UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical Results and Sample Locality Map of Water Samples from the Birdseye, Nephi, and Santaquin Roadless Areas, Juab and Utah Counties, Utah

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Open-File Report 84-414

1984

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STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a hydrogeochemical survey of the Birdseye, Nephi, and Santaquin Roadless Areas in Uinta National Forest, Juab, and Utah Counties, Utah. The Birdseye, Nephi, and Santaquin Roadless Areas were classified as further planning areas during the second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

INTRODUCTION

In July 1981, a hydrogeochemical reconnaissance survey was conducted in the Birdseye, Nephi, and Santaquin Roadless Areas, Juab and Utah Counties, Utah. This study supplements the drainage geochemical study done for these areas (Sorensen and Korzeb, 1982). Water was used as a sampling media because anomalous values of the elements analyzed for in water can represent a potential mineral deposit. The Birdseye, Nephi, and Santaquin Roadless Areas comprise about 78 mi ^{2} (202 km^2) in the eastern part of Juab county and southern part of Utah County, Utah, and lie a few miles south and east of Santaquin, Utah, and 55 miles south of Salt Lake City, Utah. Access to the vicinity of the study area is provided on the west by Interstate Highway 15, on the east by U.S. Highway 89, and on the south by Utah Highway 132. Access to the study area is provided by Nebo Loop, Santaquin Canyon, and Pole Canyon Forest Service roads.

The study area is located in the southern Wasatch Mountains, which are in the Rocky Mountains physiographic province. The study area is separated from the Basin and Range province by the Wasatch fault. The study area is underlain by approximately 26,000 ft of Proterozoic to Tertiary sedimentary rocks and by discontinuous Tertiary volcanic rocks.

The topographic relief in the study area is about 6,600 ft (2,012 m), with a maximum elevation of 11,877 ft (3,620 m). The ground surface is mountainous with some areas of near-vertical relief. The climate is arid to semiarid.

SAMPLE COLLECTION AND ANALYSES

Thirty-nine water samples were collected from twenty-seven springs and twelve surface streams from the study areas (fig. 1). Samples were collected using acid-rinsed polyethylene bottles. A 60-mL sample was taken at each site, filtered through a 0.45-µm filter and acidified with reagent-grade concentrated nitric acid to a pH of less than 2. An untreated 250-mL sample was also taken. The water temperature was measured at each site. The pH of the water was determined at the sample site using a Markson pH meter.

The analytical methods used and limit of detection for the various constituents are shown in table 1. Untreated water samples were analyzed for anions, uranium, pH, and specific conductance. Filtered and acidified water samples were analyzed for the remaining constituents. Table 2 shows analytical data for each sample, as well as sample site location by latitude and longitude.

