UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment, panned-concentrate, soil, and rock samples from the Kanab Creek (B3060) Roadless Area, Coconino and Mohave Counties, Arizona

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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 geochemical survey of the Kanab Creek Roadless Area in the Kaibab National Forest, Coconino and Mohave Counties, Arizona. The roadless area was classified as a further planning area (B3060) during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

INTRODUCTION

In March, 1982 we conducted a reconnaissance geochemical survey of the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona.

The Kanab Creek Roadless Area is a canyon (Snake Gulch) which comprises about 14.3 mi^2 (37 km^2) in northern Coconino and Mohave Counties, Arizona, and lies about 15 mi (24 km) south of Fredonia, Arizona (see figure 1). Access to the rims of the canyon is provided on the north and south by small dirt roads, and a four wheel drive road provides access down to the floor of the canyon for its entire 22 mile length.

Snake Gulch Canyon lies within the Colorado Plateau province 18 miles north of the central region of Grand Canyon, Arizona. Horizontal exposures of sedimentary sandstones, shales, and limestones, all of Lower Permian age, outcrop along the canyon walls. Detailed geologic mapping (scale 1:24,000) was done for this study which included aerial photo interpretation and field checking (Billingsley, unpub. data, 1983).

The Kanab Creek Area is located on the U.S. Geological Survey Jumpup Canyon and Big Springs 15-minute quadrangle maps. The topographic relief in the canyon ranges from 3720 ft (1153 m), to 6200 ft (1922 m). The climate is arid to semiarid.

METHODS OF STUDY

Sample Collection

We collected 85 samples at various locations (Plate 1) within and around the study area. We analyzed 31 stream-sediment samples, 16 panned-concentrate samples, 23 rock samples, 9 soil samples, and 6 water samples for a sampling density of about 1 sample per .5 mi^2 for the stream sediment, about 1 sample per 0.89 mi^2 for the heavy-mineral concentrate, and about 1 sample per .62 mi^2 for the rock. The drainage basins ranged from 1/2 to 14 mi^2.

Stream-sediment samples

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits.

