0.1	< 0.1
410921	742651	NJ01		P	< 0.1	2	< 0.5	0.8	0.19	5	2.10	< 3	< 10	0.01	12	4.2	< 0.1	0.1
414158	742714	NY09		P	< 0.1	3	< 0.5	0.4	1.10	1	0.14	< 3	10	0.02	24	5.3	< 0.1	0.6
434224	745428	NY16		P	< 0.1	< 2	< 0.5	0.4	0.21	< 1	0.12	< 3	< 10	0.09	11	4.2	< 0.1	< 0.1
434224	745428	NY24		R	1.0	< 2	< 0.5	0.4	0.23	5	0.04	< 3	10	0.10	11	4.9	< 0.1	< 0.1
434224	745428	NY29		A	< 0.1	23	< 0.5	0.4	0.48	3	0.52	< 3	10	0.01	43	5.1	< 0.1	0.2
434224	745428	NY31	NY16	Z	< 0.1	6	< 0.5	0.4	0.19	38	0.24	< 3	80	0.04	12	4.3	< 0.1	< 0.1

concentrations of bulk-precipitation samples

Laboratory identification number	Li (µg/L)	Mg (mg/L)	Mn (µg/L)	Mo (µg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (µg/L)	Pb (µg/L)	Se (µg/L)	Si (µg/L)	SO_4 (m/L)	Sr (µg/L)	V (µg/L)	Zn (µg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (µmho/cm @25°C)
NE12	51	0.4	6	< 10	0.07	0.3	0.9	< 1	5	< 0.1	0.280	1.60	3.6	< 6	5	0.126	0.097	16.0
NE17	56	0.5	1	< 10	0.06	0.3	0.5	1	78	< 0.1	0.240	1.40	2.6	< 6	9	0.112	0.078	15.0
NE09	50	0.4	2	< 10	0.08	0.4	1.3	< 1	5	< 0.1	0.260	2.00	4.0	< 6	4	0.154	0.129	23.0
NE18	56	0.5	1	< 10	< 0.01	0.1	0.3	3	8	< 0.1	0.240	0.41	2.5	< 6	< 3	0.072	0.020	3.0
NE11	47	0.1	10	< 10	0.29	0.5	1.3	1	9	< 0.1	< 0.009	2.90	3.6	7	7	0.155	0.178	27.0
NE14	51	0.3	1	< 10	< 0.01	0.1	0.2	< 1	< 1	< 0.1	0.330	0.44	3.1	< 6	< 3	0.052	0.019	3.9
NE25	50	0.6	1	< 10	< 0.01	0.1	0.3	< 1	2	< 0.1	0.400	0.61	5.2	< 6	< 3	0.088	0.023	1.8
NE13	55	0.6	3	< 10	0.12	0.4	1.4	< 1	8	< 0.1	0.037	2.30	2.8	< 6	9	0.191	0.138	28.0
NE15	56	0.4	10	< 10	< 0.01	0.2	0.4	< 1	4	< 0.1	0.150	1.30	2.9	< 6	12	0.093	0.051	8.9
NE16	52	0.6	1	< 10	0.07	0.3	1.1	< 1	5	< 0.1	0.150	1.90	2.8	< 6	4	0.157	0.103	19.0
NE10	47	0.4	1	< 10	0.05	0.2	1.1	2	8	< 0.1	0.140	1.40	2.7	< 6	3	0.129	0.091	15.0
NE03	47	0.3	1	< 10	0.05	0.1	0.3	3	1	< 0.1	0.021	0.59	1.9	< 6	25	0.066	0.030	4.0
NE02	47	0.4	< 1	< 10	< 0.01	0.1	0.6	< 1	2	< 0.1	0.031	1.10	2.3	< 6	7	0.089	0.056	7.2
NE01	43	0.4	< 1	< 10	< 0.01	0.1	0.8	4	2	< 0.1	0.070	1.30	2.8	< 6	9	0.104	0.076	10.0
NE20	55	0.6	2	< 10	0.07	0.3	1.2	< 1	5	< 0.1	0.220	1.80	3.6	< 6	40	0.166	0.104	21.0
NE26	47	0.6	2	< 10	0.06	0.3	1.1	2	6	< 0.1	0.400	1.80	3.9	< 6	44	0.238	0.104	17.0
NE06	48	0.3	1	< 10	0.06	0.3	0.5	3	5	< 0.1	0.028	1.20	2.3	< 6	33	0.096	0.068	12.0
NE08	52	0.4	2	< 10	0.06	0.3	0.6	1	5	< 0.1	0.180	1.10	3.0	< 6	< 3	0.099	0.065	10.0
NE27	53	0.5	2	< 10	0.05	0.3	0.8	2	4	< 0.1	0.380	1.70	4.5	< 6	9	0.116	0.085	8.7
NE22A	55	0.6	1	< 10	0.09	0.3	1.2	< 1	11	< 0.1	< 0.009	1.50	1.6	< 6	7	0.146	0.101	18.0
NE22B	49	0.5	2	< 10	0.09	0.3	1.2	< 1	11	< 0.1	0.480	1.50	5.6	< 6	7	0.209	0.101	23.0
NE21	58	0.6	1	< 10	0.06	0.3	0.8	1	8	< 0.1	0.260	1.50	3.1	< 6	15	0.137	0.084	15.0
NE07	53	< 0.1	3	< 10	0.13	0.4	0.3	3	10	< 0.1	< 0.009	1.30	2.7	< 6	93	0.062	0.075	12.0
NE04	46	0.3	< 1	< 10	< 0.01	0.1	0.3	5	< 1	< 0.1	< 0.009	0.40	1.4	< 6	11	0.056	0.019	1.6
NE05	48	0.4	1	< 10	< 0.01	0.3	0.5	< 1	1	< 0.1	0.049	1.20	2.3	< 6	19	0.099	0.063	11.0
NE23	54	0.5	3	< 10	0.05	0.1	0.7	< 1	1	< 0.1	0.190	1.10	3.3	< 6	< 3	0.108	0.056	9.6
NE19	59	0.5	1	< 10	0.10	0.2	0.5	1	4	< 0.1	0.170	1.20	2.4	< 6	11	0.107	0.057	11.0
NE24	50	0.7	5	< 10	0.08	0.4	1.2	1	9	< 0.1	0.470	2.30	5.5	< 6	< 3	0.170	0.127	21.0
NY14	9	< 0.1	2	< 10	0.08	0.4	0.3	< 1	6	< 0.1	0.130	1.30	2.8	< 6	< 3	0.081	0.067	22.0
NY06	4	0.3	6	< 10	0.12	0.6	0.3	< 1	4	< 0.1	0.130	2.20	2.7	< 6	17	0.155	0.097	23.0
NY35	10	< 0.1	5	< 10	0.14	0.6	0.2	2	4	< 0.1	0.130	1.90	2.4	< 6	15	0.114	0.091	20.0
NY05	< 4	0.2	4	< 10	0.14	0.4	0.5	< 1	9	< 0.1	0.098	1.80	1.8	< 6	10	0.117	0.081	20.0
NY20	4	< 0.1	2	< 10	0.10	0.4	< 0.2	< 1	5	< 0.1	0.110	1.30	2.2	< 6	< 3	0.068	0.060	15.0
NY25	11	0.2	2	< 10	0.13	0.5	< 0.2	< 1	4	< 0.1	0.330	1.50	3.6	< 6	23	0.099	0.073	17.0
NY37A	< 4	< 0.1	2	< 10	0.38	0.3	< 0.2	< 1	4	< 0.1	0.250	1.70	2.0	< 6	32	0.071	0.067	8.0
NY37B	< 4	< 0.1	2	< 10	0.52	0.2	0.3	4	1	< 0.1	0.190	0.60	3.0	< 6	129	0.074	0.041	6.0
NY37C	< 4	< 0.1	5	< 10	0.75	0.2	0.6	4	1	< 0.1	0.130	1.00	3.0	< 6	156	0.113	0.061	10.0
NY21	< 4	< 0.1	1	< 10	0.17	0.5	< 0.2	2	1	< 0.1	0.020	1.50	1.4	< 6	6	0.082	0.071	16.0
NY23	< 4	< 0.1	1	< 10	0.14	0.4	< 0.2	3	3	< 0.1	0.022	1.50	3.5	< 6	13	0.065	0.065	14.0
NY13	8	0.1	1	< 10	0.10	0.5	0.2	< 1	8	< 0.1	0.250	2.50	3.1	< 6	20	0.102	0.099	13.0
NY19	10	0.1	5	< 10	0.17	0.6	0.3	< 1	6	< 0.1	0.052	2.20	3.3	< 6	7	0.127	0.098	12.0
NY28	14	0.2	2	< 10	0.18	0.5	0.3	13	5	< 0.1	0.210	1.80	3.2	< 6	27	0.107	0.081	11.0
NY26	13	0.3	2	< 10	0.18	0.4	0.2	< 1	4	< 0.1	0.230	1.30	3.5	< 6	13	0.083	0.061	46.0
NY32	12	< 0.1	2	< 10	0.15	0.5	0.2	1	5	< 0.1	0.100	1.80	2.1	< 6	12	0.098	0.082	18.0
NJ01	28	0.1	2	< 10	0.08	0.4	1.3	1	9	< 0.1	0.076	2.10	2.4	< 6	9	0.143	0.131	25.0
NY09	< 4	0.3	67	< 10	< 0.01	0.2	0.9	< 1	2	< 0.1	0.800	2.70	3.8	< 6	47	0.124	0.074	16.0
NY16	< 4	< 0.1	1	< 10	0.14	0.5	< 0.2	< 1	6	< 0.1	0.018	5.70	< 0.5	< 6	8	0.084	0.157	11.0
NY24	11	0.3	1	< 10	0.09	0.2	0.2	< 1	3	< 0.1	0.350	0.35	4.2	< 6	27	0.064	0.023	3.6
NY29	11	0.1	4	< 10	< 0.01	< 0.1	0.3	< 1	43	< 0.1	0.210	2.30	5.1	< 6	34	0.032	0.062	0.2
NY31	10	0.1	2	< 10	0.15	0.5	< 0.2	4	4	< 0.1	0.230	1.40	2.3	< 6	28	0.079	0.072	13.0

Lati-tude	Longi-tude	Labora-tory iden-tifi-cation number	Split sample iden tifi-cation number	Sample type	As (µg/L)	Ba (µg/L)	Be (µg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (µg/L)	Cl (mg/L)	Co (µg/L)	Cu (µg/L)	F (mg/L)	Fe (µg/L)	pH (µg/L)	Hg (µg/L)	K (mg/L)
410547	745800	NJ02		P	< 0.1	< 2	< 0.5	0.1	0.19	1	1.80	< 3	< 10	0.07	14	4.3	< 0.1	0.1
410547	745800	NJ04		R	< 0.1	< 2	< 0.5	0.4	0.18	< 1	1.80	< 3	< 10	0.01	24	4.2	< 0.1	0.1
410547	745800	NJ05A		A	< 0.1	3	< 0.5	0.4	0.24	2	0.66	3	< 10	0.02	26	4.2	< 0.1	< 0.1
410547	745800	NJ05B		B	1.0	3	< 0.5	0.4	0.92	5	1.20	< 3	< 10	0.03	27	3.8	< 0.1	0.2
410547	745800	NJ05C		D	< 0.1	< 2	< 0.5	0.4	0.17	1	1.80	< 3	< 10	0.04	9	3.9	< 0.1	0.1
410219	745945	NJ03		P	1.0	< 2	< 0.5	0.4	0.20	< 1	1.90	< 3	< 10	0.01	19	4.2	< 0.1	< 0.1
421710	750538	NY10		P	1.0	< 2	< 0.5	0.4	0.26	3	0.32	< 3	10	0.01	35	4.3	< 0.1	< 0.1
443535	751353	NY04		P	< 0.1	5	< 0.5	0.4	0.32	14	0.48	< 3	100	0.09	18	4.0	< 0.1	0.1
413519	751954	PA18		P	1.0	< 2	< 0.5	0.2	0.18	6	0.80	< 3	30	0.06	35	4.2	< 0.1	< 0.1
413519	751954	PA08		R	1.0	< 2	< 0.5	0.4	0.14	< 1	0.34	< 3	< 10	0.03	14	4.3	< 0.1	< 0.1
413519	751954	PA25	PA18	Z	< 0.1	< 2	< 0.5	0.2	0.23	< 1	0.90	< 3	< 10	0.06	19	4.2	< 0.1	< 0.1
424854	752634	NY07		P	< 0.1	2	< 0.5	0.4	0.57	< 1	0.54	< 3	< 10	0.04	33	5.3	< 0.1	< 0.1
