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ANALYTICAL RESULTS FOR 60 WATER SAMPLES FROM MOUNT NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO

by

John B. McHugh
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ABSTRACT

Sixty water samples were collected from Mount Naomi Wilderness study area, Utah-Idaho, during the summer of 1980, as part of the geochemical evaluation of the study area. The water samples were analyzed for calcium, magnesium, sodium, potassium, lithium, silica, alkalinity, sulfate, chloride, fluoride, nitrate, zinc, copper, molybdenum, arsenic, iron, manganese, aluminum, and uranium. Specific conductance, pH, and temperature were also measured. Sample analyses and localities are presented in this report.

INTRODUCTION

Sixty water samples were collected from 48 springs and 12 surface streams, during July 1980, in the Mount Naomi Wilderness study area, Utah-Idaho. Figure 1 is an index map of the area. Figure 2 is a sample locality map.

Temperature and pH were measured at each sample site. The remaining analyses were completed at the U.S. Geological Survey laboratory in Denver, Colorado. The results of the analyses are given in this report.

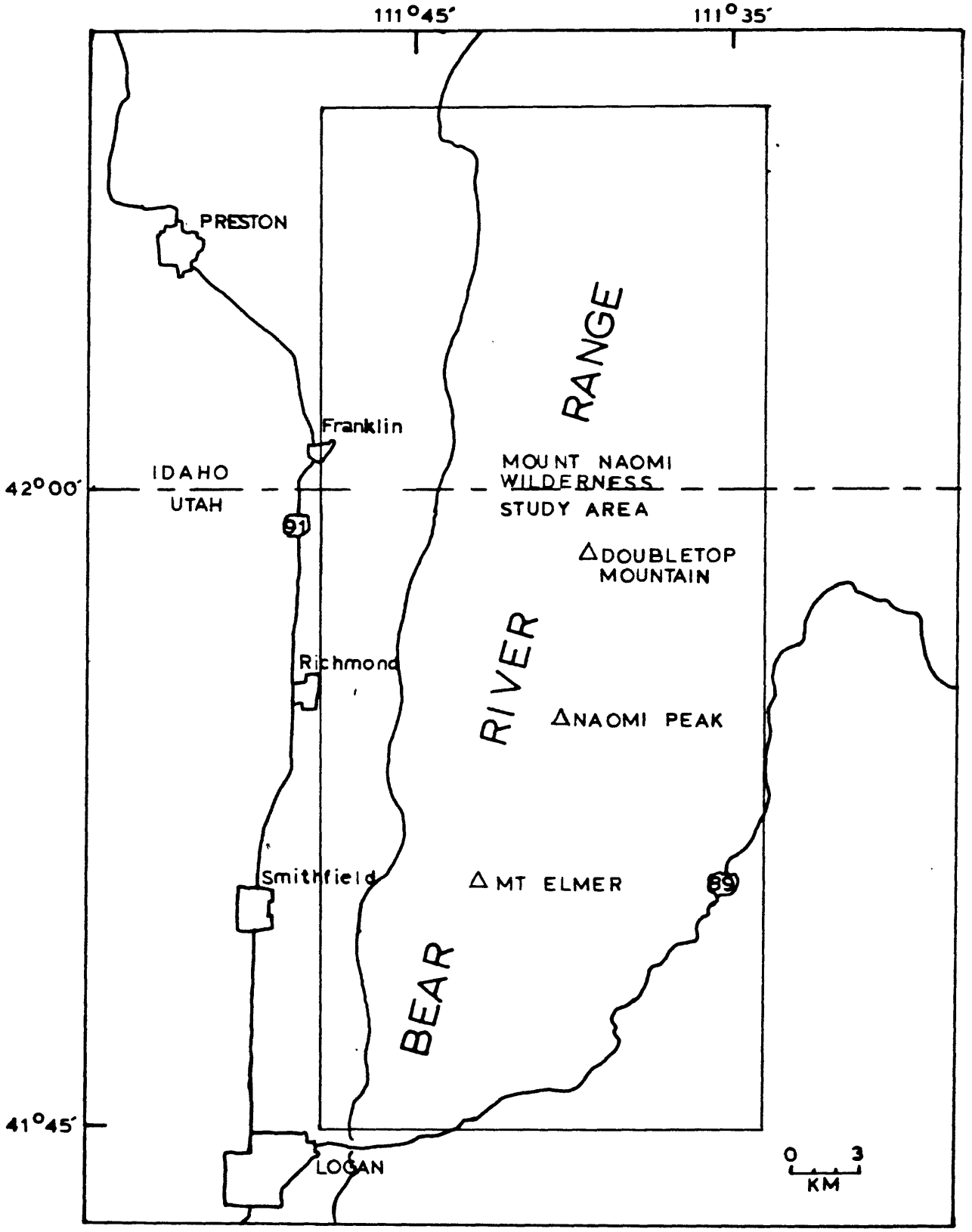

Figure 1.--Index map of Mount Naomi Wilderness study area, Utah-Idaho.

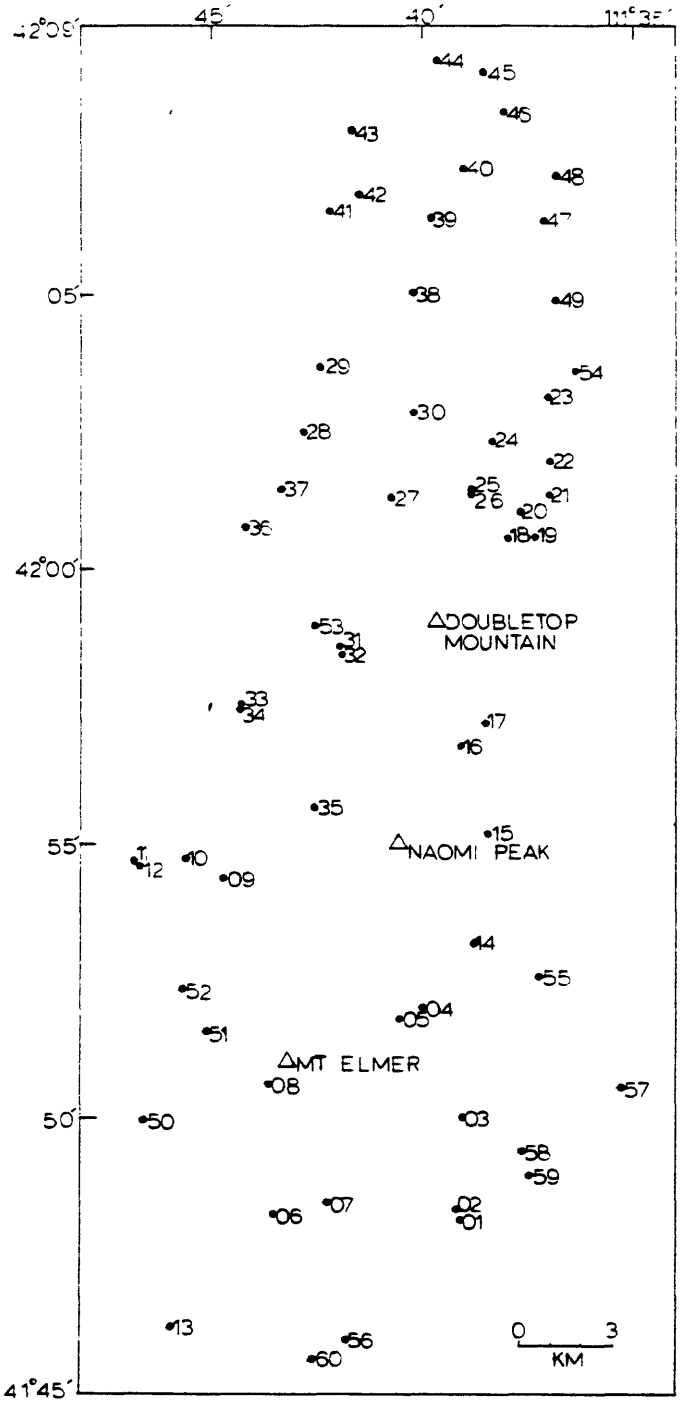

Figure 2.--Sample locality map, Mount Naomi Wilderness study area, Utah-Idaho.

