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ORIENTATION STUDY OF THE LAKE SUNAPEE AREA, NEW HAMPSHIRE

NATIONAL URANIUM RESOURCE EVALUATION PROGRAM

BARBARA S. KARFUNKEL AND KENNETH A. SARGENT

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E. I. du Pont de Nemours & Co.
Savannah River Laboratory
Aiken, SC 29808

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MASTER

NATIONAL URANIUM RESOURCE EVALUATION PROGRAM

Approved by

C. E. Coffey, Research Manager
Analytical Development Division

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ABSTRACT

An orientation study was conducted in the area of Lake Sunapee, New Hampshire, in preparation for a hydrogeochemical and stream sediment reconnaissance in glacial terrain. The study was carried out by the Savannah River Laboratory as part of the National Uranium Resource Evaluation (NURE).

Ground water, lake water, stream water, lake sediment, and stream sediment samples were collected at 188 sites. The concentrations of uranium and other elements were determined by neutron activation analysis.

This report is issued in draft form, without detailed technical and copy editing. This was done to make the report available to the public before the end of the NURE program.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

ORIENTATION STUDY OF THE LAKE SUNAPEE AREA, NEW HAMPSHIRE

INTRODUCTION

The National Uranium Resource Evaluation (NURE) was established to evaluate uranium resources in the United States and to identify areas favorable for uranium exploration. The Grand Junction Office of the U.S. Department of Energy (DOE) was responsible for administering the program. The Savannah River Laboratory (SRL) was responsible for hydrogeochemical and stream sediment reconnaissance of 3.9 million square kilometers (1.5 million square miles) in 37 eastern and western states.

This report presents data from an orientation study in the area of Lake Sunapee, New Hampshire. The study area is located in central New Hampshire along longitude 72° W, which divides the Glens Falls and Portland 1° x 2° quadrangles of the National Topographic Map Series. The particular area was chosen for sampling because of a reported occurrence of autunite and meta-autunite. A total of 188 water and sediment samples were collected at various sites by Geohydrology Associates, an SRL subcontractor, during September 1976.

The Lake Sunapee area is characterized by low, rounded mountain topography having a maximum relief of about 1500 feet. Two rivers drain the area. The Sugar River, a tributary of the Connecticut River, flows westward from Lake Sunapee. A drainage divide along the east side of the lake separates the Sugar system from the Blackwater River, which flows eastward into the Merrimack River.

Bedrock, which is locally called "ledge" by water-well drillers, consists primarily of early Paleozoic granitic gneiss that is locally cut by intrusive rocks that are more basic. The region has been subjected to repeated periods of glaciation that have modified the topography and the older drainage systems. The bedrock is covered by a veneer of unconsolidated glacial deposits of till and stratified drift. Although the thickness of the glacial deposits may locally exceed 100 feet, the average thickness probably is less than 20 feet. Lake Sunapee occupies a deep trough that was glacially scoured by the last (Wisconsinian) ice sheet. The only significant stratified deposits in the area are present in the valley now occupied by the North Branch and South Branch of the Sugar River near the town of Newport, west of Lake Sunapee.

In 1967-68 a road cut for Interstate 89 was made on the southwest flank of Burpee Hill, about 2 miles east of the village of Georges Mills. This road cut exposed about 30 feet of pink, granitic gneiss cut by two dark gray lamprophyre dikes. There is a thin veneer of ground moraine on the top of the igneous rocks. Several distinct minerals were found associated with these dikes and were ultimately delivered to the Department of Geology at Dartmouth University in Hanover, New Hampshire. Dr. John B. Lyons, of the Department, identified two of the minerals as autunite, $Ca(UO_2)_2(PO_4)_2 \cdot 10\text{-}12H_2O$, and meta-autunite, $Ca(UO_2)_2(PO_4)_2 \cdot 2\text{-}6H_2O$, both of which are relatively common secondary minerals in uranium deposits. Since the original discovery of these minerals, the exposures have weathered and have been damaged so much that there is little evidence of minerals now present. The lamprophyre dikes, however, are very obvious.

In August 1976, the U.S. Geological Survey (USGS) began a detailed study of central New Hampshire in an effort to determine the provenance of the uranium minerals. The Project Chief was Dr. Eugene Boudette. It is his theory that much of the gneiss near Lake Sunapee may have been derived from a large partial melt of the Concord Granite. Weathering of the gneiss released disseminated uranium minerals, and the uranium was transported by ground water and subsequently deposited along the lamprophyre dikes. During September and October 1976, Boudette planned to collect a series of 200 samples along a northwest-southeast profile across New Hampshire; the profile would cross the Lake Sunapee area. Detailed petrologic analyses of these samples may provide data for a more detailed sampling program to follow. Boudette believes that the analyses may be useful in identifying the original source of the uranium minerals.

The Water Resources Division of the USGS has subdivided the state of New Hampshire into nine separate river basins. Water resources investigations, mostly by John E. Cotton, have been completed in several of the areas. These reports are intended to be used as guides for ground water exploration and planning and for management of water use and land use. Well yield and water quality are discussed in the reports.

An evaluation of these published reports showed that they are not particularly useful in selecting sampling sites for the NURE project. Most of the information pertains to stratified drift deposits, primiarily valley terrain that is highly transmissive. However, the best indicator of the mineralogy of the underlying bedrock would be reflected in the more fine-grained morainic deposits which generally yield little water to wells; the hydrology of the ground moraine receives little attention in these reports.

The wells from which ground-water samples were collected in the Lake Sunapee area were readily grouped into older large-diameter hand-dug wells in the glacial drift and small-diameter drilled wells in the bedrock. The dug wells, which are generally less than 20 feet deep, frequently were excavated in glacial till, and water samples should reflect the characteristic of the bedrock from which the till was derived. Those hand-dug wells

in wide,flat valleys probably tap water from glacial outwash that is well sorted and devoid of silt and clay fractions. Consequently, water from these wells probably would be less useful indicators of bedrock that had been glaciated.

Drilled wells in the area range in depth from about 12 feet to more than 700 feet. Most of these wells are 6-inch holes that are cased through the upper drift deposits; the lower part of the hole is uncased. Inasmuch as these wells obtain water from fractures in the crystalline rocks, the depth of the well is left to the discretion of the driller. The size, number, distribution, and degree of interconnection of fractures intersected by a well is highly variable. However, most drillers are sufficiently familiar with an area to have quite accurate judgment of the depth needed. Also, the completion of these wells as open holes allows the driller to re-enter and deepen a well that fails to yield the necessary amount of water.

The depth of the well as given on the Well Sampling Card is a useful parameter in determining the stratigraphic sequence through which the well penetrates. However, in the Lake Sunapee area, all the drilled wells penetrated the glacial drift, which was cased off, and were then drilled to various depths within the crystalline rocks. Because the depth of the different crystalline units generally exceeds the well depth, an accurate map of geology and well locations probably would be more useful than would be the well depth in determining the source rocks. The construction of wells meant that the depth of few drilled holes could be measured. Therefore, the field teams were required to depend on reported well depths, and only the unused dug wells could be measured with any accuracy.

ANALYTICAL DATA

Water Analyses

Tables 1, 2, and 4 give the water analyses for ground water, lake water, and stream water. Figures 2, 4, and 10 show areal distribution of uranium in water samples. The following elements were determined by neutron activation: U, Al, Br, Cl, Dy, F, Mn, Na, and V. The elemental concentrations are given in parts per billion (ppb). Missing values are denoted by "M." For uranium, the analytical background is about 0.020 ppb.

Eh

Redox potential in millivolts (mV) versus the standard calomel electrode. Normally, Eh will be about +400 mV. Values far from +400 mV may suggest instrument malfunction.

pH

Normally, pH will be in the range of 4.0 to 9.5. Values outside that range may suggest pollution or instrument malfunction.

ALKALIN

Alkalinity as milliequivalents of sulfuric acid required per liter of sample (meq/L) to titrate to a pH of about 4.5.

CONDUCT

Conductivity measure in micromhos per centimeter (μmhos/cm).

OXYGEN

Dissolved oxygen (ppm) by electrometer. Values above 12 ppm may indicate instrument malfunction.

AMMONIA

Ammonia (ppm) by colorimetry.

PHOSPHAT

Orthophosphate (ppm) by colorimetry.

NITRATE

Nitrate plus nitrite (ppm) by colorimetry.

SULFATE

Sulfate (ppm) by barium sulfate turbidimetry.

Sediment Analyses

Tables 3 and 5 present the analytical data for lake and stream sediments. Each sediment sample was sieved in the field to pass a -40 mesh (420 μm) screen. Four size fractions were analyzed: S6, -40 to +100 mesh (420 to 150 μm); S7, -100 mesh (<150 μm); S8, -100 to +200 mesh (150 to 75 μm); and S9, -200 mesh (<75 μm). Figures 5 through 8 and 11 through 14 show areal distribution of uranium in sediment samples. The samples were analyzed by neutron activation for the following elements: U, Th, Al, Ce, Dy, Eu, Fe, Hf, La, Lu, Mn, Na, Sc, Sm, Ti, V, and Yb. The concentrations are reported in ppm. Loss on ignition (LOI) is reported in weight percent. In the tables, "M" denotes a missing value. A brief explanation of the analyses follows.

Uranium

The user of these data is cautioned that the concentration of uranium in sediment samples varies with the abundance of such minerals as zircon and monazite. High concentration of uranium in a sample may bear little relation to the commercial potential of the sampled area.

Thorium

The geochemical association between uranium and thorium in high-temperature environments is well known. Compounds of these elements enter into extensive solid solution.

Aluminum

High values of aluminum in sediment samples are probably related to the clay and feldspar content of the samples.

Cerium and lanthanum

Concentrations of cerium and lanthanum are probably due to the presence of the mineral monazite [$CeLaTh(PO_4)$].

Dysprosium

Dysprosium is found as a minor constituent of the resistate mineral xenotime (YPO_4), which is reported to contain as much as 3.5% uranium. Dysprosium analyses may be useful, therefore, in estimating contributions of uranium by xenotime.

Iron and manganese

The areal distribution of iron and manganese reflects the relative abundance of iron- and manganese-bearing detrital minerals (which may be a complex function of original source rock type or metamorphic conditions), weathering, and transport conditions.

Hafnium

Hafnium is found as an accessory constituent in the resistate mineral zircon ($ZrSiO_4$), and is useful for inferring the amount of zircon in the sample.

Scandium

Scandium is interesting because its geochemical behavior is similar to that of the lanthanide metals under some conditions. Scandium can substitute for trivalent iron, aluminum, and vanadium, and for rare earths.

Titanium and vanadium

High concentrations of vanadium and iron suggest the presence of the mineral ilmenite ($FeTiO_3$). The presence of rutile (TiO_2) might be inferred from a high Ti/Fe ratio (Ti/Fe>1).

Loss on ignition

Loss on ignition was determined at 600-620°C.

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Goldthwaite, J. W., and others, 1950, Glacial geology of New Hampshire: New Hampshire State Planning and Development Commission, 1 map.

SRL-146, SRL-NURE data reports, E. I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S. C.

Glens Falls 1° x 2° NTMS Area, New Hampshire, New York, and Vermont: DPST-79-146-3, U.S. Department of Energy, GJBX-44(79).

Portland 1° x 2° NTMS Area, Maine and New Hampshire: DPST-79-146-2, U.S. Department of Energy, GJBX-28(79).

