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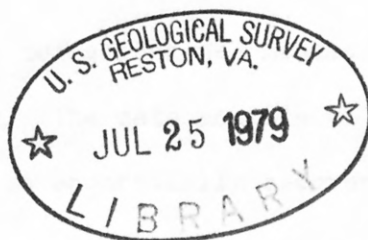
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Geochemical analyses of rock, soil, and stream sediment
samples from the Big Frog Wilderness Study Area,
Polk County, Tennessee and Fannin County, Georgia

by

R. T. Hopkins, A. L. Meir, and J. F. Slack

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This report is preliminary and has not been edited or reviewed for
conformity with Geological Survey standards or nomenclature.

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Abstract

Semiquantitative spectrographic analyses for 31 elements and atomic absorption analyses for gold and zinc on 43 stream sediments, 5 panned concentrates, 65 soils, and 81 rock samples from the Big Frog Wilderness Study Area and vicinity, Polk County, Tennessee, and Fannin County, Georgia, are reported here in detail. Locations for all 194 samples are given in Universal Transverse Mercator (UTM) coordinates. Rocks analyzed include metasiltstone, metasandstone, metaconglomerate, slate, and vein quartz. The data contain no obviously anomalous values that might be related to economically recoverable mineralization.

Introduction

The analyses reported here are on 194 samples from the Big Frog Wilderness Study Area, Polk County, Tennessee, and Fannin County, Georgia, collected in October, 1977, by J. F. Slack, E. R. Force, A. E. Grosz, and R. H. Ketelle, all of the U.S. Geological Survey. The samples include 81 rock chips, 65 soils, 5 panned concentrates, and 43 stream sediments. The rock samples mainly are 1 meter chip samples of representative material collected from outcrop or road cuts; a few samples are from float boulders along ridge crests. Some of the rock is partly weathered, but the freshest material available was sampled. Soil samples were taken below surficial organic material generally from the lower to middle parts of the A horizon, but in some places from the upper part of the B horizon. Stream sediment was collected from active and a few smaller intermittent drainages; heavy minerals from major drainages were artificially concentrated by standard panning techniques. Sample locations and discussion of the results of the analytical work are given by Slack, Gazdik, and Dunn (1979).

The X and Y coordinates are Universal Transverse Mercator (UTM) grid, zone 16, Caney Creek, Ducktown, Hemp Top, and Epworth (Tenn.-Ga.) U.S. Geological Survey 7.5 minute Topographic Quadrangle Maps. The X coordinate is the easting value; the Y is the northing.

Analytical techniques

Rock samples were crushed to approximately 0.25 inch (6 mm) and pulverized to minus 140-mesh (0.105 mm) in a vertical grinder with ceramic plates. Stream sediments and soils were dried and sieved to minus 80-mesh (0.177 mm) and then pulverized. Pan concentrates were dried and ground with a mortar and pestle.

Each sample was analyzed semiquantitatively for 31 elements by a six-step, D.C. arc, optical emission spectrographic method (Grimes and Marranzino, 1968). In addition, each sample was analyzed by an atomic absorption technique for gold and zinc (Ward and others, 1969).

The semiquantitative spectrographic values are reported as six steps per order of magnitude (1, 0.7, 0.5, 0.3, 0.2, 0.15, or multiples of 10 of these numbers) and are approximate geometric midpoints of the concentration ranges. The precision is shown to be within one adjoining interval on each side of the reported value 83 percent of the time and within two adjoining intervals 96 percent of the time (Motooka and Grimes, 1976).

Explanation of table

Iron, magnesium, calcium, and titanium values are reported in percent (%); all others are in parts per million. Letters preceeding chemical symbols indicate the methods of analysis: S, six-step semiquantitative spectrographic method; AA, atomic absorption. Other symbols represented on the table are: N, not detected; --, not determined; <, amount detected is below the lowest limit of determination, which is figure shown; >, amount detected is above the highest limit of determination, which is figure shown. The table is divided into 4 sections by sample type: soil, stream sediment and panned concentrates ("P" follows sample number), quartz veins, and rock chips. The rock samples are further subdivided lithologically into slate, siltstone, sandstone, and conglomerate from two areas on the northwest and southeast sides of the Greenbrier Fault.

Soils.--Elements looked for spectrographically but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5) except K008 and K020 which are reported as <0.5 and K004 and K047 which are reported as 0.5; As(200); Au(0.05) except G035 and S077 which are reported respectively as 0.05 and <.05; Bi(10); Cd(20); Mo(5) except F059 which is reported as <5; Sb(100); Sn(10); Th(100); W(50).

Stream sediment and panned concentrates.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5) except S001, S059, F045, and G018, which are reported respectively as 5, 5, 10, and <5; Sb(100); Sn(10); Th(100); W(50).

Quartz veins.--Elements looked for but not found, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5); Nb(20); Sb(100); Sn(10); Sr(100); Th(100); W(50).

Slate.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200) except S011 which is reported as 500; Au(0.05); Bi(10); Cd(20); Mo(5) except F069 and G004 which are reported respectively as 7 and <5; Nb(20) except K006, K050, S011, and S084 which are reported as <20, and S148 which is reported as 20; Sb(100); Sn(10); Th(100); W(50).

Conglomerate-sandstone-siltstone.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5); Sb(100); Sn(10); Th(100); W(50).

References cited

- Grimes, D.J., and Marranzino, A.P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.
- Motooka, J.M., and Grimes, D.J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.
- Slack, J.F., Gazdik, G.C., and Dunn, M.L., Jr., 1979, Mineral resources of the Big Frog Wilderness Study Area, Polk County, Tennessee, and Fannin County, Georgia: U.S. Geological Survey Open-File Report OF 79-1209, 39 p.
- Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analysis useful in geochemical exploration: U. S. Geological Survey Bulletin 1289, 45 p.

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-RE	S-CO	S-CR	S-CU	S-LA	S-NB
F015	725,893	3,879,460	3.0	-50	-15	1.0	700	150	500	2.0	20	100	30	70	<20
F037	723,090	3,877,230	5.0	-30	-07	.7	500	100	500	2.0	10	70	30	70	N
F038	723,460	3,877,340	3.0	-20	<.05	1.0	50	100	700	2.0	7	70	15	100	<20
F048	723,920	3,877,330	3.0	-20	<.05	1.0	100	150	700	2.0	7	70	15	70	<20
F050	724,550	3,878,000	3.0	-30	.05	.7	300	100	700	2.0	10	70	15	70	<20
F053	724,940	3,878,140	5.0	-30	<.05	.7	150	100	500	2.0	20	70	20	70	<20
F057	724,340	3,878,730	3.0	-15	.05	1.0	100	100	500	1.5	7	70	15	100	20
F059	723,230	3,876,660	3.0	-20	<.05	.5	150	100	300	2.0	5	70	20	70	N
F061	723,590	3,876,310	3.0	-15	<.05	.5	150	50	300	2.0	7	50	20	70	N
F064	724,070	3,876,110	5.0	-30	.07	.7	2,000	50	500	2.0	15	70	50	100	<20
F066	724,750	3,876,020	3.0	-20	.07	.7	700	50	300	2.0	7	70	20	50	<20
F070	725,410	3,875,950	5.0	-30	.05	.7	700	150	700	3.0	7	50	20	50	N
F072	725,250	3,876,240	5.0	-20	.20	.3	2,000	70	300	3.0	30	30	20	50	N
F074	724,990	3,876,620	3.0	-30	.15	.5	3,000	50	700	2.0	10	30	20	70	N
G002	726,810	3,877,100	3.0	-30	.50	.5	2,000	30	500	2.0	20	30	30	70	N
G008	725,790	3,876,430	3.0	-30	.10	.7	2,000	70	500	2.0	5	50	20	70	N
G009	726,010	3,877,260	3.0	-30	.07	.7	1,500	50	500	2.0	20	50	30	70	N
G010	726,360	3,877,650	7.0	-30	<.05	.7	200	100	500	1.5	10	50	50	70	N
G011	727,150	3,877,790	3.0	-30	.07	1.0	200	70	500	2.0	10	70	15	50	<20
G013	724,710	3,879,790	3.0	-30	.05	1.0	500	70	700	2.0	7	70	30	70	<20
G014	724,750	3,879,360	3.0	-30	<.05	1.0	70	150	700	2.0	<5	70	20	50	<20
G015	724,800	3,878,700	3.0	-20	<.05	1.0	150	100	300	1.5	7	50	20	100	<20
G022	725,240	3,879,610	2.0	-20	<.05	1.0	50	150	500	2.0	<5	70	10	50	20
G023	725,530	3,879,350	3.0	-20	<.05	1.0	150	100	500	2.0	7	70	15	50	<20
G033	724,750	3,876,920	3.0	-30	.20	.7	1,000	70	500	2.0	15	70	30	70	<20
G035	724,200	3,877,310	3.0	-30	<.05	.7	150	100	500	2.0	10	50	15	70	<20
K004	725,100	3,878,740	1.5	-20	.05	.3	150	150	300	3.0	7	50	20	70	20
K007	725,580	3,878,410	2.0	-20	.10	.7	200	100	500	2.0	15	70	20	50	20
K008	725,990	3,878,340	3.0	-20	<.05	.7	100	150	500	2.0	10	100	20	50	20
K010	726,020	3,878,650	5.0	-30	.10	.3	2,000	100	500	3.0	50	70	70	100	<20
K020	726,140	3,875,280	5.0	-50	.05	.5	1,500	100	500	3.0	15	100	50	70	<20
K047	724,080	3,876,010	5.0	-30	.10	.3	1,500	70	500	3.0	50	70	50	100	<20
K053	723,220	3,877,250	5.0	-30	.05	.5	1,500	100	500	3.0	30	70	20	70	<20
K075	726,520	3,874,370	3.0	-30	.05	.5	300	150	500	2.0	10	70	30	70	20
S003	726,550	3,876,600	3.0	-30	.15	.5	1,000	100	500	2.0	10	70	20	70	N
S009	726,370	3,876,200	5.0	-30	.07	.5	3,000	100	500	3.0	70	50	70	100	N
S015	725,810	3,875,820	5.0	-50	.20	.7	1,500	100	500	3.0	20	70	50	70	<20
S019	725,820	3,876,300	3.0	-30	.07	.5	1,500	70	500	2.0	10	70	20	50	N
S021	726,810	3,875,780	2.0	-15	.20	.3	2,000	50	300	2.0	7	20	15	50	N
S023	727,020	3,876,600	3.0	-20	.07	.5	500	100	300	2.0	7	50	20	70	<20
S033	727,080	3,878,960	3.0	-30	.15	.7	1,000	70	500	2.0	20	50	20	50	<20
S039	726,850	3,878,390	5.0	-30	.07	.7	700	70	500	2.0	15	50	50	70	<20
S043	726,430	3,877,830	3.0	-30	.07	.7	1,500	70	500	2.0	10	50	20	70	<20
S044	726,470	3,878,720	3.0	-30	<.05	.7	100	100	700	2.0	7	100	30	70	<20
S047	726,920	3,879,420	3.0	-30	.05	1.0	150	70	700	2.0	7	70	20	50	<20