421225	754242	NY01		P	< 0.1	2	< 0.5	0.4	0.35	3	0.25	< 3	< 10	0.06	32	4.2	< 0.1	< 0.1
432842	754438	NY17		P	1.0	2	< 0.5	0.4	0.20	1	0.22	< 3	20	0.03	22	4.3	< 0.1	< 0.1
404826	760030	PA07		P	1.0	< 2	< 0.5	0.4	0.65	< 1	1.00	< 3	< 10	0.05	14	4.2	< 0.1	0.1
420126	761318	NY02		P	< 0.1	< 2	< 0.5	0.4	0.26	1	0.43	< 3	< 10	0.08	25	4.2	< 0.1	< 0.1
420126	761318	NY33	NY02	Z	< 0.1	2	< 0.5	0.4	0.32	6	0.43	< 3	20	0.04	29	4.3	< 0.1	0.1
412821	763455	PA10		P	< 0.1	< 2	< 0.5	0.4	0.27	191	0.16	< 3	120	0.03	26	4.2	< 0.1	< 0.1
422358	763913	NY11		P	1.0	< 2	< 0.5	0.4	0.32	4	0.37	< 3	10	0.03	32	4.1	< 0.1	< 0.1
422358	763913	NY27		R	1.0	< 2	< 0.5	0.4	0.24	< 1	0.46	< 3	< 10	0.06	21	4.1	< 0.1	0.1
422358	763913	NY22A		A	1.0	2	< 0.5	0.1	0.89	5	0.97	< 3	20	0.10	111	7.2	< 0.1	0.1
422358	763913	NY22B		B	< 0.1	< 2	< 0.5	0.4	0.37	5	0.79	< 3	10	0.06	44	4.1	< 0.1	0.1
422358	763913	NY22C		C	1.0	7	< 0.5	0.4	2.00	14	1.20	< 3	50	0.04	235	5.1	0.1	0.2
422358	763913	NY22D		D	1.0	< 2	< 0.5	0.4	0.38	3	0.55	< 3	10	0.04	26	4.2	< 0.1	0.1
422358	763913	NY30		S	1.0	4	< 0.5	0.3	0.38	< 1	0.67	< 3	< 10	0.03	37	5.5	0.2	0.1
422358	763913	NY34	NY11	Z	1.0	< 2	< 0.5	0.4	0.36	4	0.47	< 3	20	0.04	30	4.1	< 0.1	< 0.1
422358	763913	NY36	NY22B	Z	1.0	4	< 0.5	0.4	0.42	1	0.79	< 3	10	0.09	39	4.1	< 0.1	0.1
430653	764829	NY15		P	1.0	< 2	< 0.5	0.4	0.45	3	0.61	< 3	10	0.02	39	4.2	< 0.1	< 0.1
405452	771310	PA13		P	1.0	< 2	< 0.5	0.4	0.33	< 1	1.10	< 3	< 10	0.04	18	4.2	< 0.1	0.1
405452	771310	PA24	PA13	Z	1.0	< 2	< 0.5	0.4	0.39	2	0.72	< 3	< 10	0.09	16	4.3	< 0.1	0.1
400147	771741	PA14		P	1.0	< 2	< 0.5	0.4	0.25	< 1	0.42	< 3	< 10	0.04	14	4.3	< 0.1	0.1
400147	771741	PA22	PA14	Z	< 0.1	< 2	< 0.5	0.4	0.34	27	1.30	< 3	30	0.06	14	4.3	< 0.1	0.1
420630	773206	NY12		P	< 0.1	< 2	< 0.5	0.6	0.40	5	0.24	< 3	10	0.05	40	4.2	< 0.1	0.1
412121	775532	PA09		P	1.0	< 2	< 0.5	0.4	0.20	< 1	0.38	< 3	< 10	0.08	26	4.1	< 0.1	< 0.1
412121	775532	PA21	PA09	Z	1.0	< 2	< 0.5	0.4	0.22	< 1	0.29	< 3	< 10	0.09	12	4.1	< 0.1	< 0.1
404718	775643	PA15		P	1.0	< 2	< 0.5	0.4	0.33	< 1	0.20	< 3	< 10	0.04	32	4.1	< 0.1	< 0.1
404718	775643	PA11		R	< 0.1	< 2	< 0.5	0.4	0.16	< 1	0.61	3	< 10	0.04	21	4.4	< 0.1	< 0.1
404718	775643	PA16		A	< 0.1	< 2	< 0.5	0.4	0.26	< 1	0.27	< 3	< 10	0.08	9	4.8	< 0.1	< 0.1
404718	775643	PA20		B	1.0	< 2	< 0.5	0.1	0.44	< 1	0.60	< 3	< 10	0.06	31	5.0	< 0.1	< 0.1
404718	775643	PA17		C	< 0.1	< 2	< 0.5	0.1	0.23	5	0.24	< 3	< 10	0.05	12	4.7	< 0.1	< 0.1
404718	775643	PA19		D	1.0	< 2	< 0.5	0.4	0.25	< 1	0.36	< 3	< 10	0.07	11	4.3	< 0.1	< 0.1
431028	780108	NY03		P	1.0	6	< 0.5	0.4	0.82	5	0.71	< 3	< 10	0.07	64	4.3	< 0.1	0.1
423315	780435	NY18		P	1.0	< 2	< 0.5	0.4	0.50	1	0.77	< 3	< 10	0.11	61	4.1	< 0.1	< 0.1
402043	780639	PA12		P	< 0.1	< 2	< 0.5	0.4	0.30	22	0.58	< 3	< 10	0.03	25	4.2	< 0.1	< 0.1
414138	790322	PA02		P	1.0	< 2	< 0.5	0.4	0.29	< 1	0.37	< 3	< 10	0.08	40	4.0	< 0.1	< 0.1
414138	790322	PA23	PA02	Z	1.0	< 2	< 0.5	0.4	0.36	< 1	0.54	< 3	< 10	0.12	33	4.0	< 0.1	< 0.1
393621	790335	MD07		P	< 0.1	2	< 0.5	0.1	0.38	4	0.59	< 3	< 10	0.06	52	4.2	< 0.1	0.1
401210	790500	PA04		P	1.0	5	< 0.5	0.4	0.64	< 1	0.34	< 3	< 10	0.19	64	4.0	< 0.1	< 0.1
405008	790640	PA06		P	2.0	2	< 0.5	0.4	0.71	< 1	2.10	< 3	< 10	0.12	66	3.9	< 0.1	0.1
385754	792054	WV02		P	1.0	2	< 0.5	0.4	0.73	< 1	0.66	< 3	< 10	0.38	41	4.1	< 0.1	0.1

Laboratory identification number	Li (µg/L)	Mg (mg/L)	Mn (µg/L)	Mo (µg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (µg/L)	Pb (µg/L)	Se (µg/L)	Si (µg/L)	SO_4 (m/L)	Sr (µg/L)	V (µg/L)	Zn (µg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (µmho/cm @25°C)
NJ02	26	0.1	2	< 10	0.18	0.3	1.0	< 1	5	< 0.1	0.010	2.00	2.5	< 6	7	0.124	0.114	33.0
NJ04	24	0.1	2	< 10	0.11	0.4	1.1	< 1	5	< 0.1	0.090	2.40	3.2	< 6	6	0.136	0.129	26.0
NJ05A	45	< 0.1	4	< 10	0.29	0.6	0.4	< 1	10	< 0.1	0.057	2.00	2.6	< 6	20	0.113	0.103	26.0
NJ05B	45	0.2	10	< 10	0.12	1.2	0.7	< 1	5	< 0.1	0.062	2.80	5.0	< 6	23	0.260	0.178	30.0
NJ05C	44	0.1	1	< 10	0.07	0.3	1.0	< 1	3	< 0.1	0.310	2.00	4.5	< 6	5	0.191	0.114	16.0
NJ03	25	0.1	4	< 10	0.12	0.4	1.2	< 1	5	< 0.1	0.096	2.40	3.3	< 6	6	0.142	0.132	26.0
NY10	8	0.3	4	< 10	0.54	0.7	0.3	2	7	< 0.1	0.170	2.50	2.4	< 6	28	0.139	0.111	29.0
NY04	7	0.3	3	< 10	0.29	0.8	0.3	< 1	14	< 0.1	0.062	2.70	2.1	< 6	9	0.174	0.127	34.0
PA18	< 4	< 0.1	4	< 10	0.12	0.4	0.5	1	10	< 0.1	0.380	2.20	3.5	< 6	12	0.102	0.097	25.0
PA08	10	< 0.1	1	< 10	0.09	0.3	0.5	1	7	< 0.1	0.450	1.80	2.6	< 6	< 3	0.085	0.068	18.0
PA25	26	< 0.1	3	< 10	0.29	0.7	0.5	2	7	< 0.1	0.260	2.20	2.9	< 6	4	0.117	0.121	22.0
NY07	4	0.3	3	< 10	0.65	0.8	0.4	< 1	11	< 0.1	0.049	3.30	12.3	< 6	23	0.122	0.141	27.0
NY01	48	0.4	4	< 10	0.38	0.7	0.4	1	16	< 0.1	0.450	1.90	4.0	< 6	11	0.158	0.097	19.0
NY17	12	< 0.1	2	< 10	0.21	0.5	< 0.2	< 1	9	< 0.1	0.600	1.40	3.4	< 6	6	0.075	0.071	31.0
PA07	12	0.1	7	< 10	0.23	0.5	1.2	1	7	< 0.1	0.320	2.90	4.6	< 6	11	0.172	0.124	30.0
NY02	52	0.4	3	< 10	0.38	0.6	0.4	< 1	11	< 0.1	0.450	2.10	4.1	< 6	9	0.154	0.099	22.0
NY33	15	< 0.1	4	< 10	0.32	0.6	0.2	21	9	< 0.1	0.320	2.10	3.8	< 6	9	0.098	0.099	19.0
PA10	5	< 0.1	8	< 10	0.17	0.4	0.2	2	4	< 0.1	0.110	2.00	2.9	< 6	192	0.097	0.075	19.0
NY11	5	0.2	4	< 10	0.23	0.7	0.3	< 1	10	< 0.1	0.120	2.10	2.3	< 6	27	0.141	0.104	21.0
NY27	< 4	< 0.1	3	< 10	0.23	0.7	0.2	< 1	11	< 0.1	0.040	2.50	< 0.5	< 6	8	0.117	0.115	18.0
NY22A	11	0.1	12	< 10	1.80	1.7	0.3	1	28	1.0	0.130	5.10	5.7	< 6	57	0.194	0.255	46.0
NY22B	12	0.1	4	< 10	0.13	0.8	0.3	< 1	9	< 0.1	0.010	1.90	2.2	< 6	6	0.128	0.119	22.0
NY22C	18	0.2	20	< 10	0.07	0.9	2.6	12	81	< 0.1	0.340	1.60	7.1	< 6	122	0.242	0.131	26.0
NY22D	5	0.3	4	< 10	0.25	0.6	0.5	2	12	< 0.1	0.120	2.60	3.8	< 6	32	0.146	0.112	16.0
NY30	< 4	< 0.1	7	< 10	0.77	1.0	0.2	3	11	< 0.1	0.054	5.20	3.0	< 6	18	0.086	0.198	23.0
NY34	10	< 0.1	4	< 10	0.24	0.7	0.2	1	9	< 0.1	0.093	2.50	2.3	< 6	12	0.123	0.115	28.0
NY36	21	< 0.1	5	< 10	0.15	0.7	0.3	1	5	< 0.1	0.071	1.70	2.5	< 6	7	0.124	0.108	24.0
NY15	11	< 0.1	4	< 10	0.25	0.8	0.4	< 1	4	< 0.1	0.130	2.20	2.8	< 6	< 3	0.121	0.120	14.0
PA13	10	< 0.1	79	< 10	0.12	0.4	0.3	1	4	< 0.1	0.420	2.20	4.7	< 6	< 3	0.101	0.105	22.0
PA24	25	< 0.1	73	< 10	0.19	0.3	0.3	2	3	< 0.1	0.110	2.30	2.5	< 6	5	0.096	0.090	19.0
PA14	14	< 0.1	2	< 10	0.17	0.3	0.7	1	6	< 0.1	0.022	2.20	2.2	< 6	< 3	0.105	0.079	20.0
PA22	6	< 0.1	3	< 10	0.18	0.4	0.7	< 1	5	< 0.1	0.290	2.20	4.0	< 6	24	0.110	0.111	21.0
NY12	12	0.2	5	< 10	0.21	0.8	0.2	< 1	12	< 0.1	0.170	2.40	3.7	< 6	12	0.123	0.114	16.0
PA09	5	< 0.1	2	< 10	0.11	0.3	< 0.2	1	6	< 0.1	0.320	1.60	3.2	< 6	< 3	0.097	0.065	24.0
