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Analyses and Descriptions of Geochemical Samples, Ellicott Rock Wilderness and additions, South Carolina, North Carolina, and Georgia

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CONTENTS

ABSTRACT

Analyses are presented in this report for geochemical samples from the Ellicott Rock Wilderness, the Ellicott Rock Extension, and the Ellicott Rock Expansion and Persimmon Mountain Further Planning Areas and vicinity, which are located in Oconee County, S. C., Jackson and Macon Counties, N. C., and Rabun County, Ga. Latitude and longitude coordinates of the sample localities are given. Semiquantitative spectrographic analyses for 31 elements were made for 125 stream-sediment samples, 86 panned concentrates, and 75 rock samples. More sensitive analyses for gold, zinc, arsenic, and uranium were made for most samples and are also tabulated. The rock samples, 14 of which were weakly mineralized, are briefly described. Also reported are X-ray fluorescence analyses of the major oxides for seven rock samples of the dominant lithologies in the area studied.

INTRODUCTION

The analyses in this report are of samples from the Ellicott Rock Wilderness, Ellicott Rock Extension, and the Ellicott Rock Expansion and Persimmon Mountain Further Planning Areas and vicinity in Oconee County, S. C., Jackson and Macon Counties, N. C., and Rabun County, Ga. The samples were collected in March and October of 1978 and 1979 by R.W. Luce and H. Bell, III. M.E. Paidakovich assisted ably in field work in March 1979. The samples include 74 rock samples, 125 stream sediments, and 86 panned concentrates. Each of these sample types is described below separately. Maps showing sample localities, drainage basins, and a summary of geochemical results are given by Luce and Bell (in press).

SAMPLE DESCRIPTIONS

Rock samples

Each rock sample is a grab sample of the lithology named in table 1. Unless otherwise designated, the samples are of fresh rock. Sixty-one of the samples are from metasedimentary units, veins, or pegmatites of the Tallulah Falls Formation. In addition, seven samples are from the Toxaway Gneiss itself, three are from veins in the Toxaway Gneiss, one is from the Brevard zone, and two are from ultramafic pods within, but probably younger and faulted into the Tallulah Falls.

Table 1.--Rock sample names.

Sample No.	Rock name
300	quartz biotite gneiss
301	quartz biotite gneiss
302	Toxaway Gneiss (granite composition)
303	garnet aluminous schist
304	Toxaway Gneiss (granite composition)
305	biotite muscovite gneiss
306	garnet biotite schist
307	quartz biotite gneiss
308	garnet aluminous schist, altered
309	metagraywacke
310	metagraywacke
311	gneissic granite vein
312	garnet muscovite biotite schist
313	quartz biotite schist
314	biotite muscovite schist
315	garnet epidote hornblende gneiss
316	metagraywacke
317	granite pegmatite
318	metaperidotite (ultramafic)
319	quartz biotite gneiss
320	granite pegmatite
321	quartz biotite gneiss
322	metagraywacke
323	metagraywacke
324	quartz biotite gneiss
325	garnet aluminous schist
326	metagraywacke
327	quartz muscovite gneiss
328	biotite muscovite schist
329	garnet aluminous schist
330	biotite gneiss
331	garnet aluminous schist
332	metagraywacke
333	biotite gneiss
334	biotite muscovite schist
335	amphibolite
336	gneissic granite vein
337	biotite gneiss
338	amphibolite
339	garnet hornblende quartzite
340	garnet aluminous schist
341	garnet aluminous schist
342	biotite muscovite schist
343	metagraywacke, weathered
344	quartz-biotite gneiss
345	garnet amphibolite
346	amphibolite
347	granite gneiss
348	garnet biotite gneiss, altered; gold prospect

Sample No.	Rock name--Continued
349	garnet aluminous schist
350	garnet kyanite schist
351	biotite muscovite schist, altered
352	garnetiferous granite gneiss
353	garnet aluminous schist
354	pegmatitic granite gneiss
355	granite gneiss
356	metagraywacke
357	biotite granite gneiss
358	magnetite vein in Toxaway Gneiss
359	magnetite vein in Toxaway Gneiss
360	magnetite vein in Toxaway Gneiss
361	Toxaway Gneiss, weathered
362	chlorite talc schist (altered ultramafic)
363	metagraywacke
364	Toxaway Gneiss (granite composition)
365	Toxaway Gneiss (granite composition)
366	Toxaway Gneiss (granite composition), weathered
367	Toxaway Gneiss (granite composition)
368	Toxaway Gneiss (granite composition)
369	mylonite gneiss; Brevard zone
370	quartz vein; gold prospect
371	quartz vein, iron-rich; gold prospect
372	muscovite biotite schist; gold prospect wall rock,
373	garnet aluminous schist

Stream-sediment samples

Each stream-sediment sample is a composite of several grab samples of predominantly silt- and clay-size material. Eighteen of the samples were taken from intermittent streams; these are designated as colluvium in table 3.

Panned-concentrate samples

Each of the panned-concentrate samples was obtained by shoveling enough sand- and gravel-size material from several places in the fast-running parts of the stream to fill heapingly a standard 16-inch (40.6-cm) lip diameter gold pan. Each sample thus is concentrated from an initial volume of approximately 0.01 cubic yards (6 1/2 liters), which weighed approximately 21 lbs. (9 1/2 kg). The samples were panned at the stream site. Coarse gravel was picked out by hand. The samples were later dried, weighed, sieved to -2.0 mm, split, and the magnetic fraction was removed by a hand magnet prior to chemical analysis.

The initial weights of the panned concentrates and the percentages of the magnetic fractions (rounded to the nearest whole number) are given in table 2.

Table 2.--Panned-concentrate sample weights and percent magnetic fraction

Sample	Concentrate weight, in grams	Magnetic fraction, in percent
200	49	4
201	67	0
202	54	2
203	292	7
204	465	14
205	54	0
206	35	4
207	23	2
208	35	0
209	17	0
210	32	0
211	99	1
212	59	2
213	67	2
214	115	9
215	88	25
216	48	5
217	64	0
218	266	2
219	222	2
220	124	1
221	222	2
222	80	0
223	89	6
224	686	5
225	549	47
226	74	13
227	33	43
228	69	6
229	686	5
230	266	2
231	549	47
232	549	47
233	271	1
234	56	0
235	14	0
236	91	2
237	37	0
238	44	2
239	19	0

Sample	Concentrate weight, in grams	Magnetic fraction, in percent
240	35	0
241	112	3
242	25	0
243	105	2
244	168	1
245	121	1
246	182	0
247	75	11
248	31	0
249	271	1
250	182	0
251	549	47
252	549	47
253	13	2
254	28	2
255	24	2
256	12	1
257	68	0
258	88	3
259	68	2
260	108	1
261	85	0
262	55	0
263	227	21
264	86	3
265	27	3
266	194	0
267	243	0
268	91	0
269	59	0
270	110	0
271	26	7
272	32	4
273	49	40
274	25	20
275	62	50
276	58	51
277	55	46
278	26	13
279	57	45

Sample	Concentrate weight, in grams	Magnetic fraction, in percent
280	47	54
281	34	14
282	54	54
283	13	2
284	25	16
285	25	4

ANALYTICAL TECHNIQUES

Rock samples were crushed and ground to approximately -75 μm, and a split was taken for analysis. The dry stream-sediment samples were sieved to -180 μm and then split. Panned concentrate samples were analyzed as received.