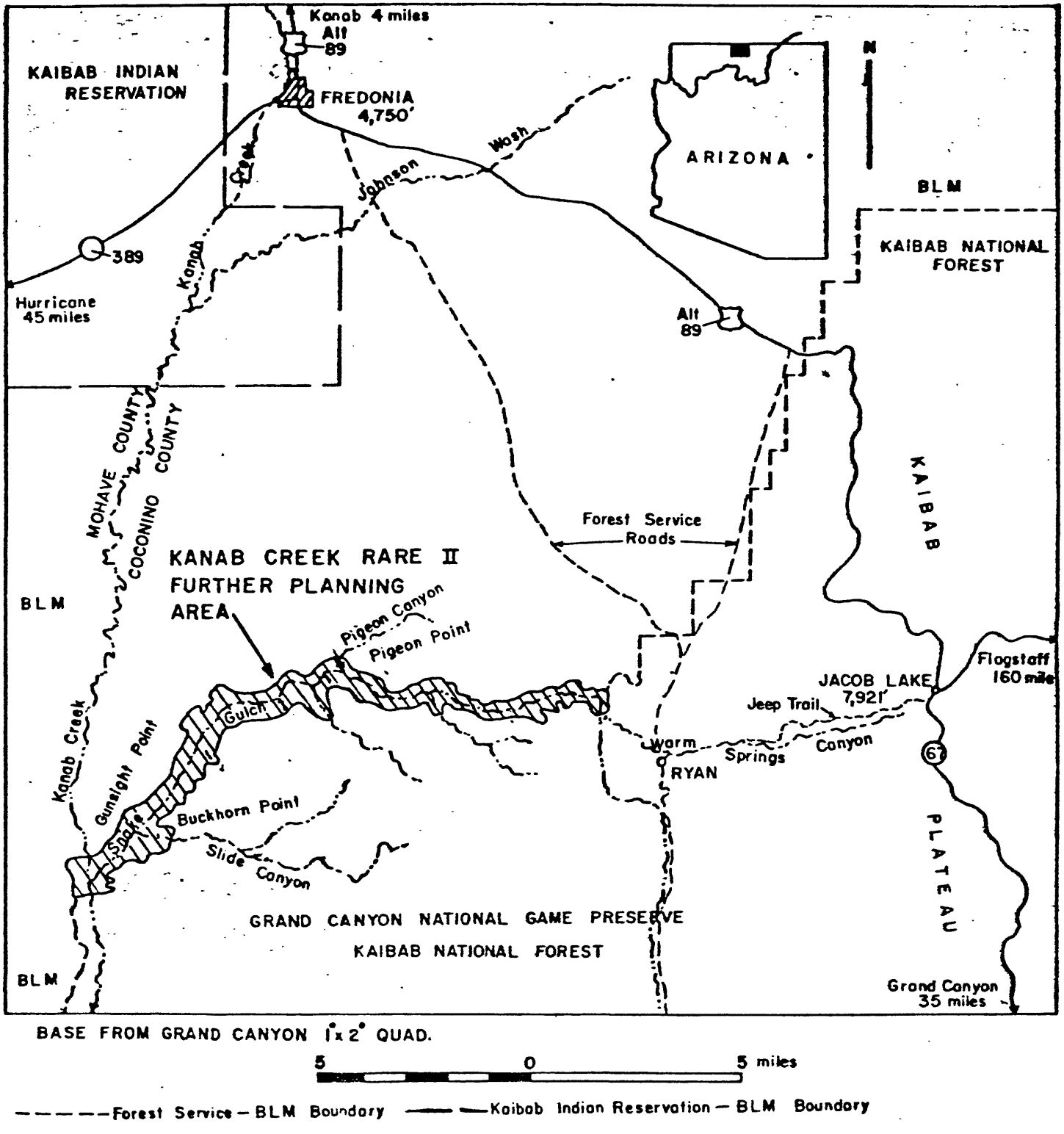

Figure 1. Location map of the Kanab Creek (B3060) Roadless Area, Coconino and Mohave Counties, Arizona (G. H. Billingsley, written communication, 1983).

The stream-sediment samples consisted of alluvium collected at the confluence of all major tributaries in the main drainage (Snake Gulch), as well as from selected sites just outside the designated study area. Each sample was composited from several localities within an area that may extend as much as 150 ft from the site plotted on the map.

Heavy-mineral-concentrate samples

We collected concentrates of stream alluvium from drainages which were large enough to deposit gravel size and coarser sediment. We intentionally biased collection by selection of material from points of natural concentration of heavy minerals by stream processes.

The material selected was panned until most of the quartz, feldspar, organic material, and clay-sized particles was removed. The sample was air dried.

Rock and soil samples

We collected rock samples from outcrops or exposures in the vicinity of the plotted site location. Most samples were collected from unaltered rock. Rock samples provide information on elements in rocks that have not been affected by alteration or mineralization. In addition, some altered rocks were collected.

Soil samples were collected at various rock sample sites to give backup data for the rock analyses and to provide well mixed composites of the outcrops. In addition, soil samples were taken from locations where outcrops were not available.

Water samples

We collected water samples from six springs that emerge in the side canyons of Snake Gulch. A 500-ml sample was taken at each site and stored in a new untreated plastic bottle. In addition, a 60-mL sample was filtered through a 0.45-micrometer filter, was acidified with reagent-grade concentrated nitric acid to pH 2, and was stored in an acid-rinsed polyethylene bottle.

Sample Preparation

Only the soil and stream-sediment samples required extensive preparation. Rock samples were simply crushed and then pulverized. Water samples required no preparation beyond that done in the process of collecting them.

We sieved the soil and stream-sediment samples through an 80-mesh (177 micron) stainless-steel screen and the minus-80-mesh material was retained. The portion of the sample passing through the sieve was split and a representative fraction was saved for analysis.

Panned-concentrates were air dried and examined to determine mineral composition. A small split of each sample was separated and hand ground for spectrographic analysis. The entire remainder of each concentrate was weighed and chemically analyzed (via atomic absorption) for gold content.

Sample Analysis

Spectrographic method

We analyzed the stream-sediment, heavy-mineral-concentrate, and rock samples for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in Table 1. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting unit at the 83 percent confidence level and plus or minus two reporting units at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (iron, magnesium, calcium, and titanium) are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical results are listed in Table 3.

TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The spectrographic limits of determination for heavy-mineral-concentrate samples are two reporting units higher than the limits given for rocks and stream sediments because 5-mg samples were analyzed]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

Chemical methods

Other methods of analysis used on samples from the Kanab Creek Roadless area are summarized in Table 2.