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F015	30	30	20	100	70	100	N	500	130
F037	30	30	15	100	100	50	N	300	140
F038	20	30	15	100	100	150	N	700	45
F048	20	30	15	<100	100	70	N	700	55
F050	20	30	15	<100	70	70	N	500	60
F053	30	30	15	<100	70	70	N	300	70
F057	15	30	10	<100	70	70	N	700	50
F059	15	30	15	<100	70	70	N	300	130
F061	20	30	10	<100	70	70	<200	200	180
F064	50	50	15	100	100	70	<200	300	240
F066	20	50	15	100	100	50	<200	300	160
F070	10	50	20	100	70	100	N	500	150
F072	30	30	10	100	70	50	300	200	270
F074	30	30	10	100	70	70	200	200	200
G002	50	50	10	100	50	50	200	200	260
G008	20	50	10	100	70	100	200	300	160
G009	50	50	10	100	70	50	200	300	230
G010	30	50	20	100	100	100	<200	700	150
G011	15	50	15	<100	100	100	N	700	85
G013	20	50	15	<100	100	100	N	500	60
G014	20	30	20	100	100	100	N	500	40
G015	30	30	15	N	100	70	N	700	45
G022	15	30	15	100	100	100	N	700	35
G023	15	50	15	<100	100	70	N	700	55
G033	30	50	15	100	100	70	N	500	200
G035	20	50	15	<100	70	70	N	300	65
K004	10	50	7	<100	100	50	N	500	65
K007	30	20	10	100	100	50	N	700	85
K008	20	30	10	100	100	70	N	300	65
K010	70	50	10	100	100	50	200	300	190
K020	30	70	15	100	200	50	N	200	150
K047	50	50	10	100	100	50	N	200	180
K053	30	50	15	100	100	100	N	300	170
K075	30	70	15	100	150	70	N	500	75
S003	50	30	15	100	70	100	<200	300	200
S009	50	30	15	100	70	70	200	200	280
S015	50	50	15	100	100	70	200	300	210
S019	15	50	10	100	100	50	<200	300	140
S021	15	50	7	100	70	20	<200	200	170
S023	15	50	10	100	70	30	<200	300	150
S033	30	30	10	100	70	50	N	500	120
S039	30	50	15	<100	100	70	N	700	130
S043	20	30	10	100	70	70	N	500	150
S044	20	30	15	<100	100	100	N	700	80
S047	15	30	15	<100	100	70	N	700	70

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-HA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB
S053	728,970	3,876,570	3.0	.50	<.05	.7	500	70	300	2.0	10	50	15	50	N
S055	728,180	3,876,530	3.0	.30	.15	.7	2,000	100	500	2.0	20	70	50	70	<20
S061	727,720	3,876,190	3.0	.30	.50	.7	1,500	70	500	2.0	20	50	30	70	<20
S066	727,270	3,876,270	5.0	.30	.07	.7	2,000	100	500	2.0	30	70	100	70	<20
S073	727,570	3,874,220	3.0	.30	.05	.7	2,000	100	500	3.0	70	70	50	70	<20
S077	727,100	3,874,540	3.0	.30	.15	.7	3,000	70	500	3.0	20	50	50	70	N
S081	726,690	3,874,980	3.0	.30	.07	.7	700	100	500	3.0	50	50	30	70	N
S086	725,660	3,878,000	3.0	.30	.07	.7	700	100	500	2.0	20	50	50	70	N
S091	725,990	3,877,680	5.0	.30	.05	.7	300	100	700	2.0	10	100	50	70	N
S096	725,540	3,877,860	3.0	.30	.10	.7	2,000	70	700	2.0	20	70	20	70	N
S099	725,590	3,877,540	3.0	.20	.10	.5	1,500	70	300	2.0	30	30	30	70	N
S102	725,690	3,877,120	3.0	.30	.07	.7	500	70	300	2.0	10	70	30	70	N
S105	725,250	3,877,670	3.0	.15	<.05	.7	70	70	300	1.5	7	50	15	70	<20
S113	725,210	3,877,360	3.0	.30	.07	.7	2,000	100	500	2.0	20	70	20	70	N
S115	725,290	3,876,900	3.0	.30	.07	.7	150	100	500	2.0	<5	50	30	70	N
S117	724,320	3,878,350	2.0	.20	.05	1.0	700	100	700	1.5	15	70	15	50	<20
S121	727,850	3,874,390	3.0	.30	.07	.7	1,500	70	500	1.5	15	50	20	70	N
S125	727,840	3,874,940	3.0	.30	.07	1.0	700	100	500	2.0	15	50	15	50	N
S130	727,380	3,875,190	3.0	.30	<.05	.7	200	100	500	2.0	20	70	30	50	N
S134	726,810	3,875,550	3.0	.30	.15	.7	700	100	500	2.0	15	70	15	30	N
S053	20	30	10	70	20	50	100	50	500	2.0	120	260	50	190	140
S055	50	50	15	100	70	50	500	70	500	N	160	200	50	200	200
S061	50	20	15	100	100	200	300	300	300	<200	210	260	200	170	120
S066	70	30	15	100	100	200	300	300	300	<200	300	260	300	170	110
S073	50	50	15	100	70	200	500	500	500	<200	230	260	300	190	140
S077	50	30	10	100	70	100	300	300	300	<200	230	260	300	190	140
S081	50	30	10	100	70	100	300	300	300	<200	230	260	300	190	140
S086	50	30	10	100	70	100	300	300	300	<200	230	260	300	190	140
S091	50	50	20	100	100	200	300	300	300	N	150	260	300	190	140
S096	30	20	10	100	70	100	300	300	300	N	130	260	300	190	140
S099	50	30	10	100	70	100	300	300	300	<200	230	260	300	190	140
S102	30	30	15	100	70	50	300	300	300	200	200	260	300	190	140
S105	30	20	15	100	100	200	300	300	300	200	200	260	300	190	140
S113	50	30	15	100	70	200	300	300	300	200	200	260	300	190	140
S115	7	30	15	100	70	50	300	300	300	N	90	260	300	190	140
S117	15	30	10	100	70	100	300	300	300	<200	190	260	300	190	140
S121	30	30	15	100	100	50	300	300	300	N	170	260	300	190	140
S125	20	30	15	100	70	50	300	300	300	N	120	260	300	190	140
S130	30	30	15	100	100	200	300	300	300	N	300	260	300	190	140
S134	20	30	15	100	70	50	300	300	300	N	110	260	300	190	140