A direct-current arc spectrographic analysis for 31 elements was made for each sample following the method of Grimes and Marranzino (1968). The semiquantitative spectrographic values are reported (table 3) in parts per million (ppm) or percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15 (or multiples of 10 thereof). The numbers represent approximate geometric midpoints of the concentration ranges. The precision of this method has been 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). Spectrographic analyses were carried out by D.F. Siems, assisted by E.L. Mosier and K.E. Gargan.

Results of spectrographic analyses for the following elements are given in table 3:

Element	Lower detection limit (ppm unless otherwise indicated)	Element	Lower detection limit (ppm)
Fe	0.05 %		
Mg	0.02 %	La	20
Ca	0.05 %	Nb	20
Ti	0.002 %	Ni	5
Mn	10	Pb	10
B	10	Sc	5
Ba	20	Sr	100
Be	1	V	10
Co	5	Y	10
Cr	10	Zr	10
Cu	5	Th	100

Thorium is reported for panned concentrate samples only.

Data for the following spectrographically determined elements are not shown in table 3 because all or almost all analyses were less than the detection limits given below or because the spectrographic data were superseded by results of more sensitive analytical techniques discussed later.

Element	Lower detection limit (ppm)	Element	Lower detection limit (ppm)
Ag	0.5	Mo	5
As	200	Sb	100
Au	10	Sn	10
Bi	10	W	50
Cd	20	Zn	200

Detected amounts of the above elements are:

Element	Concentration (ppm)	Sample Nos.
Panned-concentrate samples		
Sn	100	279
Ni	20	201,253
Ni	30	239
Ni	2000	228
rock samples		
Ag	0.5	347
Ag	1	326
Bi	15	371
Mo	5	365
Mo	7	358
Mo	10	359,360
Mo	15	315
Mo	20	328
Sn	10	305,308,371
Sn	15	361
Sn	20	366
Sn	30	358-360
Th	200	365
Th	500	366

More sensitive analytical techniques were used to determine gold, zinc, and arsenic; results from these techniques are reported in table 3 instead of the spectrographic analyses for these elements. Gold was determined by means of ordinary atomic-absorption methods (column heading AA-AU-P in table 3; detection limit is 0.05 ppm) described by Ward and others (1969), or by means of flameless-atomic-absorption methods (column heading AA-AU-T in table 3; detection limit is 0.002 ppm) described by Meier (1980). A.L. Meier and J.D. Sharkey performed the analyses. Zinc was determined by means of atomic-absorption methods (column heading AA-ZN-P in table 3; detection limit is 5 ppm) described by Ward and others (1969). Analysts were A.L. Meier and B.F. Arbogast. Uranium in stream-sediment samples and in some rock samples was determined fluorometrically (column heading U-INST in table 3; detection limit is 0.1 ppm) following the method of Centanni and others (1956). F.N. Ward and J.G. Viets carried out the uranium determinations. Arsenic was determined colorimetrically by A.L. Meier, J.D. Sharkey, and B.F. Arbogast, using the method of Ward and others (1963, p. 40-44). The lower detection limit for arsenic by colorimetry is 10 ppm, which is the amount found in panned-concentrate samples 206, 210, 223, 226, 227, 244-246, and 250, and in rock sample 349. Rock sample 357 contains 20 ppm arsenic.

Seven samples chosen to be representative of the major rock units in the area were analyzed for 10 major oxides by means of X-ray fluorescence by Paul P. Hearn assisted by S. Wargo. These analyses are given in table 4. The technique, including its accuracy, precision, and sensitivity, is described by Fabbi and Elsheimer (1976).

SAMPLING AND ANALYTICAL ERROR CHECKS

Replicate samples were taken at five different stream-sediment sampling localities. The replicates show very good agreement (table 3). On the average, fewer than three of the 32 elements determined differed by more than two concentration intervals from one another. Splits from panned-concentrate samples were used to test analytical precision, which was found to be excellent (table 3). Three samples were split into two parts and one was split into five parts. Less than 2 percent of the determinations compared varied by more than two concentration intervals.

Table 3.--Geochemical analyses of samples from the Ellicott Rock Wilderness and additions.

Iron, magnesium, calcium, and titanium contents are reported in percent; all others are in parts per million. S in front of element symbol in column heading indicates analysis by semiquantitative spectrographic methods. Other column headings are explained in the section on analytical techniques. Symbols that relate to analytical data are: <, less than detection limit; >, greater than value shown; N, looked for but not detected; ---, not determined. Symbols in the sample column include: C, colluvium; R, replicate of the sample whose number follows; S, split of the sample whose number follows; dump, panned sample of dump material from the Laurel Creek corundum mine. We thank W.A. Scott for data manipulation in the preparation of this table's format.

STREAM SEDIMENTS

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA
001	35.0081	83.0572	1.0	.30	.30	.50	500	10	700
002	35.0086	83.0522	1.0	.30	.30	.30	300	10	700
003	35.0111	83.0467	2.0	.50	.30	.30	300	10	1,000
004	35.0269	83.0919	3.0	.30	.30	.50	500	15	1,000
005	35.0206	83.0936	7.0	.50	.05	.70	500	50	700
006	34.9656	83.0908	2.0	.50	.10	.30	200	15	1,000
007	34.9653	83.0903	2.0	.30	.10	.50	300	20	700
008	34.9817	83.1114	1.5	.50	.70	.30	300	20	700
009	34.9850	83.1058	1.0	15.00	.70	.30	300	10	700
010	34.9861	83.1047	1.0	.50	.20	.30	200	10	1,000
011	34.9856	83.1022	2.0	.30	.30	.50	500	15	700
012	34.9756	83.1117	1.5	.30	.10	.30	200	10	1,000
013	34.9669	83.1225	2.0	.50	.10	.30	200	10	1,000
014	35.0233	83.0597	1.5	.70	.50	.30	300	10	1,000
015	34.9503	83.1136	1.5	.20	.05	.30	200	20	700
016	35.0294	83.0639	7.0	.30	.15	1.00	700	30	500
017	35.9856	83.0669	2.0	.50	.30	.30	300	20	700
018	35.9875	83.0708	1.5	.30	.30	.50	300	20	700
019	35.0044	83.1081	2.0	.50	.50	.50	500	50	1,000
020	34.9822	83.0850	2.0	.50	.20	.30	500	10	1,000
021	34.9681	83.1378	5.0	.70	.50	.30	300	20	1,000
022	34.9506	83.1475	5.0	.50	.20	.50	300	20	700
023	35.0031	83.1125	.7	.30	.70	.10	300	<10	1,000
024 (R023)	35.0036	83.1131	2.0	.50	.20	.30	300	10	300
025	35.0039	83.1150	1.5	.50	.30	.50	200	10	500
026	34.9636	83.1106	2.0	.50	.15	.30	200	<10	300
027	34.9847	83.0428	1.5	.30	.15	.20	200	10	300
028	34.9861	83.0739	2.0	.50	.30	.30	300	10	300
029	34.9831	83.0331	1.5	.20	.50	.15	200	10	700
030	34.9906	83.0289	1.5	.20	.30	.20	100	10	700
031	34.9281	83.1758	5.0	1.00	.30	.30	300	10	300
032 (R031)	34.9281	83.1758	7.0	.70	.20	.30	2,000	<10	200
033 C	34.9817	83.0864	2.0	.70	.20	.30	300	10	300
034 C	34.9842	83.0786	2.0	.70	.20	.30	500	10	300
035	35.0286	83.0875	3.0	.70	.70	.50	500	15	500
036	34.9681	83.1164	2.0	.70	.20	.30	300	10	500
037	34.9708	83.1114	2.0	.50	.20	.50	300	10	300
038	34.9719	83.1197	1.5	.50	.05	.50	200	10	300
039	34.9775	83.1192	1.0	.30	.30	.15	50	<10	300
040	34.9764	83.1203	1.5	.30	.30	.20	150	10	500
041	35.0183	83.0603	2.0	.50	.30	.30	300	10	300
042	34.9444	83.0958	2.0	.50	.10	.50	500	10	300
043	34.9436	83.0933	2.0	.50	.15	.50	300	10	500
044	34.9842	83.0783	3.0	.50	.20	.30	200	10	500
045	34.9908	83.0964	2.0	.50	.30	.50	500	<10	500