Table 2.--Chemical methods used

Sample type	Constituent determined	Analytical method	Determination limit[1] micrograms/ gram or ppm	Analyst	Reference
Rocks	Au	AA	0.05	W. L. Campbell	Thompson and others, 1968
	U	Fluorometry	.05	R. W. Leinz	Modification of Centanni and others, 1956
	Zn, Cu, Pb	AA	5	W. L. Campbell	Modification of Viets, 1978
Sediments	Zn, Cu, Pb	AA	5	W. L. Campbell	Modification of Viets, 1978.
	U	Fluorometry	.05	R. W. Leinz	Modification of Cantanni, and others, 1956
Concentrates	Au	AA	.05	W. L. Campbell	Thompson and others, 1968
Water[2]	Cu, Pb, Zn	AA	1 µg/L	J. B. McHugh	Miller, and others, 1982
	Specific Conductance	Conductivity Bridge	NA	J. B. McHugh	Miller, and others, 1982
	$SO_4^=$	Ion Chromatography	.1 mg/L	J. B. McHugh	Miller, and others 1982
	F^-, Cl^-	Ion Chromatography	.01 mg/L	J. B. McHugh	Miller, and others 1982
	U	Fluorometry	.10 µg/L	J. B. McHugh	Scintrex Corp., 1978

[1]The determination limit is dependent upon sample weight. Given limits imply use of sample weight required by method. Higher limits of determination result from using less than required sample weight.

[2]Untreated water samples were analyzed for anions, U, and specific conductance. Filtered and acidified water samples were analyzed for metals.

ROCK ANALYSIS STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into a computer-based file called RASS (Rock Analysis Storage System). This RASS file contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a standard form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1976).

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VanTrump, George, Jr., and Miesch, A. T., 1976, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

Viets, J. G., 1978, Determination of silver, bismuth, cadmium, copper, lead, and zinc in geologic materials by atomic absorption spectrometry with tricaprylylmethylammonium chloride: Analytical Chemistry, v. 50, p. 1097-1101.

TABLE 3. **Analytical data for stream sediments and soils from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona**

[The following qualifiers are used in reporting spectrographic data: --, no determination made; N, concentration less than the detection limit; <, detected, but at a concentration less than the value reported; >, element present at a concentration greater than the upper detection limit. "S" under column title represents spectrographic analysis; "aa" represents atomic absorption analysis; L represents soil samples.]