SAMPLE COLLECTION TECHNIQUES

Samples were collected using acid-rinsed polyethylene bottles. At each locality, a 60-mL and a 30-mL sample were collected and filtered through a 0.45-μm and a 0.10-μm membrane filter, respectively, and acidified with reagent-grade concentrated nitric acid to pH<2. An untreated 0.5-L sample was also taken.

ANALYTICAL TECHNIQUES

Water temperature and pH were measured at each sample site. Calcium, magnesium, sodium, potassium, lithium, silica, zinc, copper, molybdenum, and arsenic were determined, using the 0-45μm filtered and acidified sample. Iron, mangnaese, and aluminum were determined, using the 0.10-μm filtered and acidified sample. Alkalinity, sulfate, chloride, fluoride, nitrate, uranium, and specific conductance were determined, using the untreated sample. The analytical methods used for the analysis of each constituent are shown in table 1.

Table 1.--Analytical methods used for water analysis, Mount Naomi Wilderness study area, Utah-Idaho

Constituent	Method	Reference
Alkalinity	Gran's plot potentiometric titration	Orion Research, Inc. (1975).
Sulfate	Ion chromatography	Smee, and Hall (1978)
Chloride	---do	Do.
Fluoride	---do	Do.
Nitrate	---do	Do.
Calcium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Magnesium	---do	Do.
Sodium	---do	Do.
Potassium	---do	Do.
Lithium	---do	Do.
Silica	---do	Do.
Zinc	---do	Do.
Copper	Flameless atomic absorption spectrophotometry	Perkin-Elmer Corp. (1977).
Molybdenum	---do	Do.
Arsenic	---do	Do.
Iron	---do	Do.
Manganese	---do	Do.
Aluminum	---do	Do.
Uranium	Laser-excited fluorescence	Scintrex Corp. (1978).
Specific conductance	Conductivity bridge	Brown, Skougstad, and Fishman (1970) p. 28-29.

RESULTS

Analytical data for each sample locality are shown in table 2. The twelve stream-water samples are marked by a black dot near the sample number in table 2.

Table 3 is a summary of the chemical analyses for the 60 Mount Naomi Wilderness study area samples showing each variable with its minimum and maximum values, mean, geometric, mean, standard deviation, and geometric deviation.