sample	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-NI	S-PB	S-SC
001	<1.0	50	50	10	50	<20	5	15	5
002	<1.0	30	50	<5	N	<20	5	10	N
003	<1.0	50	70	10	20	<20	10	20	5
004	<1.0	70	70	7	500	<20	7	20	5
005	<1.0	100	150	50	300	20	10	20	7
006	<1.0	50	70	10	50	<20	10	15	5
007	<1.0	70	50	10	20	20	10	15	5
008	<1.0	50	50	5	30	<20	7	20	5
009	1.0	50	50	7	20	<20	5	30	5
010	<1.0	50	50	7	30	<20	5	20	<5
011	<1.0	70	70	7	30	<20	5	15	5
012	<1.0	50	50	7	30	<20	5	15	5
013	<1.0	50	100	10	30	<20	10	30	7
014	<1.0	50	100	10	20	<20	7	20	5
015	<1.0	30	50	7	20	<20	7	10	5
016	<1.0	100	150	50	100	<20	10	15	5
017	<1.0	50	100	20	20	20	15	20	7
018	<1.0	50	50	5	<20	<20	7	20	5
019	1.0	50	100	7	20	20	10	20	5
020	<1.0	50	70	7	20	20	10	15	5
021	<1.0	70	150	30	150	<20	30	20	15
022	<1.0	70	100	20	100	20	30	20	7
023	<1.0	10	15	<5	300	N	<5	20	<5
024 (R023)	1.0	10	70	7	70	<20	20	15	5
025	<1.0	7	50	<5	150	20	7	20	5
026	<1.0	7	50	7	50	N	10	10	5
027	<1.0	5	20	5	<20	N	7	10	<5
028	<1.0	7	50	7	20	<20	15	15	7
029	1.0	5	<10	<5	70	<20	<5	30	10
030	<1.0	5	20	N	20	N	<5	10	5
031	<1.0	50	200	30	300	N	150	10	10
032 (R031)	1.0	30	150	15	50	<20	100	<10	5
033 C	1.0	20	70	20	20	<20	20	10	7
034 C	1.0	15	70	15	50	<20	20	20	7
035	1.5	20	150	30	100	20	30	20	10
036	1.0	20	70	20	30	<20	20	15	10
037	1.5	10	50	15	30	<20	10	15	5
038	<1.0	7	50	<5	20	<20	7	15	<5
039	<1.0	5	30	<5	N	N	<5	10	5
040	<1.0	7	30	5	70	<20	7	15	10
041	1.0	10	50	10	30	<20	10	20	5
042	1.0	7	30	5	50	<20	10	20	5
043	1.0	10	50	10	30	<20	20	15	5
044	<1.0	20	50	30	50	N	15	20	5
045	<1.0	7	30	<5	20	<20	7	20	5

STREAM SEDIMENTS

sample	S-SR	S-V	S-Y	S-ZR	AA-AU-P	AA-ZN-P	U-INST	AA-AU-T
001	N	20	50	1,000	N	30	.5	--
002	N	30	10	700	N	20	.4	--
003	<100	90	20	300	N	60	.5	--
004	100	100	300	1,000	N	30	1.8	--
005	N	100	150	500	N	40	.7	--
006	N	50	20	500	N	60	.4	--
007	N	50	20	>1,000	N	40	.4	--
008	200	50	15	300	N	30	.6	--
009	150	50	20	200	N	35	.4	--
010	<100	30	10	500	N	50	.6	--
011	<100	50	20	500	N	25	.3	--
012	N	50	15	500	N	40	.4	--
013	<100	50	20	200	N	80	.6	--
014	<100	70	20	500	N	50	.6	--
015	N	50	15	500	N	35	.3	--
016	100	100	50	500	N	40	.7	--
017	<100	70	50	200	N	50	.5	--
018	<100	50	20	1,000	N	30	.4	--
019	150	100	20	700	N	30	.4	--
020	N	70	30	300	N	60	.6	--
021	<100	100	70	500	N	65	.7	--
022	N	100	100	500	N	40	.7	--
023	100	10	50	300	N	30	1.1	--
024 (R023)	N	50	30	1,000	N	60	.7	--
025	N	30	30	500	N	40	.7	--
026	N	30	20	300	N	60	.4	--
027	N	30	15	300	N	40	.6	--
028	<100	50	15	300	N	45	.6	--
029	100	20	20	300	N	40	.9	--
030	N	20	20	700	N	35	.7	--
031	N	70	30	300	N	80	.7	--
032 (R031)	N	70	20	150	N	75	.4	--
033 C	N	50	20	200	N	85	.9	--
034 C	N	50	20	300	N	80	.8	--
035	200	100	70	1,000	N	45	.8	--
036	N	50	20	700	N	60	.4	--
037	N	50	50	700	N	45	.5	--
038	N	20	15	1,000	N	40	.6	--
039	N	10	15	300	N	45	.5	--
040	N	20	20	1,000	N	35	.5	--
041	<100	50	20	1,000	N	55	.7	--
042	<100	50	100	>1,000	N	40	.4	--
043	<100	70	30	700	N	50	.5	--
044	<100	50	30	300	N	85	.9	--
045	<100	50	70	1,000	N	40	.5	--