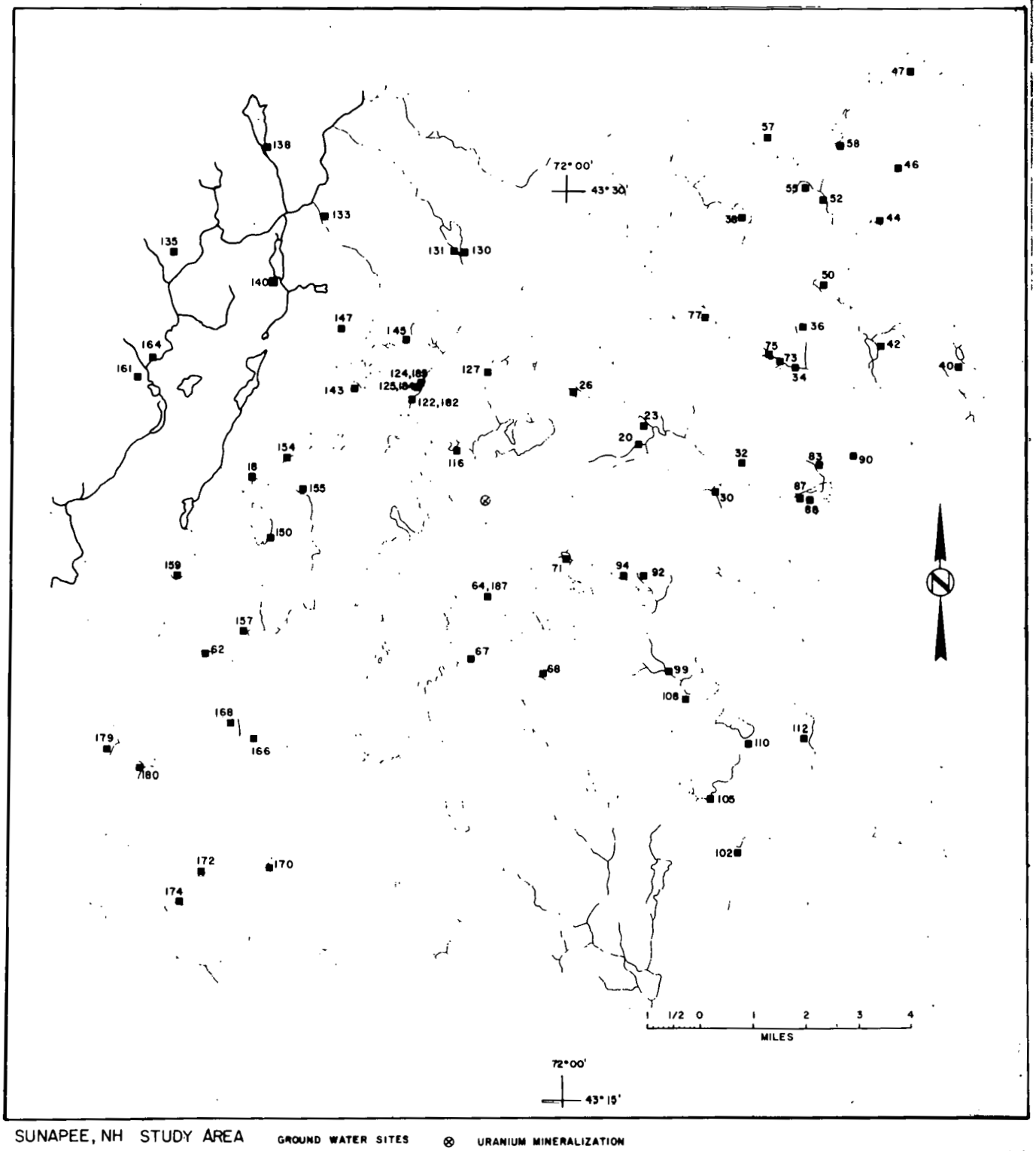

FIGURE 1. Ground Water Sampling Site Locations

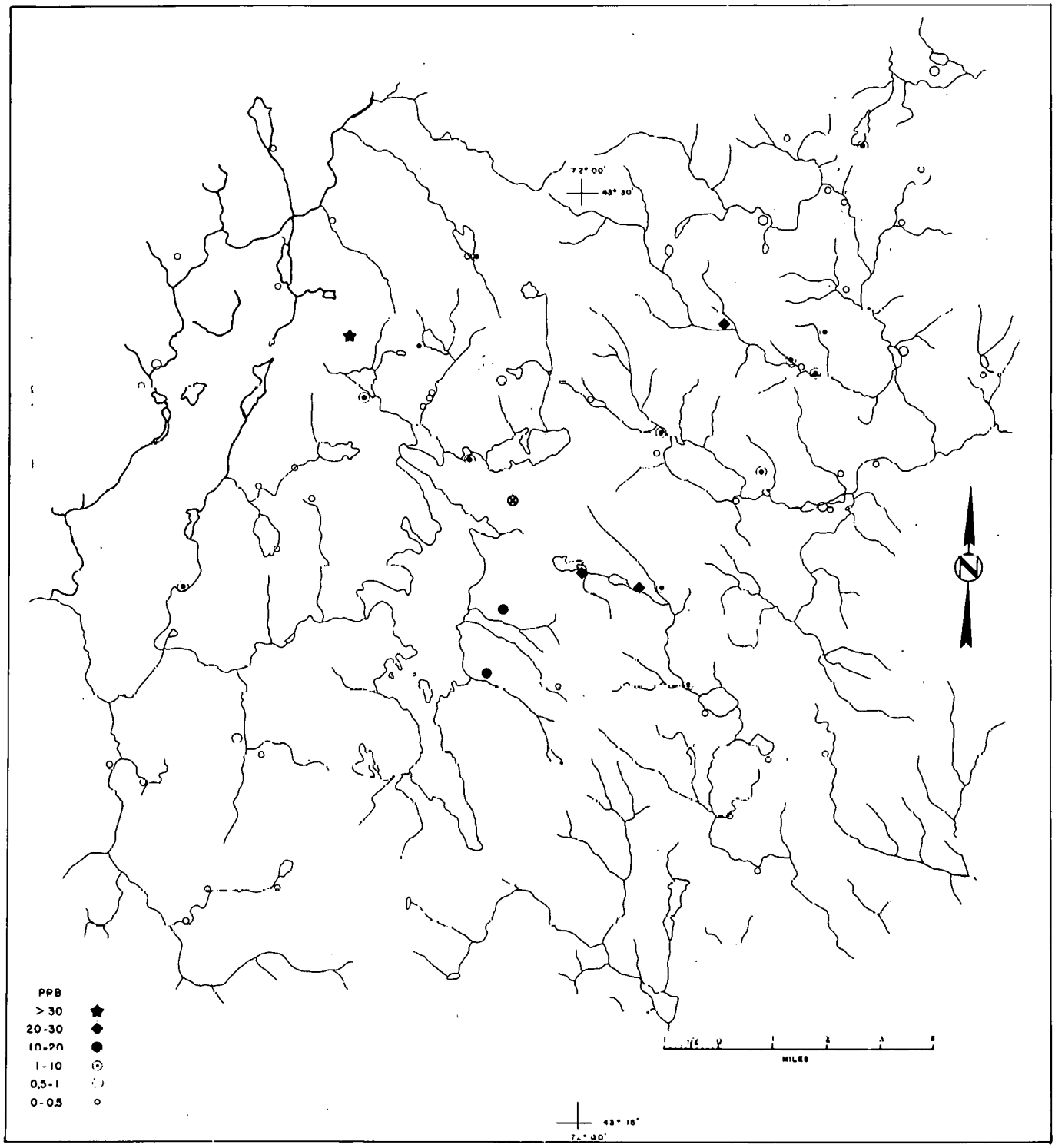

FIGURE 2. Uranium Content in Ground Water

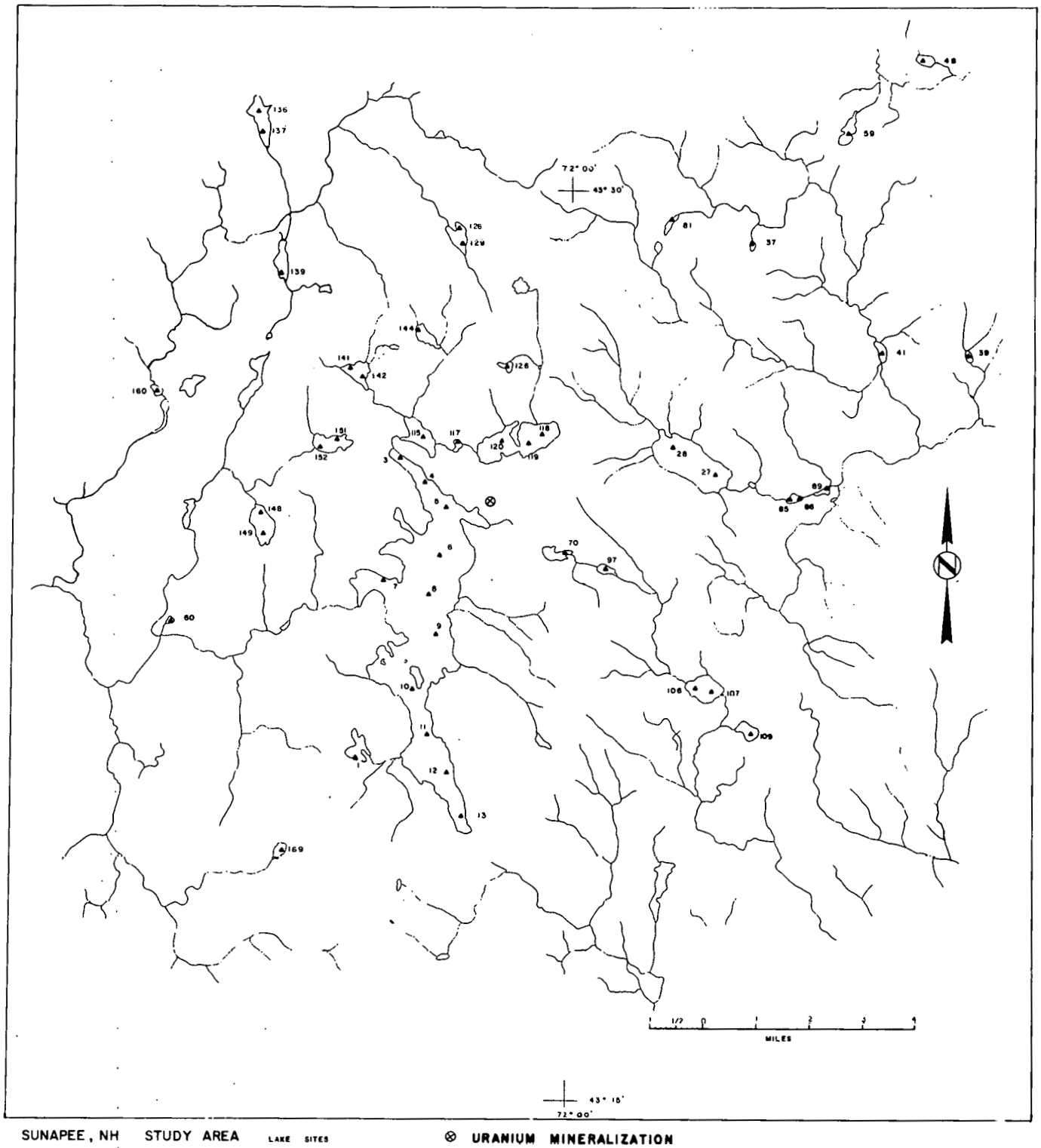

FIGURE 3. Lake Sampling Site Locations

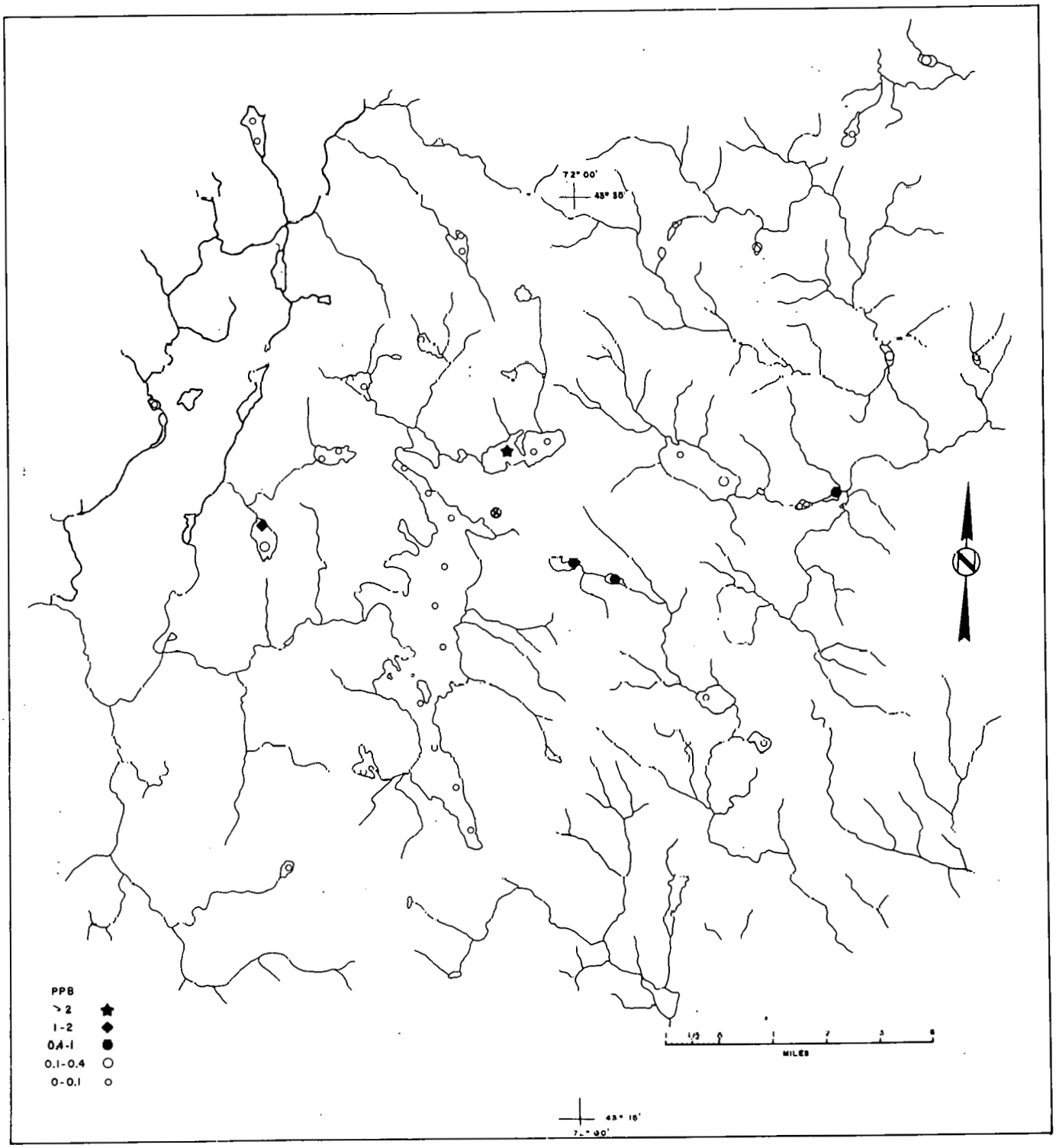

FIGURE 4. Uranium Content in Lake Water

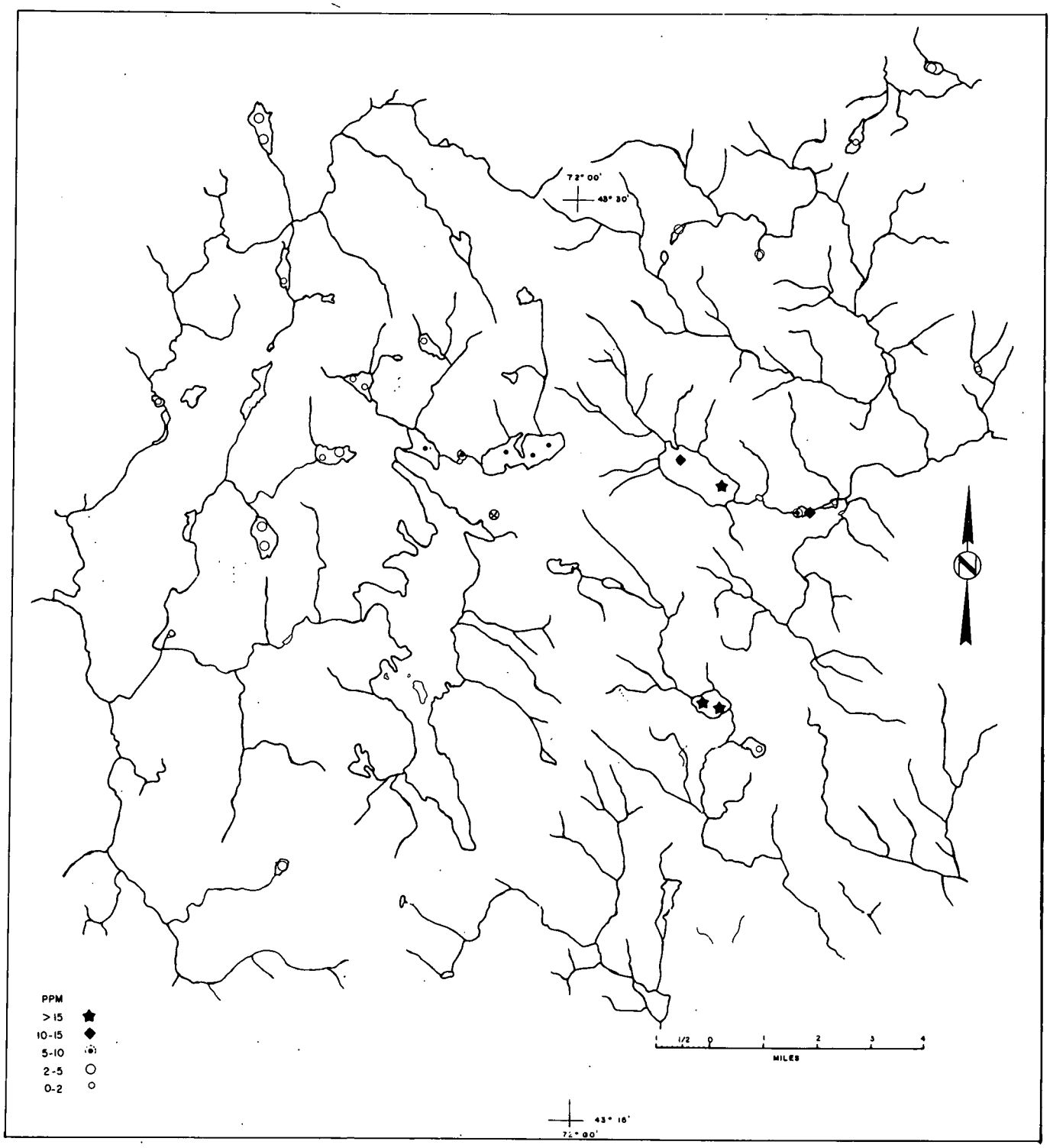

FIGURE 5. Uranium Content in Lake Sediments, -40 to +100 Mesh Fraction

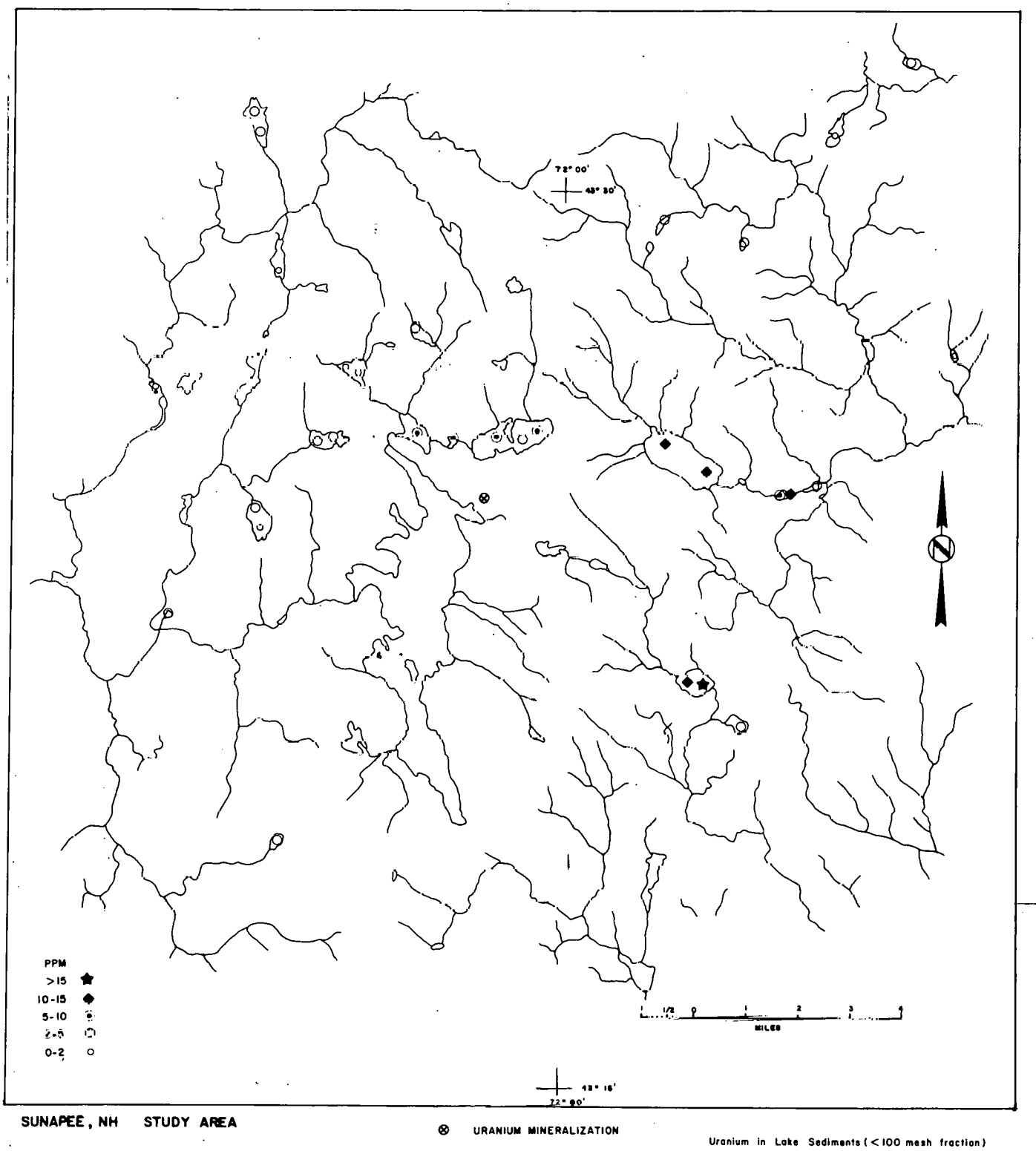

FIGURE 6. Uranium Content in Lake Sediments, -100 Mesh Fraction

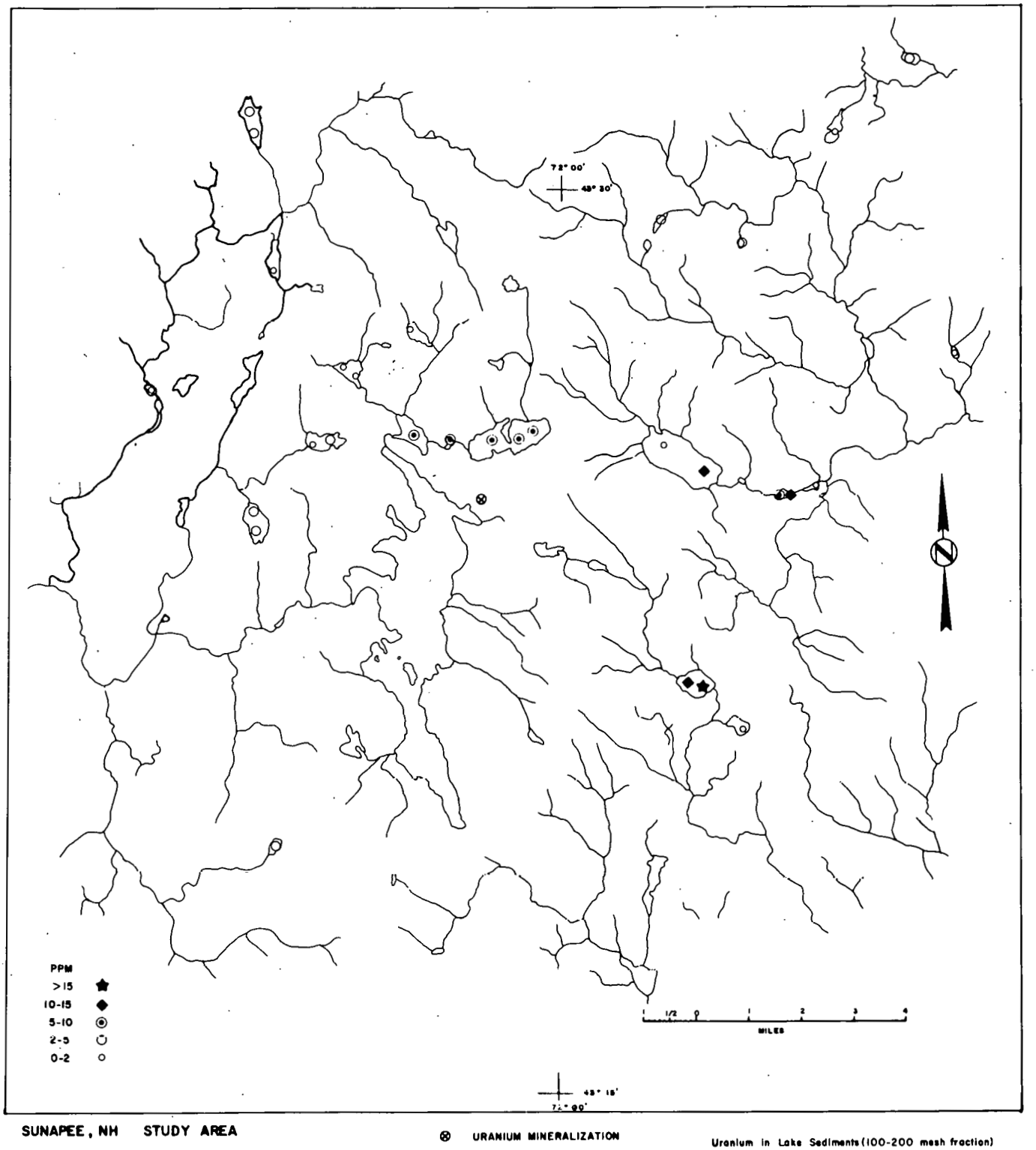

FIGURE 7. Uranium Content in Lake Sediments, -100 to +200 Mesh Fraction

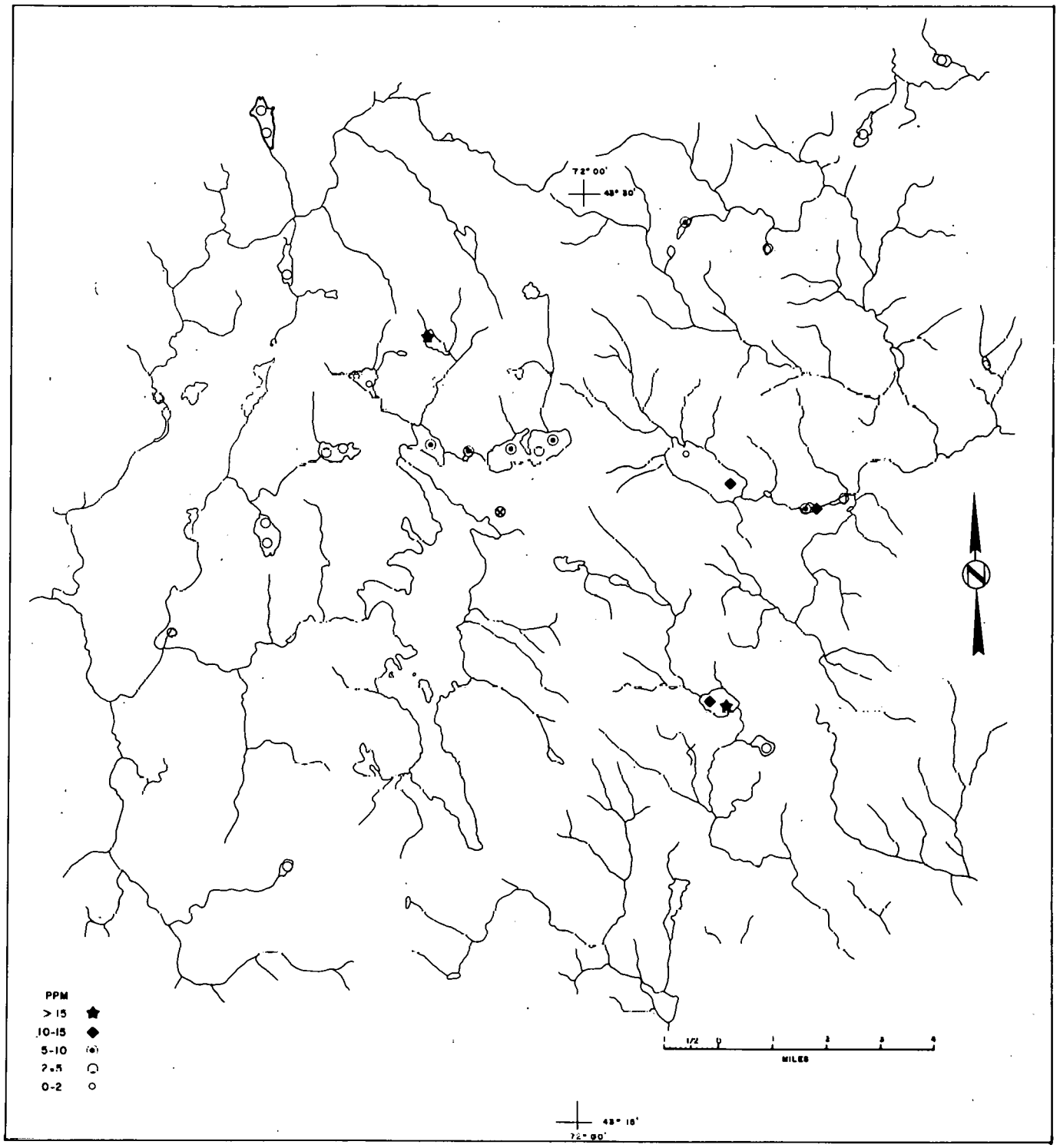

FIGURE 8. Uranium Content in Lake Sediments, -200 Mesh Fraction

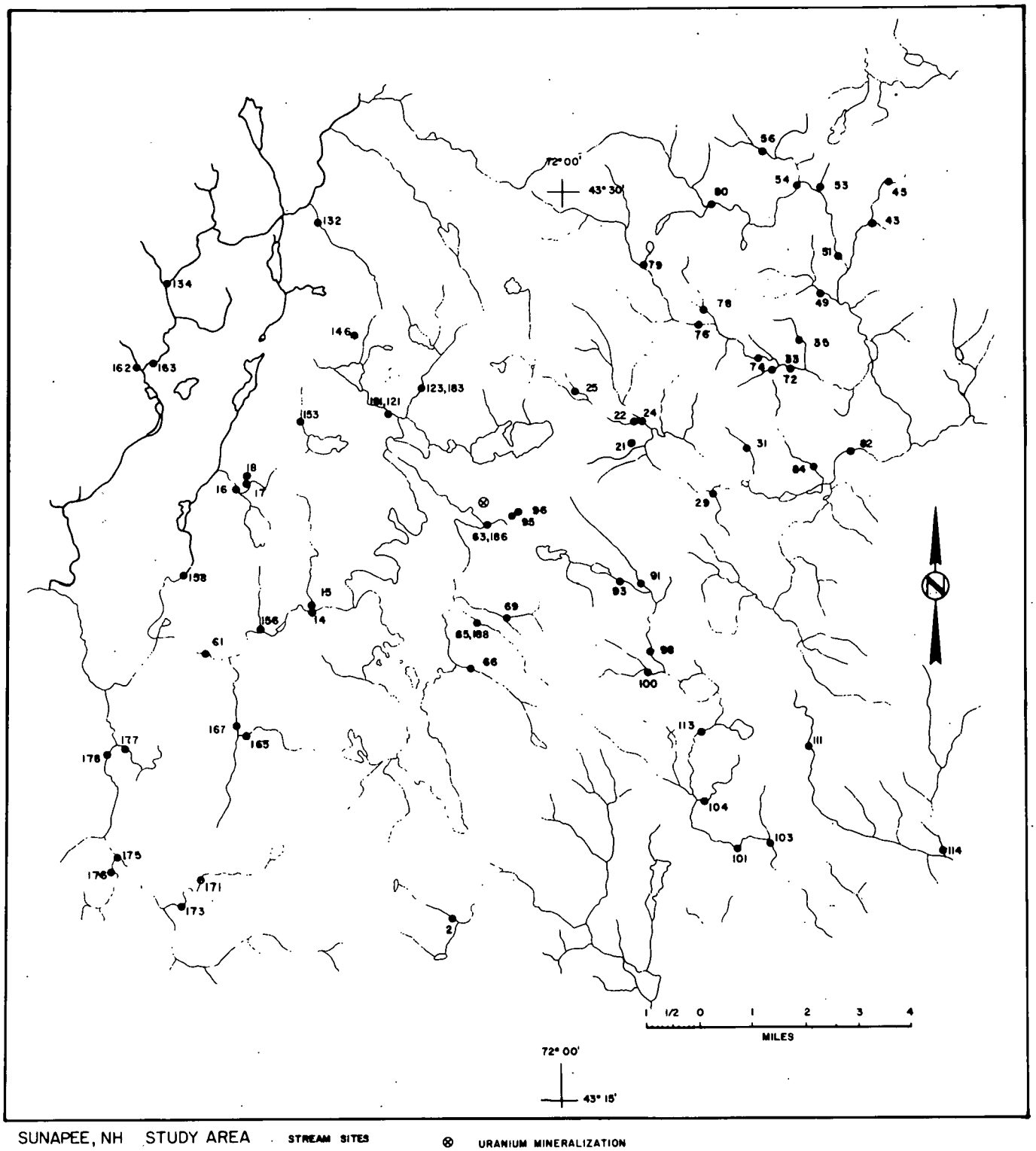

FIGURE 9. Stream Sampling Site Locations

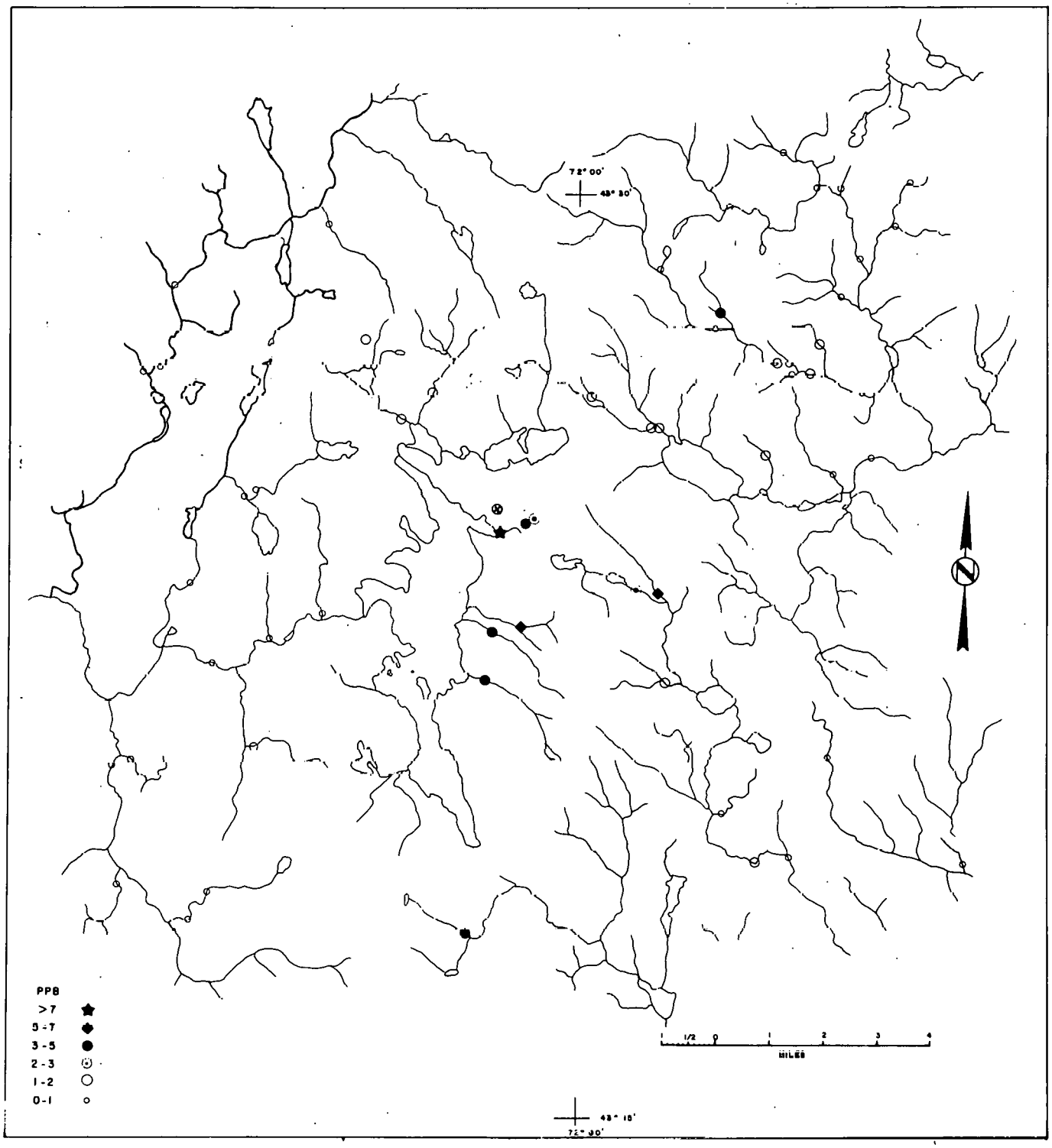

FIGURE 10. Uranium Content in Stream Water

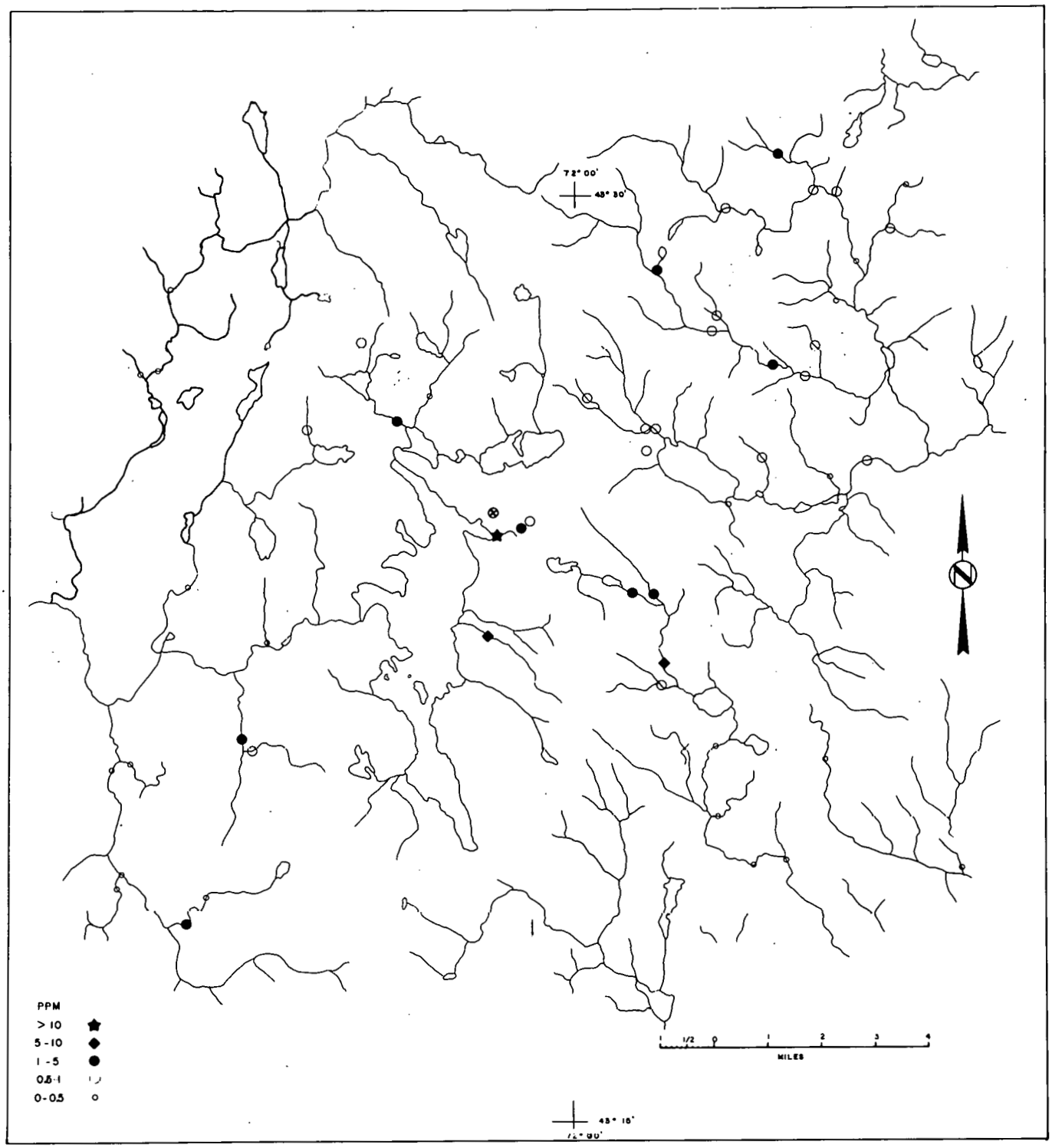

FIGURE 11. Uranium Content in Stream Sediments, -40 to +100 Mesh Fraction

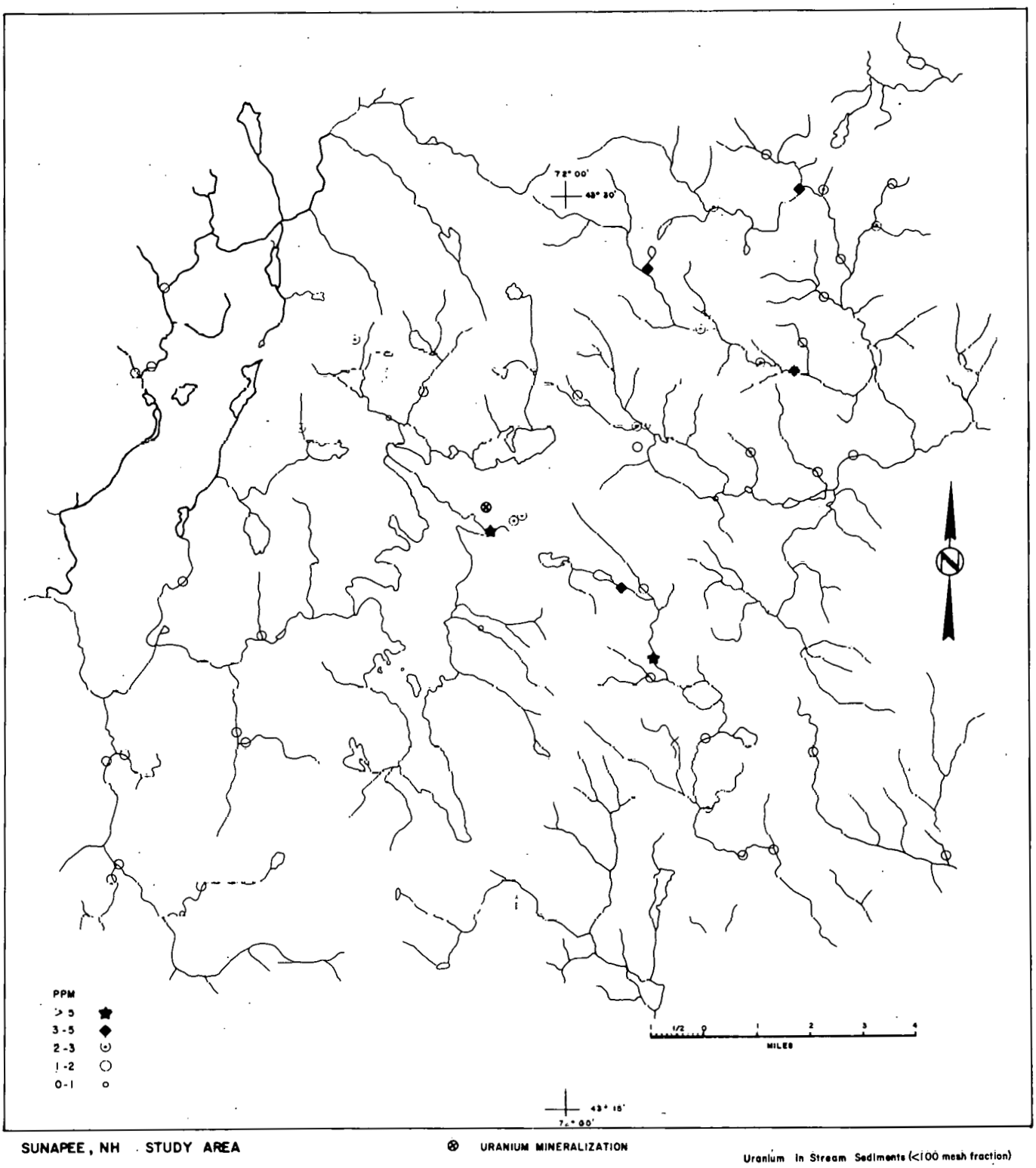

FIGURE 12. Uranium Content in Stream Sediments, -100 Mesh Fraction

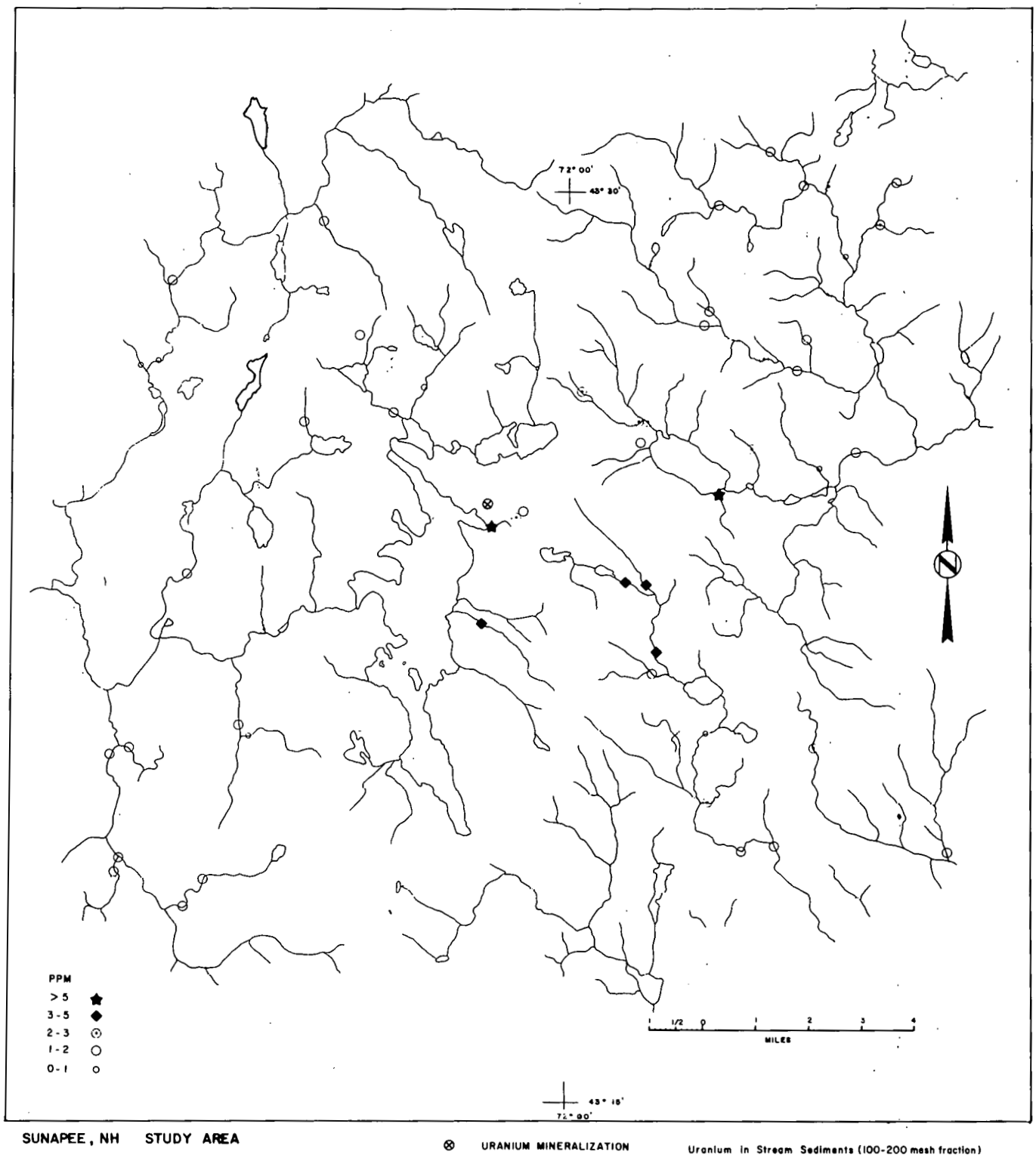

FIGURE 13. Uranium Content in Stream Sediments, -100 to +200 Mesh Fraction

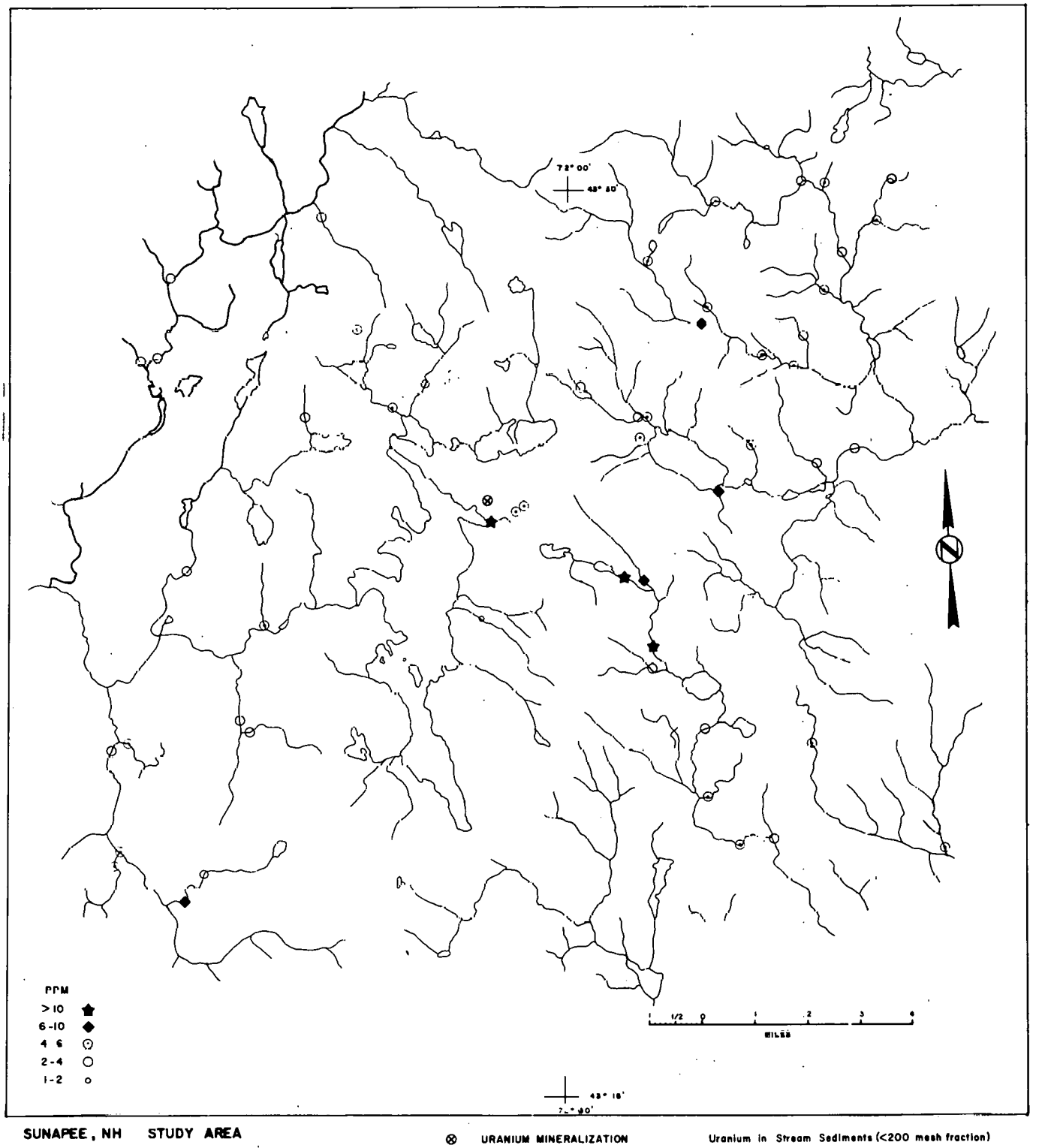

FIGURE 14. Uranium Content in Stream Sediments, -200 Mesh Fraction

TABLE 1. ANALYTICAL DATA FOR GROUND WATERS

SAMPLE	U	AL	BR	CL	DY	F	MN	NA	V	EH	PH	ALKALIN	CONDUCT	OXYGEN	AMMONIA	PHOSPHAT	NITRATE	SULFATE	DEPTH
020	0.205	52	M	20700	M	M	12	20200	M	603	4.4	0.52	120	0.36	0.10	0.07	0.01	6.10	M
023	2.385	32	19	2000	M	57	24	2200	M	M	7.1	0.18	14	0.22	0.13	M	0.05	3.40	M
026	0.117	28	9	3400	M	M	M	3400	0.2	651	6.3	0.32	92	3.25	0.23	0.23	1.08	12.00	M
030	0.325	95	M	15600	0.22	M	119	16600	M	511	6.2	0.54	313	1.44	1.26	0.09	1.31	17.80	M
032	1.735	69	16	3700	M	M	5	3300	M	359	7.5	0.46	113	3.25	0.16	0.16	0.56	7.80	250
034	6.653	89	12	M	0.09	M	26	M	M	231	7.7	0.92	18	3.75	0.07	0.02	0.05	2.00	M