Table 2.--WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO

SAMPLE	LATITUDE	LONGITUDE	CA(mg/L)	MG(mg/L)	NA(mg/L)	K(mg/L)	LI(ug/L)	SIO2(mg/L)	ALK(mg/L)
N01	41 48 3	111 39 2	40.0	12.00	1.60	.30	<4	4.3	146.0
N02●	41 48 15	111 39 7	48.0	16.00	1.20	.24	<4	3.7	165.0
N03	41 49 53	111 38 58	38.0	13.00	.78	.23	<4	2.5	124.0
N04	41 51 49	111 39 54	60.0	12.00	1.10	.20	<4	3.1	201.0
N05	41 51 37	111 40 28	47.0	7.80	.87	.22	<4	2.0	130.0
N06	41 48 10	111 43 26	50.0	24.00	1.00	.20	<4	2.5	182.0
N07	41 48 22	111 42 8	60.0	24.00	1.70	.31	<4	6.1	261.0
N08	41 50 27	111 43 32	28.0	14.00	1.30	.61	<4	5.0	127.0
N09●	41 54 4	111 44 35	33.0	8.20	1.70	.29	<4	4.2	127.0
N10●	41 54 24	111 45 28	7.7	1.80	1.90	.47	<4	6.4	26.0
N11	41 54 19	111 46 38	50.0	15.00	5.40	.57	5	11.0	224.0
N12	41 54 17	111 46 33	53.0	18.00	5.50	.40	4	10.0	222.0
N13	41 46 12	111 45 48	47.0	24.00	.90	.17	<4	3.2	227.0
N14	41 52 56	111 38 43	45.0	3.30	1.30	.28	<4	9.1	125.0
N15	41 54 52	111 38 22	35.0	20.00	.85	.13	<4	2.7	167.0
N16	41 56 24	111 39 1	27.0	18.00	.74	.14	<4	2.9	143.0
N17	41 56 49	111 38 27	27.0	18.00	.66	.18	<4	2.4	129.0
N18	42 0 3	111 37 54	6.7	3.40	.83	.18	<4	3.4	31.0
N19	42 0 4	111 37 16	47.0	17.00	1.10	.32	<4	3.7	201.0
N20	42 0 30	111 37 37	10.0	6.20	.85	.06	<4	3.1	55.0
N21	42 0 49	111 36 56	21.0	8.00	1.30	.13	<4	4.4	51.0
N22	42 1 24	111 36 55	2.6	.60	1.00	.17	<4	3.9	<1.0
N23	42 2 31	111 36 58	5.5	.75	1.30	.10	<4	5.0	<1.0
N24	42 1 45	111 38 17	11.0	7.40	.78	.22	<4	2.6	22.0
N25	42 0 50	111 38 44	51.0	3.00	.91	.31	<4	2.3	121.0
N26●	42 0 48	111 38 45	45.0	4.60	.85	.34	<4	2.1	129.0
N27	42 0 45	111 40 38	49.0	17.00	1.20	.38	<4	2.5	162.0
N28	42 1 55	111 42 42	3.4	1.00	1.80	.35	<4	4.9	3.5
N29●	42 3 4	111 42 20	4.2	1.20	2.10	.43	<4	5.4	5.6
N30●	42 2 15	111 40 8	49.0	17.00	1.20	.29	<4	3.8	175.0
N31	41 58 9	111 41 52	57.0	12.00	1.90	.35	<4	4.4	157.0
N32●	41 58 0	111 41 48	49.0	13.00	1.40	.37	<4	2.8	168.0
N33	41 57 3	111 44 12	3.9	1.00	2.00	.39	<4	5.7	8.1
N34●	41 57 2	111 44 18	4.2	.95	1.60	.43	<4	4.8	1.2
N35	41 55 20	111 42 28	37.0	17.00	.85	.24	<4	2.0	145.0
N36●	42 0 13	111 44 5	3.7	1.00	1.80	.38	<4	5.1	6.9
N37	42 0 54	111 43 13	3.7	.85	1.70	.42	<4	5.2	<1.0
N38	42 4 21	111 40 9	7.8	2.10	1.90	.40	<4	6.1	24.0
N39	42 5 41	111 39 43	72.0	7.70	2.80	.37	<4	6.2	167.0
N40	42 6 33	111 38 58	73.0	8.60	2.40	.30	<4	6.2	220.0
N41	42 5 47	111 42 7	68.0	12.00	5.30	.64	4	11.0	134.0
N42	42 6 5	111 41 25	61.0	4.70	4.80	1.20	4	11.0	158.0
N43	42 7 13	111 41 36	84.0	5.10	7.30	3.50	6	18.0	200.0
N44	42 8 26	111 39 37	60.0	15.00	2.60	.39	4	6.1	198.0
N45	42 8 14	111 38 30	41.0	10.00	1.20	.32	<4	4.0	136.0