sample S-NI S-PB S-SC S-SR S-V S-Y S-ZN S-ZR AA-ZN-P

sample	X-COORD	Y-COORD	S-FEX	S-MG%	S-CAR	S-TIX	S-MN	S-B	S-HA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB
F002	727,390	3,877,430	3	-3	-15	-7	1,500	30	300	2.0	20	70	30	50	<20
F004	724,460	3,878,740	3	-2	-10	1.0	700	70	300	2.0	10	50	20	70	<20
F007	724,460	3,879,290	3	-2	-10	-7	1,000	100	300	2.0	15	30	15	70	N
F011	725,510	3,879,880	5	-3	-15	1.0	700	150	500	2.0	15	50	20	70	<20
F012	725,500	3,879,790	5	-3	-10	>1.0	700	150	300	1.5	10	30	20	70	N
F033	723,610	3,877,850	5	-5	-15	-7	1,500	150	500	2.0	20	50	30	50	<20
F043	723,700	3,877,520	3	-3	-20	-5	1,000	70	300	2.0	10	30	15	70	N
F044	723,660	3,876,940	3	-3	-30	-5	1,500	70	500	2.0	15	30	30	70	N
F045	723,710	3,876,970	5	-3	-20	-7	1,500	150	500	2.0	15	30	30	50	N
F052	724,940	3,877,970	3	-2	-10	-7	1,500	150	300	2.0	15	30	20	50	N
G003	726,550	3,876,970	7	-3	-15	-7	200	100	500	2.0	20	30	50	100	N
G012	726,920	3,877,400	5	-3	-07	-7	1,500	150	500	2.0	20	50	50	70	<20
G017	724,970	3,879,000	5	-3	-07	-7	1,000	200	500	2.0	15	70	30	50	<20
G018	725,030	3,879,000	3	-3	-07	1.0	700	100	500	2.0	10	70	20	70	<20
G019	725,050	3,879,180	3	-3	-05	-7	1,000	100	500	2.0	15	50	30	70	N
G020	725,000	3,879,160	3	-7	-10	1.0	700	150	500	2.0	10	30	20	100	<20
G021	724,860	3,879,820	3	-2	-05	1.0	500	150	200	1.5	7	20	20	70	N
G027	724,810	3,879,800	3	-3	-05	1.0	500	150	700	2.0	10	50	30	70	N
G029	723,840	3,877,940	3	-3	-10	1.0	1,000	150	500	2.0	10	30	20	70	N
G034	724,780	3,876,890	3	-3	-10	-7	1,500	150	500	2.0	20	30	30	70	N
G036	724,390	3,877,850	3	-3	-07	1.0	1,000	100	500	2.0	15	70	20	70	N
G037	723,950	3,877,970	3	-2	-05	1.0	700	100	500	1.5	15	50	20	70	N
G038P	727,050	3,879,180	3	-3	-05	-7	700	100	500	2.0	7	30	10	20	N
G039P	727,230	3,877,450	7	-3	-05	-7	1,000	200	500	2.0	15	70	30	20	N
G040P	723,870	3,878,090	5	-5	-05	-7	700	100	500	2.0	7	50	15	30	N
G041P	723,680	3,878,000	7	-5	-05	-7	700	150	500	2.0	10	70	20	50	N
G042P	724,870	3,879,680	3	-3	-05	-5	300	50	300	2.0	7	30	5	20	N
J002	723,910	3,876,600	5	-5	-20	-5	3,000	100	500	3.0	50	70	70	70	<20
J004	723,330	3,876,940	5	-7	-15	-5	2,000	150	500	5.0	50	100	50	70	<20
J005	723,310	3,877,490	5	-7	-15	-3	3,000	200	500	5.0	50	100	50	70	<20
S001	726,550	3,876,910	7	-5	-15	-7	2,000	100	500	2.0	15	50	30	50	N
S007	726,480	3,876,230	5	-3	-15	-5	2,000	70	300	2.0	20	30	70	70	N
S008	726,410	3,876,250	5	-3	-15	-7	2,000	100	500	3.0	20	50	50	70	N
S040	727,130	3,879,280	5	-3	-10	1.0	2,000	150	500	1.5	15	50	30	50	<20
S032	727,120	3,879,000	3	-3	-20	1.0	1,500	70	500	2.0	15	30	20	50	<20
S034	726,980	3,878,940	3	-2	-15	1.0	1,500	150	300	2.0	15	30	15	50	<20
S035	727,050	3,878,890	5	-3	-15	1.0	2,000	150	500	2.0	30	50	30	70	<20
S049	729,550	3,876,270	2	-3	-07	-7	700	100	300	2.0	7	15	10	20	N
S050	729,670	3,876,420	5	-5	-10	1.0	1,000	150	300	2.0	15	30	30	50	<20
S059	727,900	3,876,410	5	-3	-20	-7	2,000	150	500	3.0	70	50	30	70	N
S060	727,910	3,876,320	5	-5	-20	1.0	2,000	100	500	2.0	30	50	50	100	<20
S063	727,600	3,876,150	5	-3	-10	1.0	1,500	150	300	2.0	30	50	30	50	<20
S070	727,910	3,876,260	5	-3	-07	>1.0	1,000	150	300	1.5	15	30	30	20	<20
S071	727,790	3,876,160	5	-3	-07	1.0	700	150	300	1.5	10	50	20	50	<20
S075	727,500	3,876,380	3	-3	-15	1.0	1,500	150	300	2.0	15	30	20	50	<20

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F002	50	30	15	100	70	70	<200	700	180
F006	30	30	10	<100	70	150	N	700	110
F007	30	30	10	100	70	100	N	1,000	140
F011	30	30	15	100	70	100	N	700	100
F012	20	30	15	100	50	100	N	1,000	100
F033	50	30	15	100	70	100	200	300	250
F043	30	30	10	100	50	50	<200	300	200
F044	30	30	10	100	50	70	<200	300	200
F045	50	30	15	100	70	70	<200	300	190
F052	30	50	10	<100	50	150	<200	500	160
G003	50	50	15	<100	70	70	<200	500	220
G012	50	50	15	<100	70	70	<200	300	180
G017	30	30	15	100	70	70	N	500	150
G018	30	30	15	100	100	100	N	500	150
G019	30	30	15	100	70	70	N	500	140
G020	30	30	10	100	50	70	N	500	120
G021	20	30	10	<100	50	100	N	>1,000	75
G027	30	30	15	<100	70	100	N	300	100
G029	30	30	10	100	50	100	N	700	120
G034	50	50	10	100	70	70	N	500	180
G036	20	50	10	<100	70	100	N	700	95
G037	20	30	10	<100	70	100	N	700	75
G038P	10	20	10	N	70	30	N	300	80
G039P	20	30	15	100	70	50	N	300	130
G040P	15	20	15	N	70	30	N	300	100
G041P	20	30	15	N	70	50	<200	300	140
G042P	10	20	10	N	50	30	N	300	100
J002	50	70	10	100	100	50	N	500	150
J004	50	50	10	100	100	70	N	300	130
J005	70	50	10	100	100	70	N	300	180
S001	30	30	15	100	70	100	<200	700	190
S007	50	30	15	100	70	70	200	200	290
S008	30	50	15	100	70	70	200	300	180
S030	30	30	15	100	70	150	N	700	120
S032	30	50	10	100	70	70	N	200	130
S034	30	30	15	<100	70	70	N	700	120
S035	30	30	15	100	70	100	N	500	150
S049	10	20	7	100	30	70	N	700	85
S050	30	30	15	100	70	70	N	500	130
S059	70	50	15	100	70	100	<200	300	230
S060	70	50	15	100	100	100	<200	700	210
S063	30	30	15	100	70	100	<200	500	160
S070	30	20	10	100	50	100	N	1,000	130
S071	20	20	15	100	70	150	N	700	130
S075	30	30	10	100	50	100	N	500	150

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sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB
S076	727,330	3,874,420	5	.3	.07	>1.0	1,500	300	1.5	15	50	30	20	
S093	725,360	3,878,170	7	.3	.07	1.0	1,500	300	2.0	20	50	30	50	
S094	725,280	3,878,080	7	.3	.15	.7	1,500	500	2.0	15	70	30	50	N
sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P	Quartz Veins				
S076	30	20	10	100	70	100	700	140						
S093	30	30	10	>100	70	100	700	190						
S094	30	30	15	100	70	100	500	180						

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NI
F020	725,670	3,879,890	.3	.03	.15	.030	150	70	N	N	N	N	20	5
F022	725,210	3,879,810	.2	.02	<.05	.030	300	70	N	N	N	N	<20	5
F027	724,010	3,878,810	.2	.02	<.05	.005	20	50	N	N	N	<5	<20	5
K003	724,950	3,878,780	.7	.02	<.05	.010	150	50	5	<10	<10	<5	20	5
K011	725,940	3,879,300	.3	.05	N	.050	50	100	1	N	10	<5	20	5
S092	725,950	3,877,650	.7	.02	N	.030	20	100	N	N	10	5	N	<5
S095	725,000	3,879,160	.3	.02	<.05	.030	30	100	N	N	10	5	N	<5
S135	726,740	3,875,600	1.5	.02	<.05	.020	700	70	N	5	N	7	N	5
S142	726,730	3,878,930	.1	<.02	<.05	.005	50	50	N	N	<10	N	<20	<5

sample	S-PB	S-SC	S-V	S-Y	S-ZN	AA-ZN-P
F020	N	N	<10	N	50	15
F022	N	N	<10	<10	20	15
F027	N	N	<10	N	N	10
K003	N	<5	<10	N	<10	15
K011	<10	<5	10	N	20	10
S092	<10	N	10	N	15	20
S095	N	N	10	N	50	40
S135	<10	N	<10	20	100	25
S142	N	N	<10	N	N	10

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NI
F023	725,210	3,879,810	2.0	.07	.05	.3	700	70	150	<1.0	5	20	<5	<20	7
F032	723,690	3,878,100	1.5	.15	.05	.7	100	150	300	1.5	7	30	5	30	5
F039	723,630	3,877,100	3.0	.70	.05	.7	150	50	500	2.0	5	70	15	50	5
F042	723,700	3,877,520	3.0	.50	.10	.5	150	100	700	1.5	15	30	30	50	70
F058	723,080	3,877,090	1.0	.07	.05	.5	70	20	300	1.0	<5	20	<5	30	5
G028	723,860	3,878,140	3.0	.70	.50	.7	700	150	300	1.0	10	30	10	30	20

sample	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
F023	20	5	<100	30	30	300	45
F032	15	10	150	70	50	300	20
F039	30	20	150	100	100	300	90
F042	20	10	100	50	100	300	220
F058	15	5	100	30	20	300	15
G028	30	15	150	50	100	300	95

Slates NW of the Greenbrier Fault

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-MO
F005	724,360	3,878,950	3	1.0	.10	.5	200	200	1,500	3.0	10	150	30	70	5
F008	724,340	3,879,400	5	1.0	<.05	.5	300	200	1,500	3.0	7	100	20	70	7
F010	724,460	3,879,600	5	1.0	.07	.5	300	200	1,000	2.0	10	100	30	70	N
F025	724,200	3,878,930	3	.7	.05	.5	300	100	1,000	2.0	5	150	10	70	N
F030	723,790	3,878,650	3	1.0	.07	.7	300	100	1,000	2.0	<5	150	5	70	N
F035	723,270	3,877,440	7	1.0	.05	.5	300	100	700	1.5	15	70	70	50	N
G026	724,850	3,879,700	3	.7	.05	.7	150	100	1,000	2.0	5	100	10	100	5
K050	723,320	3,876,900	5	1.5	.05	.5	700	100	700	5.0	10	100	<5	100	5