PA21	7	< 0.1	< 1	< 10	0.16	0.5	< 0.2	1	4	< 0.1	0.560	2.50	3.4	< 6	< 3	0.102	0.096	24.0
PA15	11	< 0.1	2	< 10	0.17	0.5	0.2	1	7	< 0.1	0.031	2.70	1.7	< 6	< 3	0.117	0.097	26.0
PA11	4	< 0.1	1	< 10	0.09	0.2	< 0.2	< 1	3	< 0.1	0.330	1.40	3.2	< 6	< 3	0.054	0.061	9.6
PA16	7	< 0.1	1	< 10	0.10	0.1	< 0.2	< 1	6	< 0.1	0.220	0.82	2.1	< 6	< 3	0.036	0.032	5.5
PA20	9	< 0.1	2	< 10	0.33	0.6	< 0.2	2	10	< 0.1	0.560	1.50	3.5	< 6	8	0.056	0.091	25.0
PA17	12	< 0.1	< 1	< 10	0.14	0.2	< 0.2	< 1	4	< 0.1	0.170	1.10	2.2	< 6	< 3	0.041	0.044	22.0
PA19	9	< 0.1	3	< 10	0.08	0.2	0.2	1	4	< 0.1	0.570	1.70	3.1	< 6	< 3	0.077	0.060	13.0
NY03	52	0.5	9	< 10	0.57	1.0	0.6	< 1	10	< 0.1	0.530	3.30	6.5	< 6	27	0.199	0.160	29.0
NY18	10	0.1	9	< 10	0.33	0.9	0.3	< 1	16	< 0.1	0.025	3.00	2.5	< 6	43	0.149	0.148	20.0
PA12	7	0.1	3	< 10	0.16	0.5	0.3	1	7	< 0.1	0.012	2.60	1.3	< 6	8	0.111	0.106	22.0
PA02	< 4	< 0.1	6	< 10	0.28	0.7	< 0.2	1	12	< 0.1	0.140	3.00	2.9	< 6	10	0.134	0.123	34.0
PA23	10	< 0.1	4	< 10	0.28	0.7	< 0.2	2	10	< 0.1	0.600	3.10	5.4	< 6	5	0.138	0.130	32.0
MD07	9	< 0.1	7	< 10	0.46	0.6	0.3	1	10	< 0.1	0.220	3.70	2.0	< 6	23	0.128	0.136	34.0
PA04	5	< 0.1	75	< 10	0.29	0.9	0.2	2	9	< 0.1	0.400	3.80	4.9	< 6	23	0.161	0.153	38.0
PA06	10	0.1	9	< 10	0.27	0.8	0.2	3	15	< 0.1	0.510	0.49	5.9	< 6	14	0.198	0.127	44.0
WV02	29	< 0.1	9	< 10	0.34	0.8	0.3	< 1	11	< 0.1	0.290	4.60	5.1	< 6	28	0.153	0.171	36.0

Latitude	Longitude	Laboratory identification number	Split sample identification number	Sample type	As (µg/L)	Ba (µg/L)	Be (µg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (µg/L)	Cl (mg/L)	Co (µg/L)	Cu (µg/L)	F (mg/L)	Fe (µg/L)	pH (µg/L)	Hg (µg/L)	K (mg/L)
421835	792408	NY08		P	1.0	< 2	< 0.5	0.4	0.32	< 1	0.40	< 3	< 10	0.03	35	4.1	< 0.1	< 0.1
392630	792704	MD05		P	< 0.1	2	< 0.5	0.2	0.24	79	0.31	< 3	40	0.08	35	4.4	< 0.1	< 0.1
392630	792704	MD06		R	—	3	< 0.5	0.1	0.67	10	1.10	< 3	10	0.19	48	4.3	0.1	0.4
392630	792704	MD01		A	< 0.1	6	< 0.5	0.2	0.54	8	0.47	< 3	10	0.06	60	4.4	< 0.1	0.1
392630	792704	MD02		B	1.0	3	< 0.5	0.2	0.62	< 1	0.56	< 3	< 10	0.06	56	4.3	< 0.1	0.1
392630	792704	MD04		C	1.0	4	< 0.5	0.1	0.91	< 1	0.62	< 3	< 10	0.08	127	4.9	< 0.1	0.4
392630	792704	MD03		D	< 0.1	< 2	< 0.5	0.1	0.28	8	0.38	< 3	20	0.05	40	4.5	< 0.1	< 0.1
384123	793230	WV05		P	1.0	2	< 0.5	0.4	0.72	< 1	0.56	< 3	< 10	0.07	50	3.9	< 0.1	0.1
385619	794316	WV03		P	< 0.1	< 2	< 0.5	0.4	0.14	< 1	0.34	< 3	< 10	0.08	10	4.7	< 0.1	0.1
410506	795327	PA03		P	1.0	3	< 0.5	0.4	0.31	< 1	1.60	< 3	< 10	0.08	47	4.3	< 0.1	< 0.1
384024	795348	WV01		P	< 0.1	< 2	< 0.5	0.4	0.43	< 1	0.32	< 3	< 10	0.06	16	4.2	< 0.1	< 0.1
384024	795348	WV06A		B	< 0.1	< 2	< 0.5	0.4	0.12	< 1	0.29	< 3	< 10	0.02	10	4.5	< 0.1	< 0.1
384024	795348	WV06B		C	< 0.1	< 2	< 0.5	0.4	0.30	< 1	0.52	< 3	< 10	0.04	14	5.1	< 0.1	< 0.1
384024	795348	WV06C		D	< 0.1	< 2	< 0.5	0.4	0.45	< 1	0.29	< 3	< 10	0.03	17	4.1	< 0.1	0.1
382256	800503	WV04		P	< 0.1	< 2	< 0.5	0.4	0.50	< 1	0.73	< 3	< 10	0.12	46	3.9	< 0.1	0.1
394935	802100	PA05		P	1.0	2	< 0.5	0.4	0.42	< 1	0.79	< 3	< 10	0.07	56	4.0	< 0.1	0.1
414444	802715	PA01A		P	1.0	3	< 0.5	0.4	0.38	< 1	0.36	3	< 10	0.07	52	4.0	< 0.1	< 0.1
414444	802715	PA01B		R	1.0	< 2	< 0.5	0.4	0.54	< 1	0.36	< 3	< 10	0.05	35	3.8	< 0.1	< 0.1
413446	803206	OI14		P	1.0	2	< 0.5	0.4	0.60	< 1	0.59	< 3	< 10	0.09	65	4.0	< 0.1	0.1
404800	805208	OI10		P	1.0	2	< 0.5	0.6	0.55	< 1	0.40	< 3	< 10	0.08	80	4.0	< 0.1	0.1
412839	805327	OI13		P	1.0	< 2	< 0.5	0.4	0.65	< 1	0.86	< 3	< 10	0.14	77	4.0	< 0.1	0.1
413629	805803	OI16		P	< 0.1	< 2	< 0.5	0.4	0.61	< 1	0.74	< 3	< 10	0.11	62	4.1	< 0.1	0.1
415128	805822	OI18		P	< 0.1	2	< 0.5	0.4	0.80	< 1	0.40	3	< 10	0.09	83	4.0	< 0.1	0.1
415128	805822	OI19		R	1.0	2	< 0.5	0.4	0.84	< 1	1.70	< 3	< 10	0.27	97	4.2	< 0.1	0.1
415128	805822	OI17A		A	< 0.1	2	< 0.5	0.4	1.00	< 1	1.10	< 3	< 10	0.06	64	5.4	< 0.1	0.5
415128	805822	OI17B		B	1.0	2	< 0.5	0.4	0.67	< 1	1.10	< 3	< 10	0.06	87	4.0	< 0.1	0.1
415128	805822	OI17C		C	1.0	3	< 0.5	0.4	1.40	< 1	0.60	< 3	< 10	0.08	92	4.0	< 0.1	0.1
415128	805822	OI17D		D	< 0.1	< 2	< 0.5	0.4	0.43	< 1	0.50	4	< 10	0.10	35	4.0	< 0.1	< 0.1
415128	805822	OI22	OI18	Z	1.0	< 2	< 0.5	0.4	0.65	< 1	0.62	< 3	< 10	0.08	58	4.6	< 0.1	< 0.1
411233	810713	OI11		P	1.0	< 2	< 0.5	0.6	0.67	< 1	0.85	< 3	< 10	0.18	61	4.0	< 0.1	0.1
413256	811613	OI15		P	1.0	2	< 0.5	0.4	0.75	< 1	0.87	< 3	< 10	0.07	101	4.1	< 0.1	< 0.1
413256	811613	OI20	OI15	Z	< 0.1	< 2	< 0.5	0.4	0.78	< 1	1.10	5	< 10	0.10	69	4.5	< 0.1	< 0.1
411530	815542	OI03		P	1.0	2	< 0.5	3.1	0.98	< 1	0.84	< 3	< 10	0.08	60	6.8	< 0.1	1.0
405152	815631	OI12		P	< 0.1	< 2	< 0.5	0.4	0.60	< 1	0.84	3	< 10	0.08	68	4.2	< 0.1	0.1
405152	815631	OI24	OI12	Z	3.0	< 2	< 0.5	0.4	0.59	< 1	0.43	< 3	< 10	0.05	44	7.2	< 0.1	< 0.1
402351	821658	OI01		P	< 0.1	< 2	< 0.5	0.8	0.35	< 1	0.22	< 3	< 10	0.11	22	4.3	< 0.1	< 0.1
405743	824716	OI09		P	< 0.1	2	< 0.5	0.6	0.92	< 1	0.65	< 3	< 10	0.09	62	4.2	< 0.1	0.1
405743	824716	OI08		R	< 0.1	2	< 0.5	0.8	1.10	< 1	0.52	< 3	10	0.10	54	4.3	< 0.1	0.1
405743	824716	OI23	OI09	Z	5.0	< 2	< 0.5	0.4	0.67	< 1	0.59	< 3	< 10	0.07	39	4.7	< 0.1	0.1
413232	824852	OI05		P	1.0	< 2	< 0.5	0.8	1.50	< 1	0.77	< 3	< 10	0.06	32	4.6	< 0.1	0.1
403257	824906	OI06		P	< 0.1	< 2	< 0.5	0.4	0.73	10	0.45	3	10	0.07	32	—	< 0.1	< 0.1
425953	831058	MI07		P	1.0	2	< 0.5	0.4	0.60	5	0.54	< 3	10	0.09	37	4.5	< 0.1	0.2
434549	831446	MI19		P	1.0	5	< 0.5	1.8	4.00	8	0.81	< 3	10	0.08	10	6.6	< 0.1	0.1
403048	831545	OI07		P	< 0.1	2	< 0.5	0.4	1.40	< 1	0.91	< 3	< 10	0.07	60	4.3	0.3	0.1
450829	833610	MI16		P	1.0	2	< 0.5	0.4	0.86	< 1	0.29	< 3	< 10	0.08	50	4.3	< 0.1	0.1
443212	834322	MI17		P	< 0.1	2	< 0.5	0.4	0.51	< 1	0.42	< 3	< 10	0.10	31	4.2	< 0.1	0.1
411254	834551	OI02		P	< 0.1	2	< 0.5	0.4	0.88	< 1	0.40	< 3	< 10	0.05	48	4.2	< 0.1	0.1
413838	842141	OI04		P	< 0.1	2	< 0.5	0.2	0.86	< 1	0.37	< 3	< 10	0.06	128	4.6	< 0.1	0.1
413838	842141	OI21	OI04	Z	< 0.1	< 2	< 0.5	0.4	0.46	< 1	0.36	< 3	< 10	0.14	33	5.5	< 0.1	< 0.1
435243	842818	MI18		P	1.0	2	< 0.5	0.4	1.20	19	0.55	< 3	< 10	0.09	33	4.4	< 0.1	0.4

Laboratory identification number	Li (µg/L)	Mg (mg/L)	Mn (µg/L)	Mo (µg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (µg/L)	Pb (µg/L)	Se (µg/L)	Si (µg/L)	SO_4 (m/L)	Sr (µg/L)	V (µg/L)	Zn (µg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (µmho/cm @25°C)
NY08	7	0.3	4	< 10	0.25	0.7	0.3	< 1	11	< 0.1	0.045	2.70	2.1	< 6	< 3	0.151	0.117	9.6
MD05	6	< 0.1	6	< 10	0.25	0.3	0.4	2	9	< 0.1	0.210	2.60	1.4	< 6	91	0.087	0.084	22.0
MD06	7	0.1	8	< 10	0.50	0.6	0.3	1	10	< 0.1	0.670	4.20	2.5	< 6	113	0.141	0.161	.