036	3.463	31	M	2100	0.02	51	39	4800	M	263	7.4	0.78	138	2.71	0.06	M	1.13	3.30	100
038	0.718	1	M	M	M	34	1	100	M	251	7.4	0.58	127	2.91	0.20	0.36	M	12.00	250
040	0.041	21	7	1300	M	M	20	1200	M	250	6.1	0.08	41	3.17	0.36	0.02	M	16.00	10
042	1.078	119	M	1200	M	276	21	5800	M	193	7.5	0.74	203	1.57	0.38	0.20	M	8.80	200
044	0.105	24	M	23400	M	M	105	16900	M	277	7.6	0.26	201	2.00	0.87	0.01	0.47	13.80	20
046	0.229	123	15	1400	0.11	106	5	1600	M	252	6.9	1.12	208	3.00	0.06	M	0.22	4.50	200
047	0.576	34	4	1400	M	242	14	2800	0.2	193	7.8	0.32	81	3.41	0.21	0.26	M	11.40	220
050	0.201	31	10	1300	M	7	6	1400	0.3	219	7.3	0.28	58	3.57	M	0.22	0.04	7.20	M
052	0.119	71	M	1900	0.05	15	8	2000	0.1	292	7.4	0.06	39	4.70	0.34	0.03	0.32	1.00	20
055	0.227	82	8	3600	0.07	20	114	2700	M	346	7.8	0.10	93	1.59	0.12	0.23	1.10	12.00	30
057	0.117	29	18	2100	M	9	7	2300	0.6	296	7.0	0.58	107	3.55	0.21	0.21	M	2.80	20
058	1.663	21	16	2500	M	571	59	3800	M	114	7.2	0.78	185	1.56	M	0.21	M	10.50	250
062	M	M	M	M	M	M	M	M	M	269	7.9	0.08	44	3.69	0.56	0.15	0.12	4.20	M
064	13.870	46	12	2900	M	33	111	4700	0.5	249	7.2	0.60	128	2.54	0.08	0.10	0.01	1.50	M
067	19.520	M	M	M	M	M	M	7200	M	283	7.2	0.66	336	2.85	0.33	0.17	0.13	7.50	M
068	0.319	46	38	M	0.07	M	17	M	M	338	6.6	0.50	161	2.78	0.18	0.21	2.50	5.80	M
071	29.150	35	M	3900	0.11	329	62	11100	M	285	7.2	0.76	185	3.21	0.22	0.74	M	M	20
073	0.479	106	M	11200	M	M	M	10300	M	319	7.5	0.80	283	2.19	0.07	0.15	1.30	30.00	120
075	2.730	33	M	3000	M	1152	59	8100	M	702	6.1	0.68	132	3.96	0.06	M	0.16	3.00	100
077	23.310	82	M	3600	M	104	20	4400	M	411	7.7	0.68	119	4.67	0.12	0.12	0.20	2.00	127
083	0.043	207	10	1400	0.05	23	12	1200	0.3	650	6.8	0.24	57	0.56	0.06	0.11	0.06	M	18
087	0.751	41	23	3800	M	52	12	3400	0.6	-604	8.9	0.62	169	3.24	0.09	0.34	0.41	10.80	120
088	0.080	90	M	3600	M	17	11	3000	M	273	7.3	0.80	191	2.13	M	0.19	0.35	4.50	320
090	0.125	78	5	4800	M	121	28	2800	M	290	7.7	0.54	130	2.42	0.09	0.01	0.01	2.00	95
092	2.580	53	5	11500	0.14	M	11	M	M	280	8.1	0.12	109	3.30	M	0.04	M	3.10	350