STREAM SEDIMENTS--continued

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA
046	34.9922	83.0961	2.0	.50	.30	.50	500	10	500
047	34.9692	83.1367	1.5	.50	.30	.30	300	10	500
048	34.9689	83.1406	2.0	.70	.50	.50	300	10	300
049	34.9600	83.1431	3.0	.30	.10	.50	500	10	300
050	34.9553	83.1497	3.0	.70	.50	.50	500	10	300
051	34.9914	83.0731	2.0	.50	.15	.30	500	10	500
052	34.9967	83.0717	1.5	.50	.50	.30	500	10	300
053	34.9958	83.0728	2.0	.70	.30	.30	700	10	500
054	34.9886	83.0700	1.5	.30	.30	.30	500	10	300
055	34.9700	83.0314	5.0	.70	.50	.30	500	10	1,000
056	34.9772	83.0292	1.0	.10	.50	.20	100	10	1,000
057	34.9861	83.0289	1.5	.30	1.00	.30	300	10	1,500
058 C	34.9869	83.1014	5.0	.50	.20	.50	300	10	500
059 C	34.9822	83.1058	5.0	.70	.50	.30	500	10	700
060 C	34.9814	83.1056	7.0	.70	.50	.50	700	<10	700
061 C	34.9792	83.1083	7.0	.70	.70	.70	300	10	700
062 C	34.9836	83.1008	3.0	.50	.15	.50	200	15	700
063 C	34.9844	83.1000	3.0	.30	.30	.70	700	10	700
064 C	34.9844	83.0961	5.0	.30	.15	.50	500	20	500
065 C	34.9844	83.0944	3.0	.50	.10	.50	700	15	500
066 C	34.9839	83.0933	5.0	.50	.70	.50	700	10	700
067 C	34.9831	83.0817	7.0	.70	.30	.50	1,000	10	700
068 C	34.9831	83.0819	3.0	.20	.15	.30	300	20	300
069 C	34.9972	83.1014	5.0	.70	.50	.30	700	10	700
070	34.9772	83.0547	7.0	1.00	.70	.70	1,000	20	700
071	34.9950	83.0711	3.0	.50	.30	.50	700	10	700
072 C	34.9792	83.0906	7.0	1.50	.70	.50	1,000	15	700
073 C	34.9789	83.0917	2.0	.50	.70	.30	700	10	700
074 C	34.9786	83.0914	7.0	.50	.50	.50	200	20	500
075 C	34.9797	83.0928	7.0	.70	.70	.50	1,000	20	700
076	34.9225	83.1253	1.5	.20	.20	.20	200	N	200
077	34.9300	83.1311	1.5	.15	.15	.50	500	15	200
078	34.9206	83.1208	2.0	.20	.15	.30	300	<10	300
079	34.9192	83.1217	1.5	.20	.07	.50	300	<10	300
080	34.9153	83.1203	2.0	.30	.10	.30	300	10	500
081	34.8997	83.1219	2.0	.20	.20	.50	500	15	500
082	34.8956	83.1300	1.5	.10	.20	.50	500	<10	200
083	34.8875	83.1369	1.0	.07	<.05	.30	200	N	150
084	34.9244	83.1439	2.0	.20	.10	.30	300	N	50
085	34.9261	83.1483	2.0	.20	.07	.30	300	N	50
086	34.9233	83.1575	2.0	.50	.15	.30	300	N	50
087	34.9181	83.1567	1.5	.30	.07	.30	200	N	50
088	34.9147	83.1569	2.0	.50	.15	.30	500	N	50
089	34.9233	83.1722	2.0	.50	.10	.30	300	<10	50
090	34.9311	83.1808	5.0	.30	.15	.70	500	<10	30

sample	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-NI	S-PB	S-SC
046	<1.0	7	30	<5	20	<20	5	20	5
047	<1.0	7	30	5	50	N	7	20	5
048	1.0	10	70	7	70	<20	20	10	7
049	1.0	10	50	7	N	<20	15	10	5
050	<1.0	15	70	10	70	<20	30	15	10
051	<1.0	10	30	5	30	<20	15	30	5
052	<1.0	7	50	5	20	<20	10	20	5
053	<1.0	10	50	5	20	<20	15	20	7
054	<1.0	5	20	<5	70	<20	5	30	5
055	1.0	10	20	<5	70	<20	5	50	10
056	<1.0	<5	N	N	50	N	<5	20	7
057	1.0	5	10	N	70	<20	5	50	10
058 C	1.5	10	30	10	50	20	20	50	10
059 C	1.5	10	30	10	70	20	20	70	10
060 C	1.0	7	30	7	150	20	15	70	10
061 C	2.0	10	50	10	100	20	30	70	15
062 C	1.0	7	30	10	70	20	20	50	10
063 C	1.0	7	30	5	100	30	10	50	7
064 C	1.5	7	50	10	70	20	20	50	10
065 C	2.0	10	50	10	70	20	30	70	10
066 C	1.5	10	50	15	70	20	15	30	10
067 C	2.0	15	70	20	100	20	30	50	15
068 C	2.0	7	50	10	50	<20	15	70	10
069 C	2.0	10	70	15	50	<20	20	50	10
070	2.0	15	70	30	70	20	30	50	15
071	2.0	7	30	10	50	20	10	50	7
072 C	2.0	30	150	30	50	<20	50	70	20
073 C	3.0	10	30	10	50	<20	15	30	7
074 C	1.5	7	70	15	50	20	15	30	10
075 C	2.0	10	70	15	50	<20	20	50	10
076	1.0	7	10	5	<20	N	10	10	5
077	<1.0	5	15	N	30	<20	10	<10	10
078	1.0	7	20	15	30	<20	10	10	7
079	<1.0	5	15	5	20	<20	10	10	7
080	1.5	7	20	10	30	N	15	20	7
081	1.0	5	10	<5	20	N	10	10	7
082	<1.0	N	10	<5	20	N	5	<10	7
083	<1.0	N	<10	<5	N	N	5	N	5
084	1.0	7	15	10	20	<20	10	15	7
085	1.0	7	20	10	50	<20	10	15	7
086	1.0	7	20	20	50	<20	15	20	7
087	1.0	7	15	15	50	N	15	10	7
088	1.0	7	20	15	20	N	10	20	7
089	1.0	7	20	15	30	N	15	20	7
090	1.0	7	50	15	100	<20	20	<10	10

sample	S-SR	S-V	S-Y	S-ZR	AA-AU-P	AA-ZN-P	U-INST	AA-AU-T
046	<100	30	30	1,000	N	45	.3	--
047	<100	30	20	500	N	30	.4	--
048	100	70	20	500	N	30	.5	--
049	<100	50	50	300	N	35	.3	--
050	<100	70	70	500	N	40	.5	--
051	<100	50	20	500	N	70	.5	--
052	N	30	10	700	N	35	.5	--
053	<100	70	30	300	N	60	.5	--
054	N	30	50	500	N	35	.6	--
055	150	70	50	500	N	70	2.3	--
056	<100	10	50	>1,000	N	25	.5	--
057	150	30	50	500	N	45	.6	--
058 C	100	70	50	700	N	55	.7	--
059 C	100	70	50	300	N	50	.6	--
060 C	150	70	50	500	N	55	.4	--
061 C	200	100	70	300	N	60	1.2	--
062 C	100	70	50	700	N	70	.7	--
063 C	150	50	100	500	N	40	.6	--
064 C	100	70	30	700	N	55	.6	--
065 C	100	70	30	500	N	75	.7	--
066 C	100	70	50	700	N	50	.4	--
067 C	100	100	70	700	N	80	.8	--
068 C	100	100	50	500	N	100	.7	--
069 C	100	70	70	300	N	65	.6	--
070	150	70	50	500	N	100	.8	--
071	100	70	20	300	N	40	.6	--
072 C	100	100	50	300	N	100	1.2	--
073 C	100	70	70	500	N	50	.3	--
074 C	100	100	30	300	N	50	.8	--
075 C	100	100	30	500	N	80	.8	--
076	<100	50	10	300	--	40	.5	.002
077	<100	70	100	>1,000	--	15	.5	N
078	<100	70	50	1,000	--	45	.7	.002
079	<100	70	15	1,000	--	35	.6	N
080	<100	70	20	1,000	--	50	.7	N
081	100	70	20	1,000	--	15	.4	N
082	<100	50	100	>1,000	--	10	.2	.002
083	N	20	<10	700	--	20	.5	N
084	<100	50	50	700	--	30	.5	N
085	<100	50	30	500	--	45	.8	N
086	<100	50	30	300	--	55	.6	N
087	<100	50	50	300	--	70	.5	N
088	<100	50	15	700	--	40	.4	<.00
089	100	70	15	300	--	50	.7	N
090	<100	100	150	700	--	20	.2	N