MD01	10	< 0.1	7	< 10	0.45	0.6	0.2	2	12	< 0.1	0.078	3.30	1.4	< 6	52	0.108	0.125	25.0
MD02	< 4	< 0.1	12	< 10	0.48	0.7	< 0.2	1	9	< 0.1	0.110	3.00	0.6	< 6	18	0.115	0.128	29.0
MD04	< 4	< 0.1	16	< 10	0.37	1.0	0.3	1	10	< 0.1	0.150	2.40	3.0	< 6	44	0.097	0.139	35.0
MD03	4	< 0.1	6	< 10	0.32	0.4	< 0.2	< 1	7	< 0.1	0.054	3.00	1.2	< 6	12	0.068	0.102	28.0
WV05	24	< 0.1	9	< 10	0.60	0.9	0.4	1	24	< 0.1	0.098	6.60	3.4	< 6	184	0.222	0.217	60.0
WV03	26	< 0.1	2	< 10	0.06	0.1	< 0.2	1	2	< 0.1	0.200	0.99	2.9	< 6	17	0.031	0.037	5.6
PA03	< 4	< 0.1	6	< 10	0.20	0.5	< 0.2	2	10	< 0.1	0.330	2.90	3.5	< 6	592	0.080	0.141	17.0
WV01	26	< 0.1	10	< 10	0.22	0.6	0.3	< 1	3	< 0.1	0.260	2.50	3.7	< 6	18	0.113	0.104	25.0
WV06A	36	< 0.1	2	< 10	0.20	0.4	< 0.2	1	< 1	< 0.1	0.310	1.10	2.3	< 6	< 3	0.052	0.060	7.0
WV06B	31	< 0.1	2	< 10	0.17	0.3	< 0.2	< 1	1	< 0.1	0.520	0.71	4.5	< 6	< 3	0.035	0.051	6.0
WV06C	32	0.1	6	< 10	0.18	0.5	0.3	< 1	2	< 0.1	0.430	2.30	5.9	< 6	20	0.136	0.092	16.0
WV04	24	< 0.1	7	< 10	0.25	0.9	0.2	1	11	< 0.1	0.640	3.30	6.6	< 6	18	0.177	0.153	45.0
PA05	4	< 0.1	8	< 10	0.25	0.6	< 0.2	2	9	< 0.1	0.200	4.00	3.2	< 6	13	0.139	0.148	37.0
PA01A	< 4	< 0.1	7	< 10	0.36	0.7	< 0.2	3	12	< 0.1	0.160	3.50	3.6	< 6	17	0.145	0.133	35.0
PA01B	< 4	< 0.1	6	< 10	0.20	0.4	< 0.2	2	8	< 0.1	0.410	2.40	4.0	< 6	15	0.200	0.089	19.0
OI14	15	0.1	8	< 10	0.34	0.8	0.3	6	12	< 0.1	0.600	3.50	6.3	< 6	22	0.175	0.146	34.0
OI10	4	< 0.1	10	< 10	0.26	0.7	0.2	1	11	< 0.1	0.600	3.70	4.6	< 6	15	0.155	0.138	32.0
OI13	9	0.1	10	< 10	0.35	0.8	0.3	34	15	< 0.1	0.680	3.50	6.5	< 6	17	0.179	0.154	36.0
OI16	19	0.1	9	< 10	0.32	0.7	0.4	2	14	< 0.1	0.220	3.70	4.1	< 6	14	0.158	0.148	34.0
OI18	22	< 0.1	9	< 10	0.30	0.9	0.3	2	16	< 0.1	0.290	2.80	4.5	< 6	19	0.174	0.134	19.0
OI19	20	< 0.1	9	< 10	0.32	0.9	0.3	2	16	< 0.1	0.800	5.90	7.4	< 6	18	0.141	0.235	42.0
OI17A	15	0.1	9	< 10	0.41	0.6	0.8	6	19	< 0.1	0.480	2.80	6.0	< 6	49	0.126	0.132	15.0
OI17B	17	0.1	8	< 10	0.27	1.0	0.7	2	24	< 0.1	0.220	3.40	4.1	< 6	24	0.191	0.173	35.0
OI17C	20	0.1	15	< 10	0.47	1.2	0.4	2	26	< 0.1	0.510	4.50	6.3	< 6	60	0.229	0.196	41.0
OI17D	18	0.1	6	< 10	0.24	0.8	0.2	2	11	< 0.1	0.150	3.50	2.9	6	11	0.156	0.144	33.0
OI22	25	< 0.1	7	< 10	0.29	0.9	0.3	2	13	< 0.1	0.180	3.50	3.9	< 6	17	0.091	0.154	36.0
OI11	12	0.1	8	< 10	0.28	0.8	0.4	< 1	16	< 0.1	0.630	3.60	6.6	< 6	16	0.179	0.156	39.0
OI15	13	0.2	12	< 10	0.34	0.8	0.5	2	19	< 0.1	0.280	3.90	4.7	< 6	27	0.179	0.163	36.0
OI20	26	< 0.1	11	< 10	0.33	0.8	0.4	1	15	< 0.1	0.640	4.30	7.6	< 6	26	0.112	0.177	34.0
OI03	9	0.2	12	< 10	2.70	0.7	0.6	3	27	< 0.1	0.540	4.40	4.6	< 6	7	0.284	0.165	42.0
OI12	17	0.1	7	< 10	0.73	0.8	0.3	7	7	< 0.1	0.770	3.70	7.2	< 6	13	0.166	0.158	30.0
OI24	22	0.1	6	< 10	0.72	0.8	0.3	2	10	< 0.1	0.260	3.90	4.0	< 6	14	0.102	0.150	30.0
OI01	10	0.1	3	< 10	0.20	0.4	< 0.2	1	5	< 0.1	0.830	2.20	4.0	< 6	< 3	0.090	0.080	15.0
OI09	5	0.1	5	< 10	0.45	1.0	0.2	< 1	6	< 0.1	0.620	4.30	4.7	< 6	8	0.158	0.179	33.0
OI08	4	0.3	7	< 10	0.60	0.7	0.5	1	12	< 0.1	0.530	4.00	5.3	< 6	22	0.194	0.148	19.0
OI23	26	0.1	5	< 10	0.46	1.0	0.2	2	19	< 0.1	0.140	4.10	3.0	< 6	7	0.103	0.173	32.0
OI05	10	0.4	7	< 10	0.37	0.9	0.5	1	9	< 0.1	0.530	4.60	6.7	< 6	< 3	0.181	0.182	23.0
OI06	6	0.2	3	< 10	0.26	0.6	0.2	< 1	9	< 0.1	0.620	2.80	4.3	< 6	13	0.080	0.114	18.0
MI07	< 4	0.1	5	< 10	0.50	0.6	0.2	5	9	< 0.1	0.084	3.00	1.5	< 6	16	0.114	0.120	22.0
MI19	< 4	0.8	19	< 10	0.82	1.4	0.3	1	1	< 0.1	0.110	3.40	5.1	< 6	21	0.337	0.193	44.0
OI07	4	0.3	7	< 10	0.66	1.1	0.6	3	14	< 0.1	0.580	5.10	5.4	< 6	21	0.218	0.210	34.0
MI16	6	< 0.1	8	< 10	0.23	0.6	< 0.2	< 1	8	< 0.1	0.270	2.50	3.4	< 6	10	0.109	0.103	25.0
MI17	4	< 0.1	4	< 10	0.51	0.7	< 0.2	2	14	< 0.1	0.300	2.60	3.6	< 6	13	0.125	0.116	35.0
OI02	10	0.2	7	< 10	0.65	1.0	0.3	1	9	< 0.1	0.610	4.40	5.7	< 6	11	0.183	0.174	32.0
OI04	8	0.2	6	< 10	0.48	0.7	0.2	< 1	12	< 0.1	0.910	3.40	3.9	< 6	18	0.127	0.131	9.5
OI21	19	< 0.1	4	< 10	0.38	0.4	< 0.2	1	7	< 0.1	0.180	2.20	3.1	< 6	11	0.053	0.084	11.0
MI18	5	0.1	6	< 10	0.29	0.8	< 0.2	2	11	< 0.1	0.041	2.90	2.3	< 6	26	0.129	0.133	28.0

Latitude	Longitude	Laboratory identification number	Split sample iden tification number	Sample type	As (μg/L)	Ba (μg/L)	Be (μg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (μg/L)	Cl (mg/L)	Co (μg/L)	Cu (μg/L)	F (mg/L)	Fe (μg/L)	pH (μg/L)	Hg (μg/L)	K (mg/L)
435243	842818	MI36	MI18	Z	1.0	4	< 0.5	0.4	1.20	1	0.36	< 3	< 10	0.06	30	4.4	< 0.1	0.3
444230	843026	MI08		P	< 0.1	< 2	< 0.5	0.4	0.70	< 1	0.27	< 3	< 10	0.06	24	4.2	< 0.1	< 0.1
444230	843026	MI09		R	< 0.1	< 2	< 0.5	0.4	0.15	< 1	0.08	< 3	< 10	0.04	9	5.1	< 0.1	< 0.1
444230	843026	MI10A		A	< 0.1	< 2	< 0.5	0.4	0.18	< 1	0.15	< 3	< 10	0.03	20	4.9	< 0.1	0.1
444230	843026	MI10B		B	< 0.1	< 2	< 0.5	0.4	0.57	< 1	0.27	< 3	< 10	0.07	54	4.2	< 0.1	0.1
444230	843026	MI10C		C	< 0.1	3	< 0.5	0.4	0.54	< 1	0.52	< 3	< 10	0.09	43	3.8	< 0.1	0.1
444230	843026	MI10D		D	< 0.1	< 2	< 0.5	0.4	0.32	< 1	0.81	< 3	< 10	0.06	21	3.8	< 0.1	< 0.1
444230	843026	MI32	MI09	Z	< 0.1	< 2	< 0.5	0.4	0.14	< 1	0.19	< 3	< 10	0.09	4	5.1	< 0.1	< 0.1
452226	843054	MI15		P	< 0.1	3	< 0.5	0.4	0.80	16	0.32	< 3	10	0.05	19	4.4	< 0.1	< 0.1
423432	843523	MI01		P	< 0.1	5	< 0.5	0.4	0.39	< 1	0.61	< 3	< 10	0.12	22	4.5	< 0.1	< 0.1
423432	843523	MI02		R	< 0.1	3	< 0.5	0.4	0.51	< 1	0.42	3	10	0.07	65	4.6	< 0.1	0.1
423432	843523	MI03A		A	< 0.1	< 2	< 0.5	0.4	0.42	< 1	0.32	< 3	< 10	0.07	40	4.3	< 0.1	< 0.1
423432	843523	MI03B		B	< 0.1	< 2	< 0.5	0.4	0.50	< 1	0.38	< 3	< 10	0.06	35	4.0	< 0.1	0.1
423432	843523	MI03C		C	< 0.1	4	< 0.5	0.4	0.85	< 1	0.76	< 3	< 10	0.07	55	4.3	< 0.1	0.1
423432	843523	MI03D		D	< 0.1	2	< 0.5	0.4	0.43	< 1	0.29	< 3	< 10	0.07	27	3.2	< 0.1	0.1
461222	843548	MI28		P	1.0	< 2	< 0.5	0.4	0.42	3	0.24	< 3	< 10	0.05	21	4.2	< 0.1	< 0.1
461222	843548	MI33	MI28	Z	1.0	< 2	< 0.5	0.4	0.51	2	0.32	< 3	< 10	0.05	19	4.1	< 0.1	0.1
415148	843622	MI04		P	< 0.1	< 2	< 0.5	0.4	0.47	< 1	0.77	< 3	< 10	0.11	35	4.3	< 0.1	< 0.1
403408	850054	IN06		P	1.0	4	< 0.5	0.4	1.50	17	0.34	< 3	10	0.08	81	4.6	< 0.1	0.1
394331	851155	IN09		P	1.0	3	< 0.5	0.6	0.86	3	0.23	< 3	10	0.06	44	4.4	< 0.1	0.1
390701	851322	IN12		P	1.0	2	< 0.5	0.4	1.10	130	0.52	< 3	60	0.11	34	4.2	< 0.1	0.1
411958	852235	IN03		P	< 0.1	< 2	< 0.5	0.6	0.70	8	0.17	< 3	< 10	0.06	24	4.4	< 0.1	< 0.1
411958	852235	IN15A		A	< 0.1	3	< 0.5	0.6	0.72	1	0.75	< 3	10	0.05	21	4.4	< 0.1	0.1
411958	852235	IN15B		B	1.0	4	< 0.5	0.3	3.10	13	0.47	< 3	10	0.04	31	6.4	< 0.1	0.1