094	24.520	27	M	5500	0.11	M	36	3900	M	231	6.7	0.64	143	1.32	M	M	M	3.80	150
099	2.835	21	23	5400	M	120	12	M	M	271	7.3	0.54	126	3.90	0.19	0.14	M	6.70	88
102	0.233	M	13	M	M	M	30	M	M	252	6.6	0.62	950	0.92	0.41	M	0.71	25.00	18
105	0.034	33	11	1700	0.02	68	7	M	M	296	7.4	0.08	39	5.34	0.45	0.45	M	23.00	25
108	0.061	253	M	2800	0.07	45	16	2700	M	203	8.3	0.34	88	3.18	0.59	0.29	0.04	6.00	127
110	0.023	23	4	1400	M	75	5	2200	0.2	303	7.6	0.14	35	3.90	0.03	0.03	M	5.80	M
112	0.023	44	M	5800	M	M	18	3200	M	300	7.2	0.14	13	2.20	0.70	0.14	0.11	3.30	8
116	1.060	24	40	2200	M	22	16	2900	M	247	6.7	0.40	33	3.73	0.09	0.01	0.08	1.00	300
122	0.057	48	M	26200	M	M	28	M	0.5	245	7.8	0.16	240	2.61	0.56	0.16	0.10	7.00	11
124	0.378	71	4	1100	0.02	106	7	2300	0.1	218	6.8	0.22	61	2.66	0.20	0.20	M	5.80	M
125	0.307	24	M	M	M	2541	13	14900	M	154	8.3	0.54	160	2.03	0.11	0.14	0.04	3.00	305
127	0.957	M	M	17700	M	M	85	14100	M	145	6.7	0.80	397	1.90	0.22	0.06	0.38	9.00	100
129	0.035	99	M	2000	M	M	10	1500	0.1	200	7.4	0.06	52	4.76	0.91	M	0.01	13.20	25
130	5.572	23	M	3600	M	387	12	7200	M	135	7.8	0.60	M	1.93	0.09	0.03	0.03	0.25	120
131	0.475	3598	M	900	0.13	M	M	2000	M	182	8.2	0.20	71	5.20	0.28	0.23	0.53	11.40	M
133	0.070	591	M	10000	M	M	26	5000	M	258	7.0	0.18	146	2.88	0.34	0.33	0.06	6.00	40
135	0.050	70	11	3800	0.04	12	20	3100	M	284	7.3	0.10	39	3.84	0.14	4.05	M	M	M
138	0.030	31	M	4300	M	M	38	2700	M	254	7.8	0.30	81	4.40	0.18	0.22	0.06	7.00	140
140	0.234	24	9	1400	0.02	97	8	M	M	240	7.2	0.22	47	4.14	0.13	0.02	0.01	2.00	M
143	1.403	130	18	15900	0.24	M	7	19200	M	262	7.5	0.30	193	4.30	0.53	0.38	0.43	22.40	M
145	4.951	21	7	1500	0.03	389	7	4800	0.1	468	7.5	0.52	M	3.19	0.19	0.19	0.06	M	558
147	100.500	34	M	11300	M	M	22	3000	M	314	7.4	0.52	142	1.99	0.06	0.37	1.20	5.00	678
150	0.078	21	12	M	M	M	3	M	M	307	7.9	0.34	81	3.90	0.14	M	0.04	6.00	22
154	0.206	144	20	1400	M	18	52	1900	M	344	6.0	0.38	80	1.98	0.60	0.79	0.04	3.00	12
155	0.260	81	19	3500	M	77	38	3600	0.1	245	6.9	0.48	151	2.90	0.65	M	0.08	1.80	100