Table 2.--WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO--Continued

SAMPLE	SO4(mg/L)	CL(mg/L)	F(mg/L)	NO3(mg/L)	ZN(ug/L)	CU(ug/L)	MO(ug/L)	AS(ug/L)
N01	3.50	1.50	.08	.18	4	2.4	.6	1.0
N02◆	2.60	1.40	.13	<.10	3	2.1	.7	1.1
N03	1.80	.88	.05	.10	1	1.2	.6	1.4
N04	2.60	1.20	.07	<.10	7	2.1	.5	2.0
N05	2.00	.81	.07	<.10	3	1.7	.6	1.8
N06	2.60	1.20	.04	.55	2	2.8	.5	1.2
N07	5.10	2.00	.08	.18	7	13.6	.4	1.3
N08	7.70	1.10	.06	<.10	4	1.9	.4	1.2
N09●	3.70	1.50	.03	.10	4	1.0	.4	.7
N10●	2.60	1.30	.05	.55	2	.7	.3	.1
N11	4.80	2.40	.10	.92	2	1.4	.4	1.7
N12	4.20	4.30	.07	2.00	8	1.9	.4	1.7
N13	2.40	.98	.08	.55	11	22.7	.3	.7
N14	1.70	.84	.06	.46	4	1.8	.4	2.2
N15	1.50	.82	.09	.18	3	.9	.5	1.4
N16	1.50	.73	.08	.18	5	.7	.4	.7
N17	1.10	.61	.04	.10	3	.8	.6	.8
N18	1.30	.63	.04	<.10	1	.5	.4	.8
N19	2.40	1.10	.05	<.10	2	1.8	.3	1.4
N20	1.10	.57	.02	<.10	1	.3	.3	.7
N21	1.10	.70	.09	<.10	4	.4	.4	.8
N22	1.10	.61	.02	<.10	3	.3	.3	.2
N23	.73	.55	.03	<.10	4	.5	.5	.4
N24	1.30	.49	.03	<.10	3	.3	.3	.5
N25	1.70	.67	.04	<.10	6	.3	.3	1.3
N26●	1.30	.70	.04	.10	3	.6	.6	1.6
N27	2.20	1.10	.04	<.10	3	.4	.4	1.1
N28	2.00	1.20	.02	1.10	1	.3	.3	.1
N29●	2.40	1.40	.03	.73	5	.4	.4	.7
N30●	2.20	1.20	.08	<.10	4	.3	.3	1.5
N31	3.90	1.70	.07	.10	4	.3	.3	1.4
N32●	2.80	1.10	.04	.10	3	.3	.3	1.0
N33	2.40	1.20	.03	.73	2	.2	.2	.4
N34●	2.00	.96	.05	<.10	3	.2	.2	.6
N35	1.80	.90	.04	.10	2	.2	.2	1.2
N36●	2.00	1.20	.02	<.10	2	.2	.2	.2
N37	2.40	1.20	.03	.18	2	.4	.4	.9
N38	2.60	1.10	.03	<.10	3	.2	.2	.5
N39	5.30	2.40	.06	.18	5	.6	.6	1.5
N40	4.60	1.70	.06	<.10	2	.4	.4	2.0
N41	6.10	4.10	.08	.55	4	3.3	.3	1.4
N42	3.10	3.70	.07	.18	3	2.6	.2	1.1
N43	4.40	5.10	.08	<.10	4	2.8	.3	1.3
N44	3.90	1.90	.05	.55	3	2.3	.4	1.1
N45	2.00	1.10	.05	.10	5	1.5	.2	1.3