411958	852235	IN15C		C	1.0	3	< 0.5	0.8	2.70	24	0.38	< 3	20	0.07	15	4.4	< 0.1	0.1
411958	852235	IN15D		D	1.0	< 2	< 0.5	0.6	0.79	5	0.33	< 3	10	0.05	29	4.4	< 0.1	0.1
411958	852235	IN20	IN15C	Z	< 0.1	3	< 0.5	0.6	2.50	20	0.42	< 3	20	0.06	14	6.3	< 0.1	0.1
443818	853110	MI14		P	< 0.1	< 2	< 0.5	0.4	0.53	< 1	0.30	< 3	< 10	0.05	19	4.2	< 0.1	< 0.1
462459	853429	MI30		P	< 0.1	2	< 0.5	0.2	0.17	< 1	0.16	< 3	< 10	0.04	6	4.9	< 0.1	< 0.1
462459	853429	MI31		S	< 0.1	< 2	< 0.5	0.4	0.09	8	0.26	< 3	< 10	0.06	7	4.7	< 0.1	< 0.1
462459	853429	MI35	MI31	Z	< 0.1	< 2	< 0.5	0.4	0.17	< 1	0.19	< 3	< 10	0.03	6	4.8	< 0.1	< 0.1
432610	854000	MI12		P	< 0.1	3	< 0.5	0.4	0.84	14	0.40	< 3	10	0.08	43	4.3	< 0.1	0.1
422121	854916	MI06		P	1.0	3	< 0.5	0.4	0.60	< 1	1.90	< 3	< 10	0.30	48	4.4	< 0.1	0.2
422121	854916	MI34	MI06	Z	< 0.1	< 2	< 0.5	0.4	0.55	4	0.45	< 3	< 10	0.03	38	4.4	< 0.1	0.1
435640	855103	MI13		P	< 0.1	3	< 0.5	0.4	0.91	11	1.30	< 3	< 10	0.11	26	4.6	< 0.1	0.1
435640	855103	MI37	MI13	Z	< 0.1	3	< 0.5	0.4	0.83	1	1.00	< 3	< 10	0.03	23	4.6	< 0.1	< 0.1
411233	855616	IN02		P	1.0	3	< 0.5	0.4	1.20	17	0.37	< 3	10	0.06	25	4.6	< 0.1	0.1
382805	860334	IN14		P	< 0.1	5	< 0.5	0.4	1.10	3	0.28	< 3	10	0.05	51	4.3	< 0.1	0.1
382805	860334	IN19	IN14	Z	1.0	4	< 0.5	0.4	0.83	< 1	0.35	< 3	< 10	0.06	30	4.3	< 0.1	0.1
390744	860641	IN11		P	< 0.1	3	< 0.5	3.5	1.50	< 1	0.55	< 3	< 10	0.06	14	7.0	< 0.1	1.5
390744	860641	IN18	IN11	Z	1.0	3	< 0.5	2.9	1.40	2	0.54	< 3	10	0.06	20	7.1	< 0.1	1.3
400126	861855	IN08		P	1.0	5	< 0.5	0.4	1.70	3	0.31	< 3	< 10	0.07	43	4.8	< 0.1	< 0.1
400126	861855	IN16A		A	< 0.1	< 2	< 0.5	0.8	0.30	35	0.35	< 3	30	0.05	22	5.1	< 0.1	0.1
400126	861855	IN16B		B	< 0.1	< 2	< 0.5	0.1	0.54	< 1	0.25	< 3	< 10	0.03	29	5.1	0.1	< 0.1
400126	861855	IN16C		C	1.0	4	< 0.5	0.1	1.30	< 1	0.71	< 3	< 10	0.09	25	5.1	< 0.1	< 0.1
400126	861855	IN16D		D	1.0	4	< 0.5	0.2	1.00	< 1	0.22	< 3	< 10	0.08	31	5.1	< 0.1	< 0.1
400126	861855	IN21	IN16B	Z	< 0.1	< 2	< 0.5	0.4	0.65	< 1	0.67	< 3	< 10	0.11	26	4.4	< 0.1	< 0.1
403707	861914	IN05		P	< 0.1	4	< 0.5	0.4	1.10	6	0.25	< 3	< 10	0.06	53	4.6	< 0.1	< 0.1
420159	862009	MI05		P	< 0.1	6	< 0.5	0.6	0.66	< 1	0.78	< 3	< 10	0.08	82	4.4	< 0.1	0.1
461026	862518	MI29		P	< 0.1	< 2	< 0.5	0.4	0.12	< 1	0.17	< 3	< 10	0.02	4	4.9	< 0.1	< 0.1

Laboratory identification number	Li (µg/L)	Mg (mg/L)	Mn (µg/L)	Mo (µg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (µg/L)	Pb (µg/L)	Se (µg/L)	Si (µg/L)	SO_4 (m/L)	Sr (µg/L)	V (µg/L)	Zn (µg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (µmho/cm @25°C)
MI36	23	< 0.1	5	< 10	0.30	0.8	< 0.2	< 1	8	< 0.1	0.082	2.90	3.9	< 6	21	0.121	0.128	26.0
MI08	< 4	< 0.1	5	< 10	0.25	0.7	< 0.2	1	8	< 0.1	0.330	2.50	3.7	< 6	9	0.116	0.110	26.0
MI09	4	< 0.1	1	< 10	< 0.01	0.1	< 0.2	2	1	< 0.1	0.320	0.42	2.6	< 6	4	0.015	0.018	4.5
MI10A	< 4	< 0.1	2	< 10	< 0.01	< 0.1	< 0.2	2	2	< 0.1	0.400	0.36	2.5	< 6	< 3	0.022	0.012	3.0
MI10B	< 4	0.1	5	< 10	0.14	0.7	< 0.2	2	17	< 0.1	0.280	2.20	4.2	< 6	23	0.110	0.103	16.0
MI10C	< 4	0.1	6	< 10	< 0.01	< 0.1	0.2	1	18	< 0.1	0.270	3.10	3.9	< 6	23	0.202	0.079	36.0
MI10D	4	< 0.1	3	< 10	0.29	0.7	< 0.2	1	7	< 0.1	0.210	3.00	2.6	< 6	16	0.195	0.135	16.0
MI32	24	< 0.1	1	< 10	0.07	0.1	< 0.2	< 1	2	< 0.1	0.036	0.41	1.4	< 6	3	0.020	0.021	1.8
MI15	< 4	< 0.1	3	< 10	0.28	0.8	0.2	< 1	9	< 0.1	0.023	2.40	1.3	< 6	80	0.108	0.116	21.0
MI01	< 4	< 0.1	4	< 10	0.26	0.4	< 0.2	2	8	< 0.1	0.030	2.30	1.9	< 6	< 3	0.070	0.094	13.0
MI02	< 4	0.1	6	< 10	0.37	0.5	< 0.2	2	9	< 0.1	0.510	2.40	4.7	< 6	9	0.085	0.097	16.0
MI03A	< 4	0.1	4	< 10	0.43	0.6	< 0.2	1	12	< 0.1	0.037	2.90	2.5	< 6	9	0.110	0.112	21.0
MI03B	< 4	0.1	5	< 10	0.18	0.6	< 0.2	1	9	< 0.1	0.220	1.90	3.3	< 6	13	0.146	0.093	15.0
MI03C	4	0.1	9	< 10	0.63	0.9	0.5	1	15	< 0.1	0.380	3.10	4.9	< 6	40	0.168	0.150	21.0
MI03D	4	0.1	6	< 10	0.45	0.7	< 0.2	1	7	< 0.1	0.220	3.00	3.1	< 6	10	0.693	0.120	21.0
MI28	20	0.1	5	< 10	0.46	0.9	< 0.2	2	13	< 0.1	0.011	2.80	1.8	< 6	12	0.125	0.129	38.0
MI33	26	< 0.1	4	< 10	0.45	0.9	< 0.2	< 1	12	< 0.1	< 0.009	2.80	1.9	< 6	11	0.137	0.131	35.0
MI04	< 4	< 0.1	6	< 10	0.41	0.7	< 0.2	4	11	< 0.1	0.190	3.20	2.9	< 6	10	0.103	0.138	26.0
IN06	5	0.3	12	< 10	0.69	1.0	0.3	2	13	< 0.1	0.360	5.40	5.6	< 6	55	0.187	0.193	29.0
IN09	6	0.1	9	< 10	0.69	0.8	0.2	2	4	< 0.1	0.510	4.40	6.2	< 6	11	0.149	0.155	27.0
IN12	6	0.1	18	< 10	0.34	0.8	< 0.2	1	10	< 0.1	0.100	3.90	3.6	< 6	115	0.151	0.153	29.0
IN03	5	< 0.1	6	< 10	0.44	0.6	< 0.2	7	5	< 0.1	0.033	3.00	1.6	< 6	33	0.106	0.110	21.0
IN15A	7	0.1	5	< 10	1.10	0.8	0.2	2	10	< 0.1	0.180	4.40	3.5	< 6	16	0.171	0.170	26.0
IN15B	6	0.6	20	< 10	1.30	1.6	0.5	3	5	< 0.1	0.300	3.30	5.8	< 6	62	0.319	0.196	38.0
IN15C	7	0.4	17	< 10	0.98	1.0	0.3	2	4	< 0.1	0.370	5.90	6.2	< 6	59	0.291	0.205	30.0
IN15D	5	0.1	7	< 10	0.81	0.6	0.3	< 1	8	< 0.1	0.360	3.80	4.3	< 6	42	0.158	0.131	18.0
IN20	5	0.4	19	< 10	0.68	1.0	0.2	3	1	< 0.1	0.650	7.10	7.9	< 6	67	0.215	0.231	32.0
MI14	5	< 0.1	3	< 10	0.27	0.7	< 0.2	< 1	7	< 0.1	< 0.009	2.30	1.0	< 6	13	0.109	0.106	29.0
MI30	20	< 0.1	1	< 10	0.08	0.1	< 0.2	< 1	3	< 0.1	< 0.009	0.65	1.4	< 6	3	0.027	0.025	3.8
MI31	24	< 0.1	< 1	< 10	0.08	0.2	< 0.2	< 1	2	< 0.1	0.086	0.69	1.4	< 6	8	0.030	0.036	5.3
MI35	24	< 0.1	1	< 10	0.08	0.2	< 0.2	< 1	2	< 0.1	0.034	0.63	1.6	< 6	< 3	0.030	0.033	5.7
MI12	< 4	< 0.1	7	< 10	0.43	0.9	< 0.2	1	15	< 0.1	0.029	3.60	2.0	< 6	257	0.123	0.150	38.0
MI06	< 4	0.1	9	< 10	0.68	0.7	0.2	1	11	< 0.1	0.430	3.90	5.3	< 6	16	0.135	0.185	19.0
MI34	21	0.1	7	< 10	0.68	0.7	0.2	< 1	9	< 0.1	0.072	3.00	2.5	< 6	18	0.133	0.125	27.0
MI13	5	0.2	28	< 10	0.28	0.8	0.7	1	9	< 0.1	0.025	2.50	1.9	< 6	17	0.137	0.146	31.0
MI37	26	< 0.1	22	< 10	0.28	0.8	0.6	< 1	8	< 0.1	0.090	2.40	3.7	< 6	11	0.113	0.135	22.0
IN02	6	< 0.1	28	< 10	0.11	0.4	0.2	6	9	< 0.1	0.039	4.80	2.3	< 6	67	0.102	0.139	27.0
IN14	4	< 0.1	44	< 10	0.51	0.7	0.2	1	6	< 0.1	0.150	4.80	4.2	< 6	18	0.150	0.158	27.0
IN19	8	< 0.1	32	< 10	0.50	0.7	0.2	1	4	< 0.1	0.540	5.60	6.3	< 6	13	0.136	0.176	28.0
IN11	6	0.1	12	< 10	1.90	0.6	0.2	1	5	< 0.1	0.180	5.00	6.4	< 6	13	0.228	0.162	51.0
IN18	6	0.2	11	< 10	2.80	0.6	0.2	< 1	3	< 0.1	0.350	6.00	7.6	< 6	13	0.295	0.183	48.0
IN08	6	0.3	13	< 10	0.65	0.9	0.3	1	8	< 0.1	0.510	4.90	6.3	< 6	29	0.185	0.175	34.0
IN16A	6	0.1	2	< 10	0.58	0.4	0.2	1	8	< 0.1	0.230	2.50	2.3	< 6	38	0.081	0.090	23.0
IN16B	6	0.1	3	< 10	0.52	0.6	< 0.2	1	11	< 0.1	0.460	2.30	3.4	< 6	24	0.080	0.098	13.0
IN16C	6	0.2	9	< 10	1.20	1.1	0.2	1	3	< 0.1	0.590	6.10	4.9	< 6	76	0.184	0.225	28.0