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S	B-ppm S	Ba-ppm S	Be-ppm S
KAN001S	36 38 24	112 37 32	1.0	3.0	10.0	.30	300	N	N	N	70	300	<1.0
KAN002S	36 38 28	112 37 42	1.0	1.5	3.0	.30	500	N	N	N	100	700	1.0
KAN003S	36 39 25	112 36 22	1.0	2.0	7.0	.30	500	N	N	N	70	500	1.0
KAN004S	36 39 26	112 36 27	1.5	3.0	10.0	.50	700	N	N	N	100	500	2.0
KAN005S	36 43 27	112 30 31	1.5	1.5	3.0	.30	500	N	N	N	70	500	1.0
KAN006S	36 43 21	112 30 32	1.5	2.0	10.0	.30	500	N	N	N	70	500	1.5
KAN007S	36 42 47	112 27 57	1.0	2.0	7.0	.20	500	N	N	N	70	500	<1.0
KAN008S	36 42 43	112 27 54	1.5	2.0	7.0	.20	500	N	N	N	100	500	1.0
KAN009S	36 41 2	112 34 16	.7	2.0	15.0	.20	300	N	N	N	100	300	1.0
KAN010S	36 40 59	112 34 49	3.0	3.0	10.0	.30	700	N	N	N	100	500	2.0
KAN011S	36 42 2	112 33 57	2.0	3.0	7.0	.30	500	N	N	N	100	700	1.5
KAN012S	36 42 34	112 33 26	1.0	3.0	10.0	.30	500	N	N	N	70	300	1.0
KAN013S	36 42 34	112 31 43	1.0	3.0	10.0	.20	500	N	N	N	100	300	1.0
KAN014S	36 42 45	112 27 15	1.5	3.0	7.0	.30	700	N	N	N	100	500	1.0
KAN015S	36 42 17	112 25 9	3.0	2.0	5.0	.50	700	N	N	N	150	700	2.0
KAN016S	36 42 33	112 22 21	1.5	2.0	7.0	.30	500	N	N	N	100	500	1.0
KAN017S	36 42 31	112 22 33	.7	2.0	10.0	.30	300	N	N	N	70	300	<1.0
KAN018S	36 41 30	112 25 27	2.0	.7	1.5	.30	700	<.5	N	N	70	700	1.0
KAN019S	36 41 19	112 25 18	1.0	.3	.7	.30	200	<.5	N	N	50	300	1.0
KAN020S	36 41 22	112 25 27	.7	.5	.7	.15	300	N	N	N	30	300	1.0
KAN021S	36 41 28	112 25 18	.7	.3	.7	.15	300	<.5	N	N	50	300	1.0
KAN022S	36 41 41	112 25 35	.7	.3	1.0	.15	300	N	N	N	20	300	1.0
KAN023S	36 41 31	112 25 32	1.0	1.5	3.0	.20	300	N	N	N	30	300	1.0
KAN024S	36 41 5	112 26 42	1.5	.7	1.5	.30	500	N	N	N	50	500	1.0
KAN025S	36 41 5	112 26 31	.7	1.0	3.0	.20	300	N	N	N	50	300	1.0
KAN026S	36 41 0	112 26 33	2.0	.5	.7	.30	500	N	N	N	70	500	1.5
KAN027S	36 39 50	112 34 35	.7	1.0	5.0	.30	300	N	N	N	50	300	1.0
KAN028S	36 41 30	112 25 25	1.5	.7	1.5	.50	500	N	N	N	50	300	1.5
KAN029S	36 41 55	112 23 40	1.5	.3	.5	.30	500	N	N	N	70	300	1.5
KAN030S	36 41 40	112 32 42	1.0	1.5	3.0	.30	300	N	N	N	70	500	1.5
KAN031S	36 41 31	112 32 44	1.5	1.5	5.0	.30	500	N	N	N	70	500	1.0
KAN001L	36 43 28	112 31 40	2.0	7.0	15.0	.15	700	.5	N	N	100	3,000	<1.0
KAN002L	36 43 28	112 31 40	2.0	5.0	15.0	.30	700	N	N	N	200	1,000	1.5
KAN003L	36 43 28	112 31 40	3.0	5.0	10.0	.50	500	N	N	N	150	1,000	1.0
KAN004L	36 41 22	112 25 21	3.0	1.5	3.0	.70	700	N	N	N	100	1,000	1.0
KAN005L	36 43 47	112 24 50	2.0	.5	.3	.50	700	N	N	N	100	1,000	1.0
KAN006L	36 44 45	112 26 42	3.0	1.0	.7	.50	700	N	N	N	100	700	1.5
KAN007L	36 44 16	112 27 6	3.0	2.0	5.0	.50	700	N	N	N	100	700	1.5
KAN008L	36 44 25	112 27 4	3.0	1.5	1.5	.50	700	N	N	N	100	700	1.5
KAN009L	36 39 47	112 34 44	.5	2.0	10.0	.15	300	N	N	N	30	200	1.0

Table 3.-- Analytical data for stream sediments from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona [continued]

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
KAN001S	N	N	5	70	15	20	N	N	10	30			7	N
KAN002S	N	N		70	15	20	N	N	10				7	N
KAN003S	N			100	15	20	N	N	15	30				
KAN004S	N	N		70	20	20	N	<20	20	50			10	N
KAN005S	N	N		100	15	20	N	<20	15	30			N	N
KAN006S	N	N	7	70	20	30	N	<20	15	70			N	N
KAN007S	N	N		100	15	30	N	N	15	50				N
KAN008S	N	N	5	100	20	30	N	<20	15	30	N		N	N
KAN009S	N	N	5	70	15	20	N	N	10	20			N	N
KAN010S	N	N	7	70	20	30	N	<20	30	50	N	10	N	N
KAN011S	N	N	5	100	20	30	N	<20	30	50	N		7	N
KAN012S	N	N	5	70	15	30	N	N	20	50				N
KAN013S	N	N	5	50	15	20	N	N	20					
KAN014S	N	N	7	100	20		N	<20	15					
KAN015S	N	N	7	100	20	30	N	<20	20					N
KAN016S	N	N	5	100	20		N	N	15	50	N			N
KAN017S	N	N	5	70	20	30	N	N	15	30	N		N	N
KAN018S	N	N	5	70	20	20	N		15	30	N		N	N
KAN019S	N	N	7	50	15	20	N	<20	15	30	N		N	N
KAN020S	N	N	7	70	15	20	N	N	10	30	N		N	N
KAN021S	N	N	5	50	15	20	N	<20	10	20	N			N
KAN022S	N	N	5	50	20	20	N	<20	10	20	N		N	N
KAN023S	N	N	5	50	20	20	N	<20	10	30	N		N	N
KAN024S	N	N	7	50	20	20	N	<20	15	50	N		N	N
KAN025S	N	N	5	50	15	20	N	<20	10		N			N
KAN026S	N	N	7	70	20	20	N	<20	20	50	N			N
KAN027S	N	N	5	70	15	20	N	N	10		N			N
KAN028S	N	N	7	50	15	20	N	<20	15	30	N		N	
KAN029S	N	N	5	50	20	20	N	<20	15	50	N		N	N
KAN030S	N	N		50	20	20	N	<20	15	30	N		N	N
KAN031S	N			70	20	20	N	<20	15	30			N	N
KAN001L	N	N	10	100	20	20	N	N	50	20	N		N	N
KAN002L	N	N	7	100	70	30	N	<20	30	50	N		N	N
KAN003L	N	N	10	100	30	50	7	<20	50	50	N			10
KAN004L	N	N	10	100	20	30	N	<20	30	30	N			N
KAN005L	N	N	5	100	20	30	N	<20	20	30	N		N	N
KAN006L	N	N	7	70	20	20	N	<20	20	30	N		N	N
KAN007L	N	N	7	100	30	50	N	<20	20	30	N		N	N
KAN008L	N	N	5	100	20	30	N	<20	30	50	N		N	N
KAN009L	N	N	5	50	15	20	N	N	10	30	N		N	N