Table 2.-- WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO --Continued

SAMPLE	FE(ug/L)	MN(ug/L)	AL(ug/L)	U(ug/L)	SP.COND. (µmhos/cm)	pH	TEMP.(C)
N01	4.5	.6	9	.36	380	7.51	6.5
N02●	4.4	.8	13	.30	330	8.27	10.0
N03	1.5	.5	7	.28	280	8.09	5.0
N04	11.0	1.1	28	.36	400	7.79	9.5
N05	.8	.5	8	.30	280	8.27	7.0
N06	.6	.4	7	.36	420	8.32	7.0
N07	1.9	.5	9	.36	440	7.59	5.5
N08	3.7	.3	5	.20	250	7.76	7.0
N09●	15.0	1.3	6	.28	240	8.18	10.0
N10●	3.0	.8	7	.12	70	7.78	11.5
N11	35.0	3.0	6	.42	360	7.47	9.0
N12	2.9	.6	6	.32	400	7.50	8.5
N13	28.0	.6	5	.30	400	7.86	11.0
N14	3.2	.8	5	.22	250	7.79	3.5
N15	2.6	.9	6	.22	330	7.36	4.5
N16	.8	.6	4	.20	270	8.02	4.5
N17	4.1	.7	5	.20	280	7.77	3.5
N18	5.9	.9	7	.12	70	6.96	5.0
N19	1.3	.5	5	.18	350	7.38	3.5
N20	1.7	.6	5	.14	105	6.76	5.0
N21	50.0	2.4	70	.16	190	7.30	8.5
N22	83.0	2.9	26	.12	23	6.24	9.5
N23	32.0	4.8	50	.10	39	6.70	14.5
N24	2.2	.5	11	.14	120	7.36	3.5
N25	1.7	.4	5	.20	280	7.62	3.5
N26●	3.0	.9	9	.24	260	8.15	8.5
N27	4.9	1.2	6	.24	340	8.24	5.0
N28	5.4	.6	18	.12	40	6.13	8.0
N29●	12.0	1.0	25	.04	45	7.52	11.5
N30●	2.8	.6	7	.26	340	8.23	6.0
N31	3.2	.6	6	.34	350	7.67	6.0
N32●	55.0	.4	5	.32	320	8.24	8.0
N33	7.0	.5	14	.08	42	7.51	8.5
N34●	6.5	1.6	11	.10	41	7.52	15.0
N35	2.7	.7	4	.24	300	8.22	6.0
N36●	15.0	7.3	9	.10	40	7.38	9.0
N37	7.0	1.1	7	.08	34	7.25	8.0
N38	1.7	.6	4	.12	70	6.70	9.0
N39	2.2	1.2	7	.36	410	7.62	8.0
N40	7.0	1.0	8	.30	420	7.19	6.5
N41	2.1	1.0	7	.36	420	8.27	11.0
N42	2.0	7.9	4	.32	350	7.98	15.5
N43	14.0	35.0	8	.40	460	8.06	9.5
N44	4.2	.8	6	.28	390	7.61	8.5
N45	2.1	.4	5	.22	270	7.96	5.5

Table 2.-- WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO--continued

SAMPLE	LATITUDE	LONGITUDE	CA(mg/L)	MG(mg/L)	NA(mg/L)	K(mg/L)	LI(ug/L)	SIO2(mg/L)	ALK(mg/L)
N46	42 7 33	111 38 2	43.0	8.60	1.20	.30	<4	3.6	145.0
N47	42 5 38	111 37 4	3.8	2.00	1.00	.17	<4	3.3	17.0
N48	42 6 26	111 36 46	6.1	1.20	.66	.19	<4	2.5	10.0
N49	42 4 13	111 36 47	3.6	.70	1.10	.20	<4	3.9	6.1
N50	41 49 50	111 46 29	19.0	4.80	4.10	.63	<4	8.2	<1.0
N51●	41 51 23	111 44 58	41.0	18.00	1.10	.23	<4	3.5	144.0
N52●	41 52 7	111 45 34	44.0	16.00	1.30	.24	<4	3.8	137.0
N53●	41 58 30	111 42 27	48.0	16.00	1.40	.27	<4	3.6	160.0
N54	42 3 0	111 36 20	2.8	.72	1.30	.13	<4	5.0	<1.0
N55	41 52 22	111 37 12	60.0	1.30	2.20	.29	<4	6.3	132.0
N56	41 45 58	111 41 42	60.0	18.00	2.70	.43	<4	5.2	215.0
N57	41 50 25	111 35 16	48.0	14.00	1.40	.32	<4	4.8	199.0
N58	41 49 18	111 37 35	60.0	40.00	2.70	.38	4	6.0	311.0
N59	41 48 50	111 37 25	47.0	17.00	1.60	.39	<4	5.0	190.0
N60	41 45 37	111 42 31	55.0	19.00	3.40	.43	<4	5.2	190.0