IN16D	6	0.1	8	< 10	0.99	0.7	< 0.2	3	5	< 0.1	0.280	4.50	3.3	< 6	14	0.137	0.150	23.0
IN21	8	< 0.1	2	< 10	0.28	0.6	< 0.2	6	12	< 0.1	0.200	2.60	2.7	< 6	23	0.092	0.116	21.0
IN05	7	0.1	10	< 10	0.76	0.7	0.2	3	9	< 0.1	0.580	4.50	7.1	< 6	26	0.151	0.151	25.0
MI05	< 4	0.1	12	< 10	0.40	0.7	0.2	2	11	< 0.1	0.400	3.20	4.3	< 6	14	0.118	0.138	22.0
MI29	20	< 0.1	< 1	< 10	0.10	0.2	< 0.2	< 1	< 1	< 0.1	0.340	0.45	3.2	< 6	< 3	0.026	0.028	4.1

Latitude	Longitude	Laboratory identification number	Split sample identification number	Sample type	As (µg/L)	Ba (µg/L)	Be (µg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (µg/L)	Cl (mg/L)	Co (µg/L)	Cu (µg/L)	F (mg/L)	Fe (µg/L)	pH (µg/L)	Hg (µg/L)	K (mg/L)
411947	864703	IN01		P	< 0.1	5	< 0.5	0.4	0.75	21	0.22	< 3	< 10	0.13	49	4.6	0.1	< 0.1
404859	865014	IN04		P	1.0	6	< 0.5	0.4	1.40	13	0.30	< 3	10	0.06	73	4.4	< 0.1	0.1
404859	865014	IN17	IN04	Z	< 0.1	5	< 0.5	0.4	1.30	14	0.68	< 3	10	0.31	73	4.4	< 0.1	0.1
390929	870213	IN10		P	< 0.1	2	< 0.5	0.8	0.85	14	0.21	< 3	< 10	0.09	14	4.4	< 0.1	< 0.1
382221	870324	IN13		P	1.0	3	< 0.5	0.4	2.20	1	0.26	< 3	10	0.09	37	4.8	0.1	0.1
395610	870605	IN07		P	1.0	3	< 0.5	0.8	1.20	92	0.27	< 3	50	0.07	45	4.3	< 0.1	0.1
454300	871115	MI20		P	1.0	2	< 0.5	0.4	0.61	121	1.80	< 3	100	0.11	33	4.1	< 0.1	0.1
454300	871115	MI21		R	1.0	2	< 0.5	0.4	0.66	< 1	0.23	3	< 10	0.09	32	4.1	< 0.1	0.1
454300	871115	MI22A		A	1.0	4	< 0.5	0.4	0.83	< 1	0.55	< 3	< 10	0.14	74	4.0	< 0.1	0.1
454300	871115	MI22B		B	1.0	< 2	< 0.5	0.4	0.28	< 1	0.17	< 3	< 10	0.04	58	4.0	< 0.1	0.1
454300	871115	MI22C		C	1.0	4	< 0.5	0.1	0.86	< 1	0.40	< 3	< 10	0.05	44	4.2	< 0.1	0.1
454300	871115	MI22D		D	< 0.1	3	0.6	0.4	0.49	< 1	0.36	< 3	< 10	0.07	21	4.2	0.1	< 0.1
441908	873449	WI28		P	1.0	< 2	< 0.5	0.4	0.97	< 1	0.82	< 3	< 10	0.11	31	4.8	< 0.1	0.2
463323	874128	MI26		P	1.0	2	< 0.5	0.4	0.41	< 1	0.13	< 3	< 10	0.05	31	4.2	< 0.1	< 0.1
460121	875022	MI27		P	1.0	< 2	< 0.5	0.4	0.32	5	0.48	< 3	< 10	0.17	21	4.2	< 0.1	< 0.1
403312	875823	IL10		P	1.0	5	< 0.5	0.4	1.20	7	0.42	< 3	< 10	0.07	36	4.5	< 0.1	0.1
400002	875827	IL15		P	1.0	7	< 0.5	0.4	1.30	4	0.53	< 3	< 10	0.08	43	4.4	< 0.1	< 0.1
410833	875835	IL09		P	1.0	5	< 0.5	0.4	1.80	9	0.57	< 3	< 10	0.09	15	4.9	< 0.1	0.1
384909	875931	IL20		P	< 0.1	2	< 0.5	0.4	1.40	3	0.61	< 3	< 10	0.05	13	5.8	< 0.1	0.4
384909	875931	IL24	IL20	Z	< 0.1	6	< 0.5	0.4	1.40	6	0.32	< 3	< 10	0.08	19	5.8	< 0.1	0.3
392743	880145	IL16		P	1.0	3	< 0.5	0.4	1.50	27	0.41	< 3	20	0.06	41	4.4	0.1	< 0.1
382015	880455	IL21		P	1.0	4	< 0.5	0.4	1.70	6	0.26	< 3	< 10	0.06	28	4.8	< 0.1	0.1
433434	881116	WI27		P	1.0	2	< 0.5	0.4	1.50	< 1	0.47	< 3	< 10	0.04	22	5.4	< 0.1	0.1
444949	881831	WI09		P	< 0.1	< 2	< 0.5	0.4	0.11	< 1	0.21	< 3	< 10	0.04	5	4.9	0.1	< 0.1
454530	882748	WI12		P	1.0	< 2	< 0.5	0.4	0.43	< 1	0.35	< 3	< 10	0.13	37	4.3	0.1	0.1
463453	883412	MI25		P	1.0	< 2	0.6	0.4	0.21	< 1	0.07	< 3	< 10	0.05	13	4.4	< 0.1	0.1
471338	883744	MI24		P	1.0	< 2	0.6	0.4	0.36	< 1	0.19	< 3	< 10	0.04	24	4.3	< 0.1	0.1
424430	883746	WI26		P	1.0	3	< 0.5	0.4	1.00	< 1	1.50	4	< 10	0.35	31	4.7	< 0.1	0.1
382138	884854	IL22		P	1.0	3	< 0.5	0.4	1.40	11	0.22	< 3	10	0.05	29	4.5	< 0.1	< 0.1
411230	885551	IL08		P	1.0	5	< 0.5	0.4	1.60	23	0.44	< 3	40	0.09	13	4.8	< 0.1	0.1
411230	885551	IL25	IL08	Z	< 0.1	4	< 0.5	0.4	1.80	23	0.49	< 3	10	0.11	12	4.8	< 0.1	0.1
403412	885628	IL11		P	< 0.1	7	< 0.5	0.4	1.70	6	0.49	< 3	< 10	0.07	27	4.7	< 0.1	0.1
403412	885628	IL23	IL11	Z	< 0.1	3	< 0.5	0.4	1.50	9	0.52	< 3	< 10	0.13	22	4.7	< 0.1	< 0.1
392535	885631	IL17		P	1.0	3	< 0.5	0.4	1.30	13	0.38	< 3	10	0.06	33	4.5	< 0.1	< 0.1
463339	891936	MI23		P	1.0	< 2	0.6	0.4	0.36	< 1	0.08	< 3	< 10	0.03	16	4.5	< 0.1	0.1
443949	892020	WI08		P	< 0.1	3	< 0.5	0.4	0.53	< 1	0.26	< 3	< 10	0.09	24	4.4	0.1	< 0.1
460307	893912	WI14		P	< 0.1	< 2	< 0.5	0.4	0.10	< 1	0.14	< 3	< 10	0.10	6	4.7	0.1	< 0.1
460307	893912	WI15		R	< 0.1	< 2	< 0.5	0.4	0.29	< 1	0.11	3	< 10	0.09	21	4.4	0.1	< 0.1
460307	893912	WI16A		A	< 0.1	< 2	< 0.5	0.4	0.09	< 1	0.25	< 3	< 10	0.21	3	3.9	0.1	< 0.1
460307	893912	WI16B		B	< 0.1	2	< 0.5	0.4	0.57	< 1	0.30	< 3	< 10	0.33	54	4.1	0.3	0.1
460307	893912	WI16C		C	< 0.1	< 2	< 0.5	0.4	0.34	< 1	0.36	< 3	< 10	0.22	19	4.1	0.1	0.1
460307	893912	WI16D		D	1.0	< 2	< 0.5	0.4	0.27	< 1	0.22	< 3	< 10	0.13	21	5.0	0.3	0.1
460307	893912	WI17		S	< 0.1	< 2	< 0.5	0.4	0.23	< 1	0.15	3	< 10	0.09	15	4.6	< 0.1	< 0.1
460307	893912	WI29	WI16A	Z	< 0.1	< 2	< 0.5	0.4	0.18	< 1	0.27	< 3	< 10	0.06	9	4.9	0.1	0.1
460307	893912	WI32	WI16D	Z	< 0.1	< 2	< 0.5	0.4	0.36	< 1	0.28	< 3	< 10	0.11	11	4.6	0.1	0.1
455909	894058	WI13		P	< 0.1	< 2	< 0.5	0.4	0.20	< 1	0.84	< 3	< 10	0.06	10	4.9	0.1	0.1
432557	894358	WI01		P	1.0	3	< 0.5	0.4	1.10	< 1	0.30	< 3	< 10	0.04	17	5.4	< 0.1	< 0.1
432557	894358	WI02		R	1.0	2	< 0.5	0.4	0.93	< 1	0.22	< 3	< 10	0.08	13	5.2	< 0.1	< 0.1
432557	894358	WI30	WI01	Z	1.0	< 2	< 0.5	0.4	1.30	< 1	0.38	< 3	< 10	0.03	25	5.0	< 0.1	0.1
441257	894502	WI07		P	< 0.1	5	< 0.5	0.4	0.87	< 1	0.34	< 3	< 10	0.10	44	4.4	0.1	0.1

concentrations of bulk-precipitation samples—Continued

Laboratory identification number	Li (µg/L)	Mg (mg/L)	Mn (µg/L)	Mo (µg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (µg/L)	Pb (µg/L)	Se (µg/L)	Si (µg/L)	SO_4 (m/L)	Sr (µg/L)	V (µg/L)	Zn (µg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (µmho/cm @25°C)
IN01	4	< 0.1	9	< 10	0.12	0.4	< 0.2	11	5	< 0.1	0.044	2.90	1.7	< 6	29	0.071	0.095	17.0
IN04	7	0.1	15	< 10	0.61	1.0	0.2	7	5	< 0.1	0.059	5.30	2.7	< 6	39	0.170	0.190	32.0
IN17	5	0.1	14	< 10	0.61	1.0	0.2	< 1	4	< 0.1	0.180	5.80	4.1	< 6	39	0.165	0.211	35.0
IN10	7	< 0.1	8	< 10	0.65	0.6	< 0.2	1	2	< 0.1	0.190	4.20	3.3	< 6	14	0.129	0.136	25.0
IN13	5	0.1	13	< 10	0.60	0.8	0.2	< 1	4	< 0.1	0.150	5.90	5.5	< 6	24	0.185	0.187	22.0
IN07	5	< 0.1	12	< 10	0.50	0.8	< 0.2	2	4	< 0.1	0.470	4.40	5.8	< 6	84	0.146	0.156	31.0
MI20	4	< 0.1	7	< 10	0.60	1.0	< 0.2	1	12	< 0.1	< 0.009	3.30	1.7	< 6	96	0.153	0.191	42.0
MI21	22	0.2	8	< 10	0.60	0.9	0.2	< 1	9	< 0.1	0.097	3.10	2.9	< 6	6	0.180	0.135	38.0
MI22A	20	0.1	10	< 10	0.89	1.6	< 0.2	< 1	21	< 0.1	0.210	3.40	3.9	< 6	33	0.213	0.200	55.0
MI22B	24	< 0.1	4	< 10	0.22	0.5	< 0.2	< 1	9	< 0.1	0.083	2.00	1.9	< 6	6	0.130	0.082	18.0
MI22C	21	< 0.1	14	< 10	1.30	1.3	0.2	< 1	17	< 0.1	0.099	4.70	3.3	< 6	16	0.208	0.202	41.0
MI22D	23	< 0.1	6	< 10	0.57	0.8	< 0.2	< 1	8	< 0.1	0.110	3.70	3.1	< 6	5	0.128	0.144	33.0
WI28	21	0.2	8	< 10	1.40	1.0	0.4	1	4	< 0.1	0.270	5.20	4.1	< 6	41	0.198	0.203	28.0