Table 3.-- Analytical data for stream sediments from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona---continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	FL-U	Zn-ppm aa	Cu-ppm aa	Pb-ppm aa
KAN001S	150	70	N	20	N	300	N	.75	18	5	12
KAN002S	150	70	N	20	N	200	N	.90	11	4	6
KAN003S	100	70	N	20	N	300	N	.80	12	3	7
KAN004S	150	100	N	20	N	150	N	.95	14	4	9
KAN005S	150	70	N	20	N	200	N	.95	19	6	12
KAN006S	150	70	N	30	N	200	N	.80	13	8	9
KAN007S	150	70	N	20	N	300	N	.55	21	6	12
KAN008S	100	70	N	30	N	200	N	.55	16	5	9
KAN009S	1,500	50	N	20	N	200	N	2.00	15	3	14
KAN010S	150	100	N	30	N	300	N	.75	26	8	44
KAN011S	150	100	N	30	N	300	N	.90	19	8	12
KAN012S	100	70	N	20	N	300	N	1.00	17	4	15
KAN013S	100	50	N	20	N	200	N	.95	19	5	13
KAN014S	100	70	N	30	N	300	N	.90	21	6	14
KAN015S	150	100	N	30	N	300	N	1.00	24	7	11
KAN016S	<100	70	N	20	N	500	N	.50	21	5	12
KAN017S	<100	70	N	20	N	300	N	.65	15	7	10
KAN018S	N	70	N	20	N	300	N	.65	15	6	5
KAN019S	<100	30	N	20	N	200	N	.40	22	7	9
KAN020S	<100	30	N	15	N	150	N	.25	18	8	8
KAN021S	<100	30	N	20	N	300	N	.50	17	7	6
KAN022S	N	30	N	15	N	150	N	.20	16	8	6
KAN023S	100	30	N	15	N	150	N	.40	22	8	11
KAN024S	100	50	N	20	N	300	N	.55	29	9	11
KAN025S	<100	30	N	15	N	300	N	.50	17	9	10
KAN026S	N	50	N	20	N	200	N	.50	24	7	9
KAN027S	150	30	N	15	N	100	N	.35	20	8	12
KAN028S	100	50	N	20	N	200	N	.50	22	7	10
KAN029S	N	50	N	20	N	300	N	.50	17	6	7
KAN030S	100	50	N	20	N	100	N	.35	22	10	13
KAN031S	150	50	N	20	N	200	N	.40	23	11	11
KAN001L	200	100	N	30	N	70	N	2.20	25	11	20
KAN002L	300	100	N	30	N	300	N	2.20	17	29	13
KAN003L	19	150	N	30	N	300	N	5.60	85	16	19
KAN004L	200	100	N	50	N	500	N	.75	25	7	5
KAN005L	100	100	N	30	N	300	N	.85	21	7	5
KAN006L	100	100	N	20	N	700	N	.35	21	8	6
KAN007L	150	100	N	50	N	700	N	.90	21	8	8
KAN008L	150	100	N	50	N	500	N	1.40	22	9	9
KAN009L	200	30	N	15	N	70	N	.50	11	5	15

Table 4.-- Analytical data for panned concentrates from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona

[The following qualifiers are used in reporting spectographic data: --, no determination made; N, concentration less than the detection limit; <, detected--but at a concentration less than the value reported; >, element present at a concentration greater than the upper detection limit. "S" under column title represents spectrographic analysis, "aa" represents atomic absorption analysis.]