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
F005	30	30	30	150	100	100	200	120
F008	15	50	30	100	70	100	300	80
F010	10	20	20	150	70	100	300	110
F025	7	30	30	150	100	100	200	65
F030	5	15	30	150	100	100	200	70
F035	10	30	20	150	70	100	300	120
G026	7	20	30	100	100	100	200	45
K050	15	20	20	150	150	70	200	110

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAZ	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-MO
F001	727,410	3,877,500	5.0	1.00	.07	.5	500	200	1,500	3.0	7	100	20	50	N
F015	725,690	3,879,580	3.0	.07	<.05	.3	700	20	300	1.0	10	20	5	<20	N
F016	726,000	3,879,230	3.0	.30	.07	.5	700	50	1,000	1.5	10	70	15	30	N
F017	725,950	3,879,690	5.0	1.00	.10	.5	700	200	1,000	2.0	15	150	30	70	N
F047	723,910	3,877,050	7.0	1.50	.10	.7	200	150	1,500	2.0	10	150	30	100	15
F051	724,910	3,877,960	3.0	.15	.70	.7	1,000	100	500	1.5	5	30	7	70	N
F056	724,590	3,878,520	3.0	.70	.05	.7	150	70	2,000	2.0	7	100	20	100	N
F063	723,730	3,876,180	2.0	.15	.50	.2	500	30	500	2.0	7	15	10	30	N
F065	724,630	3,876,100	2.0	.30	.07	.7	50	150	500	1.5	5	30	7	20	5
F067	725,260	3,875,780	3.0	.70	<.05	.7	100	100	1,000	2.0	5	70	20	20	N
F071	725,290	3,876,130	2.0	.50	.07	.7	150	100	1,000	2.0	10	30	20	50	N
F075	724,900	3,876,730	5.0	.70	.15	.7	500	100	700	2.0	10	70	7	70	N
G001	726,850	3,877,240	5.0	.70	.15	.7	300	150	1,000	1.5	10	150	20	50	5
G006	725,870	3,876,520	3.0	.30	.50	.5	300	50	300	1.0	7	20	7	30	N
G007	725,800	3,876,460	3.0	1.00	1.00	.5	1,000	150	500	2.0	10	50	20	30	N
G024	725,710	3,879,210	5.0	.30	.50	.7	700	50	700	1.5	10	70	15	50	N
G025	725,920	3,878,810	7.0	1.50	.15	.7	500	150	1,000	2.0	10	100	30	70	N
G030	723,990	3,877,530	5.0	.70	.70	.7	1,000	70	300	1.5	10	70	15	30	10
G031	724,380	3,877,340	5.0	1.50	.15	.7	200	100	1,500	2.0	10	150	15	30	N
G032	724,570	3,877,120	7.0	1.00	<.05	.7	200	50	1,000	2.0	5	100	20	50	N
J001	723,920	3,876,730	5.0	.50	.05	.5	700	100	500	1.5	10	50	5	50	N
K009	726,120	3,878,340	5.0	1.50	.10	.5	200	100	700	3.0	15	150	50	30	N
K019	726,310	3,874,680	7.0	1.50	<.05	.5	500	200	1,000	5.0	10	100	50	100	N
K046	724,080	3,876,050	7.0	2.00	.10	.5	500	150	700	3.0	15	100	50	70	N
S006	726,540	3,876,350	7.0	1.00	.30	.7	500	100	1,000	1.5	15	100	20	50	5
S018	725,610	3,875,800	1.5	.10	.07	.7	100	N	300	1.0	N	30	<5	30	N
S036	727,070	3,878,840	7.0	1.00	<.05	1.0	200	200	2,000	1.5	7	300	50	50	<5
S041	726,640	3,878,270	3.0	1.50	3.00	.7	1,500	100	700	1.5	15	30	<5	50	N
S045	726,440	3,879,150	2.0	.20	<.05	.5	150	20	500	1.5	5	50	7	20	N
S054	728,800	3,876,650	5.0	1.50	.05	.7	300	150	1,500	2.0	7	150	15	70	N
S056	728,070	3,876,470	2.0	.50	.07	.5	700	70	700	2.0	7	50	10	30	N
S067	727,130	3,876,190	5.0	1.00	.15	.7	500	200	1,000	2.0	10	150	30	50	N
S072	727,700	3,874,140	7.0	1.50	.30	.7	1,500	200	1,000	2.0	15	100	70	100	N
S078	727,030	3,874,610	3.0	1.00	.10	.7	300	150	1,500	2.0	10	150	15	70	N
S085	725,460	3,878,130	7.0	1.00	.10	.7	300	150	1,000	2.0	15	100	50	100	N
S088	725,820	3,877,820	3.0	.70	.10	.7	200	100	1,000	2.0	7	70	15	50	N
S098	725,460	3,877,730	5.0	1.00	.07	.5	200	200	1,500	2.0	10	150	50	70	7
S101	725,650	3,877,320	1.0	.20	.15	.7	300	200	500	1.5	N	30	5	30	N
S111	725,020	3,877,580	5.0	.70	.70	.5	700	100	1,000	1.5	10	70	20	30	N
S114	725,350	3,877,160	1.0	.20	.07	.5	150	50	500	1.5	7	20	5	20	N
S127	727,450	3,875,050	3.0	1.00	.05	.5	200	100	1,500	2.0	15	150	50	70	N
S132	727,010	3,875,280	5.0	.30	.10	.5	1,000	100	500	1.5	7	30	7	50	N

sample	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F001	N	7	20	20	150	100	100	N	300	100
F013	N	5	20	5	<100	30	30	N	700	60
F016	N	30	20	10	150	70	30	N	200	75
F017	N	70	50	20	100	70	100	<200	300	160
F047	N	20	15	30	100	100	100	N	200	140
F051	N	10	15	7	100	50	70	N	300	35
F056	N	10	15	30	<100	100	100	N	300	55
F063	N	15	10	10	150	50	70	N	300	30
F065	N	7	10	10	150	50	70	N	300	35
F067	N	<5	15	20	150	100	100	N	500	70
F071	N	50	20	15	150	70	70	N	300	180
F075	N	50	20	15	100	70	70	N	500	140
G001	N	30	20	30	200	100	70	N	300	120
G006	N	10	<10	5	150	30	30	N	500	50
G007	N	30	30	15	150	70	20	<200	500	90
G024	N	20	15	20	150	70	100	N	700	70
G025	N	30	20	20	100	100	150	N	300	140
G030	N	20	<10	15	150	70	30	N	700	80
G031	N	20	10	20	100	100	100	N	200	170
G032	N	5	20	20	100	70	100	N	300	95
J001	<20	10	15	7	100	70	20	N	300	80
K009	20	30	20	20	150	100	50	N	500	100
K019	<20	50	20	20	150	200	100	N	200	140
K046	<20	30	30	20	100	150	100	N	500	140
S006	N	50	20	20	200	70	100	<200	500	130
S018	N	5	10	5	100	70	15	N	500	20
S036	N	15	30	30	100	100	70	N	300	75
S041	N	20	15	7	300	30	50	N	500	100
S045	N	7	20	7	N	50	20	N	300	35
S054	N	15	30	30	150	70	100	N	300	80
S056	N	7	20	10	150	70	30	N	200	40
S067	N	30	20	30	150	100	150	N	300	120
S072	N	30	30	30	150	100	100	N	300	130
S078	<20	30	30	30	150	100	100	N	300	95
S085	N	50	30	20	100	70	150	N	300	120
S088	N	10	20	20	150	70	100	N	200	80
S098	N	30	30	30	100	100	100	N	300	80
S101	<20	<5	20	7	100	50	70	N	500	65
S111	N	30	10	15	200	70	70	N	500	110
S114	N	5	30	5	150	50	20	N	500	30
S127	N	30	20	20	150	70	70	<200	100	100
S132	N	20	<10	10	150	70	70	N	300	50