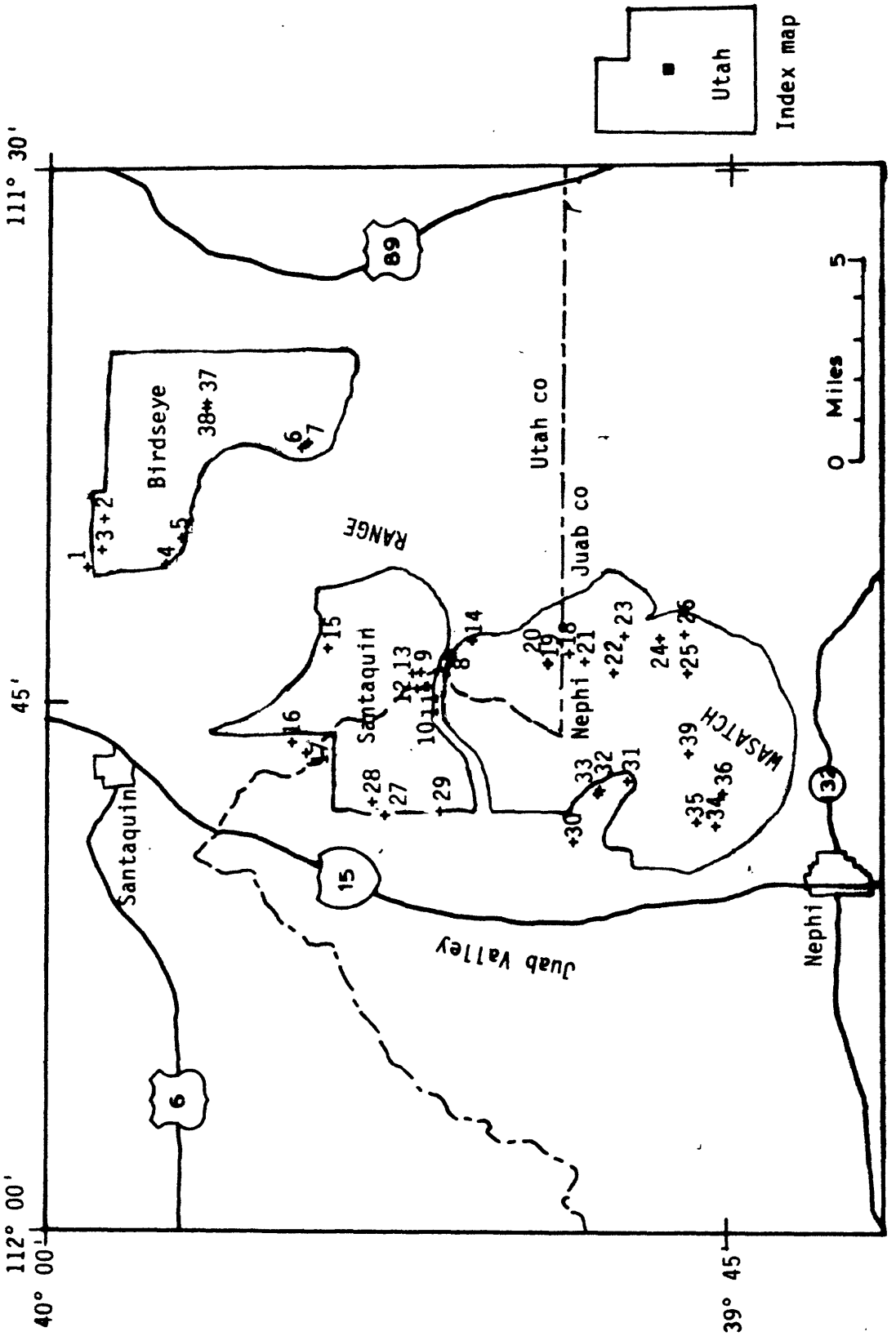

Figure 1.--Sample location map of the Birdseye, Nephi, and Santaquin Roadless Areas, Juab and Utah Counties, Utah

Table 1.--Analytical methods

Constituent	Detection limit	Method	Reference
Sulfate	1 mg/L	Ion chromatography	Fishman and Pyen (1979)
Chloride	.05 mg/L	.....do	.....Do.
Fluoride	.01 mg/L	.....do	.....Do.
Calcium	.1 mg/L	Flame atomic absorption	Perkin-Elmer Corp. (1976)
Magnesium	.01 mg/L	.....do	.....Do.
Sodium	.01 mg/L	.....do	.....Do.
Potassium	.01 mg/L	.....do	.....Do.
Lithium	2 µg/L	.....do	.....Do.
Zinc	1 µg/L	.....do	.....Do.
Copper	1 µg/L	Flameless atomic absorption	Perkin-Elmer Corp. (1977)
Molybdenum	1 µg/L	.....do	.....Do.
Arsenic	1 µg/L	.....do	.....Do.
Uranium	.10 µg/L	Laser-excited fluorescence.	Scintrex Corp. (1978)
Specific conductance	.01 µS	Conductivity bridge	Skougstad and others (1979)

Table 2.--Water analyses from Birdseye, Nephi, and Santaquin Roadless Areas, Utah

Sample	LATITUDE	LONGITUD	CA(mg/L)	MG(mg/L)	NA(mg/L)	K(mg/L)	LI(ug/L)	SO4(mg/L	CL(mg/L)	F(mg/L)
1	39 59 10	111 41 15	92	32.0	25.00	.81	12	127.0	24.00	.28
2	39 58 48	111 39 53	70	8.5	6.50	.53	2	15.0	6.30	.13
3	39 58 51	111 40 46	66	18.0	10.00	.71	4	42.0	11.00	.31
4	39 57 27	111 41 9	43	18.0	4.80	.50	4	13.0	4.80	.38
● 5	39 57 6	111 40 25	36	16.0	7.10	1.80	6	7.5	6.20	.37
6	39 54 27	111 37 51	71	20.0	6.10	.23	4	7.3	5.30	.30
7	39 54 18	111 37 42	56	31.0	13.00	.75	13	21.0	11.00	.25
8	39 51 6	111 43 44	7	2.0	1.50	.26	3	1.4	1.10	.12
9	39 51 47	111 44 10	10	2.5	2.50	.74	2	2.8	1.10	.10
● 10	39 51 38	111 44 34	29	8.7	1.80	.38	2	2.3	1.50	.07
11	39 51 41	111 44 35	19	4.4	2.60	.62	<2	1.9	.91	<.05
12	39 51 52	111 44 38	8	1.6	3.00	.29	<2	1.5	1.30	.04
13	39 51 58	111 44 12	17	3.0	2.90	1.50	<2	1.6	1.60	.08
14	39 50 38	111 43 17	5	1.7	3.30	.42	5	4.9	3.70	.06
● 15	39 51 51	111 43 30	37	15.0	2.50	.60	3	12.0	4.20	.38
16	39 54 38	111 46 11	46	24.0	3.90	.70	4	7.7	3.50	.04
17	39 54 19	111 46 29	51	21.0	10.00	.75	6	33.0	8.90	.07
● 18	39 48 29	111 43 38	47	14.0	3.90	.88	5	14.0	3.90	.19
● 19	39 48 57	111 43 57	30	7.3	.76	.25	2	4.0	.62	.18
● 20	39 49 58	111 43 54	37	9.8	1.30	.40	2	7.9	1.80	.25
● 21	39 43 9	111 43 51	28	5.6	.61	.21	<2	3.1	.53	.13
● 22	39 47 31	111 44 11	37	9.8	1.40	.47	3	9.4	1.80	.13
23	39 47 17	111 43 8	90	15.0	10.00	1.40	11	69.0	9.60	.24
● 24	39 46 31	111 43 12	48	20.0	3.00	.74	5	97.0	2.00	.08
25	39 45 55	111 44 11	135	42.0	36.00	1.70	30	420.0	20.00	.17
26	39 45 59	111 43 5	77	23.0	130.00	1.90	11	96.0	43.00	.18
27	39 52 34	111 48 13	45	29.0	7.40	1.40	7	155.0	8.90	.36
28	39 52 51	111 47 50	31	21.0	2.90	.54	3	17.0	3.10	.08
● 29	39 51 21	111 48 6	40	18.0	2.90	.58	3	25.0	3.10	.08
30	39 49 23	111 48 57	40	19.0	2.80	.58	3	22.0	3.50	.46
● 31	39 47 12	111 47 15	36	10.0	1.60	.42	2	6.7	1.80	.09
32	39 47 48	111 47 30	42	16.0	1.50	.45	3	8.7	1.70	.21
33	39 47 51	111 47 36	34	15.0	1.30	.42	3	7.5	1.50	.20
34	39 45 17	111 48 30	140	31.0	9.10	1.30	10	426.0	8.30	.20
35	39 45 42	111 48 24	34	36.0	37.00	1.80	10	63.0	56.00	.28
36	39 45 8	111 47 35	41	21.0	4.50	1.20	3	26.0	3.30	.10
37	39 56 33	111 36 35	32	13.0	2.60	.63	4	13.0	2.40	.41
● 38	39 56 34	111 36 44	40	19.0	5.10	1.70	8	16.0	4.90	1.50
39	39 45 53	111 46 28	45	19.0	2.10	.56	4	22.0	1.30	.29