STREAM SEDIMENTS--continued

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA
091	34.9917	83.1494	3.0	.50	.50	.50	500	10	500
092	34.9853	83.1503	3.0	.50	.20	.50	700	50	300
093	34.9811	83.1483	2.0	.20	.20	.50	300	N	200
094 (R047)	34.9694	83.1367	1.5	.20	.20	.30	200	N	500
095	35.0139	83.1281	5.0	.70	1.00	.50	700	10	300
096	35.0136	83.1278	2.0	.30	.30	.50	500	<10	200
097	35.0167	83.1417	5.0	.70	.70	.50	700	30	300
098	34.9236	83.0797	2.0	.20	.10	.50	300	<10	300
099	34.9258	83.0781	2.0	.30	.20	.20	500	10	300
100	34.9261	83.0778	2.0	.20	.15	.30	700	10	300
101	34.9278	83.1353	2.0	.20	.10	.30	300	<10	500
102	34.9253	83.1400	3.0	.30	.20	.30	500	<10	500
103	34.9322	83.1075	1.5	.15	.10	.30	300	10	200
104	34.9339	83.1075	2.0	.20	.10	.50	300	<10	500
105	34.9433	83.1158	1.5	.20	.10	.30	500	<10	300
106	35.0222	83.1089	1.5	.15	.15	.15	150	<10	500
107	35.0208	83.1142	2.0	.20	.70	.30	300	<10	500
108	35.0111	83.1244	2.0	.20	.30	.30	200	10	300
109	34.9444	83.0300	1.5	.15	.07	.30	150	30	150
110	34.9392	83.0319	1.5	.20	.10	.30	300	50	200
111	34.9728	83.0494	3.0	.30	.30	.70	700	<10	500
112	34.9725	83.0497	3.0	.30	.30	.50	500	<10	300
113 (R055)	34.9547	83.0319	3.0	.15	.70	.50	500	<10	700
114 (R056)	34.9783	83.0306	2.0	.20	.70	.30	500	<10	1,000
115	34.9419	83.0697	1.0	.15	.30	.30	200	<10	500
116	34.9389	83.0731	3.0	.50	.30	.50	300	<10	300
117	34.9364	83.0719	2.0	.20	.30	.30	300	<10	300
118	34.9497	83.0472	2.0	.30	.15	.50	300	20	150
119	34.9550	83.0506	1.5	.15	.15	.30	200	<10	300
120	34.9553	83.0503	2.0	.30	.70	.50	700	<10	700
121	34.9539	83.0475	1.5	.20	.15	.30	300	15	150
122	34.9425	83.0500	2.0	.15	.50	.50	300	<10	500
123	34.9428	83.0486	3.0	.15	.50	.70	700	15	300
124	34.9314	83.0631	1.5	.30	.15	.30	200	10	300
125	34.9958	83.0264	2.0	.30	.70	.50	700	<10	700

sample	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-NI	S-PB	S-SC
091	1.5	7	50	10	70	<20	15	20	10
092	1.5	10	50	20	150	N	30	30	10
093	1.0	7	15	10	150	<20	15	10	7
094 (R047)	1.0	5	10	7	150	<20	10	20	5
095	1.5	10	50	20	150	<20	20	20	10
096	1.0	7	20	15	70	N	10	15	7
097	1.0	10	50	20	200	<20	20	30	15
098	1.0	5	10	5	<20	<20	10	10	7
099	1.0	5	15	15	<20	N	15	10	5
100	1.0	5	15	5	100	<20	10	<10	5
101	1.0	<5	20	5	20	<20	10	<10	7
102	1.0	7	20	10	50	<20	15	15	10
103	<1.0	5	30	5	<20	N	10	<10	5
104	1.0	7	15	7	<20	<20	15	10	7
105	1.0	5	10	7	20	<20	15	10	7
106	1.0	5	15	5	100	N	10	10	5
107	1.0	7	15	5	70	N	10	10	7
108	1.0	7	20	15	<20	<20	15	15	7
109	1.0	5	10	<5	20	N	10	10	5
110	2.0	7	15	5	20	N	10	20	7
111	1.5	10	20	10	100	<20	15	30	15
112	1.5	10	15	7	50	<20	15	15	15
113 (R055)	2.0	5	<10	N	200	30	<5	30	30
114 (R056)	2.0	<5	<10	N	100	<20	<5	50	15
115	2.0	<5	<10	N	100	N	<5	30	15
116	2.0	10	20	10	50	<20	15	20	15
117	2.0	5	15	7	20	N	10	20	10
118	1.5	10	15	10	30	N	15	15	10
119	3.0	5	<10	N	50	<20	5	50	5
120	2.0	5	10	N	100	<20	<5	30	20
121	1.0	7	10	7	70	N	10	10	5
122	1.5	5	10	10	70	<20	5	30	15
123	1.5	5	10	N	100	<20	<5	20	100
124	1.5	7	10	10	20	<20	10	30	5
125	2.0	7	10	7	100	20	7	50	15

STREAM SEDIMENTS--continued

sample	S-SR	S-V	S-Y	S-ZR	AA-AU-P	AA-ZN-P	U-INST	AA-AU-T
091	100	70	100	500	--	35	.9	N
092	<100	70	150	500	--	75	.7	N
093	<100	70	100	500	--	60	.8	<.002
094 (R047)	<100	50	150	700	--	40	.7	N
095	150	100	100	300	--	55	1.0	.002
096	<100	70	50	200	--	60	.8	.002
097	100	70	70	300	--	40	1.1	N
098	<100	50	15	500	--	30	.5	N
099	<100	50	10	500	--	45	.7	N
100	<100	50	150	700	--	25	.6	N
101	<100	50	30	1,000	--	45	.2	N
102	100	70	50	500	--	60	.9	N
103	<100	50	10	1,000	--	20	.2	.002
104	<100	70	20	700	--	60	.4	.002
105	<100	50	15	500	--	40	.2	.004
106	<100	30	100	500	--	35	.4	N
107	150	50	70	700	--	45	.4	.002
108	<100	50	15	150	--	60	.9	N
109	N	30	10	500	N	35	.4	--
110	<100	70	10	300	<.05	25	1.1	--
111	100	70	70	>1,000	<.05	60	.4	--
112	100	70	30	700	<.05	45	.3	--
113 (R055)	150	50	70	700	<.05	50	1.0	--
114 (R056)	150	50	50	500	<.05	40	.6	--
115	150	20	30	300	<.05	50	.6	--
116	<100	70	50	500	<.05	65	.6	--
117	100	50	15	300	<.05	40	.9	--
118	<100	70	50	500	<.05	40	.8	--
119	<100	30	20	200	<.05	35	1.6	--
120	150	70	50	>1,000	N	35	.5	--
121	<100	50	20	300	N	40	1.4	--
122	100	50	30	>1,000	N	35	.7	--
123	100	70	100	>1,000	<.05	30	.9	--
124	<100	50	15	200	N	40	.9	--
125	150	70	50	300	N	45	.7	--