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S	B-ppm S	Ba-ppm S
KAN001P	36 38 24	112 37 32	1.0	.50	20.0	1.5	150	N	N	N	100	>10,000
KAN002P	36 38 28	112 37 42	1.5	.20	.7	1.5	500	N	N	N	150	>10,000
KAN003P	36 39 25	112 36 22	2.0	.30	15.0	.7	150	N	N	N	150	>10,000
KAN004P	36 43 21	112 30 32	1.5	.30	15.0	1.0	150	N	N	N	150	5,000
KAN005P	36 42 47	112 27 57	1.0	.50	10.0	.7	150	N	N	N	150	2,000
KAN006P	36 42 43	112 27 54	1.5	.30	20.0	1.0	200	N	N	N	150	>10,000
KAN007P	36 41 2	112 34 16	1.0	.50	20.0	.7	200	N	N	N	200	10,000
KAN008P	36 42 34	112 31 43	3.0	.50	3.0	1.5	200	N	N	N	700	10,000
KAN009P	36 42 33	112 22 21	1.5	.50	20.0	2.0	300	N	N	N	200	1,500
KAN010P	36 42 31	112 22 33	2.0	.50	20.0	1.5	300	N	N	N	150	10,000
KAN011P	36 41 30	112 25 27	5.0	.20	.5	2.0	700	150	N	N	1,000	300
KAN012P	36 41 41	112 25 35	1.5	.15	.7	1.0	200	N	N	N	700	200
KAN013P	36 41 2	112 26 45	5.0	.20	.7	2.0	500	N	N	N	500	200
KAN014P	36 41 25	112 22 58	3.0	.15	.7	1.5	300	5	N	N	300	300
KAN015P	36 41 55	112 23 40	1.5	.15	1.5	1.5	300	N	N	N	200	200
KAN016P	36 41 34	112 32 50	1.0	.15	.3	1.0	200	N	N	N	100	1,000

Sample	Be-ppm S	Bi-ppm S	Cd-ppm S	Co-ppm S	Cr-ppm S	Cu-ppm S	La-ppm S	Mo-ppm S	Nb-ppm S	Ni-ppm S	Pb-ppm S	Sb-ppm S
KAN001P	N	N	N	<10	100	20	70	N	N	20	70	N
KAN002P	N	N	N	<10	300	10	50	N	<50	10	70	N
KAN003P	<2	N	N	N	150	30	70	20	N	30	150	N
KAN004P	N	N	N	<10	150	20	70	N	N	20	50	N
KAN005P	N	N	N	<10	100	150	70	N	<50	20	50	N
KAN006P	<2	N	N	N	150	30	200	N	N	20	500	N
KAN007P	<2	N	N	<10	150	20	70	N	N	20	50	N
KAN008P	<2	N	N	N	200	50	50	15	N	30	150	N
KAN009P	<2	N	N	<10	150	15	200	N	<50	30	150	N
KAN010P	N	N	N	10	300	150	150	10	<50	30	50	N
KAN011P	N	N	N	10	500	70	100	N	<50	70	70	N
KAN012P	N	N	N	<10	100	50	70	N	<50	20	30	N
KAN013P	N	N	N	10	150	30	70	N	<50	30	50	N
KAN014P	N	N	N	20	150	30	100	N	<50	20	50	N
KAN015P	N	N	N	10	200	20	150	N	<50	20	70	N
KAN016P	<2	N	N	N	50	20	50	N	N	15	30	N

Table 4.-- Analytical data for panned concentrates from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona---continued

Sample	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa
KAN001P	10	N	1,000	70	N	300	N	>2,000	N	N
KAN002P	20	N	1,000	70	N	150	N	>2,000	N	N
KAN003P	20	N	1,000	70	N	200	N	>2,000	N	20.60
KAN004P	30	N	N	70	N	200	N	>2,000	N	N
KAN005P	10	N	N	70	N	150	N	>2,000	N	N
KAN006P	30	N	3,000	70	N	500	N	>2,000	N	N
KAN007P	10	N	10,000	70	N	200	N	>2,000	N	N
KAN008P	70	N	200	150	N	700	N	>2,000	N	N
KAN009P	50	N	N	70	N	700	N	>2,000	N	N
KAN010P	30	N	N	100	N	500	N	>2,000	N	N
KAN011P	70	N	N	200	N	700	N	>2,000	N	N
KAN012P	10	50	N	150	N	200	N	>2,000	N	N
KAN013P	50	N	N	300	N	700	N	>2,000	N	N
KAN014P	30	N	N	150	N	300	N	>2,000	N	N
KAN015P	30	N	N	100	N	500	N	>2,000	N	N
KAN016P	15	N	N	70	N	150	N	>2,000	N	N