TABLE 1. ANALYTICAL DATA FOR GROUND WATERS

SAMPLE	U	AL	BR	CL	DY	F	MN	NA	V	EH	PH	ALKALIN	CONDUCT	OXYGEN	AMMONIA	PHOSPHAT	NITRATE	SULFATE	DEPTH
157	M	M	M	M	M	M	M	M	M	297	7.1	0.42	37	2.30	0.26	M	M	8.4	30
159	1.609	21	M	2800	0.05	1089	15	5500	0.1	205	8.1	0.54	118	0.98	M	M	M	M	450
161	0.447	6	M	63600	M	M	8	900	M	335	7.2	0.52	1116	3.36	0.53	0.09	0.34	9.8	20
164	0.680	29	18	M	M	704	29	6200	M	238	7.7	0.68	145	2.51	M	M	M	M	350
166	0.108	29	13	1700	M	82	7	3400	0.1	186	8.7	0.42	87	2.58	0.43	0.43	0.28	22.0	12
168	0.773	25	12	1700	M	196	2	3100	0.5	208	8.2	0.32	74	3.02	0.25	M	0.32	5.0	200
170	0.504	156	30	5100	1.10	M	15	6800	0.1	299	7.0	0.08	113	3.31	0.47	0.12	M	10.1	14
172	0.082	20	16	3300	0.08	M	10	2600	0.1	325	6.5	0.10	59	2.59	0.91	3.90	0.25	21.0	M
174	0.030	42	18	3400	0.06	35	10	3000	M	292	7.3	0.22	68	3.27	0.20	0.26	0.24	11.0	15
179	0.048	72	16	8500	M	M	9	M	M	353	9.1	0.06	54	3.17	0.28	0.10	0.06	22.0	40
180	0.033	284	16	5800	M	M	41	5400	0.2	269	8.2	0.36	130	4.01	0.03	0.16	2.90	14.0	9
182	0.106	83	M	42300	M	M	30	56100	M	302	6.5	0.18	206	2.26	0.18	0.18	M	15.0	11
184	0.213	34	12	4500	M	4557	25	43700	M	208	7.4	0.84	188	1.99	0.61	0.20	0.56	20.0	305
185	0.581	59	M	M	0.05	M	11	M	M	251	8.9	0.20	54	4.40	0.15	0.55	M	3.0	M
187	21.240	26	8	3900	0.14	292	144	5700	1.4	171	8.1	0.68	128	2.50	0.18	0.12	0.08	2.0	1

TABLE 2. ANALYTICAL DATA FOR LAKE WATERS

SAMPLE	U	AL	BR	CL	DY	F	MN	NA	V	EH	PH	ALKALIN	CONDUCT	OXYGEN	AMMONIA	PHOSPHAT	NITRATE	SULFATE	DEPTH
001	0.029	36	11	8400	M	M	8	6200	M	-59	8.0	0.08	115	5.34	M	M	M	M	18
003	0.066	55	11	6100	M	M	3	M	M	393	6.9	0.06	66	3.28	M	M	M	M	40
004	0.059	64	11	6400	M	M	2	M	M	259	6.8	0.06	65	4.19	M	M	M	M	50
005	0.053	42	M	M	M	M	4	M	M	96	9.9	0.06	70	5.98	M	M	M	M	80
006	0.058	40	M	6800	M	16	3	4600	M	232	7.0	0.06	65	4.39	M	M	M	M	60
007	0.055	36	6	M	M	M	2	M	M	231	6.9	0.06	62	9.58	M	M	M	M	95
008	0.056	30	M	6300	M	M	M	4800	M	251	6.0	0.06	63	4.71	M	M	M	M	90
009	0.067	41	M	M	M	M	3	M	M	251	6.0	0.06	59	4.58	M	M	M	M	80
010	0.070	35	M	5600	M	M	M	M	M	255	5.9	0.06	58	4.62	M	M	M	M	70
011	0.067	33	10	5900	M	40	3	4200	0.2	213	6.2	0.08	58	4.42	M	M	M	M	45
012	0.053	32	6	5600	M	M	4	M	M	225	8.2	0.06	62	4.45	M	M	M	M	90
013	0.061	34	M	M	M	M	5	M	M	483	5.6	0.06	62	4.28	M	M	M	M	50
027	0.128	30	M	3200	M	24	2	2400	M	335	7.1	0.08	36	4.36	0.18	0.07	0.01	4.0	35
028	0.023	M	M	M	M	M	M	M	M	327	7.0	0.06	36	4.60	0.12	M	M	6.6	60
037	0.114	44	10	1300	M	35	13	1200	0.1	299	8.0	0.10	28	4.36	M	M	M	M	24
039	0.024	46	10	1300	M	25	11	900	M	270	6.4	0.18	19	3.74	0.24	0.11	M	8.8	M
041	0.113	55	M	6800	M	M	118	4700	M	199	6.2	0.12	13	2.35	0.34	0.18	0.04	4.5	5
048	0.108	60	9	1400	M	13	M	1400	0.1	236	6.1	0.06	32	8.10	0.60	0.18	M	10.8	M
059	0.049	46	9	1200	M	26	8	800	0.4	219	8.2	0.06	22	3.65	0.12	M	0.03	4.5	12
060	M	M	M	M	M	M	M	M	M	253	8.1	0.10	41	3.77	0.18	M	0.02	4.9	5
070	0.789	49	7	6300	0.07	26	9	M	M	392	7.9	0.06	72	4.54	0.42	0.04	0.03	8.0	M
081	0.040	44	M	400	0.01	23	9	300	0.1	449	6.8	0.04	17	3.42	0.68	0.03	M	4.5	M
085	0.062	22	10	2700	0.02	40	8	1700	M	283	7.6	0.06	41	4.31	0.08	0.44	M	1.4	10
086	0.067	27	M	3500	M	36	11	2600	M	320	7.2	0.06	M	4.25	0.11	0.03	0.01	3.1	12
089	0.619	67	M	9200	M	838	6	22900	0.5	274	8.2	0.06	44	5.77	0.07	M	0.10	1.5	4
097	0.407	89	21	9900	M	M	10	6800	M	238	7.9	0.06	73	4.15	0.37	M	0.01	6.7	5
106	0.094	20	11	10300	M	M	M	7200	M	233	7.8	0.08	101	3.67	0.19	0.04	0.06	5.8	18
107	M	M	M	M	M	M	M	M	M	368	7.1	0.08	98	2.66	0.47	0.47	0.06	M	12
109	0.014	36	M	3000	M	31	4	2400	0.1	339	7.5	0.08	30	4.55	0.08	0.03	0.06	2.0	M
115	M	M	M	M	M	M	M	M	M	225	8.0	0.04	68	3.50	0.49	0.52	M	6.0	25
117	M	M	M	M	M	M	M	M	M	220	7.5	0.06	68	3.70	0.22	0.02	M	8.0	6
118	0.093	38	M	4300	M	M	11	2700	0.1	280	8.3	0.04	50	4.45	M	M	M	M	35
119	0.087	27	M	4300	M	11	13	2800	0.1	267	8.3	0.04	48	4.23	0.21	M	0.01	3.1	15
120	52.110	44	M	3400	M	282	24	10100	M	278	9.1	0.04	50	3.68	0.19	0.03	M	6.9	18
126	M	M	M	M	M	M	M	M	M	227	7.7	0.04	23	5.16	0.56	M	0.47	14.0	M
128	0.038	32	6	4100	M	M	3	2600	M	202	7.6	0.06	49	2.26	0.17	0.24	0.21	4.0	20
136	0.025	31	M	5000	0.09	M	41	2800	M	317	7.5	0.08	67	4.12	0.22	0.06	0.02	12.0	30
137	0.078	37	16	2200	M	38	64	1800	M	301	8.0	0.06	66	4.28	0.19	0.04	0.04	5.0	40
139	M	M	M	M	M	M	M	M	M	235	8.7	0.14	96	3.78	0.26	0.04	M	2.0	M
141	0.055	38	M	6100	0.07	M	11	4800	M	318	8.3	0.06	59	4.21	0.27	0.12	0.07	5.5	16
142	0.054	26	M	4000	M	22	5	2900	M	598	7.4	0.08	63	4.53	0.65	M	0.07	27.0	14
144	0.083	86	16	2300	M	35	10	1500	M	680	6.9	0.04	29	3.96	0.59	M	0.06	14.0	M
148	1.917	313	6	1600	M	14	19	2700	M	280	7.9	0.04	34	4.56	5.10	5.10	M	M	M
149	0.127	19	15	2800	M	34	5	1800	0.1	218	8.1	0.06	35	5.72	0.30	0.30	M	9.0	10
151	0.057	33	9	1200	M	40	10	600	0.1	388	7.4	0.06	19	4.31	0.36	0.20	0.03	M	15
152	0.041	36	5	1100	M	21	11	600	M	346	7.7	0.06	19	4.81	0.16	0.09	0.01	3.7	12
160	0.082	40	15	3800	M	12	14	3700	M	250	8.5	0.08	50	3.82	0.23	0.23	M	6.0	2
169	0.023	22	17	2800	M	M	3	2500	0.1	208	8.5	0.06	38	3.79	0.62	M	0.10	8.0	15

TABLE 3. ANALYTICAL DATA FOR LAKE SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
060	S6	0.5	1	18300	M	1.1	M	4180	2	9	M	300	8330	1.6	M	1250	7	1.9	0.78
060	S7	2.2	3	14900	26	M	M	5040	13	13	0.5	240	6590	2.6	2	1200	15	2.7	2.15
060	S8	1.5	4	31900	19	0.6	M	3190	7	13	M	490	10310	4.7	1	M	10	2.1	1.56
060	S9	4.3	8	37000	43	3.0	0.4	5130	24	28	1.5	440	7190	4.1	5	4200	13	4.0	3.03
080	S6	14.8	2	24100	32	2.4	1.2	4530	2	21	M	470	2410	3.0	5	1150	14	M	0.79
080	S7	14.4	2	24300	27	3.1	0.8	6350	1	13	0.7	550	3390	2.9	3	520	18	M	2.14
080	S8	0.7	M	14600	M	M	M	4410	3	8	M	120	7340	1.8	M	790	15	M	1.59
080	S9	1.8	6	9600	26	2.9	0.2	3910	9	16	0.7	120	5390	3.0	3	420	7	1.8	2.51
081	S6	0.4	M	18000	M	1.4	1.1	M	M	4	M	60	7860	1.9	M	M	9	M	22.25
081	S6	3.2	4	23500	34	1.2	M	M	2	31	M	110	5710	3.7	2	890	16	2.7	22.25
081	S7	0.9	M	13200	M	2.1	M	1670	3	13	M	130	6590	3.1	1	480	7	2.1	27.79
081	S7	4.7	4	15700	39	2.1	1.8	5770	5	35	M	110	3960	3.1	5	1260	16	1.6	27.79
081	S8	11.2	2	20200	33	2.3	0.4	6360	1	18	M	440	2440	2.5	3	1030	21	M	23.62
081	S8	4.5	4	14000	43	3.1	0.2	8080	3	32	M	100	3920	4.5	M	700	10	M	23.62
081	S9	8.2	1	16700	M	2.2	M	3010	M	10	0.5	380	2560	1.4	M	720	16	M	30.17
081	S9	5.2	2	11100	60	1.8	M	4230	4	39	M	70	2660	4.8	6	930	14	3.3	30.17
085	S6	5.5	2	21400	22	2.1	M	6990	2	15	M	170	6560	2.2	2	810	13	M	19.71
085	S7	9.7	3	21800	57	1.2	0.1	5710	6	22	0.6	260	5620	3.0	5	1920	25	M	26.03
085	S8	7.9	4	22700	27	1.4	1.7	10440	4	30	M	250	6840	5.8	1	1380	19	2.8	24.82
085	S9	9.9	5	24600	48	1.9	0.4	6550	7	27	0.5	230	6260	3.0	4	1230	17	3.0	31.96
085	S6	12.4	2	26200	32	2.3	0.5	10590	4	26	M	240	5300	4.7	3	1630	21	M	36.31
085	S7	12.6	5	25700	47	1.5	0.2	8200	5	25	0.9	250	6300	3.2	6	1990	19	M	30.25
085	S8	11.2	2	23100	27	1.1	M	8890	2	22	M	230	6240	4.8	3	1530	15	M	23.94
085	S9	12.5	4	24700	45	2.4	0.3	6430	7	26	0.6	230	7150	3.7	4	1830	21	2.3	27.17
089	S6	0.8	M	21800	26	1.3	M	2800	3	M	M	80	7950	2.1	M	530	9	1.8	6.81
089	S7	2.1	3	12200	33	1.6	1.4	3560	9	21	M	100	4260	2.6	2	970	11	2.3	16.72
089	S8	1.3	3	14100	M	M	M	4060	5	9	M	140	5220	2.8	1	730	11	2.2	9.64
089	S9	2.5	5	13900	37	1.2	M	5050	11	18	0.7	100	4390	2.2	3	1280	13	3.7	18.56
098	S6	1.2	4	25500	41	1.6	M	4530	2	19	M	130	3300	3.9	2	1010	17	2.3	3.66
098	S7	1.2	3	25100	21	2.6	0.5	4660	2	18	0.3	140	4060	3.0	2	1450	15	1.9	8.79
098	S8	1.2	3	24700	M	1.7	M	5750	1	18	M	150	4000	4.5	2	1270	20	M	7.86
098	S9	1.3	4	22900	16	2.9	M	5680	3	18	M	130	3690	3.0	2	830	18	1.2	13.32
107	S6	0.5	2	16900	17	M	0.5	4320	1	7	M	230	7430	2.5	M	630	12	M	33.11
107	S7	1.5	6	12800	40	2.5	M	6670	7	21	0.7	270	5940	5.4	3	880	16	2.3	33.10
107	S8	1.2	3	12500	44	2.3	0.4	9010	5	17	0.9	250	5740	5.9	2	1100	11	M	34.49
107	S9	3.5	11	13500	71	1.7	0.8	7040	29	35	1.6	330	5780	4.1	6	2230	20	5.5	33.06
114	S6	0.5	M	20100	M	1.6	M	5480	M	8	0.8	190	8930	1.7	M	790	9	M	0.63
114	S7	1.7	M	14300	M	1.6	M	M	12	M	M	300	6530	6.3	105	1220	10	M	1.16
114	S8	2.1	6	14400	51	1.6	0.4	4410	16	39	1.6	400	6600	4.9	3	2140	18	3.2	0.91
114	S9	4.7	12	11800	85	1.5	M	7040	44	47	2.2	270	5560	6.2	7	1840	10	6.1	1.74
136	S6	2.7	M	25600	19	3.1	0.3	7080	2	24	0.4	360	5410	4.7	4	1430	24	1.8	33.96
136	S7	2.5	3	27300	17	3.6	0.4	9410	2	37	0.5	360	5920	5.4	4	2010	31	M	28.96
136	S8	2.3	2	26900	25	4.1	1.0	8620	M	25	0.5	370	4910	5.4	4	1850	35	2.3	34.68
136	S9	2.6	5	28100	19	4.2	0.7	6920	2	30	0.6	350	6560	5.0	5	1260	33	M	28.37
137	S6	2.3	3	24000	27	4.7	1.1	6160	1	29	M	3240	82470	3.6	4	1370	19	M	37.50
137	S7	2.2	M	18900	10	3.4	0.7	5930	2	27	M	680	11190	3.8	3	1550	25	M	36.32
137	S8	2.3	3	20400	36	3.9	0.1	5900	2	33	0.4	250	4540	3.2	4	1180	25	M	37.84
137	S9	2.4	M	20600	M	3.9	0.6	7110	M	M	M	240	3670	3.1	17	1210	25	M	36.51
139	S6	0.4	M	34100	M	1.8	M	2290	M	4	M	340	16870	2.2	M	1480	8	M	0.96
139	S7	1.6	3	33900	31	1.6	M	7920	5	22	2.2	550	14690	4.2	3	3160	36	3.4	1.16
139	S8	1.1	2	36400	10	5.3	M	7460	3	10	0.9	590	15440	5.2	1	3290	36	2.3	1.03
139	S9	2.8	9	36900	52	5.3	1.1	10560	17	25	2.1	760	15480	8.7	3	5260	51	7.2	1.53
141	S6	1.7	2	9500	19	2.4	0.5	3290	1	16	0.4	110	2400	1.7	3	360	7	M	42.99
141	S7	1.7	2	10600	20	3.7	M	2620	1	23	1.0	120	2550	1.8	4	570	3	M	41.62
141	S8	1.7	M	10000	11	2.3	0.7	1500	M	22	M	110	2460	1.5	3	390	6	1.7	42.55
141	S9	1.8	2	11400	18	2.6	M	2730	1	19	0.5	120	3140	2.1	3	660	9	M	40.28