PANNED CONCENTRATES

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B
200	35.0081	83.0569	10	.30	1.00	>1.0	>5,000	15
201	35.0083	83.0525	>20	.20	1.00	1.0	>5,000	15
202	35.0036	83.0550	>20	.15	.20	>1.0	5,000	20
203	35.0286	83.0875	10	.10	.15	>1.0	>5,000	30
204	35.0206	83.0936	15	.10	.10	>1.0	>5,000	50
205	34.9656	83.0908	5	.30	.15	>1.0	>5,000	10
206	34.9681	83.1164	5	.20	.20	>1.0	>5,000	20
207	34.9708	83.1114	5	.10	.15	>1.0	3,000	10
208	34.9719	86.1197	3	.10	.10	>1.0	5,000	N
209	34.9775	83.1192	3	.20	1.00	>1.0	>5,000	15
210	34.9764	83.1203	10	.15	.20	>1.0	5,000	30
211	34.0183	83.0603	20	.15	1.00	>1.0	5,000	15
212	34.9444	83.0958	5	.15	.10	>1.0	>5,000	20
213	34.9436	83.0933	20	.15	.30	>1.0	>5,000	20
214	34.9842	83.0783	20	.20	.30	1.0	5,000	N
215	34.9908	83.0964	>20	.10	.50	>1.0	>5,000	N
216	34.9922	83.0961	>20	.10	.70	>1.0	>5,000	20
217	34.9692	83.1367	>20	.15	.10	>1.0	>5,000	100
218	37.9689	83.1406	>20	.20	.10	>1.0	>5,000	100
219	34.9600	83.1431	>20	.10	.07	>1.0	>5,000	50
220	34.9553	83.1497	>20	.50	.10	>1.0	>5,000	100
221 S219	34.9600	83.1431	>20	.10	.10	>1.0	>5,000	70
222	34.9967	83.0717	7	.50	1.50	>1.0	>5,000	N
223	34.9958	83.0728	10	.20	.50	>1.0	5,000	10
224	34.9450	83.1758	>20	.30	.15	>1.0	>5,000	30
225	34.9700	83.0314	7	.05	.50	1.0	1,500	15
226	34.9772	83.0292	3	.02	5.00	.5	2,000	N
227	34.9861	83.0289	7	.10	5.00	1.0	3,000	10
228 dump	34.9464	83.1736	5	>10.00	.10	.3	2,000	10
229 S224	34.9450	83.1758	>20	.20	.10	>1.0	>5,000	50
230 S218	34.9689	83.1406	>20	.20	.10	>1.0	>5,000	100
231 S225	34.9700	83.0314	10	.05	2.00	1.0	2,000	10
232 S225	34.9700	83.0314	10	.05	1.50	1.0	2,000	10
233	35.0269	83.0919	20	.10	.20	>1.0	>5,000	70
234	34.9653	83.0903	7	.15	.20	>1.0	5,000	20
235	34.9817	83.1114	10	.20	.50	>1.0	>5,000	30
236	34.9856	83.1022	7	.20	.50	>1.0	>5,000	100
237	34.9756	83.1117	3	.15	.15	>1.0	3,000	N
238	34.9669	83.1225	3	.15	.20	>1.0	5,000	50
239	35.0233	83.0597	2	.20	.70	>1.0	5,000	10
240	34.9503	83.1136	2	.10	.10	>1.0	3,000	N
241	35.0294	83.0639	>20	.10	.10	>1.0	5,000	100
242	35.9856	83.0669	7	.15	.30	>1.0	5,000	100
243	35.9875	83.0708	15	.50	1.50	>1.0	>5,000	10
244	35.0044	83.1081	2	.15	.50	1.0	1,000	50

PANNED CONCENTRATES

sample	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-PB
200	200	N	N	100	N	700	50	N
201	200	1.0	N	50	N	200	50	N
202	200	N	N	100	N	300	50	N
203	100	1.0	30	300	100	300	30	N
204	100	1.0	30	200	100	300	50	N
205	100	1.0	10	50	10	300	50	N
206	150	1.0	15	100	30	500	20	10
207	150	1.0	7	50	N	150	50	N
208	150	N	N	50	30	300	70	N
209	200	N	N	50	5	>1,000	30	15
210	300	N	N	50	7	>1,000	50	20
211	300	N	N	30	70	200	50	N
212	70	1.0	15	70	N	500	50	N
213	100	<1.0	20	150	N	500	50	10
214	200	N	N	50	N	100	20	N
215	200	N	20	100	N	200	20	N
216	100	N	20	150	30	200	30	10
217	100	N	30	200	50	>1,000	30	20
218	100	N	30	150	70	>1,000	30	20
219	150	N	30	200	70	1,000	30	N
220	150	N	30	500	50	1,000	30	N
221 S219	100	N	30	200	70	1,000	30	N
222	200	N	10	70	N	200	50	N
223	300	N	15	70	N	150	30	N
224	N	N	50	3,000	70	500	30	N
225	500	1.0	10	100	N	200	30	15
226	150	<1.0	N	10	N	300	N	20
227	500	<1.0	N	20	N	300	N	20
228 dump	20	N	70	3,000	20	N	N	N
229 S224	50	N	50	1,000	100	500	50	N
230 S218	70	N	N	300	100	>1,000	30	20
231 S225	500	1.0	15	200	10	300	N	30
232 S225	500	1.0	15	150	10	500	N	20
233	150	<1.0	N	200	100	>1,000	30	20
234	200	<1.0	N	70	10	300	50	N
235	200	<1.0	N	150	20	>1,000	70	15
236	200	<1.0	15	100	10	150	50	15
237	300	<1.0	5	50	N	300	50	N
238	200	1.5	N	70	5	500	100	N
239	300	<1.0	N	50	N	500	50	N
240	300	N	5	50	N	200	30	N
241	100	1.0	20	200	30	150	50	N
242	300	N	10	100	15	150	50	N
243	200	N	20	100	20	300	20	10
244	300	1.5	7	70	N	30	N	N

PANNED CONCENTRATES

sample	S-SC	S-SR	S-V	S-Y	S-ZR	S-TH	AA-AU-P	AA-ZN-P	AA-AU-T
200	50	N	100	2,000	>1,000	N	N	30	--
201	N	N	50	1,000	>1,000	N	N	20	--
202	30	N	100	700	>1,000	N	N	20	--
203	30	N	200	500	1,000	N	N	55	--
204	30	N	200	300	1,000	N	.10	35	--
205	70	N	70	1,500	>1,000	N	N	30	--
206	70	N	100	1,500	>1,000	N	N	25	--
207	10	N	70	300	>1,000	N	N	20	--
208	15	N	50	2,000	>1,000	N	N	20	--
209	20	N	70	2,000	>1,000	500	N	20	--
210	20	N	70	1,500	>1,000	1,000	N	20	--
211	20	N	70	500	>1,000	N	N	25	--
212	50	N	70	1,000	>1,000	N	N	35	--
213	50	N	100	2,000	>1,000	N	2.70	25	--
214	20	N	50	200	>1,000	N	N	30	--
215	50	N	100	500	>1,000	N	.10	35	--
216	50	N	150	500	>1,000	N	N	25	--
217	50	N	200	1,500	1,000	700	N	20	--
218	50	N	300	1,500	700	200	2.60	25	--
219	30	N	300	300	>1,000	N	N	25	--
220	50	N	200	500	>1,000	100	2.20	30	--
221 S219	50	N	300	500	1,000	N	N	25	--
222	30	N	100	300	>1,000	N	N	25	--
223	20	N	100	500	>1,000	N	N	30	--
224	30	N	200	500	700	N	N	35	--
225	20	100	100	200	>1,000	N	N	45	--
226	100	N	70	500	>1,000	N	N	30	--
227	70	150	100	200	>1,000	N	N	25	--
228 dump	N	N	50	30	500	N	N	45	--
229 S224	30	N	200	200	1,000	N	N	25	--
230 S218	30	N	200	1,000	1,000	500	N	20	--
231 S225	50	150	150	300	>1,000	N	2.30	35	--
232 S225	50	100	150	300	>1,000	N	2.70	35	--
233	10	N	200	2,000	>1,000	300	N	15	--
234	20	N	100	700	>1,000	N	N	25	--
235	N	N	200	2,000	>1,000	200	1.70	20	--
236	15	N	200	500	>1,000	N	<.05	20	--
237	15	N	50	500	>1,000	N	N	20	--
238	10	N	70	1,000	>1,000	150	N	25	--
239	10	N	70	>2,000	>1,000	100	N	15	--
240	10	N	50	500	1,000	N	N	25	--
241	10	N	300	200	1,000	N	N	30	--
242	10	N	200	500	>1,000	N	N	35	--
243	50	N	150	700	1,000	N	N	20	--
244	N	N	70	50	1,000	N	N	40	--