Table 5.-- Analytical data for rocks from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona

[The following qualifiers are used in reporting spectographic data: --, no determination made; N, concentration less than the detection limit; <, detected--but at a concentration less than the value reported; >, element present at a concentration greater than the upper detection limit. "S" under column title represents spectrographic analysis; "aa" represents atomic absorption analysis.]

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S	B-ppm S	Ba-ppm S	Be-ppm S
KAN001R	36 43 28	112 31 40	.7	5.00	15.0	.500	500	N	N	N	70	1,500	<1.0
KAN002R	36 43 28	112 31 40	1.0	10.00	20.0	.100	2,000	N	N	N	20	200	<1.0
KAN003R	36 43 28	112 31 40	1.0	10.00	>20.0	.100	1,500	N	N	N	20	150	N
KAN004R	36 42 40	112 27 49	15.0	2.00	3.0	.100	200	1.0	N	N	20	500	<1.0
KAN005R	36 43 6	112 29 45	3.0	10.00	20.0	.300	1,000	N	N	N	150	300	1.5
KAN006R	36 41 2	112 34 22	.3	1.50	7.0	.015	200	<.5	N	N	300	200	<1.0
KAN007R	36 42 34	112 31 43	>20.0	.30	.7	.015	200	30.0	1,500	N	20	700	N
KAN008R	36 42 33	112 22 21	7.0	.50	2.0	.015	300	2.0	500	N	150	200	<1.0
KAN009R	36 41 28	112 25 32	.7	5.00	15.0	.050	500	.7	N	N	200	100	<1.0
KAN010R	36 41 28	112 25 32	.7	.15	1.5	.100	500	N	N	N	200	150	<1.0
KAN011R	36 41 28	112 25 32	.3	1.00	5.0	.020	150	N	N	N	300	100	<1.0
KAN012R	36 41 28	112 25 32	.3	.10	.5	.015	500	1.0	N	N	300	150	<1.0
KAN013R	36 41 27	112 25 26	.3	.20	1.5	.015	30	.5	N	N	150	70	1.5
KAN014R	36 41 27	112 25 26	10.0	.15	.5	.050	100	3.0	700	N	30	1,500	<1.0
KAN015R	36 41 28	112 25 17	.7	3.00	10.0	.015	200	1.0	N	N	100	50	<1.0
KAN016R	36 41 31	112 25 32	.5	5.00	15.0	.050	300	.7	N	N	70	50	<1.0
KAN017R	36 41 8	112 26 38	.3	.03	.1	.003	<10	1.0	N	N	100	100	<1.0
KAN018R	36 41 7	112 26 40	.5	.70	5.0	.030	150	1.5	N	N	150	70	1.5
KAN019R	36 39 50	112 34 54	10.0	.15	1.5	.030	100	2.0	700	N	10	200	N
KAN020R	36 41 25	112 22 58	.3	.05	.2	.030	100	1.0	N	N	20	700	N
KAN021R	36 41 25	112 22 58	.2	.07	.7	.030	150	.7	N	N	100	70	<1.0
KAN022R	36 41 55	112 23 40	.3	.03	.2	.030	150	.7	N	N	100	50	<1.0
KAN023R	36 41 35	112 32 43	.7	.07	.3	.003	<10	1.0	<200	N	70	30	N

Table 5.-- Analytical data for rocks from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona---continued