TABLE 3. ANALYTICAL DATA FOR LAKE SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
142	S5	1.7	M	11800	15	3.0	M	2390	1	23	0.3	130	2940	1.9	2	680	10	0.8	37.91
142	S7	1.7	M	13700	M	5.5	M	M	2	M	M	130	2500	2.1	M	1000	12	M	33.90
142	S8	1.8	M	12800	16	2.8	0.3	2450	1	24	M	120	2160	2.5	3	400	12	M	35.72
142	S9	1.8	M	13600	M	2.8	M	M	2	M	M	130	2800	2.0	M	940	10	M	33.50
144	S6	0.2	M	22900	M	1.2	M	5240	M	3	M	560	9450	2.8	M	M	7	3.8	0.20
144	S7	2.3	7	25600	43	7.5	0.4	7850	14	20	2.9	1240	8520	4.6	4	5250	23	5.6	0.36
144	S8	1.4	4	26300	51	3.3	M	8730	8	10	1.1	1230	9030	5.0	3	3910	21	8.1	0.33
144	S9	17.8	40	18300	226	21.1	0.5	970	205	131	10.0	980	7900	9.0	22	8400	21	27.6	0.55
148	S6	3.6	3	10100	M	5.4	1.0	4050	M	27	0.7	120	1420	3.8	3	520	13	2.0	42.70
148	S7	3.4	3	10100	22	6.0	0.3	4490	M	24	0.5	120	1310	2.8	5	530	11	2.6	M
148	S8	3.7	2	10300	19	5.2	0.4	4100	1	31	M	130	1240	3.6	5	750	12	3.4	57.88
148	S9	3.9	3	10900	23	4.1	M	2430	1	28	M	130	1330	3.7	5	710	12	M	57.52
149	S6	3.3	3	10400	19	5.9	1.1	5600	1	28	0.6	110	1320	2.1	5	740	10	4.9	61.89
149	S7	1.7	M	6200	11	2.3	M	2510	1	14	M	70	1000	1.8	2	280	6	M	M
149	S8	3.8	2	21700	29	1.5	0.7	6690	2	27	1.2	170	3170	3.9	5	670	12	2.1	29.05
149	S9	3.5	1	10200	16	4.1	M	3990	M	21	0.8	110	1390	2.3	5	730	11	1.1	63.52
151	S6	3.9	2	21800	29	4.6	0.5	7580	1	27	M	170	3050	3.6	4	600	10	3.1	30.92
151	S7	3.8	5	22500	29	6.2	0.5	5360	2	28	0.8	190	3570	3.1	4	870	17	3.4	29.61
151	S8	3.6	4	11000	M	6.2	1.4	4970	2	30	M	120	1700	4.3	4	400	10	1.5	60.27
151	S9	4.1	5	22700	32	4.5	0.4	6960	2	24	0.9	190	3430	4.4	5	1040	19	5.2	30.48
152	S6	1.7	3	20500	20	1.2	M	4550	3	15	M	190	7710	3.3	M	810	9	1.8	8.35
152	S7	2.7	4	17900	27	2.5	0.5	4990	9	16	1.3	220	6520	4.5	3	1470	14	3.6	9.86
152	S8	1.6	1	21600	23	1.9	0.4	7140	3	10	M	180	8120	2.6	2	910	16	M	8.99
152	S9	3.3	6	17200	35	3.6	0.3	1520	13	23	1.7	260	6320	3.8	5	1570	15	5.1	13.13
160	S6	0.4	2	9800	M	M	M	11760	2	6	0.9	540	4770	5.2	1	920	6	2.0	0.83
160	S7	1.7	3	9900	20	2.1	0.6	8990	5	10	1.3	370	3970	4.7	2	1200	16	M	1.71
160	S8	1.6	11	7900	36	2.5	M	11580	8	7	1.9	360	3310	8.0	2	1770	13	5.8	1.47
160	S9	2.5	7	31800	34	2.6	0.7	11640	15	25	1.1	520	10820	5.9	3	7160	36	5.8	1.99
169	S6	3.6	3	19200	M	4.0	M	5360	2	24	M	240	3090	2.8	1	970	15	2.9	26.93
169	S7	3.9	2	19100	32	1.9	0.7	6100	3	20	0.9	250	4330	2.6	4	850	14	1.7	24.93
169	S8	3.7	6	20600	16	3.3	0.7	5990	2	26	0.8	250	2800	6.0	3	920	21	1.9	27.68
169	S9	3.9	4	20500	27	2.8	M	3490	4	25	1.1	240	3860	5.2	4	1320	16	1.2	25.40

TABLE 4. ANALYTICAL DATA FOR STREAM WATERS

SAMPLE	U	AL	BR	CL	DY	F	MN	NA	V	EH	PH	ALKALIN	CONDUCT	OXYGEN	AMMONIA	PHOSPHAT	NITRATE	SULFATE
002	0.044	226	M	1500	M	33	34	1300	0.1	152	6.0	0.02	25	2.66	M	M	M	M
014	M	M	M	M	M	M	M	M	M	165	8.7	0.08	71	4.40	0.50	M	0.10	6.0
015	0.054	56	M	8200	M	M	14	5800	M	250	7.9	0.16	92	3.33	0.24	0.09	0.31	M
016	0.025	61	14	2100	M	45	8	1500	0.1	245	7.2	0.08	31	4.27	1.00	0.07	0.16	1.8
017	0.065	103	13	1500	M	52	11	1000	0.3	340	7.0	0.14	24	4.85	0.22	0.22	M	M
018	0.115	40	12	12900	M	M	16	M	M	234	7.8	0.58	126	2.16	0.28	0.22	0.86	7.0
021	M	M	M	M	M	M	M	M	M	729	7.5	0.52	125	0.90	0.95	0.48	0.08	3.0
022	0.128	38	M	2500	M	28	15	1500	0.1	190	10.5	0.14	36	3.99	0.12	0.95	0.08	22.0
024	0.160	205	18	1800	M	30	7	1400	M	336	7.0	0.06	30	4.60	0.14	0.14	M	4.8
025	0.134	53	16	2000	M	34	6	1800	0.1	536	7.1	0.08	29	3.90	0.22	M	0.06	5.5
029	M	M	M	M	M	M	M	M	M	338	6.8	0.10	113	2.82	0.14	0.14	0.16	8.8
031	0.122	44	20	2500	0.02	38	16	2300	M	474	3.8	0.18	20	3.30	0.70	0.01	0.05	2.8
033	0.282	70	25	7200	M	M	312	5400	M	248	7.4	0.14	62	2.85	0.09	M	0.01	3.0
035	0.150	53	19	1400	M	20	10	5300	M	274	7.8	M	30	3.77	0.22	0.07	0.04	4.5
043	0.093	49	8	1700	M	M	12	1900	0.2	229	7.2	0.14	40	3.20	0.53	0.26	M	7.8
045	0.003	32	M	4300	M	M	6	4000	M	240	7.3	0.18	70	3.85	0.48	0.02	0.05	2.8
049	0.062	42	15	1600	M	32	23	1800	0.1	226	6.8	0.12	35	4.20	0.21	0.09	0.02	4.3
051	0.060	83	10	1400	M	27	8	1400	M	263	7.7	0.08	23	4.25	0.72	0.03	M	M
053	0.041	78	10	1100	0.03	8	4	1500	0.1	301	6.2	0.04	27	4.70	0.28	M	0.02	3.0
054	0.050	62	8	1300	M	42	6	1100	M	300	6.5	0.06	20	5.41	0.19	M	0.26	1.0
056	0.042	38	9	1400	M	42	M	1500	0.1	274	7.6	0.12	31	3.60	0.20	0.01	0.04	2.0
061	0.048	33	12	8200	M	M	13	6000	M	260	7.5	0.08	76	5.18	0.18	0.18	M	M
063	1.589	517	56	32900	0.11	M	174	21100	M	307	7.2	0.12	245	3.36	0.51	0.01	0.05	4.8
065	0.330	42	7	1300	0.01	32	9	1600	M	230	8.2	0.12	32	3.31	0.20	0.21	0.06	9.0
066	0.438	109	2	2400	M	M	15	1800	M	297	7.4	0.06	19	3.22	1.20	0.19	0.02	13.0
069	0.605	188	17	3400	M	M	37	2500	M	296	6.7	0.36	44	3.17	0.43	0.01	0.30	3.4
072	0.059	25	M	4100	M	M	448	3300	M	355	8.1	0.24	77	1.57	0.21	0.08	0.71	3.0
074	0.183	49	15	3800	M	M	163	3700	M	527	7.6	0.10	53	5.45	0.45	M	0.01	8.7
076	0.078	59	11	5100	M	M	21	3400	M	452	8.1	0.06	48	3.73	0.13	0.04	M	1.5
078	0.399	82	13	1100	M	46	89	900	M	703	7.6	0.06	20	3.51	0.50	0.09	0.03	1.5
079	0.084	353	4	1300	M	19	11	900	0.7	504	7.0	0.06	19	3.76	0.18	0.86	0.02	3.0
080	0.098	93	12	1300	M	46	9	1100	M	448	7.5	0.06	14	5.16	0.47	M	0.02	1.5
082	0.078	868	M	4400	M	20	23	3500	M	403	5.1	0.10	46	4.62	0.53	M	0.07	3.0
084	0.034	42	10	1500	M	24	12	1400	M	849	6.2	0.12	32	4.25	0.15	0.15	M	M
091	0.655	127	7	19600	M	M	79	19500	M	316	6.5	0.02	318	3.59	1.10	0.07	0.06	12.0
093	0.273	33	M	11200	0.09	M	77	5400	M	264	6.6	0.06	99	3.55	0.08	0.08	0.13	9.8
095	0.404	92	23	3900	M	M	99	2500	M	248	9.0	0.12	47	2.13	0.50	M	0.01	4.9
096	0.270	925	23	7800	M	M	M	5800	M	209	8.0	0.20	15	4.92	0.17	M	0.02	4.6
100	0.194	219	20	2700	M	40	M	1800	0.2	203	8.8	0.08	29	5.51	0.10	0.11	0.02	2.9
101	0.110	58	23	14000	M	M	65	11000	M	226	7.6	0.14	104	4.15	0.52	M	0.02	5.1
103	0.048	28	M	9500	M	M	20	8100	M	241	7.8	0.14	96	4.07	0.29	M	0.03	4.3
104	0.041	32	M	12900	M	M	12	8300	M	290	7.2	0.16	99	4.85	0.11	0.11	M	23.0
111	0.021	23	M	21600	M	M	73	13600	M	273	7.4	0.18	219	3.33	0.34	0.21	0.14	7.2
113	M	M	M	M	M	M	M	M	M	332	9.4	0.14	92	6.27	0.16	0.16	0.07	4.8
114	0.041	56	19	1600	0.03	26	39	2700	0.1	272	7.2	0.10	25	3.65	0.11	M	M	7.5
121	0.083	46	30	7500	M	M	44	5300	M	202	8.6	0.06	94	5.09	0.29	M	0.01	6.0
123	M	M	M	M	M	M	M	M	M	215	7.7	0.08	51	5.27	0.42	0.01	0.10	5.8
132	0.027	49	10	1500	0.02	15	11	2100	M	243	7.5	0.08	42	3.96	0.85	M	0.08	4.5
134	0.046	321	6	1400	M	37	5	3100	M	250	7.3	0.08	54	5.60	0.71	0.64	0.04	6.0
146	0.107	176	10	1400	0.08	36	36	1000	M	331	9.1	0.06	23	3.75	0.34	M	0.08	7.2
153	M	M	M	M	M	M	M	M	M	363	6.3	0.04	20	3.47	0.09	M	M	4.5
156	0.077	78	9	3200	0.04	39	19	2500	M	260	8.9	0.08	35	3.45	1.10	M	0.01	6.7
158	0.078	66	M	2000	0.02	14	13	1500	M	212	8.2	0.08	32	4.15	0.50	0.05	M	M
162	0.099	70	9	4200	M	32	8	1700	M	202	8.9	0.08	27	4.59	0.22	M	0.02	5.8
163	0.040	37	M	5200	M	M	20	3400	M	248	8.1	0.10	53	4.14	0.21	0.21	0.08	12.0
165	0.106	53	10	14200	M	M	15	12000	M	155	9.1	0.14	112	3.45	0.65	M	0.14	10.2

TABLE 4. ANALYTICAL DATA FOR STREAM WATERS

SAMPLE	U	AL	BR	CL	DY	F	MN	NA	V	EH	PH	ALKALIN	CONDUCT	OXYGEN	AMMONIA	PHOSPHAT	NITRATE	SULFATE
167	0.028	36	M	4000	M	37	15	3600	M	213	9.0	0.16	64	3.45	M	M	M	M
171	0.087	90	M	10200	M	M	45	6400	M	310	7.2	0.08	83	3.30	0.31	0.07	0.95	8.4
173	0.046	47	11	3000	0.04	M	8	2400	M	282	7.7	0.08	43	3.87	0.46	M	0.43	8.4
175	0.036	52	10	5400	M	M	5	M	M	246	7.9	0.08	56	9.06	0.18	0.02	0.06	5.8
176	0.567	77	M	2800	M	M	M	2200	0.1	252	8.0	0.16	45	3.72	0.11	0.11	0.10	2.9
177	0.062	36	M	10200	0.07	M	7	8000	0.2	186	8.8	0.26	98	3.73	0.23	0.11	0.63	4.5
178	0.080	66	14	9600	M	M	27	9000	0.2	204	8.5	0.08	58	3.89	1.00	0.15	0.62	9.0
181	0.159	152	M	15900	M	M	94	14200	M	265	8.3	0.06	83	4.17	M	M	M	M
183	0.134	83	M	6700	M	M	11	7700	M	235	9.0	0.06	44	4.24	0.05	0.16	M	M
186	2.328	145	M	50400	M	M	222	30900	M	258	8.9	0.10	218	3.98	0.61	0.03	0.03	2.0
188	0.436	53	M	19000	M	M	M	12100	0.3	189	8.2	0.12	52	5.04	0.53	0.03	0.06	2.0