PANNED CONCENTRATES--continued

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B
245	34.9681	83.1378	10	.20	.50	>1.0	5,000	200
246	34.9506	83.1475	5	.10	.30	>1.0	2,000	50
247	34.9831	83.0331	3	.10	5.00	.2	2,000	N
248	34.9906	83.0289	7	.15	.70	>1.0	3,000	N
249 S233	35.0269	83.0919	>20	.15	.20	>1.0	>5,000	100
250 S246	34.9506	83.1475	7	.10	.20	>1.0	2,000	30
251 S225	34.9700	83.0314	10	.03	3.00	1.0	2,000	15
252 S225	34.9700	83.0314	7	.03	.50	.7	1,500	10
253	34.9225	83.1253	10	.30	1.00	2.0	3,000	<20
254	34.9300	83.1311	15	.10	.30	>2.0	3,000	<20
255	34.9192	83.1217	7	.10	.30	>2.0	3,000	<20
256	34.8956	83.1300	7	.07	.70	2.0	3,000	20
257	34.8875	83.1369	7	.15	.10	2.0	3,000	N
258	34.9244	83.1439	10	.10	.50	>2.0	3,000	<20
259	34.9233	83.1722	20	.07	.20	>2.0	5,000	<20
260	34.9311	83.1808	15	.20	.30	>2.0	2,000	30
261	34.0139	83.1281	7	.50	1.00	1.5	1,500	50
262	34.0136	83.1278	15	.03	.70	2.0	3,000	N
263	34.9322	83.1075	30	.07	.20	>2.0	5,000	20
264	34.9339	83.1075	20	.15	.30	2.0	5,000	<20
265	34.9433	83.1158	7	.05	.10	1.5	1,500	N
266	34.9925	83.1497	10	.30	.30	>2.0	7,000	200
267	34.9914	83.1481	15	.30	.70	>2.0	7,000	70
268	34.0222	83.1089	7	.50	.50	2.0	3,000	20
269	34.0208	83.1142	15	.30	2.00	2.0	10,000	N
270	34.0111	83.1244	15	.30	.70	>2.0	7,000	50
271	34.9444	83.0300	20	.50	1.00	>2.0	10,000	200
272	34.9392	83.0319	20	.30	.30	>2.0	7,000	300
273	34.9728	83.0494	15	.15	1.50	>2.0	3,000	100
274	34.9725	83.0497	20	.15	1.00	>2.0	5,000	70
275	34.9419	83.0697	15	.05	7.00	>2.0	2,000	<20
276	34.9389	83.0731	20	.10	1.50	>2.0	5,000	70
277	34.9364	83.0719	20	.20	1.00	>2.0	3,000	50
278	34.9497	83.0472	30	.50	1.00	>2.0	10,000	1,500
279	34.9550	83.0506	30	<.05	1.00	>2.0	3,000	<20
280	34.9553	83.0503	15	.20	3.00	>2.0	5,000	30
281	34.9539	83.0475	20	.30	.70	>2.0	7,000	1,500
282	34.9425	83.0500	20	.15	5.00	>2.0	5,000	30
283	34.9314	83.0631	20	.10	1.50	>2.0	5,000	100
284	34.9211	83.0775	20	.07	.50	>2.0	7,000	70
285	34.9958	83.0264	15	.10	3.00	>2.0	3,000	<20

PANNED CONCENTRATES--continued

sample	S-BA	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-PB
245	150	<1.0	N	100	30	>1,000	30	N
246	200	N	5	150	20	200	20	N
247	500	1.0	N	50	N	200	N	20
248	500	1.0	15	50	N	150	30	10
249 S233	300	1.0	N	200	50	>1,000	30	30
250 S246	200	N	15	300	15	300	20	N
251 S225	500	1.0	15	100	15	300	N	50
252 S225	500	1.0	15	100	15	200	50	15
253	N	1.0	30	70	10	200	50	N
254	N	N	15	100	<10	700	50	N
255	<50	<2.0	10	50	10	300	50	20
256	50	N	10	50	N	200	<50	N
257	<50	1.5	15	50	N	150	50	N
258	70	N	15	50	<10	500	<50	N
259	<50	N	20	200	20	1,500	100	20
260	<50	N	15	150	10	500	70	N
261	50	<2.0	10	30	15	200	<50	N
262	<50	N	10	70	10	2,000	50	<20
263	<50	N	15	300	10	700	50	N
264	N	N	10	70	N	300	100	N
265	N	N	N	20	N	100	<50	N
266	N	N	20	100	10	>2,000	70	70
267	<50	<2.0	20	100	10	>2,000	100	70
268	N	N	20	70	N	>2,000	200	70
269	50	N	15	100	<10	>2,000	50	50
270	N	N	20	100	<10	>2,000	70	30
271	<50	N	30	500	10	2,000	50	N
272	<50	N	30	300	<10	2,000	70	20
273	N	N	30	700	<10	700	50	20
274	N	N	20	300	<10	2,000	<50	20
275	N	N	<10	70	N	1,000	50	50
276	N	N	20	200	<10	1,000	50	20
277	N	N	20	300	<10	300	<50	20
278	<50	N	30	300	15	>2,000	50	50
279	N	N	10	300	N	700	<50	50
280	N	N	10	150	N	700	<50	50
281	N	N	30	300	20	>2,000	50	30
282	50	N	15	300	N	1,500	<50	100
283	N	N	15	70	<10	1,000	<50	30
284	N	N	20	200	15	1,500	50	20
285	N	N	10	100	N	700	<50	50

PANNED CONCENTRATES--continued

sample	S-SC	S-SR	S-V	S-Y	S-ZR	S-TH	AA-AU-P	AA-ZN-P	AA-AU-T
245	15	N	150	500	>1,000	200	N	15	--
246	N	N	150	150	>1,000	N	N	30	--
247	70	100	70	200	>1,000	N	N	15	--
248	20	N	70	200	>1,000	N	N	20	--
249 S233	N	N	200	2,000	>1,000	500	N	15	--
250 S246	N	N	200	150	>1,000	N	N	15	--
251 S225	70	N	150	700	>1,000	N	1.50	35	--
252 S225	20	N	150	200	>1,000	N	1.00	45	--
253	10	200	150	300	>2,000	N	--	10	N
254	10	<200	200	500	>2,000	N	--	10	N
255	10	<200	150	700	>2,000	N	--	15	.640
256	10	<200	150	300	>2,000	N	--	5	.076
257	<10	<200	100	300	>2,000	N	--	15	.080
258	10	<200	150	500	>2,000	N	--	5	N
259	<10	<200	500	1,000	>2,000	200	--	5	N
260	N	<200	500	200	2,000	N	--	5	N
261	N	<200	200	200	500	N	--	5	N
262	10	<200	300	700	>2,000	500	--	130	N
263	<10	<200	500	700	>2,000	<200	--	5	.670
264	10	<200	150	500	>2,000	N	--	5	.020
265	N	N	70	300	>2,000	N	--	5	.002
266	200	<200	200	5,000	2,000	2,000	--	<5	N
267	100	<200	200	3,000	>2,000	1,000	--	5	N
268	200	<200	150	5,000	>2,000	2,000	--	5	N
269	50	200	200	2,000	>2,000	700	--	<5	N
270	50	<200	300	1,500	>2,000	1,000	--	<5	N
271	50	<200	700	2,000	>2,000	N	N	5	--
272	50	<200	700	3,000	>2,000	N	N	<5	--
273	70	200	700	500	>2,000	N	N	10	--
274	100	200	700	1,000	>2,000	N	N	5	--
275	150	500	500	700	>2,000	N	<.05	10	--
276	70	<200	700	1,500	>2,000	N	<.05	5	--
277	30	<200	1,000	200	>2,000	N	<.05	<5	--
278	50	<200	1,000	1,000	>2,000	500	<.10	10	--
279	70	200	1,000	700	>2,000	N	1.50	5	--
280	100	300	500	500	>2,000	N	.05	15	--
281	20	<200	700	1,500	>2,000	500	<.05	5	--
282	200	700	700	700	>2,000	N	4.00	10	--
283	50	200	700	500	>2,000	N	.30	<5	--
284	20	<200	1,000	1,000	>2,000	N	.15	10	--
285	150	300	500	1,000	>2,000	N	<.05	10	--