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAZ	S-ITX	S-MN	S-B	S-BA	S-DE	S-CO	S-CR	S-CU	S-LA	S-NI
F060	723,280	3,876,370	3	.3	<.05	.7	50	30	700	1.5	N	70	10	50	<5
F069	725,460	3,875,880	2	1.0	.10	.7	200	100	1,000	2.0	<5	150	7	50	5
F073	725,200	3,876,320	5	1.0	.10	.7	300	100	1,500	2.0	10	100	50	70	30
G004	726,490	3,876,980	5	1.0	.10	.5	300	70	700	2.0	7	70	15	30	10
G005	726,140	3,876,730	5	.7	.20	.3	700	70	300	1.5	10	50	20	30	20
G016	724,980	3,878,700	7	.7	<.05	.7	200	150	700	1.5	7	70	50	50	15
K006	725,560	3,878,520	7	1.5	.30	.5	700	100	500	2.0	15	100	50	100	30
S002	726,540	3,876,790	7	1.0	.20	.7	500	70	1,000	2.0	15	100	50	70	50
S011	726,140	3,875,960	3	1.0	.07	.7	150	150	1,000	2.0	20	150	50	30	30
S020	726,240	3,875,590	3	1.0	5.00	.7	300	100	1,000	1.5	<5	150	20	200	7
S031	727,150	3,879,190	7	1.5	.20	.7	200	150	1,000	2.0	10	150	20	70	50
S062	727,630	3,876,200	7	1.5	.15	.5	500	200	1,500	1.5	20	150	70	50	50
S084	726,530	3,875,280	7	1.0	.05	.7	300	200	1,000	1.5	<5	150	30	50	5
S104	725,630	3,876,920	3	.7	.05	.7	150	30	700	2.0	N	100	10	20	<5
S123	727,890	3,874,700	5	1.0	.05	.7	300	150	1,000	2.0	5	100	30	50	5
S148	726,240	3,872,250	7	1.5	<.05	.5	500	300	1,000	3.0	5	150	20	70	10
F060	30	30	150	100	100	70	500	20	20	65	20	65	20	65	20
F069	20	30	150	100	100	100	200	65	65	140	140	140	140	140	140
F073	15	30	100	100	100	70	200	200	200	150	150	150	150	150	150
G004	30	20	150	70	70	70	200	200	200	100	100	100	100	100	100
G005	20	10	100	50	50	70	300	100	100	100	100	100	100	100	100
G016	30	20	100	70	150	150	300	65	65	110	110	110	110	110	110
K006	30	20	200	150	150	70	300	110	110	150	150	150	150	150	150
S002	15	20	150	100	100	100	300	60	60	150	150	150	150	150	150
S011	30	30	150	100	100	100	300	60	60	150	150	150	150	150	150
S020	30	50	500	100	200	200	700	65	65	150	150	150	150	150	150
S031	30	30	100	100	100	70	300	150	150	120	120	120	120	120	120
S062	20	30	150	100	100	100	300	120	120	150	150	150	150	150	150
S084	20	30	150	100	100	100	500	100	100	100	100	100	100	100	100
S104	20	20	100	100	100	30	200	200	200	120	120	120	120	120	120
S123	30	20	150	100	100	100	300	100	100	100	100	100	100	100	100
S148	20	20	150	150	150	70	200	90	90	10	10	10	10	10	10

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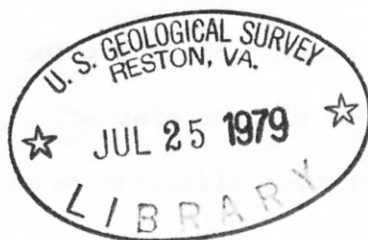
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Geochemical analyses of rock, soil, and stream sediment
samples from the Big Frog Wilderness Study Area,
Polk County, Tennessee and Fannin County, Georgia

by

R. T. Hopkins, A. L. Meir, and J. F. Slack

1979



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conformity with Geological Survey standards or nomenclature.

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Abstract

Semiquantitative spectrographic analyses for 31 elements and atomic absorption analyses for gold and zinc on 43 stream sediments, 5 panned concentrates, 65 soils, and 81 rock samples from the Big Frog Wilderness Study Area and vicinity, Polk County, Tennessee, and Fannin County, Georgia, are reported here in detail. Locations for all 194 samples are given in Universal Transverse Mercator (UTM) coordinates. Rocks analyzed include metasiltstone, metasandstone, metaconglomerate, slate, and vein quartz. The data contain no obviously anomalous values that might be related to economically recoverable mineralization.

Introduction

The analyses reported here are on 194 samples from the Big Frog Wilderness Study Area, Polk County, Tennessee, and Fannin County, Georgia, collected in October, 1977, by J. F. Slack, E. R. Force, A. E. Grosz, and R. H. Ketelle, all of the U.S. Geological Survey. The samples include 81 rock chips, 65 soils, 5 panned concentrates, and 43 stream sediments. The rock samples mainly are 1 meter chip samples of representative material collected from outcrop or road cuts; a few samples are from float boulders along ridge crests. Some of the rock is partly weathered, but the freshest material available was sampled. Soil samples were taken below surficial organic material generally from the lower to middle parts of the A horizon, but in some places from the upper part of the B horizon. Stream sediment was collected from active and a few smaller intermittent drainages; heavy minerals from major drainages were artificially concentrated by standard panning techniques. Sample locations and discussion of the results of the analytical work are given by Slack, Gazdik, and Dunn (1979).

The X and Y coordinates are Universal Transverse Mercator (UTM) grid, zone 16, Caney Creek, Ducktown, Hemp Top, and Epworth (Tenn.-Ga.) U.S. Geological Survey 7.5 minute Topographic Quadrangle Maps. The X coordinate is the easting value; the Y is the northing.

Analytical techniques

Rock samples were crushed to approximately 0.25 inch (6 mm) and pulverized to minus 140-mesh (0.105 mm) in a vertical grinder with ceramic plates. Stream sediments and soils were dried and sieved to minus 80-mesh (0.177 mm) and then pulverized. Pan concentrates were dried and ground with a mortar and pestle.

Each sample was analyzed semiquantitatively for 31 elements by a six-step, D.C. arc, optical emission spectrographic method (Grimes and Marranzino, 1968). In addition, each sample was analyzed by an atomic absorption technique for gold and zinc (Ward and others, 1969).

The semiquantitative spectrographic values are reported as six steps per order of magnitude (1, 0.7, 0.5, 0.3, 0.2, 0.15, or multiples of 10 of these numbers) and are approximate geometric midpoints of the concentration ranges. The precision is shown to be within one adjoining interval on each side of the reported value 83 percent of the time and within two adjoining intervals 96 percent of the time (Motooka and Grimes, 1976).

Explanation of table

Iron, magnesium, calcium, and titanium values are reported in percent (%); all others are in parts per million. Letters preceeding chemical symbols indicate the methods of analysis: S, six-step semiquantitative spectrographic method; AA, atomic absorption. Other symbols represented on the table are: N, not detected; --, not determined; <, amount detected is below the lowest limit of determination, which is figure shown; >, amount detected is above the highest limit of determination, which is figure shown. The table is divided into 4 sections by sample type: soil, stream sediment and panned concentrates ("P" follows sample number), quartz veins, and rock chips. The rock samples are further subdivided lithologically into slate, siltstone, sandstone, and conglomerate from two areas on the northwest and southeast sides of the Greenbrier Fault.

Soils.--Elements looked for spectrographically but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5) except K008 and K020 which are reported as <0.5 and K004 and K047 which are reported as 0.5; As(200); Au(0.05) except G035 and S077 which are reported respectively as 0.05 and <.05; Bi(10); Cd(20); Mo(5) except F059 which is reported as <5; Sb(100); Sn(10); Th(100); W(50).

Stream sediment and panned concentrates.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5) except S001, S059, F045, and G018, which are reported respectively as 5, 5, 10, and <5; Sb(100); Sn(10); Th(100); W(50).

Quartz veins.--Elements looked for but not found, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5); Nb(20); Sb(100); Sn(10); Sr(100); Th(100); W(50).

Slate.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200) except S011 which is reported as 500; Au(0.05); Bi(10); Cd(20); Mo(5) except F069 and G004 which are reported respectively as 7 and <5; Nb(20) except K006, K050, S011, and S084 which are reported as <20, and S148 which is reported as 20; Sb(100); Sn(10); Th(100); W(50).

Conglomerate-sandstone-siltstone.--Elements looked for but not found, except as noted, and their lower limits of determination, in ppm (value in parentheses): Ag(0.5); As(200); Au(0.05); Bi(10); Cd(20); Mo(5); Sb(100); Sn(10); Th(100); W(50).

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- Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analysis useful in geochemical exploration: U. S. Geological Survey Bulletin 1289, 45 p.