TABLE 5. ANALYTICAL DATA FOR STREAM SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
059	S6	0.6	M	14000	M	M	0.3	5460	1	7	M	300	7150	2.5	1	430	7	1.9	0.70
059	S6	0.6	M	20100	17	0.8	M	5770	2	9	M	220	8610	1.7	M	410	6	M	0.70
059	S7	2.2	4	12000	26	0.9	M	6140	8	12	0.9	390	5290	4.5	3	1050	10	2.1	1.37
059	S7	1.9	5	13900	53	0.7	0.4	6120	7	28	1.3	280	6450	3.1	4	720	12	3.0	1.37
059	S8	2.3	7	10900	45	2.8	1.0	11850	8	24	2.3	500	5650	4.1	3	1450	14	2.8	1.03
059	S8	1.3	2	14200	40	1.0	M	4790	1	19	M	260	6820	2.9	1	1250	11	1.7	1.03
059	S9	3.6	9	10400	62	4.9	M	7750	20	30	2.1	450	4660	5.4	4	1310	14	3.9	2.30
059	S9	3.0	M	11000	M	1.8	M	M	16	M	M	230	4860	7.8	M	1300	12	M	2.30
074	S6	0.7	2	13800	M	0.7	M	5360	M	7	M	340	6560	3.0	M	350	5	3.1	1.04
074	S6	0.7	2	18100	M	1.1	0.5	8690	2	9	1.3	400	7780	2.3	M	810	12	M	1.04
074	S7	2.5	4	8600	39	2.5	M	5220	6	21	1.4	370	5130	4.4	3	1020	9	4.2	3.16
074	S7	2.2	7	14600	45	4.5	0.6	9800	14	24	1.3	480	6170	4.6	4	1820	14	3.3	3.16
074	S8	2.4	10	9300	41	1.2	0.3	8300	5	25	1.3	380	4300	4.7	3	1060	10	4.2	1.99
074	S8	2.3	7	14800	43	1.4	M	9900	11	15	1.7	560	5920	4.7	2	2220	13	4.6	1.99
074	S9	5.8	13	8200	82	1.3	1.2	7700	31	40	2.5	290	4040	3.6	6	1370	9	9.1	3.96
074	S9	4.3	10	12300	70	1.8	M	8070	38	41	1.6	370	5490	4.7	7	1660	13	5.9	3.96
076	S6	0.7	2	15500	M	1.0	M	6960	2	5	M	190	6640	2.8	M	2700	7	M	0.84
076	S6	0.5	M	19300	M	0.6	0.4	3690	M	4	M	340	7860	2.5	M	650	11	M	0.84
076	S7	1.9	3	10000	20	1.7	M	5600	8	15	0.7	260	4490	3.7	2	650	9	3.6	1.49
076	S7	2.2	4	14800	34	2.5	M	7570	10	21	1.5	340	6990	3.8	3	1090	14	3.0	1.49
076	S8	2.1	3	9600	20	3.0	M	8890	6	19	1.7	330	5180	4.3	2	990	8	M	1.28
076	S8	1.6	5	14300	31	1.8	M	8740	7	13	1.1	370	6510	4.7	2	1100	11	4.9	1.28
076	S9	3.5	5	9000	44	1.5	1.1	7940	17	23	1.2	260	4280	3.5	4	750	10	6.7	2.04
076	S9	6.2	15	12300	103	2.9	1.1	8140	52	53	3.5	410	5360	5.5	8	2450	14	8.2	2.04
078	S6	0.6	1	21500	M	1.3	0.3	4010	1	5	M	280	8380	2.0	M	590	9	1.5	0.97
078	S7	2.6	5	17500	39	1.1	0.7	5510	10	23	1.1	330	7370	3.9	4	1470	17	3.9	2.99
078	S8	1.8	3	15000	46	1.6	M	8850	6	33	M	310	7070	3.4	4	980	12	5.5	0.29
078	S9	5.4	15	16400	111	5.2	1.8	7390	35	47	1.4	370	7490	4.9	8	2110	18	4.8	3.94
079	S6	16.8	5	24000	23	4.4	M	5210	1	21	0.9	440	2480	2.3	4	630	18	4.2	1.25
079	S6	1.1	M	22000	M	2.3	M	3050	2	12	M	380	9000	5.0	M	430	14	3.8	1.25
079	S7	14.0	2	24200	28	3.6	M	6240	2	18	M	540	3990	2.8	2	670	17	M	4.60
079	S7	3.4	7	11100	47	4.1	M	5560	12	21	1.5	500	5030	5.7	4	1300	13	3.9	4.60
079	S8	13.9	4	21100	24	2.3	0.8	6070	1	25	0.5	510	3560	2.9	3	1150	17	M	3.52
079	S8	2.2	2	13800	37	2.5	M	7330	6	15	0.7	480	6070	5.8	2	960	17	M	3.52
079	S9	13.4	2	22900	36	2.7	M	5890	2	21	0.5	530	4380	2.4	3	1120	16	1.9	7.62
079	S9	5.1	4	11100	70	3.0	M	9330	25	38	1.6	460	4420	5.7	5	1200	13	4.6	7.62
080	S6	0.5	M	21900	M	0.8	M	4050	2	5	0.6	150	8580	1.7	M	M	11	M	0.79
080	S7	2.2	6	14800	18	2.7	0.6	6060	9	18	1.4	250	6700	8.1	3	1040	11	3.4	2.14
080	S8	1.3	3	15200	15	1.0	0.8	7320	3	16	M	200	6640	2.8	M	580	11	7.8	1.59
080	S9	5.3	11	10000	96	2.2	0.8	6060	26	49	2.1	220	4820	4.0	8	1240	13	5.6	2.51
082	S6	0.8	M	17000	M	0.8	M	7520	2	4	M	460	7820	2.2	M	630	8	M	1.20
082	S7	1.7	M	18600	18	3.3	M	7670	3	16	0.6	370	5290	3.1	1	860	7	1.9	2.41
082	S8	1.3	8	12500	13	0.6	0.5	4500	11	23	0.9	290	6550	4.5	2	1190	5	4.4	1.12
082	S9	3.7	8	11700	75	3.6	M	4090	30	36	2.0	210	5700	3.1	5	1340	12	7.8	2.10
084	S6	0.7	M	21700	M	M	1.1	3140	2	4	M	180	9230	1.8	M	680	10	2.1	0.47
084	S6	0.5	M	20100	M	0.8	0.4	M	2	8	M	90	12270	1.5	7	320	2	M	0.47
084	S7	2.4	8	17100	59	1.6	0.3	7120	21	28	0.8	450	6960	5.7	5	2400	18	3.2	0.79
084	S7	1.3	3	7700	20	2.0	0.7	3190	6	10	0.9	110	9250	2.1	2	290	3	1.9	0.79
084	S8	2.1	6	12300	33	1.9	M	12000	10	23	2.1	260	5590	5.7	2	1470	13	6.8	0.66
084	S8	0.8	M	10800	31	M	M	5730	2	12	M	120	9240	1.9	1	460	M	M	0.66
084	S9	4.2	8	14000	58	1.8	M	9360	24	26	1.9	270	5890	3.3	5	1650	11	3.9	1.07
084	S9	2.3	6	11500	20	1.5	M	4250	17	15	1.2	170	5990	2.0	4	920	9	4.3	1.07
086	S6	0.6	M	19900	M	M	M	3930	2	10	M	330	8280	2.7	M	500	11	2.4	36.31
086	S7	3.6	6	13900	24	3.4	M	6060	9	19	1.1	280	6450	3.6	3	1460	15	M	30.25
086	S8	1.9	7	13600	50	4.0	0.3	8460	15	29	1.2	380	5940	7.4	3	1720	14	5.7	23.94
086	S9	4.9	10	13600	108	1.6	M	8070	59	53	2.0	420	5960	4.8	9	2410	15	5.2	27.17

TABLE 5. ANALYTICAL DATA FOR STREAM SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
091	S6	0.8	M	15800	15	M	M	7420	4	7	M	240	7710	3.1	1	1060	12	M	1.94
091	S6	4.9	7	16100	28	2.7	M	6460	10	32	1.1	320	7110	4.2	3	1460	13	4.6	1.94
091	S7	1.8	5	13500	29	1.4	M	8170	8	18	0.5	270	6220	4.2	2	1320	17	3.6	0.74
091	S7	1.7	3	17500	17	1.3	M	5640	M	4	0.7	500	8830	1.9	2	1000	M	4.5	0.74
091	S8	1.9	4	14100	25	1.4	0.6	10590	7	20	0.5	320	5980	4.1	2	1710	16	M	1.41
091	S8	3.6	5	17200	28	2.7	0.5	7150	9	15	M	410	8260	5.4	2	2030	9	3.8	1.41
091	S9	3.8	8	14000	48	1.4	0.4	10680	23	29	1.5	280	5430	3.5	6	990	14	M	2.96
091	S9	7.8	8	18900	50	2.9	M	5710	26	31	1.7	330	8070	3.4	5	1670	16	6.1	2.96
093	S6	1.4	2	10900	M	M	M	2760	2	8	M	80	6990	0.7	M	M	M	M	1.44
093	S7	4.9	4	13500	29	M	0.6	1030	4	21	0.5	90	6340	1.5	3	240	M	2.2	4.46
093	S8	3.8	3	8000	17	M	1.6	4930	4	12	M	60	5420	1.2	7	M	M	2.4	3.70
093	S9	13.5	8	8900	55	1.5	0.5	4230	10	29	0.9	90	4990	1.4	4	290	3	1.7	13.12
095	S6	4.0	M	18100	31	0.9	0.5	3920	1	10	M	180	1890	2.6	2	850	19	M	1.30
095	S6	1.0	M	19700	16	0.8	0.8	3290	2	M	0.5	180	9260	2.5	10	460	7	3.6	1.30
095	S7	4.0	2	20200	16	2.9	0.7	3050	1	7	0.5	190	2640	3.5	2	810	24	M	2.78
095	S7	2.2	3	31200	25	1.8	0.3	2940	5	14	0.7	260	M	2.2	2	M	24	M	2.78
095	S8	2.2	M	13100	30	0.6	M	4300	2	11	M	150	2230	2.4	1	770	18	3.4	2.08
095	S8	2.0	4	29400	24	1.6	0.4	6780	3	14	1.8	260	M	2.6	2	M	29	4.2	2.08
095	S9	3.6	2	19800	24	1.7	M	3060	2	16	M	220	3090	1.8	2	1520	21	1.8	3.26
095	S9	4.8	7	17800	46	3.0	M	4740	26	26	2.1	310	8100	3.6	5	1710	16	4.3	3.26
096	S6	0.9	2	26400	21	M	2.0	4870	M	4	M	190	10860	1.3	M	1210	6	M	1.09
096	S7	2.5	1	20900	18	1.2	M	5690	7	10	0.9	370	8670	3.9	1	1300	16	2.3	2.42
096	S8	1.9	4	19500	32	1.6	M	7950	5	11	M	400	8270	3.0	1	1450	18	M	1.98
096	S9	5.4	6	15800	54	3.5	M	7040	27	24	1.7	400	6890	4.9	3	1570	11	5.2	3.99
098	S6	5.8	3	22200	M	1.3	M	M	2	9	M	200	8900	2.1	6	630	9	M	3.66
098	S7	12.7	2	16000	22	1.2	M	3360	7	19	0.5	210	5980	3.2	4	780	10	1.9	8.79
098	S8	10.9	M	16200	24	1.3	M	4120	2	16	0.8	210	5990	3.6	M	970	7	4.5	7.86
098	S9	18.1	3	15600	34	1.6	0.6	3780	11	19	0.7	210	5000	3.2	5	1200	12	2.9	13.32
100	S6	0.6	M	22300	16	1.0	M	M	1	M	M	190	9220	1.4	M	360	7	M	0.82
100	S7	1.5	2	20300	19	1.2	0.7	2150	6	10	0.5	300	8740	2.4	1	1020	14	2.3	1.70
100	S8	1.4	M	18900	M	3.4	M	3900	4	11	M	320	8440	3.2	M	760	10	M	1.43
100	S9	3.7	5	15000	44	3.4	M	2090	22	20	1.0	320	6540	3.1	3	1090	10	3.5	2.20
101	S6	0.4	M	24000	M	M	1.1	4590	M	M	M	200	9610	2.3	M	700	4	M	0.74
101	S7	1.5	5	18400	22	3.3	0.5	2270	13	15	1.5	410	7900	2.2	3	1940	11	3.6	1.89
101	S8	1.3	3	19500	40	2.7	M	5740	9	16	M	380	7310	2.5	3	2240	11	4.4	1.38
101	S9	4.4	12	15500	79	3.6	0.9	5620	48	38	1.8	340	5860	3.2	7	2310	13	4.9	2.82
103	S6	0.4	M	18800	15	1.4	0.7	6000	2	8	M	250	7890	3.4	M	1830	10	M	1.65
103	S7	1.6	5	15000	33	1.7	M	8200	17	18	1.6	270	6210	3.4	3	1520	9	3.6	3.13
103	S8	1.6	11	14000	38	1.2	0.7	10950	18	27	M	370	6000	6.1	3	2130	10	3.3	2.21
103	S9	3.7	14	15100	65	4.0	M	5920	51	37	2.8	320	6350	3.1	7	2180	12	6.4	3.73
104	S6	0.8	2	16200	M	M	M	6030	2	15	M	220	6860	2.2	M	1090	7	M	0.87
104	S6	0.4	M	20800	19	M	M	4950	M	M	M	270	8820	2.5	M	1830	6	2.7	0.87
104	S7	2.2	7	12500	59	1.3	1.2	6510	14	27	1.0	250	5860	2.8	4	1380	12	5.1	1.65
104	S7	2.4	9	16600	60	1.9	M	5740	25	29	1.4	530	6880	3.8	5	3120	14	4.9	1.65
104	S8	2.6	12	11300	84	1.2	0.7	7800	20	60	M	270	5850	4.9	6	1540	10	5.0	1.38
104	S8	2.0	7	13800	33	1.5	M	10330	16	24	1.2	440	6660	4.5	2	2220	10	6.1	1.38
104	S9	5.1	19	10200	130	1.9	M	6030	49	74	1.6	260	4650	4.1	11	1690	8	7.4	2.42
104	S9	4.1	8	12200	66	2.0	0.5	8510	52	34	2.3	300	5840	4.2	6	2230	5	9.7	2.42
106	S6	15.0	M	16900	M	2.5	M	4160	M	16	M	150	1740	2.4	2	470	12	2.2	35.16
106	S7	14.5	2	16400	15	2.3	0.8	3940	M	10	M	150	2010	1.9	4	780	18	M	34.32
106	S8	14.5	2	16200	30	2.1	M	3910	1	13	0.9	180	2220	2.2	3	570	14	3.9	34.66
106	S9	13.9	2	16700	15	2.3	0.2	3610	1	14	0.3	160	2300	2.9	3	700	15	2.2	33.42
107	S6	18.7	1	12100	13	1.6	0.6	3390	M	15	M	190	1140	1.1	4	590	13	2.4	33.11
107	S7	18.5	M	12100	17	2.2	M	M	1	18	0.6	180	1370	1.2	4	450	12	M	33.10
107	S8	19.1	2	12900	25	2.3	0.6	M	M	21	M	220	1360	2.1	1	410	12	M	34.49
107	S9	18.2	1	11600	16	2.6	M	1390	M	10	M	160	1300	0.9	3	200	8	5.9	33.06