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
KAN001R	N	N	5	100	30	20	N	N	15	20	N	5	N
KAN002R	N	N	30	20	100	20	N	N	70	30	N	<5	N
KAN003R	N	N	20	30	30	20	N	N	50	15	N	<5	N
KAN004R	N	N	<5	70	15	<20	5	N	20	150	N	<5	N
KAN005R	N	N	7	70	10	30	N	N	20	20	N	7	N
KAN006R	N	N	N	30	<5	<20	N	N	5	15	N	<5	N
KAN007R	N	N	10	50	200	<20	100	N	200	70	N	N	N
KAN008R	N	N	10	50	20	<20	20	N	100	20	N	<5	N
KAN009R	N	N	<5	150	20	20	5	N	10	15	N	<5	N
KAN010R	N	N	5	100	20	20	N	N	20	<10	N	<5	N
KAN011R	N	N	<5	70	15	20	N	N	5	<10	N	N	N
KAN012R	N	N	<5	50	5	<20	N	N	5	<10	N	N	N
KAN013R	N	N	<5	100	10	<20	N	N	10	10	N	<5	N
KAN014R	N	N	15	30	150	20	30	N	30	30	N	N	N
KAN015R	N	N	<5	100	15	<20	N	N	10	10	N	N	N
KAN016R	N	N	5	100	15	20	N	N	20	10	N	5	N
KAN017R	N	N	N	<10	20	<20	<5	N	5	10	N	<5	N
KAN018R	N	N	7	70	20	20	N	N	10	15	N	N	N
KAN019R	N	N	30	10	150	<20	50	N	100	30	N	N	N
KAN020R	N	N	<5	30	15	<20	5	N	10	<10	N	N	N
KAN021R	N	N	N	30	5	20	N	N	5	<10	N	N	N
KAN022R	N	N	<5	20	20	<20	7	N	5	<10	N	N	N
KAN023R	N	N	N	10	5	<20	N	N	5	<10	N	N	N

Table 5.-- Analytical data for rocks from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona---continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	FL-U	Au-ppm aa	Zn-ppm aa	Cu-ppm aa	Pb-ppm aa
KAN001R	150	70	N	30	N	300	N	.80	N	12	15	14
KAN002R	150	50	N	10	N	70	N	.25	N	90	70	37
KAN003R	150	70	N	15	N	50	N	1.00	N	24	20	38
KAN004R	100	30	N	20	N	300	N	5.00	1.00	9	5	56
KAN005R	100	150	N	30	N	200	N	.80	.05	7	4	20
KAN006R	N	30	N	<10	N	20	N	.55	N	5	2	4
KAN007R	N	200	N	10	7,000	N	N	8.40	N	1,250	50	32
KAN008R	N	50	N	15	700	30	N	4.80	N	240	7	4
KAN009R	N	70	N	30	N	70	N	1.20	N	20	9	10
KAN010R	N	50	N	50	N	150	N	1.50	N	15	8	3
KAN011R	N	30	N	15	N	20	N	1.00	N	5	7	5
KAN012R	N	15	N	<10	N	15	N	.85	N	2	3	N
KAN013R	N	30	N	15	N	10	N	1.00	N	9	5	5
KAN014R	100	100	N	20	N	150	N	3.70	N	27	50	10
KAN015R	N	30	N	15	N	15	N	1.40	N	21	8	20
KAN016R	<100	100	N	30	N	70	N	2.70	N	36	12	18
KAN017R	N	30	N	N	N	<10	N	.40	N	4	18	N
KAN018R	N	30	N	20	N	20	N	5.30	N	9	12	6
KAN019R	N	70	N	<10	N	50	N	5.30	N	5	35	8
KAN020R	N	150	N	<10	N	15	N	.60	N	7	6	N
KAN021R	N	20	N	15	N	20	N	.35	N	4	4	N
KAN022R	N	30	N	10	N	15	N	.65	N	6	13	1
KAN023R	N	30	N	N	N	10	N	.65	N	55	4	2

Table 6.-- Analytical data for waters from the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona

Sample	Latitude	Longitude	Cu-aa (µg/L)	U-inst (µg/L)	Pb-aa (µg/L)	Zn-aa (µg/L)	SO_4^{--} (mg/L)	F (mg/L)	Cl (mg/L)	SP COND (µmhos/cm)
KAN001W	36 39 29	112 33 44	2.9	1.5	6.2	3.4	410	2.3	13	1,100
KAN002W	36 43 1	112 30 34	3.6	14.0	20.0	1.8	1,900	5.8	33	2,700
KAN003W	36 43 27	112 30 31	2.8	44.0	13.0	6.4	1,400	4.8	22	2,200
KAN004W	36 42 40	112 27 49	<1.0	5.2	10.0	120.0	820	3.0	21	1,500
KAN005W	36 41 4	112 34 16	2.1	15.0	15.0	3.7	2,100	6.0	21	2,700
KAN006W	36 42 34	112 31 43	2.0	10.0	15.0	5.0	1,900	6.9	24	2,600