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-RE	S-CO	S-CR	S-CU	S-LA	S-NB
F015	725,893	3,879,460	3.0	-50	-15	1.0	700	150	500	2.0	20	100	30	70	<20
F037	723,090	3,877,230	5.0	-30	-07	.7	500	100	500	2.0	10	70	30	70	N
F038	723,460	3,877,340	3.0	-20	<.05	1.0	50	100	700	2.0	7	70	15	100	<20
F048	723,920	3,877,330	3.0	-20	<.05	1.0	100	150	700	2.0	7	70	15	70	<20
F050	724,550	3,878,000	3.0	-30	.05	.7	300	100	700	2.0	10	70	15	70	<20
F053	724,940	3,878,140	5.0	-30	<.05	.7	150	100	500	2.0	20	70	20	70	<20
F057	724,340	3,878,730	3.0	-15	.05	1.0	100	100	500	1.5	7	70	15	100	20
F059	723,230	3,876,660	3.0	-20	<.05	.5	150	100	300	2.0	5	70	20	70	N
F061	723,590	3,876,310	3.0	-15	<.05	.5	150	50	300	2.0	7	50	20	70	N
F064	724,070	3,876,110	5.0	-30	.07	.7	2,000	50	500	2.0	15	70	50	100	<20
F066	724,750	3,876,020	3.0	-20	.07	.7	700	50	300	2.0	7	70	20	50	<20
F070	725,410	3,875,950	5.0	-30	.05	.7	700	150	700	3.0	7	50	20	50	N
F072	725,250	3,876,240	5.0	-20	.20	.3	2,000	70	300	3.0	30	30	20	50	N
F074	724,990	3,876,620	3.0	-30	.15	.5	3,000	50	700	2.0	10	30	20	70	N
G002	726,810	3,877,100	3.0	-30	.50	.5	2,000	30	500	2.0	20	30	30	70	N
G008	725,790	3,876,430	3.0	-30	.10	.7	2,000	70	500	2.0	5	50	20	70	N
G009	726,010	3,877,260	3.0	-30	.07	.7	1,500	50	500	2.0	20	50	30	70	N
G010	726,360	3,877,650	7.0	-30	<.05	.7	200	100	500	1.5	10	50	50	70	N
G011	727,150	3,877,790	3.0	-30	.07	1.0	200	70	500	2.0	10	70	15	50	<20
G013	724,710	3,879,790	3.0	-30	.05	1.0	500	70	700	2.0	7	70	30	70	<20
G014	724,750	3,879,360	3.0	-30	<.05	1.0	70	150	700	2.0	<5	70	20	50	<20
G015	724,800	3,878,700	3.0	-20	<.05	1.0	150	100	300	1.5	7	50	20	100	<20
G022	725,240	3,879,610	2.0	-20	<.05	1.0	50	150	500	2.0	<5	70	10	50	20
G023	725,530	3,879,350	3.0	-20	<.05	1.0	150	100	500	2.0	7	70	15	50	<20
G033	724,750	3,876,920	3.0	-30	.20	.7	1,000	70	500	2.0	15	70	30	70	<20
G035	724,200	3,877,310	3.0	-30	<.05	.7	150	100	500	2.0	10	50	15	70	<20
K004	725,100	3,878,740	1.5	-20	.05	.3	150	150	300	3.0	7	50	20	70	20
K007	725,580	3,878,410	2.0	-20	.10	.7	200	100	500	2.0	15	70	20	50	20
K008	725,990	3,878,340	3.0	-20	<.05	.7	100	150	500	2.0	10	100	20	50	20
K010	726,020	3,878,650	5.0	-30	.10	.3	2,000	100	500	3.0	50	70	70	100	<20
K020	726,140	3,875,280	5.0	-50	.05	.5	1,500	100	500	3.0	15	100	50	70	<20
K047	724,080	3,876,010	5.0	-30	.10	.3	1,500	70	500	3.0	50	70	50	100	<20
K053	723,220	3,877,250	5.0	-30	.05	.5	1,500	100	500	3.0	30	70	20	70	<20
K075	726,520	3,874,370	3.0	-30	.05	.5	300	150	500	2.0	10	70	30	70	20
S003	726,550	3,876,600	3.0	-30	.15	.5	1,000	100	500	2.0	10	70	20	70	N
S009	726,370	3,876,200	5.0	-30	.07	.5	3,000	100	500	3.0	70	50	70	100	N
S015	725,810	3,875,820	5.0	-50	.20	.7	1,500	100	500	3.0	20	70	50	70	<20
S019	725,820	3,876,300	3.0	-30	.07	.5	1,500	70	500	2.0	10	70	20	50	N
S021	726,810	3,875,780	2.0	-15	.20	.3	2,000	50	300	2.0	7	20	15	50	N
S023	727,020	3,876,600	3.0	-20	.07	.5	500	100	300	2.0	7	50	20	70	<20
S033	727,080	3,878,960	3.0	-30	.15	.7	1,000	70	500	2.0	20	50	20	50	<20
S039	726,850	3,878,390	5.0	-30	.07	.7	700	70	500	2.0	15	50	50	70	<20
S043	726,430	3,877,830	3.0	-30	.07	.7	1,500	70	500	2.0	10	50	20	70	<20
S044	726,470	3,878,720	3.0	-30	<.05	.7	100	100	700	2.0	7	100	30	70	<20
S047	726,920	3,879,420	3.0	-30	.05	1.0	150	70	700	2.0	7	70	20	50	<20

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F015	30	30	20	100	70	100	N	500	130
F037	30	30	15	100	100	50	N	300	140
F038	20	30	15	100	100	150	N	700	45
F048	20	30	15	<100	100	70	N	700	55
F050	20	30	15	<100	70	70	N	500	60
F053	30	30	15	<100	70	70	N	300	70
F057	15	30	10	<100	70	70	N	700	50
F059	15	30	15	<100	70	70	N	300	130
F061	20	30	10	<100	70	70	<200	200	180
F064	50	50	15	100	100	70	<200	300	240
F066	20	50	15	100	100	50	<200	300	160
F070	10	50	20	100	70	100	N	500	150
F072	30	30	10	100	70	50	300	200	270
F074	30	30	10	100	70	70	200	200	200
G002	50	50	10	100	50	50	200	200	260
G008	20	50	10	100	70	100	200	300	160
G009	50	50	10	100	70	50	200	300	230
G010	30	50	20	100	100	100	<200	700	150
G011	15	50	15	<100	100	100	N	700	85
G013	20	50	15	<100	100	100	N	500	60
G014	20	30	20	100	100	100	N	500	40
G015	30	30	15	N	100	70	N	700	45
G022	15	30	15	100	100	100	N	700	35
G023	15	50	15	<100	100	70	N	700	55
G033	30	50	15	100	100	70	N	500	200
G035	20	50	15	<100	70	70	N	300	65
K004	10	50	7	<100	100	50	N	500	65
K007	30	20	10	100	100	50	N	700	85
K008	20	30	10	100	100	70	N	300	65
K010	70	50	10	100	100	50	200	300	190
K020	30	70	15	100	200	50	N	200	150
K047	50	50	10	100	100	50	N	200	180
K053	30	50	15	100	100	100	N	300	170
K075	30	70	15	100	150	70	N	500	75
S003	50	30	15	100	70	100	<200	300	200
S009	50	30	15	100	70	70	200	200	280
S015	50	50	15	100	100	70	200	300	210
S019	15	50	10	100	100	50	<200	300	140
S021	15	50	7	100	70	20	<200	200	170
S023	15	50	10	100	70	30	<200	300	150
S033	30	30	10	100	70	50	N	500	120
S039	30	50	15	<100	100	70	N	700	130
S043	20	30	10	100	70	70	N	500	150
S044	20	30	15	<100	100	100	N	700	80
S047	15	30	15	<100	100	70	N	700	70

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P						
S053	20	30	10	100	70	50	N	500	120	500	140				
S055	50	50	15	100	100	70	N	500	160	300	210				
S061	30	20	15	100	70	50	<200	300	210	300	300				
S066	70	30	15	100	100	100	<200	300	300	300	300				
S073	30	50	15	100	70	70	<200	500	140						
S077	50	30	10	100	70	100	<200	300	230						
S081	50	30	10	100	70	100	N	500	150						
S086	50	30	10	100	70	70	N	300	190						
S091	30	50	20	100	100	100	N	300	150						
S096	30	20	10	100	100	70	N	500	130						
S099	50	30	10	100	70	50	<200	200	260						
S102	30	30	15	100	70	50	200	300	200						
S105	15	20	10	100	70	100	200	700	60						
S113	50	30	15	100	70	70	200	300	230						
S115	7	30	15	100	70	50	N	300	90						
S117	15	30	10	100	70	100	<200	700	190						
S121	30	30	15	100	100	50	N	300	170						
S125	20	30	15	100	70	70	N	500	120						
S130	30	30	15	100	100	70	N	300	110						
S134	20	30	15	100	70	70	N	500	140						

sample	X-COORD	Y-COORD	S-FEX	S-MGZ	S-CAX	S-TIX	S-MN	S-B	S-HA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB
F002	727,390	3,877,430	3	-3	-15	-7	1,500	30	300	2.0	20	70	30	50	<20
F004	724,460	3,878,740	3	-2	-10	1.0	700	70	300	2.0	10	50	20	70	<20
F007	724,460	3,879,290	3	-2	-10	-7	1,000	100	300	2.0	15	30	15	70	N
F011	725,510	3,879,880	5	-3	-15	1.0	700	150	500	2.0	15	50	20	70	<20
F012	725,500	3,879,790	5	-3	-10	>1.0	700	150	300	1.5	10	30	20	70	N
F033	723,610	3,877,850	5	-5	-15	-7	1,500	150	500	2.0	20	50	30	50	<20
F043	723,700	3,877,520	3	-3	-20	-5	1,000	70	300	2.0	10	30	15	70	N
F044	723,660	3,876,940	3	-3	-30	-5	1,500	70	500	2.0	15	30	30	70	N
F045	723,710	3,876,970	5	-3	-20	-7	1,500	150	500	2.0	15	30	30	50	N
F052	724,940	3,877,970	3	-2	-10	-7	1,500	150	300	2.0	15	30	20	50	N
G003	726,550	3,876,970	7	-3	-15	-7	200	100	500	2.0	20	30	50	100	N
G012	726,920	3,877,400	5	-3	-07	-7	1,500	150	500	2.0	20	50	50	70	<20
G017	724,970	3,879,000	5	-3	-07	-7	1,000	200	500	2.0	15	70	30	50	<20
G018	725,030	3,879,000	3	-3	-07	1.0	700	100	500	2.0	10	70	20	70	<20
G019	725,050	3,879,180	3	-3	-05	-7	1,000	100	500	2.0	15	50	30	70	N
G020	725,000	3,879,160	3	-7	-10	1.0	700	150	500	2.0	10	30	20	100	<20
G021	724,860	3,879,820	3	-2	-05	1.0	500	150	200	1.5	7	20	20	70	N
G027	724,810	3,879,800	3	-3	-05	1.0	500	150	700	2.0	10	50	30	70	N
G029	723,840	3,877,940	3	-3	-10	1.0	1,000	150	500	2.0	10	30	20	70	N
G034	724,780	3,876,890	3	-3	-10	-7	1,500	150	500	2.0	20	30	30	70	N
G036	724,390	3,877,850	3	-3	-07	1.0	1,000	100	500	2.0	15	70	20	70	N
G037	723,950	3,877,970	3	-2	-05	1.0	700	100	500	1.5	15	50	20	70	N
G038P	727,050	3,879,180	3	-3	-05	-7	700	100	500	2.0	7	30	10	20	N
G039P	727,230	3,877,450	7	-3	-05	-7	1,000	200	500	2.0	15	70	30	20	N
G040P	723,870	3,878,090	5	-5	-05	-7	700	100	500	2.0	7	50	15	30	N
G041P	723,680	3,878,000	7	-5	-05	-7	700	150	500	2.0	10	70	20	50	N
G042P	724,870	3,879,680	3	-3	-05	-5	300	50	300	2.0	7	30	5	20	N
J002	723,910	3,876,600	5	-5	-20	-5	3,000	100	500	3.0	50	70	70	70	<20
J004	723,330	3,876,940	5	-7	-15	-5	2,000	150	500	5.0	50	100	50	70	<20
J005	723,310	3,877,490	5	-7	-15	-3	3,000	200	500	5.0	50	100	50	70	<20
S001	726,550	3,876,910	7	-5	-15	-7	2,000	100	500	2.0	15	50	30	50	N
S007	726,480	3,876,230	5	-3	-15	-5	2,000	70	300	2.0	20	30	70	70	N
S008	726,410	3,876,250	5	-3	-15	-7	2,000	100	500	3.0	20	50	50	70	N
S040	727,130	3,879,280	5	-3	-10	1.0	2,000	150	500	1.5	15	50	30	50	<20
S032	727,120	3,879,000	3	-3	-20	1.0	1,500	70	500	2.0	15	30	20	50	<20
S034	726,980	3,878,940	3	-2	-15	1.0	1,500	150	300	2.0	15	30	15	50	<20
S035	727,050	3,878,890	5	-3	-15	1.0	2,000	150	500	2.0	30	50	30	70	<20
S049	729,550	3,876,270	2	-3	-07	-7	700	100	300	2.0	7	15	10	20	N
S050	729,670	3,876,420	5	-5	-10	1.0	1,000	150	300	2.0	15	30	30	50	<20
S059	727,900	3,876,410	5	-3	-20	-7	2,000	150	500	3.0	70	50	30	70	N
S060	727,910	3,876,320	5	-5	-20	1.0	2,000	100	500	2.0	30	50	50	100	<20
S063	727,600	3,876,150	5	-3	-10	1.0	1,500	150	300	2.0	30	50	30	50	<20
S070	727,910	3,874,260	5	-3	-07	>1.0	1,000	150	300	1.5	15	30	30	20	<20
S071	727,790	3,874,160	5	-3	-07	1.0	700	150	300	1.5	10	50	20	50	<20
S075	727,500	3,874,380	3	-3	-15	1.0	1,500	150	300	2.0	15	30	20	50	<20