MI26	13	< 0.1	5	< 10	0.38	0.7	< 0.2	5	9	< 0.1	0.220	2.40	3.2	< 6	6	0.111	0.104	31.0
MI27	19	< 0.1	4	< 10	0.35	0.7	< 0.2	1	5	< 0.1	0.035	2.40	1.9	< 6	12	0.104	0.113	29.0
IL10	8	< 0.1	13	< 10	0.93	0.9	< 0.2	2	3	< 0.1	0.050	6.00	2.4	< 6	18	0.158	0.201	28.0
IL15	6	0.2	24	< 10	0.52	0.9	0.2	1	1	< 0.1	0.056	5.40	2.8	< 6	18	0.167	0.191	25.0
IL09	< 4	0.1	20	< 10	0.68	1.0	< 0.2	2	3	< 0.1	0.034	6.60	2.8	< 6	20	0.159	0.225	26.0
IL20	7	0.1	24	< 10	1.70	1.5	< 0.2	< 1	3	< 0.1	0.014	4.60	3.3	< 6	16	0.201	0.220	30.0
IL24	5	0.2	22	< 10	1.70	1.6	< 0.2	< 1	2	< 0.1	0.018	4.10	3.1	< 6	16	0.209	0.208	29.0
IL16	< 4	0.1	19	< 10	0.58	0.9	0.2	1	4	< 0.1	0.067	5.90	3.0	< 6	31	0.173	0.198	28.0
IL21	< 4	0.1	28	< 10	0.55	0.8	< 0.2	< 1	< 1	< 0.1	0.040	4.50	3.2	< 6	19	0.148	0.158	22.0
WI27	21	0.5	15	< 10	0.98	1.2	0.4	1	2	< 0.1	0.240	5.20	4.3	< 6	21	0.207	0.207	25.0
WI09	28	< 0.1	1	< 10	0.08	0.1	< 0.2	< 1	1	< 0.1	0.100	0.71	2.1	< 6	< 3	0.024	0.028	1.5
WI12	32	0.1	10	< 10	0.58	0.7	< 0.2	1	6	< 0.1	0.140	3.10	2.6	< 6	12	0.121	0.124	22.0
MI25	24	< 0.1	3	< 10	0.27	0.5	< 0.2	< 1	3	< 0.1	0.083	1.70	1.9	< 6	3	0.070	0.073	19.0
MI24	24	< 0.1	4	< 10	0.37	0.6	0.3	< 1	5	< 0.1	0.450	2.30	4.9	< 6	< 3	0.108	0.096	26.0
WI26	23	0.2	16	< 10	0.70	0.8	0.2	< 1	4	< 0.1	0.160	4.20	3.8	< 6	9	0.145	0.187	21.0
IL22	5	< 0.1	17	< 10	0.37	0.7	< 0.2	1	4	< 0.1	0.054	3.30	3.1	< 6	21	0.128	0.125	21.0
IL08	< 4	0.2	19	< 10	0.68	0.8	< 0.2	1	6	< 0.1	0.060	6.10	2.9	< 6	23	0.161	0.196	23.0
IL25	6	0.3	17	< 10	0.66	0.8	< 0.2	< 1	3	< 0.1	0.078	4.90	2.9	< 6	27	0.178	0.173	25.0
IL11	5	< 0.1	24	< 10	0.44	0.8	0.2	1	2	< 0.1	0.055	5.20	3.2	< 6	41	0.145	0.179	23.0
IL23	4	0.2	21	< 10	0.44	0.8	0.3	1	2	< 0.1	0.058	3.50	2.7	< 6	19	0.156	0.145	22.0
IL17	< 4	< 0.1	16	< 10	0.98	1.0	< 0.2	< 1	4	< 0.1	0.048	7.20	3.0	< 6	25	0.166	0.232	30.0
MI23	28	< 0.1	3	< 10	0.21	0.3	< 0.2	< 1	2	< 0.1	0.290	1.50	3.1	< 6	< 3	0.065	0.055	13.0
WI08	28	< 0.1	7	< 10	0.51	0.6	< 0.2	< 1	5	< 0.1	0.130	3.10	2.8	< 6	6	0.103	0.115	18.0
WI14	32	< 0.1	1	< 10	0.10	0.2	< 0.2	< 1	< 1	< 0.1	0.130	0.37	2.1	< 6	< 3	0.032	0.026	3.9
WI15	17	< 0.1	3	< 10	0.25	0.4	< 0.2	< 1	1	< 0.1	0.510	1.60	5.0	< 6	< 3	0.072	0.065	12.0
WI16A	< 4	< 0.1	1	< 10	0.07	0.1	< 0.2	< 1	2	< 0.1	0.400	0.42	2.3	< 6	< 3	0.135	0.023	3.4
WI16B	16	< 0.1	10	< 10	0.48	0.9	< 0.2	< 1	7	< 0.1	0.200	2.60	3.7	< 6	30	0.142	0.127	24.0
WI16C	16	0.1	4	< 10	0.24	0.5	< 0.2	< 1	6	< 0.1	0.095	1.30	2.2	< 6	5	0.122	0.073	12.0
WI16D	19	0.1	3	< 10	0.16	0.6	< 0.2	1	8	< 0.1	0.350	1.40	3.7	< 6	5	0.043	0.078	16.0
WI17	18	0.1	2	< 10	0.15	0.3	< 0.2	< 1	3	< 0.1	0.110	1.00	2.2	< 6	< 3	0.056	0.046	7.1
WI29	21	0.1	1	< 10	0.08	0.1	< 0.2	< 1	1	< 0.1	0.150	0.48	2.3	< 6	< 3	0.036	0.025	2.2
WI32	20	< 0.1	4	< 10	0.27	0.4	< 0.2	1	2	< 0.1	0.160	1.30	2.3	< 6	7	0.062	0.063	9.6
WI13	34	< 0.1	2	< 10	0.17	0.2	0.3	1	2	< 0.1	0.150	1.10	2.2	< 6	22	0.048	0.061	5.0
WI01	32	0.3	12	< 10	0.59	0.7	0.2	2	3	< 0.1	0.200	3.40	4.5	< 6	9	0.134	0.129	18.0
WI02	38	0.2	13	< 10	0.43	0.5	< 0.2	< 1	1	< 0.1	0.340	3.10	4.0	< 6	8	0.100	0.106	14.0
WI30	23	0.3	13	< 10	0.60	0.8	0.2	1	2	< 0.1	0.340	3.60	5.1	< 6	8	0.151	0.143	16.0
WI07	31	< 0.1	20	< 10	0.62	0.9	0.2	< 1	3	< 0.1	0.120	4.30	3.4	< 6	19	0.136	0.163	26.0

Latitude	Longitude	Laboratory identification number	Split sample identification number	Sample type	As (µg/L)	Ba (µg/L)	Be (µg/L)	Total inorganic carbon (mg/L)	Ca (mg/L)	Cd (µg/L)	Cl (mg/L)	Co (µg/L)	Cu (µg/L)	F (mg/L)	Fe (µg/L)	pH (µg/L)	Hg (µg/L)	K (mg/L)
410816	895452	IL19		P	1.0	< 2	< 0.5	3.1	1.30	55	3.00	< 3	50	0.06	14	6.7	0.1	2.8
435732	895659	WI06		P	1.0	3	< 0.5	0.4	1.20	< 1	0.44	3	< 10	0.06	37	5.3	< 0.1	0.2
435732	895659	WI31	WI06	Z	1.0	< 2	< 0.5	0.4	1.20	< 1	0.39	< 3	< 10	0.04	36	5.1	< 0.1	0.2
392325	895836	IL18		P	1.0	4	< 0.5	0.4	1.90	3	0.46	< 3	< 10	0.06	38	4.7	< 0.1	0.1
452802	895846	WI11		P	1.0	4	< 0.5	0.4	0.66	< 1	0.41	< 3	< 10	0.13	30	4.3	0.3	0.1
460743	901111	WI18		P	< 0.1	< 2	< 0.5	0.4	0.14	< 1	0.11	< 3	< 10	0.13	22	4.5	0.2	< 0.1
445528	901228	WI10		P	< 0.1	2	< 0.5	0.4	0.77	< 1	0.26	< 3	< 10	0.10	38	4.3	0.2	< 0.1
480235	902842	MN21		P	< 0.1	< 2	< 0.5	0.4	0.08	3	0.26	< 3	20	0.04	22	5.2	0.1	< 0.1
480235	902842	MN31	MN21	Z	< 0.1	< 2	< 0.5	0.4	0.11	< 1	0.62	< 3	< 10	0.07	62	5.2	< 0.1	0.1
424413	903834	WI04		P	1.0	3	< 0.5	1.0	1.90	< 1	0.39	< 3	< 10	0.05	8	6.3	< 0.1	0.2
433418	903853	WI05		P	< 0.1	3	< 0.5	0.6	1.70	< 1	0.83	< 3	< 10	0.05	17	6.2	0.1	0.1
465426	905351	WI25		P	1.0	< 2	< 0.5	0.4	0.35	< 1	0.28	< 3	< 10	0.08	21	4.3	< 0.1	< 0.1
452011	905814	WI22		P	< 0.1	< 2	< 0.5	0.4	0.43	< 1	0.29	< 3	< 10	0.13	16	4.9	0.1	0.1
444942	905857	WI20		P	< 0.1	2	< 0.5	0.4	1.30	< 1	0.58	< 3	< 10	0.38	32	4.3	0.2	0.1
440715	912140	WI19		P	< 0.1	3	< 0.5	0.6	2.40	< 1	0.53	< 3	< 10	0.20	18	4.2	< 0.1	0.1
475800	912905	MN20		P	< 0.1	< 2	< 0.5	0.8	0.30	3	0.19	< 3	10	0.07	15	5.4	< 0.1	< 0.1
463207	913454	WI24		P	1.0	2	< 0.5	0.4	0.58	< 1	0.27	4	< 10	0.09	39	4.6	0.1	< 0.1
454920	915229	WI23		P	1.0	2	< 0.5	0.4	0.87	< 1	0.36	< 3	< 10	0.12	22	5.0	0.1	0.1
454920	915229	WI33	WI23	Z	< 0.1	3	< 0.5	0.4	0.76	< 1	0.49	< 3	< 10	0.29	15	4.6	0.1	0.1
450320	915606	WI21		P	1.0	3	< 0.5	0.4	1.80	< 1	0.45	4	< 10	0.64	29	6.3	0.1	0.2
470642	915911	MN12		P	1.0	< 2	< 0.5	0.4	0.31	1	0.14	3	20	0.03	27	4.5	< 0.1	< 0.1
463113	923303	MN11		P	< 0.1	< 2	< 0.5	0.4	0.54	29	0.20	3	100	0.04	22	4.9	< 0.1	< 0.1
455531	931726	MN05		P	< 0.1	4	< 0.5	0.6	2.60	< 1	0.49	< 3	< 10	0.07	17	6.1	< 0.1	< 0.1
455531	931726	MN30	MN05	Z	< 0.1	2	< 0.5	0.6	1.50	< 1	0.54	< 3	< 10	0.06	20	6.2	< 0.1	0.1
472807	933153	MN26		P	< 0.1	< 2	< 0.5	0.4	0.53	< 1	0.66	< 3	10	0.06	10	5.7	< 0.1	< 0.1
472807	933153	MN25		R	< 0.1	< 2	< 0.5	0.6	0.21	2	0.45	< 3	20	0.05	11	6.3	< 0.1	0.1
472807	933153	MN13A		A	< 0.1	2	< 0.5	0.2	0.56	2	0.22	< 3	10	0.03	17	5.2	0.1	0.1
472807	933153	MN13B		C	< 0.1	< 2	< 0.5	0.4	0.64	2	0.33	4	10	0.07	22	4.7	< 0.1	< 0.1
472807	933153	MN13C		D	1.0	3	< 0.5	0.4	1.30	< 1	0.39	3	30	0.08	86	4.9	0.1	< 0.1
472807	933153	MN27		S	< 0.1	< 2	< 0.5	0.4	0.22	< 1	0.29	< 3	10	0.05	19	5.1	< 0.1	< 0.1
472807	933153	MN33	MN13D	Z	< 0.1	2	< 0.5	0.4	0.92	< 1	0.34	3	10	0.08	63	4.7	< 0.1	0.1
444205	933927	MN04		P	< 0.1	4	< 0.5	1.4	3.40	< 1	0.65	< 3	< 10	0.08	14	6.6	< 0.1	0.1
444205	933927	MN28		R	< 0.1	4	< 0.5	1.2	2.90	< 1	0.77	< 3	< 10	0.07	12	6.6	< 0.1	0.1
483622	935147	MN22		P	1.0	3	< 0.5	0.4	0.93	3	0.23	< 3	20	0.04	29	4.7	< 0.1	0.1