TABLE 5. ANALYTICAL DATA FOR STREAM SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
109	S6	0.2	M	16300	M	0.8	0.3	M	M	M	M	110	7960	0.6	M	M	2	M	0.87
109	S7	2.1	9	5600	51	1.8	M	4310	16	24	0.9	120	3390	2.7	4	630	2	5.3	3.23
109	S8	1.2	5	3100	28	1.8	0.9	7180	5	25	M	50	1940	4.6	3	310	2	M	2.53
109	S9	1.7	9	5600	59	0.5	0.5	M	26	20	1.0	90	3580	2.3	4	630	5	4.9	3.97
111	S6	0.4	3	11500	17	0.7	M	4980	1	M	M	130	4780	2.7	1	390	7	3.4	1.04
111	S7	1.8	5	33100	49	2.9	M	6490	17	25	0.8	700	14190	3.9	4	4130	14	4.1	1.70
111	S8	2.0	11	32100	36	2.2	M	8280	17	40	1.1	840	M	4.1	5	2210	M	M	1.45
111	S9	4.3	15	34600	93	5.0	0.4	5490	55	45	2.3	610	9570	3.1	7	3050	28	4.6	2.47
113	S6	2.7	M	8300	M	0.6	M	2700	1	12	M	60	1080	1.9	M	270	8	M	0.41
113	S6	0.4	M	11500	M	M	M	6030	1	13	M	220	5730	1.3	M	550	2	3.5	0.41
113	S7	2.8	2	10800	15	1.2	M	1760	2	15	M	90	1660	1.5	2	570	11	0.9	1.26
113	S7	1.1	4	9700	27	1.7	M	3910	7	10	0.5	140	5200	1.6	2	250	7	1.8	1.26
113	S8	2.8	2	10400	M	1.9	0.8	M	1	13	M	90	1650	1.9	1	520	11	M	0.89
113	S8	0.9	4	8300	28	1.2	0.7	5640	5	13	M	170	4800	4.6	2	560	2	2.5	0.89
113	S9	2.8	2	10700	15	1.6	M	2410	1	9	M	80	1810	1.0	2	540	10	2.5	1.82
113	S9	3.3	6	6900	45	1.3	0.3	4980	32	26	1.2	140	4020	3.1	5	720	3	4.8	1.82
114	S6	0.4	M	13600	M	M	1.0	3610	M	M	M	80	6340	1.3	M	240	3	M	0.63
114	S7	1.2	4	13800	14	1.1	M	4790	7	10	0.6	290	6000	2.0	2	1000	7	4.5	1.16
114	S8	1.6	7	9400	52	2.0	0.3	5440	9	30	M	330	4360	4.4	3	1370	5	2.2	0.91
114	S9	4.9	12	8800	74	1.6	1.2	6590	38	40	1.6	250	3990	3.7	5	1250	8	5.2	1.74
115	S6	5.2	2	16400	36	2.9	0.6	4110	2	25	0.9	200	2060	2.7	4	740	11	M	37.87
115	S7	5.3	4	17600	41	3.9	M	4450	1	26	1.0	220	2430	1.7	6	340	17	2.9	37.48
115	S8	5.8	M	17000	34	4.3	3.5	6370	M	26	M	220	1720	3.1	4	930	13	M	41.33
115	S9	5.6	5	17200	27	4.6	M	5200	1	23	0.5	210	2040	2.2	4	560	14	1.7	38.49
117	S6	0.4	M	19800	M	M	0.5	2960	M	9	M	130	9020	1.5	M	300	M	M	20.96
117	S6	5.2	M	22100	27	1.2	M	3560	2	12	1.2	160	6370	4.1	2	M	12	M	20.96
117	S7	1.9	4	16500	40	1.1	0.2	5360	4	16	0.7	320	7040	2.8	3	1180	11	M	25.07
117	S7	5.7	3	22600	17	3.0	0.2	3860	5	13	0.9	250	5930	3.8	2	1360	13	1.9	25.07
117	S8	0.8	4	15700	M	1.3	M	2790	1	14	1.3	230	6640	3.8	1	840	10	M	23.18
117	S8	5.3	5	21900	M	1.4	1.6	3400	3	23	M	230	6250	2.8	3	1060	13	4.5	23.18
117	S9	2.8	7	13900	59	1.9	M	7370	15	32	1.1	280	5850	3.0	4	1600	12	3.6	29.15
117	S9	7.7	3	21200	23	2.7	0.6	M	6	21	1.4	230	5450	2.0	3	1510	17	M	29.15
118	S6	8.8	2	22100	29	2.8	0.3	5400	M	17	M	230	2270	2.9	2	810	15	3.2	37.77
118	S7	8.0	3	21900	23	2.8	0.5	4600	1	11	0.3	240	2320	2.0	3	690	16	M	36.05
118	S8	8.4	4	21700	21	2.5	M	4380	M	12	M	220	2300	3.5	2	M	19	7.2	37.78
118	S9	8.0	M	21400	32	3.5	M	5480	1	20	0.9	220	2560	3.4	3	1280	15	M	35.25
119	S6	0.5	2	16200	M	0.3	0.4	4400	2	6	M	210	7580	3.8	M	920	8	M	4.50
119	S6	5.1	M	9100	M	M	M	8250	1	12	M	90	4500	2.4	1	150	5	M	4.50
119	S7	12.6	16	14500	111	3.0	0.2	6880	20	51	0.9	3840	6670	3.2	7	2650	15	4.4	10.33
119	S7	5.5	4	5000	29	0.8	M	6190	7	15	0.6	100	2230	3.2	3	350	5	M	10.33
119	S8	12.0	12	12300	83	3.1	M	7730	9	51	M	310	5410	3.7	5	1470	10	6.0	11.69
119	S8	5.0	6	5100	30	2.4	1.6	6860	4	13	0.9	110	2350	3.7	1	540	6	M	11.69
119	S9	6.2	15	10800	115	3.5	0.9	7920	41	64	1.9	270	5070	5.4	8	1640	12	3.9	12.89
119	S9	6.1	5	4300	43	3.1	M	8260	8	15	1.1	90	1590	3.5	3	520	4	4.3	12.89
120	S6	0.7	M	20700	M	0.9	M	3580	1	12	0.9	280	8530	2.2	M	810	M	3.8	32.30
120	S6	5.2	3	16700	39	2.7	M	5600	M	21	M	290	1560	3.0	3	630	9	2.2	32.30
120	S7	7.1	11	14100	88	1.1	M	5230	14	43	1.2	410	6210	4.6	6	1610	17	2.9	29.81
120	S7	8.5	2	21500	20	2.9	M	4650	1	24	M	380	2520	3.1	4	M	12	M	29.81
120	S8	8.2	4	13800	35	3.4	M	6470	3	16	1.0	260	6770	3.2	3	1230	15	M	32.54
120	S8	5.4	3	22000	30	3.5	0.6	7320	M	24	M	330	1940	3.0	3	650	12	M	32.54
120	S9	9.9	11	12400	75	2.0	1.2	7470	30	48	2.0	280	5710	4.8	6	1280	8	3.1	30.57
120	S9	9.0	2	23300	31	3.5	M	5300	1	21	0.9	410	3370	3.6	4	750	21	M	30.57
121	S6	0.4	M	29200	12	1.7	0.9	4950	1	9	M	260	M	1.6	M	M	M	M	0.41
121	S7	1.8	4	31800	28	2.6	M	7510	9	18	1.1	630	8720	3.3	3	M	25	6.1	0.78
121	S8	1.4	4	10900	M	2.7	M	10460	6	15	1.6	320	5440	4.0	M	1180	15	4.9	0.72
121	S9	5.1	8	9100	48	5.1	0.2	7380	22	25	2.4	190	4590	5.6	4	890	11	5.4	1.28

TABLE 5. ANALYTICAL DATA FOR STREAM SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
132	S6	0.4	M	28600	7	0.9	M	7620	1	M	0.5	660	11400	5.3	1	1500	34	M	M
132	S7	1.4	2	28900	M	4.4	M	9090	6	9	0.9	800	10540	7.9	2	4620	56	4.3	M
132	S8	1.8	8	42500	52	7.5	M	6890	6	23	2.7	640	17440	4.9	5	3030	32	3.9	1.44
132	S8	1.2	2	28100	28	2.3	M	11340	6	7	0.9	890	9570	8.9	1	4010	44	2.8	1.44
132	S9	3.1	7	46600	67	5.5	M	7780	16	33	1.6	670	19280	5.1	4	5750	51	6.8	2.15
132	S9	3.1	6	34300	59	5.4	1.5	1380	19	37	1.9	1030	11700	12.0	4	8330	66	5.4	2.15
146	S6	0.8	M	24300	9	0.9	M	3940	M	9	M	210	10400	2.6	1	590	7	M	1.74
146	S7	2.5	2	20800	23	1.8	M	6680	8	15	1.3	450	7860	4.6	3	1990	17	4.6	3.88
146	S8	2.0	3	21800	M	1.9	0.4	9870	4	17	0.9	490	8230	5.5	3	2230	27	M	3.18
146	S9	4.1	5	19100	45	2.9	M	8240	22	27	1.6	460	6380	4.7	5	2580	26	4.8	4.91
153	S6	0.6	3	19600	16	M	M	4510	1	5	0.9	470	7660	3.3	1	570	12	M	2.09
153	S7	2.5	4	14900	37	3.2	M	9130	14	16	1.8	590	5930	3.5	3	2110	14	6.0	3.87
153	S8	1.7	4	16700	M	2.3	M	7120	8	20	1.2	480	6580	3.8	1	1800	18	4.4	3.15
153	S9	3.7	6	13900	58	2.5	0.8	7900	31	31	1.9	330	5220	4.6	4	2310	16	4.4	2.86
156	S6	0.3	M	12700	M	M	M	5380	M	5	0.7	120	6540	1.8	M	M	2	M	0.58
156	S7	1.7	3	12600	27	1.5	M	5180	10	15	1.9	220	5900	3.7	3	760	6	3.6	3.71
156	S8	2.3	2	9600	M	2.3	M	6200	10	22	1.7	260	5020	5.1	3	980	8	6.3	1.90
156	S9	5.8	14	9900	83	4.1	M	6910	61	45	3.9	210	4780	5.0	8	1750	7	10.4	4.77
158	S6	0.5	2	12000	M	1.4	0.4	4750	1	9	M	220	5980	3.6	1	660	6	M	1.34
158	S7	1.8	5	12800	29	2.1	M	4270	7	17	1.5	270	5560	3.8	3	1290	12	3.4	2.31
158	S8	1.5	4	15800	M	1.4	0.8	9850	5	18	1.1	360	6140	5.7	M	1980	13	4.2	1.94
158	S9	3.4	6	14200	55	3.3	0.5	5990	25	28	2.1	340	6400	3.9	5	2160	16	6.4	2.14
162	S6	0.5	M	22900	16	M	0.5	7870	1	M	0.7	180	12120	2.9	1	M	M	M	0.74
162	S7	1.2	1	16600	13	1.2	M	6670	5	7	1.1	510	6420	6.4	1	1800	26	1.9	1.35
162	S8	0.9	2	17300	M	1.6	0.1	9840	3	6	0.8	510	6690	4.4	2	2090	24	4.3	1.20
162	S9	2.2	4	10700	27	1.5	0.3	10540	11	14	0.8	360	4980	9.4	3	2340	21	3.4	2.02
163	S6	0.4	M	15700	M	M	M	8170	2	6	M	320	7070	3.5	M	780	11	M	0.65
163	S7	1.1	3	13000	13	3.5	M	9530	4	9	1.1	520	4380	5.6	2	2360	26	3.5	0.85
163	S8	0.9	1	13700	M	1.3	0.2	8760	3	8	0.9	560	5240	5.9	M	2130	27	3.7	0.69
163	S9	2.5	7	7600	30	3.9	0.7	4940	24	18	2.0	190	3780	2.8	3	750	7	5.0	2.96
165	S6	0.5	3	8800	M	0.8	M	3890	M	7	0.8	110	4700	1.5	1	170	4	1.7	1.86
165	S7	1.2	2	6600	16	0.9	0.5	3490	5	8	0.7	120	3440	2.5	2	230	5	2.0	2.72
165	S8	0.9	2	7200	14	1.1	M	6120	5	12	0.8	130	3920	3.2	1	270	3	M	2.16
165	S9	2.6	5	6700	42	1.2	M	8040	17	23	1.7	350	2820	6.1	4	2040	15	9.0	1.08
167	S6	1.5	3	10800	19	1.3	M	8090	3	11	0.8	130	3510	2.7	2	940	8	M	28.71
167	S7	1.6	3	7900	22	1.9	0.4	3070	7	13	0.8	90	3750	2.5	2	740	5	2.1	14.68
167	S8	1.3	M	9000	14	1.1	0.2	4400	3	12	0.8	100	4060	3.1	1	410	8	2.9	14.09
167	S9	2.1	5	10400	21	1.6	M	4420	8	14	1.1	110	3440	3.0	3	500	8	5.3	15.32
171	S6	0.3	M	12400	20	M	0.4	2430	1	3	M	120	5320	1.7	1	M	2	M	0.68
171	S7	1.4	2	10200	25	0.8	0.7	4900	9	14	0.8	230	4680	2.5	3	1080	5	4.3	1.34
171	S8	1.2	7	8500	14	2.0	M	4170	6	14	1.0	210	4290	3.5	2	370	10	6.5	1.02
171	S9	3.6	8	7900	63	4.7	M	5890	28	28	2.1	230	3910	2.9	6	1180	5	4.9	1.56
173	S6	2.2	4	6600	52	4.9	0.9	6840	12	21	2.3	310	3370	4.6	3	960	5	4.9	0.74
173	S7	0.3	M	9500	M	0.7	M	2050	1	M	0.2	150	4400	1.2	M	210	4	1.9	0.55
173	S8	1.8	4	6900	41	3.8	0.5	7310	7	22	1.0	300	3460	4.1	3	800	4	3.0	0.84
173	S9	6.6	16	4200	98	2.6	0.6	5710	68	56	3.9	230	1980	5.2	9	1010	5	8.8	1.29
175	S6	0.4	M	7300	M	1.1	M	3410	M	M	M	170	3790	2.2	M	400	2	M	1.14
175	S7	1.8	5	7200	34	1.6	1.0	3170	8	18	1.2	250	3190	3.7	4	990	6	1.4	0.90
175	S8	1.2	2	7700	15	1.0	M	7080	4	13	1.3	240	3500	3.3	2	990	6	3.9	0.80
175	S9	5.2	13	6200	97	2.0	M	7300	50	43	2.5	250	3150	4.1	8	1170	8	9.5	1.39
176	S6	0.4	M	11400	28	0.8	0.3	7220	1	14	0.6	220	4540	2.4	M	690	5	M	0.54
176	S7	1.8	4	12100	30	1.6	M	6610	9	15	1.5	350	5180	3.2	2	1420	12	3.3	1.02
176	S8	1.2	2	12900	32	1.8	M	6880	4	15	0.8	400	5220	5.8	1	1520	12	M	0.76
176	S9	4.4	9	10500	64	3.3	1.8	8690	40	35	2.2	380	4310	3.8	6	2520	16	10.1	1.53
177	S6	0.3	M	14800	M	M	M	3710	M	M	M	110	6670	1.7	M	M	4	M	0.43
177	S7	1.4	2	10900	29	1.5	M	8190	7	12	1.0	280	4760	4.0	2	910	11	2.2	0.74

TABLE 5. ANALYTICAL DATA FOR STREAM SEDIMENT SAMPLES (PPM)

SAMPLE	STYPE	U	TH	AL	CE	DY	EU	FE	HF	LA	LU	MN	NA	SC	SM	TI	V	YB	LOI
177	S8	1.2	6	13000	M	1.1	M	6730	4	12	1.2	300	5330	5.6	M	1130	12	3.4	0.62
177	S9	5.1	14	6800	88	5.8	2.0	9670	37	43	3.2	290	3440	7.9	8	1680	11	8.8	1.35
178	S6	0.3	M	10200	M	0.5	M	3880	1	M	M	80	5000	1.5	4	180	3	M	0.61
178	S7	1.1	3	10200	19	2.9	M	5830	5	9	1.0	230	4860	2.9	1	1020	9	2.0	0.81
178	S8	1.3	M	10000	22	0.9	M	7160	4	13	0.9	250	4720	4.2	1	890	10	3.4	0.83
178	S9	3.6	8	8400	58	2.1	M	7110	28	30	2.0	270	3810	5.8	6	1540	9	6.1	1.11
181	S6	0.5	M	10700	M	0.8	M	4630	1	13	1.0	130	5450	2.0	M	300	6	M	0.56
181	S7	1.4	3	10000	28	1.2	0.4	8960	8	13	1.9	290	4880	4.1	2	1140	10	3.1	0.58
181	S8	1.5	4	10900	33	2.5	0.5	9080	4	19	1.7	350	5150	3.5	3	1110	8	6.7	0.74
181	S9	6.7	19	6900	106	3.7	0.9	9500	67	57	4.4	290	3630	5.4	8	1780	10	14.5	1.35
183	S6	0.4	M	13900	M	0.8	1.2	2190	1	M	M	90	7080	1.4	M	450	3	4.2	0.59
183	S7	1.0	2	12900	11	0.7	0.6	4160	5	5	0.8	190	6160	5.6	2	620	10	2.6	1.04
183	S8	0.8	2	12100	19	0.9	0.5	5790	3	11	M	190	5850	3.8	M	700	8	2.6	0.87
183	S9	3.0	7	8300	49	3.6	0.3	7630	20	24	2.5	180	4220	4.1	5	850	8	4.5	1.74
186	S6	0.5	1	28000	M	1.2	1.2	4900	M	M	0.8	370	13480	2.4	1	M	M	8.8	20.83
186	S6	1.3	3	11200	26	2.3	2.1	5590	M	13	M	40	820	2.3	1	350	13	4.3	20.83
186	S6	30.5	6	9600	44	2.9	1.5	9220	1	32	0.7	110	3330	4.2	1	570	11	M	20.83
186	S7	1.9	4	13300	27	1.3	M	7120	9	16	1.0	440	5470	2.9	2	1130	11	2.3	10.22
186	S7	1.4	M	12500	8	1.5	0.6	5660	M	11	M	70	1200	2.4	1	510	17	M	10.22
186	S7	16.4	3	6700	22	0.7	M	5830	6	8	M	80	2610	6.5	4	440	8	1.8	10.22
186	S8	1.3	3	12100	22	1.7	1.2	6440	5	17	M	340	5520	4.7	M	1500	11	3.7	12.14
186	S8	1.4	4	12900	28	1.8	0.4	1770	1	16	M	120	1720	2.5	2	1210	13	M	12.14
186	S8	20.0	2	7800	32	1.6	1.6	9570	3	27	M	90	3090	6.7	1	300	7	M	12.14
186	S9	4.4	11	10200	63	3.6	0.8	7040	27	42	2.0	360	4690	3.6	6	1540	14	5.7	8.38
186	S9	1.5	2	14200	25	2.2	M	3030	1	11	M	80	1570	2.5	2	380	20	2.1	8.38
186	S9	13.7	4	5600	44	1.4	0.6	9190	6	23	0.6	60	2370	4.6	3	450	7	2.9	8.38
188	S6	0.6	M	13300	27	1.1	1.1	4320	3	8	M	230	6540	3.2	M	330	6	M	0.73
188	S7	3.3	9	10500	65	3.1	M	6780	17	38	0.9	420	5290	3.2	5	1370	6	4.0	1.96
188	S8	1.7	3	13000	30	1.2	M	7320	5	22	M	320	6260	2.7	3	1230	6	M	1.38
188	S9	6.3	14	12800	69	3.5	M	6580	45	7	3.1	400	5540	4.0	7	2060	12	7.5	2.68