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F002	50	30	15	100	70	70	<200	700	180
F006	30	30	10	<100	70	150	N	700	110
F007	30	30	10	100	70	100	N	1,000	140
F011	30	30	15	100	70	100	N	700	100
F012	20	30	15	100	50	100	N	1,000	100
F033	50	30	15	100	70	100	200	300	250
F043	30	30	10	100	50	50	<200	300	200
F044	30	30	10	100	50	70	<200	300	200
F045	50	30	15	100	70	70	<200	300	190
F052	30	50	10	<100	50	150	<200	500	160
G003	50	50	15	<100	70	70	<200	500	220
G012	50	50	15	<100	70	70	<200	300	180
G017	30	30	15	100	70	70	N	500	150
G018	30	30	15	100	100	100	N	500	150
G019	30	30	15	100	70	70	N	500	140
G020	30	30	10	100	50	70	N	500	120
G021	20	30	10	<100	50	100	N	>1,000	75
G027	30	30	15	<100	70	100	N	300	100
G029	30	30	10	100	50	100	N	700	120
G034	50	50	10	100	70	70	N	500	180
G036	20	50	10	<100	70	100	N	700	95
G037	20	30	10	<100	70	100	N	700	75
G038P	10	20	10	N	70	30	N	300	80
G039P	20	30	15	100	70	50	N	300	130
G040P	15	20	15	N	70	30	N	300	100
G041P	20	30	15	N	70	50	<200	300	140
G042P	10	20	10	N	50	30	N	300	100
J002	50	70	10	100	100	50	N	500	150
J004	50	50	10	100	100	70	N	300	130
J005	70	50	10	100	100	70	N	300	180
S001	30	30	15	100	70	100	<200	700	190
S007	50	30	15	100	70	70	200	200	290
S008	30	50	15	100	70	70	200	300	180
S030	30	30	15	100	70	150	N	700	120
S032	30	50	10	100	70	70	N	200	130
S034	30	30	15	<100	70	70	N	700	120
S035	30	30	15	100	70	100	N	500	150
S049	10	20	7	100	30	70	N	700	85
S050	30	30	15	100	70	70	N	500	130
S059	70	50	15	100	70	100	<200	300	230
S060	70	50	15	100	100	100	<200	700	210
S063	30	30	15	100	70	100	<200	500	160
S070	30	20	10	100	50	100	N	1,000	130
S071	20	20	15	100	70	150	N	700	130
S075	30	30	10	100	50	100	N	500	150

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB
S076	727,330	3,874,420	5	.3	.07	>1.0	1,500	300	1.5	15	50	30	20	
S093	725,360	3,878,170	7	.3	.07	1.0	1,500	300	2.0	20	50	30	50	
S094	725,280	3,878,080	7	.3	.15	.7	1,500	500	2.0	15	70	30	50	N
sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P	Quartz Veins				
S076	30	20	10	100	70	100	700	140						
S093	30	30	10	>100	70	100	700	190						
S094	30	30	15	100	70	100	500	180						

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NI
F020	725,670	3,879,890	.3	.03	.15	.030	150	70	N	N	N	N	20	5
F022	725,210	3,879,810	.2	.02	<.05	.030	300	70	N	N	N	N	<20	5
F027	724,010	3,878,810	.2	.02	<.05	.005	20	50	N	N	N	<5	<20	5
K003	724,950	3,878,780	.7	.02	<.05	.010	150	50	5	<10	<10	<5	20	5
K011	725,940	3,879,300	.3	.05	N	.050	50	100	1	N	10	<5	20	5
S092	725,950	3,877,650	.7	.02	N	.030	20	100	N	N	10	5	N	<5
S095	725,000	3,879,160	.3	.02	<.05	.030	30	100	N	N	10	5	N	<5
S135	726,740	3,875,600	1.5	.02	<.05	.020	700	70	N	5	N	7	N	5
S142	726,730	3,878,930	.1	<.02	<.05	.005	50	50	N	N	<10	N	<20	<5
sample	S-PB	S-SC	S-V	S-Y	S-ZN	AA-ZN-P								
F020	N	N	<10	N	50	15								
F022	N	N	<10	<10	20	15								
F027	N	N	<10	N	N	10								
K003	N	<5	<10	N	<10	15								
K011	<10	<5	10	N	20	10								
S092	<10	N	10	N	15	20								
S095	N	N	10	N	40	20								
S135	<10	N	<10	N	100	25								
S142	N	N	<10	N	N	10								

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NI
F023	725,210	3,879,810	2.0	.07	.05	.3	700	70	150	<1.0	5	20	<5	<20	7
F032	723,690	3,878,100	1.5	.15	.05	.7	100	150	300	1.5	7	30	5	30	5
F039	723,630	3,877,100	3.0	.70	.05	.7	150	50	500	2.0	5	70	15	50	5
F042	723,700	3,877,520	3.0	.50	.10	.5	150	100	700	1.5	15	30	30	50	70
F058	723,080	3,877,090	1.0	.07	.05	.5	70	20	300	1.0	<5	20	<5	30	5
G028	723,860	3,878,140	3.0	.70	.50	.7	700	150	300	1.0	10	30	10	30	20

sample	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
F023	20	5	<100	30	30	300	45
F032	15	10	150	70	50	300	20
F039	30	20	150	100	100	300	90
F042	20	10	100	50	100	300	220
F058	15	5	100	30	20	300	15
G028	30	15	150	50	100	300	95

Slates NW of the Greenbrier Fault

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-MO
F005	724,360	3,878,950	3	1.0	.10	.5	200	200	1,500	3.0	10	150	30	70	5
F008	724,340	3,879,400	5	1.0	<.05	.5	300	200	1,500	3.0	7	100	20	70	7
F010	724,460	3,879,600	5	1.0	.07	.5	300	200	1,000	2.0	10	100	30	70	N
F025	724,200	3,878,930	3	.7	.05	.5	300	100	1,000	2.0	5	150	10	70	N
F030	723,790	3,878,650	3	1.0	.07	.7	300	100	1,000	2.0	<5	150	5	70	N
F035	723,270	3,877,440	7	1.0	.05	.5	300	100	700	1.5	15	70	70	50	N
G026	724,850	3,879,700	3	.7	.05	.7	150	100	1,000	2.0	5	100	10	100	5
K050	723,320	3,876,900	5	1.5	.05	.5	700	100	700	5.0	10	100	<5	100	5

sample	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
F005	30	30	30	150	100	100	200	120
F008	15	50	30	100	70	100	300	80
F010	10	20	20	150	70	100	300	110
F025	7	30	30	150	100	100	200	65
F030	5	15	30	150	100	100	200	70
F035	10	30	20	150	70	100	300	120
G026	7	20	30	100	100	100	200	45
K050	15	20	20	150	150	70	200	110