● Stream sample

Table 2.--Water analyses from Birdseye, Nephi, and Santaquin Roadless Areas, Utah

Sample	ZN(ug/L)	CU(ug/L)	MO(ug/L)	AS(ug/L)	U(ug/L)	SP. COND. µS	pH	TEMP. C.
1	15	11.0	.7	2.3	2.20	800	6.72	8.0
2	5	.9	1.0	2.5	.56	520	7.14	9.0
3	6	.7	.9	2.4	1.10	600	7.27	8.0
4	4	1.0	.7	2.2	.90	420	8.03	11.0
5	3	3.8	.5	2.8	.54	380	8.52	18.0
6	10	1.8	.6	1.9	.18	600	6.82	7.0
7	4	2.6	.5	2.2	.94	640	7.09	7.0
8	3	2.6	.3	1.2	<.10	63	6.90	8.5
9	3	.6	.3	1.2	<.10	96	7.27	5.5
10	3	.6	.3	1.4	.22	260	8.24	12.0
11	4	.7	.3	1.4	.10	175	7.11	6.5
12	4	4.5	.4	.9	<.10	73	6.58	15.5
13	3	10.0	.3	1.7	.10	155	6.84	21.0
14	112	4.1	.8	1.1	<.10	60	5.91	15.5
15	4	12.0	.5	1.8	.94	350	8.42	13.5
16	4	.7	.7	2.0	.62	470	8.08	8.5
17	3	.9	.6	2.6	.78	500	8.35	15.5
18	4	10.0	.5	1.9	.62	370	8.22	13.0
19	4	3.7	.7	1.1	.34	250	8.42	12.0
20	4	.9	.5	1.5	.54	310	8.42	10.5
21	4	.7	.6	1.3	.24	220	8.42	13.0
22	3	9.6	.6	1.5	.42	310	8.39	14.5
23	4	1.4	1.0	3.3	.82	600	8.21	14.5
24	4	7.2	1.1	1.9	.74	460	8.70	18.5
25	6	2.6	.6	3.0	3.00	1,100	8.16	10.0
26	4	.7	.7	2.6	.46	1,140	8.25	15.5
27	3	2.2	.9	2.2	.52	580	8.20	15.5
28	6	.6	.9	1.9	.86	370	8.10	9.0
29	3	.6	1.5	1.7	.72	380	8.50	12.0
30	5	2.2	1.2	1.4	2.00	410	7.72	10.0
31	2	.6	.9	1.4	.62	290	8.47	12.0
32	2	.7	.9	1.5	1.20	360	8.39	9.5
33	3	.6	1.8	1.4	1.20	320	8.48	11.0
34	8	1.0	1.4	2.1	.94	970	7.32	9.5
35	2	2.0	1.4	1.8	1.30	680	8.82	15.5
36	8	9.5	.9	1.4	1.30	410	8.58	12.0
37	4	.4	1.1	1.7	.66	320	7.67	8.0
38	7	2.2	.9	1.5	.62	420	8.22	14.0
39	6	2.3	2.1	1.4	.78	440	8.06	13.0

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