Table 2.--WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO--continued

SAMPLE	SO4(mg/L)	CL(mg/L)	F(mg/L)	NO3(mg/L)	ZN(ug/L)	CU(ug/L)	MO(ug/L)	AS(ug/L)
N46	1.80	1.00	.03	.10	2	1.2	.2	1.0
N47	1.10	.63	.03	.10	3	.4	.2	.4
N48	1.10	.63	.03	<.10	150	10.2	.3	.3
N49	.89	.63	.07	<.10	5	.6	.1	.6
N50	6.70	3.40	.08	<.10	6	.9	.3	.8
N51●	3.20	1.20	.04	<.10	2	1.3	.2	1.0
N52●	3.20	1.20	.04	.10	3	1.2	.2	1.1
N53●	.89	1.40	.04	<.10	1	1.3	.3	1.4
N54	.53	.68	.04	<.10	3	1.3	.1	.5
N55	2.00	1.40	.06	1.70	3	2.5	.1	3.0
N56	10.00	1.90	.10	.36	5	2.2	.6	2.4
N57	2.00	1.10	.04	.36	4	1.7	.2	1.7
N58	5.00	2.50	.11	2.40	4	1.3	.2	1.8
N59	3.00	1.20	.06	<.10	10	1.7	.1	1.8
N60	13.00	2.50	.10	1.30	7	2.1	.7	2.2

Table 2.--WATER ANALYSES FROM MT. NAOMI WILDERNESS STUDY AREA, UTAH-IDAHO--continued

SAMPLE	FE(ug/L)	MN(ug/L)	AL(ug/L)	U(ug/L)	SP.COND. (µmhos/cm)	pH	TEMP.(C)
N46	1.4	.5	6	.22	270	7.71	5.5
N47	5.1	6.8	13	.12	45	7.21	10.0
N48	75.0	8.4	5	.10	48	6.80	14.5
N49	17.0	5.4	6	.08	32	7.02	14.5
N50	2.5	.7	2	.18	160	7.31	13.5
N51●	2.0	1.0	6	.28	310	8.29	6.5
N52●	2.3	1.1	4	.28	310	8.31	9.0
N53●	1.6	.4	5	.24	320	8.32	8.0
N54	27.0	10.0	34	.26	27	6.80	13.5
N55	4.1	1.9	4	.22	280	7.59	5.0
N56	.7	.3	4	.62	390	7.82	7.0
N57	.9	.5	3	.22	320	7.64	6.5
N58	.6	.4	6	.28	530	8.01	10.0
N59	.5	.4	3	.28	330	7.78	6.5
N60	2.3	.3	5	.56	380	8.29	8.5

Table 3.--Summary of chemical analyses of 60 water samples, Mount Naomi Wilderness study area, Utah-Idaho

Variable	Minimum	Maximum	Mean	Geometric mean	Standard deviation	Geometric deviation
Ca (mg/L)	2.6	84.	36.1	24.4	22.7	2.95
Mg (mg/L)	.60	40.	10.4	6.39	8.15	3.24
Na (mg/L)	.66	7.3	1.84	1.53	1.37	1.77
K (mg/L)	.06	3.5	.375	.298	.445	1.81
Li (µg/L)	<4.0	6.0	2.99	2.95	.584	1.17
SiO_2 (mg/L)	2.0	18.	4.95	4.40	2.79	1.59
Alkalinity (mg/L)	<1.0	311.	121.	57.3	81.6	6.14
SO_4 (mg/L)	.53	13.	2.93	2.37	2.23	1.90
Cl (mg/L)	.49	5.1	1.42	1.20	.970	1.73
F (mg/L)	.02	.13	.056	.050	.025	1.60
NO_3 (mg/L)	<.10	2.4	.317	.159	.485	2.87
Zn (µg/L)	1.0	150.	6.13	3.42	19.0	2.09
Cu (µg/L)	.20	22.7	1.86	.952	3.47	2.87
Mo (µg/L)	.10	.70	.350	.315	.153	1.63
As (µg/L)	.10	3.0	1.13	.936	.606	2.04
Fe (µg/L)	.50	83.	10.1	4.17	17.2	3.47
Mn (µg/L)	.30	35.	2.16	.997	4.84	2.76
Al (µg/L)	2.0	70.	9.85	7.29	1.14	1.95
U (µg/L)	.04	.62	.240	.212	.114	1.71
Sp. cond. (µmhos/cm)	23.	530.	254.	189.	143.	2.53
pH	6.13	8.32	7.63	--	.531	--
Temp. (°C)	3.5	15.5	8.13	7.55	3.13	1.48

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