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAZ	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-MO
F001	727,410	3,877,500	5.0	1.00	.07	.5	500	200	1,500	3.0	7	100	20	50	N
F015	725,690	3,879,580	3.0	.07	<.05	.3	700	20	300	1.0	10	20	5	<20	N
F016	726,000	3,879,230	3.0	.30	.07	.5	700	50	1,000	1.5	10	70	15	30	N
F017	725,950	3,879,690	5.0	1.00	.10	.5	700	200	1,000	2.0	15	150	30	70	N
F047	723,910	3,877,050	7.0	1.50	.10	.7	200	150	1,500	2.0	10	150	30	100	15
F051	724,910	3,877,960	3.0	.15	.70	.7	1,000	100	500	1.5	5	30	7	70	N
F056	724,590	3,878,520	3.0	.70	.05	.7	150	70	2,000	2.0	7	100	20	100	N
F063	723,730	3,876,180	2.0	.15	.50	.2	500	30	500	2.0	7	15	10	30	N
F065	724,630	3,876,100	2.0	.30	.07	.7	50	150	500	1.5	5	30	7	20	5
F067	725,260	3,875,780	3.0	.70	<.05	.7	100	100	1,000	2.0	5	70	20	20	N
F071	725,290	3,876,130	2.0	.50	.07	.7	150	100	1,000	2.0	10	30	20	50	N
F075	724,900	3,876,730	5.0	.70	.15	.7	500	100	700	2.0	10	70	7	70	N
G001	726,850	3,877,240	5.0	.70	.15	.7	300	150	1,000	1.5	10	150	20	50	5
G006	725,870	3,876,520	3.0	.30	.50	.5	300	50	300	1.0	7	20	7	30	N
G007	725,800	3,876,460	3.0	1.00	1.00	.5	1,000	150	500	2.0	10	50	20	30	N
G024	725,710	3,879,210	5.0	.30	.50	.7	700	50	700	1.5	10	70	15	50	N
G025	725,920	3,878,810	7.0	1.50	.15	.7	500	150	1,000	2.0	10	100	30	70	N
G030	723,990	3,877,530	5.0	.70	.70	.7	1,000	70	300	1.5	10	70	15	30	10
G031	724,380	3,877,340	5.0	1.50	.15	.7	200	100	1,500	2.0	10	150	15	30	N
G032	724,570	3,877,120	7.0	1.00	<.05	.7	200	50	1,000	2.0	5	100	20	50	N
J001	723,920	3,876,730	5.0	.50	.05	.5	700	100	500	1.5	10	50	5	50	N
K009	726,120	3,878,340	5.0	1.50	.10	.5	200	100	700	3.0	15	150	50	30	N
K019	726,310	3,874,680	7.0	1.50	<.05	.5	500	200	1,000	5.0	10	100	50	100	N
K046	724,080	3,876,050	7.0	2.00	.10	.5	500	150	700	3.0	15	100	50	70	N
S006	726,540	3,876,350	7.0	1.00	.30	.7	500	100	1,000	1.5	15	100	20	50	5
S018	725,610	3,875,800	1.5	.10	.07	.7	100	N	300	1.0	N	30	<5	30	N
S036	727,070	3,878,840	7.0	1.00	<.05	1.0	200	200	2,000	1.5	7	300	50	50	<5
S041	726,640	3,878,270	3.0	1.50	3.00	.7	1,500	100	700	1.5	15	30	<5	50	N
S045	726,440	3,879,150	2.0	.20	<.05	.5	150	20	500	1.5	5	50	7	20	N
S054	728,800	3,876,650	5.0	1.50	.05	.7	300	150	1,500	2.0	7	150	15	70	N
S056	728,070	3,876,470	2.0	.50	.07	.5	700	70	700	2.0	7	50	10	30	N
S067	727,130	3,876,190	5.0	1.00	.15	.7	500	200	1,000	2.0	10	150	30	50	N
S072	727,700	3,874,140	7.0	1.50	.30	.7	1,500	200	1,000	2.0	15	100	70	100	N
S078	727,030	3,874,610	3.0	1.00	.10	.7	300	150	1,500	2.0	10	150	15	70	N
S085	725,460	3,878,130	7.0	1.00	.10	.7	300	150	1,000	2.0	15	100	50	100	N
S088	725,820	3,877,820	3.0	.70	.10	.7	200	100	1,000	2.0	7	70	15	50	N
S098	725,460	3,877,730	5.0	1.00	.07	.5	200	200	1,500	2.0	10	150	50	70	7
S101	725,650	3,877,320	1.0	.20	.15	.7	300	200	500	1.5	N	30	5	30	N
S111	725,020	3,877,580	5.0	.70	.70	.5	700	100	1,000	1.5	10	70	20	30	N
S114	725,350	3,877,160	1.0	.20	.07	.5	150	50	500	1.5	7	20	5	20	N
S127	727,450	3,875,050	3.0	1.00	.05	.5	200	100	1,500	2.0	15	150	50	70	N
S132	727,010	3,875,280	5.0	.30	.10	.5	1,000	100	500	1.5	7	30	7	50	N

sample	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
F001	N	7	20	20	150	100	100	N	300	100
F013	N	5	20	5	<100	30	30	N	700	60
F016	N	30	20	10	150	70	30	N	200	75
F017	N	70	50	20	100	70	100	<200	300	160
F047	N	20	15	30	100	100	100	N	200	140
F051	N	10	15	7	100	50	70	N	300	35
F056	N	10	15	30	<100	100	100	N	300	55
F063	N	15	10	10	150	50	70	N	300	30
F065	N	7	10	10	150	50	70	N	300	35
F067	N	<5	15	20	150	100	100	N	500	70
F071	N	50	20	15	150	70	70	N	300	180
F075	N	50	20	15	100	70	70	N	500	140
G001	N	30	20	30	200	100	70	N	300	120
G006	N	10	<10	5	150	30	30	N	500	50
G007	N	30	30	15	150	70	20	<200	500	90
G024	N	20	15	20	150	70	100	N	700	70
G025	N	30	20	20	100	100	150	N	300	140
G030	N	20	<10	15	150	70	30	N	700	80
G031	N	20	10	20	100	100	100	N	200	170
G032	N	5	20	20	100	70	100	N	300	95
J001	<20	10	15	7	100	70	20	N	300	80
K009	20	30	20	20	150	100	50	N	500	100
K019	<20	50	20	20	150	200	100	N	200	140
K046	<20	30	30	20	100	150	100	N	500	140
S006	N	50	20	20	200	70	100	<200	500	130
S018	N	5	10	5	100	70	15	N	500	20
S036	N	15	30	30	100	100	70	N	300	75
S041	N	20	15	7	300	30	50	N	500	100
S045	N	7	20	7	N	50	20	N	300	35
S054	N	15	30	30	150	70	100	N	300	80
S056	N	7	20	10	150	70	30	N	200	40
S067	N	30	20	30	150	100	150	N	300	120
S072	N	30	30	30	150	100	100	N	300	130
S078	<20	30	30	30	150	100	100	N	300	95
S085	N	50	30	20	100	70	150	N	300	120
S088	N	10	20	20	150	70	100	N	200	80
S098	N	30	30	30	100	100	100	N	300	80
S101	<20	<5	20	7	100	50	70	N	500	65
S111	N	30	10	15	200	70	70	N	500	110
S114	N	5	30	5	150	50	20	N	500	30
S127	N	30	20	20	150	70	70	<200	100	100
S132	N	20	<10	10	150	70	70	N	300	50

sample	X-COORD	Y-COORD	S-FEX	S-MGX	S-CAZ	S-ITX	S-MN	S-B	S-BA	S-DE	S-CO	S-CR	S-CU	S-LA	S-NI
F060	723,280	3,876,370	3	.3	<.05	.7	50	30	700	1.5	N	70	10	50	<5
F069	725,460	3,875,880	2	1.0	.10	.7	200	100	1,000	2.0	<5	150	7	50	5
F073	725,200	3,876,320	5	1.0	.10	.7	300	100	1,500	2.0	10	100	50	70	30
G004	726,490	3,876,980	5	1.0	.10	.5	300	70	700	2.0	7	70	15	30	10
G005	726,140	3,876,730	5	.7	.20	.3	700	70	300	1.5	10	50	20	30	20
G016	724,980	3,878,700	7	.7	<.05	.7	200	150	700	1.5	7	70	50	50	15
K006	725,560	3,878,520	7	1.5	.30	.5	700	100	500	2.0	15	100	50	100	30
S002	726,540	3,876,790	7	1.0	.20	.7	500	70	1,000	2.0	15	100	50	70	50
S011	726,140	3,875,960	3	1.0	.07	.7	150	150	1,000	2.0	20	150	50	30	30
S020	726,240	3,875,590	3	1.0	5.00	.7	300	100	1,000	1.5	<5	150	20	200	7
S031	727,150	3,879,190	7	1.5	.20	.7	200	150	1,000	2.0	10	150	20	70	50
S062	727,630	3,876,200	7	1.5	.15	.5	500	200	1,500	1.5	20	150	70	50	50
S084	726,530	3,875,280	7	1.0	.05	.7	300	200	1,000	1.5	<5	150	30	50	5
S104	725,630	3,876,920	3	.7	.05	.7	150	30	700	2.0	N	100	10	20	<5
S123	727,890	3,874,700	5	1.0	.05	.7	300	150	1,000	2.0	5	100	30	50	5
S148	726,240	3,872,250	7	1.5	<.05	.5	500	300	1,000	3.0	5	150	20	70	10
F060	30	30	150	100	100	70	500	200	20						
F069	20	30	150	100	100	100	200	200	65						
F073	15	30	100	100	70	70	200	200	140						
G004	30	20	150	70	70	70	200	200	150						
G005	20	10	100	50	70	70	300	100	100						
G016	30	20	100	70	150	150	300	300	65						
K006	30	20	200	150	70	70	300	300	110						
S002	15	20	150	100	100	100	300	300	150						
S011	30	30	150	100	100	100	300	300	60						
S020	30	50	500	100	200	200	700		65						
S031	30	30	100	100	70	70	300	300	150						
S062	20	30	150	100	100	100	300	300	120						
S084	20	30	150	100	100	100	500	500	100						
S104	20	20	100	100	30	30	200	200	120						
S123	30	20	150	100	100	100	300	300	100						
S148	20	20	150	150	70	200	90								

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