474607	935156	MN19		P	< 0.1	< 2	< 0.5	0.4	0.60	2	0.25	< 3	10	0.04	17	4.8	< 0.1	< 0.1
463254	941431	MN10		P	< 0.1	2	< 0.5	0.8	2.00	4	0.53	< 3	20	0.10	17	5.8	< 0.1	< 0.1
463254	941431	MN34	MN10	Z	< 0.1	2	< 0.5	0.8	1.50	< 1	0.30	< 3	< 10	0.08	8	6.3	0.1	0.1
470251	941526	MN14		P	< 0.1	2	< 0.5	0.4	1.20	< 1	0.39	< 3	< 10	0.06	16	5.6	< 0.1	0.1
451038	941800	MN03		P	3.0	5	< 0.5	2.1	4.50	< 1	0.64	< 3	< 10	0.09	18	7.0	< 0.1	0.2
455142	942130	MN06		P	< 0.1	4	< 0.5	0.8	2.80	< 1	0.39	< 3	< 10	0.08	10	6.4	< 0.1	0.1
484307	945355	MN23		P	1.0	3	< 0.5	0.4	1.30	< 1	0.22	< 3	< 10	0.04	11	5.7	< 0.1	< 0.1
472610	951548	MN15		P	1.0	3	< 0.5	0.4	2.90	7	0.54	< 3	50	0.08	27	5.6	< 0.1	0.2
472610	951548	MN29	MN15	Z	1.0	3	< 0.5	0.4	2.20	6	0.57	< 3	50	0.07	14	5.6	< 0.1	0.2
463108	951654	MN09		P	1.0	9	< 0.5	4.3	8.60	< 1	0.74	3	10	0.13	16	6.4	< 0.1	0.2
451253	951934	MN02		P	4.0	11	< 0.5	5.3	10.30	< 1	0.80	< 3	10	0.11	10	7.2	< 0.1	0.3
481545	952418	MN18		P	< 0.1	2	< 0.5	0.6	2.30	6	0.30	3	20	0.06	11	6.3	0.1	0.1
453954	952633	MN07		P	1.0	8	< 0.5	4.7	9.10	< 1	0.92	< 3	< 10	0.16	6	7.3	< 0.1	0.3
453021	961234	MN01		P	1.0	14	< 0.5	0.4	12.10	< 1	0.28	< 3	10	0.07	15	7.0	< 0.1	0.7
462235	961455	MN08		P	1.0	27	< 0.5	4.0	30.30	< 1	1.20	< 3	10	0.13	10	7.4	0.1	0.7
471331	961746	MN16		P	1.0	30	< 0.5	8.6	40.80	2	0.69	< 3	20	0.16	71	7.9	< 0.1	0.9
485804	962656	MN24		P	1	3	< 0.5	1.2	3.4	< 1	0.80	< 3	< 10	0.07	17	6.7	< 0.1	0.2
485804	962656	MN32	MN24	Z	1	2	< 0.5	1.2	3.0	< 1	0.58	< 3	< 10	0.06	13	6.7	< 0.1	0.1
480718	964005	MN17		P	1	14	< 0.5	6.6	28.6	10	1.40	3	30	0.13	44	7.9	0.1	1.3

Laboratory identification number	Li (μg/L)	Mg (mg/L)	Mn (μg/L)	Mo (μg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Na (mg/L)	Ni (μg/L)	Pb (μg/L)	Se (μg/L)	Si (μg/L)	SO_4 (m/L)	Sr (μg/L)	V (μg/L)	Zn (μg/L)	Cations sum (meq/L)	Anions sum (meq/L)	Specific conductance (μmho/cm @25°C)
IL19	< 4	< 0.1	15	< 10	3.70	0.6	1.4	< 1	< 1	< 0.1	0.047	5.30	3.2	< 6	66	0.390	0.238	55.0
WI06	35	0.5	16	< 10	1.10	1.0	0.2	1	4	< 0.1	0.720	5.00	5.0	< 6	42	0.193	0.188	28.0
WI31	17	0.4	16	< 10	1.10	1.0	0.2	1	3	< 0.1	0.720	5.00	4.6	< 6	42	0.188	0.186	23.0
IL18	< 4	< 0.1	19	< 10	0.72	0.9	0.2	< 1	5	< 0.1	0.067	7.40	3.5	< 6	30	0.175	0.231	26.0
WI11	28	< 0.1	7	< 10	0.64	0.9	< 0.2	< 1	6	< 0.1	0.150	3.60	3.2	< 6	20	0.129	0.151	26.0
WI18	16	< 0.1	2	< 10	0.12	0.3	< 0.2	< 1	4	< 0.1	0.110	0.94	2.1	< 6	6	0.047	0.044	7.8
WI10	32	< 0.1	9	< 10	0.47	0.5	< 0.2	< 1	3	< 0.1	0.150	2.70	2.8	< 6	19	0.122	0.099	20.0
MN21	31	0.1	1	< 10	0.05	0.1	< 0.2	3	1	< 0.1	0.079	0.23	1.9	< 6	< 3	0.022	0.019	0.3
MN31	< 4	< 0.1	1	< 10	0.05	0.1	< 0.2	2	4	< 0.1	0.310	0.37	3.3	< 6	< 3	0.015	0.032	1.1
WI04	36	0.5	16	< 10	1.50	0.9	0.2	< 1	2	< 0.1	0.170	5.40	4.5	< 6	26	0.252	0.187	32.0
WI05	33	0.5	16	< 10	0.76	0.9	0.5	< 1	2	< 0.1	0.660	4.20	7.4	< 6	71	0.203	0.175	25.0
WI25	20	< 0.1	5	< 10	0.37	0.6	< 0.2	1	3	< 0.1	0.310	2.10	3.8	< 6	8	0.094	0.094	2.0
WI22	19	< 0.1	5	< 10	0.37	0.3	< 0.2	< 1	4	< 0.1	0.340	1.50	4.1	< 6	12	0.060	0.061	5.7
WI20	12	0.1	16	< 10	0.96	1.1	0.2	< 1	5	< 0.1	0.140	4.30	4.4	< 6	28	0.200	0.184	25.0
WI19	18	0.3	15	< 10	0.72	0.8	0.2	< 1	5	< 0.1	0.170	3.80	5.0	< 6	59	0.268	0.151	22.0
MN20	30	< 0.1	4	< 10	0.23	0.2	< 0.2	3	4	< 0.1	0.093	0.88	2.4	< 6	< 3	0.035	0.038	3.4
WI24	20	< 0.1	8	< 10	0.32	0.5	< 0.2	< 1	8	< 0.1	0.180	2.00	3.8	< 6	21	0.077	0.085	11.0
WI23	23	< 0.1	11	< 10	0.59	0.7	0.2	< 1	5	< 0.1	0.600	2.50	6.6	< 6	10	0.104	0.112	16.0
WI33	16	< 0.1	10	< 10	0.56	0.7	0.2	1	2	< 0.1	0.340	2.60	4.4	< 6	9	0.112	0.118	14.0
WI21	14	0.3	23	< 10	0.82	1.2	0.2	< 1	3	< 0.1	0.190	4.40	5.0	< 6	31	0.182	0.190	29.0
MN12	31	< 0.1	8	< 10	0.24	0.2	< 0.2	2	1	< 0.1	0.140	0.85	2.7	< 6	< 3	0.064	0.036	3.3
MN11	31	< 0.1	5	< 10	0.19	0.2	< 0.2	1	1	< 0.1	0.082	0.87	2.3	< 6	22	0.053	0.038	3.3
MN05	17	0.4	30	< 10	0.81	0.9	0.2	2	2	< 0.1	0.150	4.20	6.0	< 6	< 3	0.230	0.165	22.0
MN30	< 4	0.2	23	< 10	0.82	0.9	0.2	1	3	< 0.1	0.360	3.60	5.7	< 6	< 3	0.159	0.154	24.0
MN26	< 4	0.1	2	< 10	0.09	0.1	< 0.2	< 1	1	< 0.1	0.087	0.63	2.5	< 6	6	0.043	0.039	0.9
MN25	< 4	0.1	3	< 10	0.10	0.1	0.3	1	2	< 0.1	0.360	0.70	3.5	< 6	12	0.039	0.034	3.4
MN13A	34	< 0.1	9	< 10	0.33	0.3	< 0.2	2	< 1	< 0.1	0.120	0.88	3.0	< 6	3	0.058	0.046	15.0
MN13B	32	< 0.1	9	< 10	0.19	0.7	< 0.2	9	2	< 0.1	0.110	1.10	3.1	< 6	7	0.065	0.082	10.0
MN13C	35	0.1	17	< 10	0.47	0.6	0.3	3	9	< 0.1	0.150	3.20	5.4	< 6	50	0.132	0.120	27.0
MN27	< 4	< 0.1	4	< 10	0.10	0.1	< 0.2	2	1	< 0.1	0.110	0.59	2.4	< 6	4	0.026	0.028	1.1
MN33	< 4	< 0.1	13	< 10	0.46	0.6	0.2	2	12	< 0.1	0.240	3.00	5.1	< 6	39	0.107	0.115	16.0
MN04	19	0.6	49	< 10	0.84	1.0	0.3	1	2	< 0.1	0.180	5.90	6.6	< 6	< 3	0.292	0.212	34.0
MN28	< 4	0.6	43	< 10	0.80	0.9	0.3	2	4	< 0.1	0.180	4.40	6.4	< 6	12	0.265	0.177	30.0
MN22	36	0.1	11	< 10	0.91	0.9	0.2	5	4	< 0.1	0.120	3.30	4.3	< 6	9	0.148	0.139	19.0
MN19	33	0.1	5	< 10	0.23	0.3	< 0.2	6	3	< 0.1	0.094	1.20	2.6	< 6	5	0.070	0.053	5.3
MN10	22	0.2	26	< 10	0.37	0.6	< 0.2	2	2	< 0.1	0.110	2.90	5.6	< 6	< 3	0.144	0.118	16.0
MN34	6	0.3	21	< 10	0.38	0.6	< 0.2	< 1	2	< 0.1	0.330	2.60	5.9	< 6	7	0.127	0.105	14.0
MN14	31	0.3	18	< 10	0.53	0.8	0.2	1	1	< 0.1	0.170	3.00	4.9	< 6	< 3	0.134	0.130	30.0
MN03	16	0.7	49	< 10	0.98	1.1	0.2	2	1	< 0.1	0.280	6.60	8.5	< 6	< 3	0.361	0.234	41.0
MN06	21	0.4	45	< 10	0.85	0.8	0.2	3	1	< 0.1	0.210	5.60	7.7	< 6	41	0.242	0.184	27.0
MN23	< 4	0.2	19	< 10	0.65	0.9	< 0.2	12	2	< 0.1	0.110	3.50	4.3	< 6	4	0.130	0.143	18.0
MN15	28	0.5	40	< 10	0.47	0.8	0.3	2	1	< 0.1	0.390	3.90	8.9	< 6	12	0.235	0.153	20.0
MN29	< 4	0.4	30	< 10	0.46	0.8	0.3	2	4	< 0.1	0.160	3.50	6.4	< 6	18	0.191	0.146	22.0
MN09	23	1.4	16	< 10	1.10	1.2	0.2	3	1	< 0.1	0.680	9.70	17.1	< 6	< 3	0.632	0.308	64.0
MN02	11	1.3	47	< 10	0.73	1.0	0.3	2	1	< 0.1	0.79	9.7	19.5	< 6	< 3	0.686	0.295	66.0
MN18	29	0.3	31	< 10	0.73	1.0	< 0.2	3	2	< 0.1	0.23	3.5	6.5	< 6	5	0.192	0.153	22.0
MN07	22	1.2	34	< 10	0.79	1.0	0.3	2	1	< 0.1	0.82	9.0	17.9	< 6	< 3	0.622	0.284	62.0
MN01	14	1.2	91	< 10	0.29	0.6	0.6	6	2	< 0.1	0.82	4.0	27.6	< 6	8	0.749	0.134	32.0
MN08	12	2.4	31	< 10	2.00	2.5	0.8	5	1	< 0.1	1.21	41.0	66.9	< 6	< 3	1.887	1.064	169.0
MN16	36	3.4	4	< 10	0.95	1.4	0.5	2	< 1	< 0.1	2.61	29.0	81.2	< 6	< 3	2.405	0.722	188.0
MN24	< 4	0.6	38	< 10	0.61	1.0	0.3	2	33	< 0.1	0.17	4.6	8.9	< 6	< 3	0.276	0.190	28.0
MN32	4	0.5	34	< 10	0.59	1.0	0.2	1	4	< 0.1	0.19	4.4	8.6	< 6	< 3	0.242	0.179	32.0
MN17	36	3.2	57	< 10	2.30	2.4	0.7	6	2	< 0.1	1.71	47.0	68.1	< 6	26	1.885	1.187	250.0