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA
300	35.0211	83.1086	3.0	1.00	1.00	.300	500	10	1,000
301	34.9822	83.0850	5.0	1.00	.70	.500	500	10	700
302	34.9736	83.0331	1.5	.20	.05	.150	500	<10	300
303	35.0025	83.0447	3.0	1.00	1.50	.500	700	15	500
304	35.0314	83.0181	2.0	.30	1.00	.150	500	<10	700
305	34.9764	83.1106	5.0	1.00	.70	.300	500	10	1,000
306	34.9808	83.0881	5.0	1.50	1.50	.500	1,000	<10	300
307	34.9650	83.0942	3.0	.70	1.00	.500	500	10	1,000
308	34.9647	83.0950	10.0	2.00	.05	.700	1,500	10	1,000
309	34.9756	83.0953	5.0	1.50	.50	.300	500	10	700
310	34.9822	83.0914	7.0	1.50	1.50	.500	700	10	700
311	34.9822	83.0914	.7	.20	1.00	.030	700	15	200
312	34.9869	83.0889	10.0	2.00	.50	.500	2,000	15	1,000
313	34.9869	83.0889	7.0	1.50	.70	.500	700	10	1,000
314	35.0122	83.0972	5.0	.70	.50	.500	500	15	700
315	35.0033	83.1036	5.0	.70	3.00	.300	1,000	10	100
316	34.9944	83.0542	7.0	1.00	1.50	.300	700	<10	1,500
317	35.0017	83.0531	.3	.20	1.00	.020	100	10	1,000
318	34.9822	83.0581	10.0	10.00	.05	.005	700	10	<20
319	34.9967	83.0686	5.0	1.50	.50	.300	500	10	1,000
320	34.9964	83.0708	.3	.10	1.00	.015	150	10	100
321	34.9847	83.0958	7.0	.70	1.00	.500	300	10	1,000
322	34.9889	83.0992	2.0	.70	1.50	.500	500	<10	500
323	34.9886	83.0958	5.0	.50	1.00	.500	500	10	700
324	34.9842	83.0942	5.0	1.50	1.50	.300	700	<10	700
325	34.9672	83.1036	7.0	2.00	.30	.500	2,000	20	1,000
326	34.9703	83.0975	5.0	1.00	1.00	.500	1,000	<10	700
327	34.9850	83.0653	3.0	.50	<.05	.500	200	50	1,000
328	34.9850	83.0653	7.0	1.50	.70	.500	500	20	1,500
329	35.0133	83.1003	7.0	1.00	.50	.500	1,000	30	1,000
330	35.0061	83.0986	10.0	1.50	1.00	.700	700	10	1,500
331	34.9914	83.0794	5.0	1.00	1.50	.300	1,000	10	1,000
332	34.9933	83.0803	7.0	1.00	.70	.500	500	<10	1,000
333	34.9992	83.0539	5.0	1.00	2.00	.300	1,000	10	1,000
334	34.9931	83.0528	7.0	1.50	1.00	.500	700	15	1,000
335	34.9872	83.0578	10.0	3.00	7.00	.500	1,500	15	200
336	34.9803	83.0658	1.5	.50	1.00	.100	200	10	2,000
337	34.9775	83.0708	7.0	1.00	1.00	.500	1,000	15	1,000
338	35.0069	83.0781	10.0	7.00	10.00	.500	1,500	15	100
339	35.0069	83.0781	2.0	.50	2.00	.300	2,000	10	100
340	35.0311	83.0706	5.0	.70	.70	.500	700	20	1,000
341	35.0311	83.0706	10.0	2.00	1.50	.500	1,000	20	1,000
342	35.0253	83.0919	10.0	2.00	1.50	.500	1,000	20	1,000
343	34.9253	83.0897	5.0	.02	N	.300	70	N	N
344	34.9081	83.1594	2.0	.70	1.50	.200	300	N	100

sample	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-NI	S-PB	S-SC
300	2.0	5	70	10	50	<20	5	50	7
301	1.5	10	50	20	50	20	20	20	10
302	1.5	10	10	<5	100	20	5	100	10
303	3.0	15	100	N	30	<20	30	50	10
304	5.0	N	10	N	100	20	<5	100	7
305	2.0	10	70	N	150	<20	20	70	10
306	3.0	15	100	10	N	20	30	50	15
307	1.0	7	50	20	50	<20	15	30	10
308	1.5	50	150	100	200	20	50	50	30
309	1.0	10	70	10	100	<20	20	30	7
310	1.0	15	100	10	N	20	30	30	15
311	5.0	N	<10	<5	N	20	5	100	N
312	1.0	15	100	30	<20	20	15	70	30
313	1.0	15	100	15	N	20	20	15	15
314	1.5	10	100	20	70	20	30	20	10
315	1.5	10	70	10	50	20	30	15	15
316	2.0	5	100	20	70	20	7	50	10
317	5.0	N	<10	N	<20	N	5	100	N
318	N	100	5,000	5	N	N	2,000	N	5
319	1.5	10	70	<5	100	20	30	70	10
320	5.0	N	<10	5	20	<20	7	70	<5
321	2.0	15	70	N	30	20	20	50	15
322	2.0	7	50	N	70	20	7	50	10
323	2.0	10	50	20	30	20	15	70	10
324	1.5	10	100	20	20	<20	20	70	10
325	1.5	15	150	20	150	<20	30	50	20
326	2.0	5	70	15	50	<20	10	30	10
327	1.5	5	150	5	100	20	<5	30	10
328	1.5	10	150	20	<20	20	20	70	15
329	2.0	10	200	30	100	20	20	50	15
330	1.5	15	150	20	30	20	30	70	15
331	2.0	7	100	20	70	<20	15	50	10
332	1.5	7	70	15	50	<20	10	50	10
333	1.5	10	100	10	30	<20	20	30	10
334	2.0	15	150	10	70	<20	50	50	15
335	2.0	30	700	20	<20	<20	100	20	50
336	2.0	7	30	20	30	N	20	100	<5
337	2.0	20	100	20	<20	20	50	30	20
338	<1.0	100	500	70	70	<20	200	10	50
339	1.5	5	50	5	70	20	5	10	7
340	2.0	15	100	20	100	20	50	30	10
341	2.0	30	200	100	70	20	70	50	20
342	1.5	30	150	N	50	<20	70	50	20
343	1.0	5	50	7	<20	<20	7	10	15
344	2.0	5	N	N	20	N	5	20	5

Sample	S-SR	S-V	S-Y	S-ZR	AA-AU-P	AA-ZN-P	U-INST	AA-AU-1
300	200	70	15	150	N	60	--	--
301	100	100	50	200	N	65	--	--
302	<100	20	20	100	N	80	--	--
303	300	100	20	300	N	70	--	--
304	150	20	30	100	N	55	--	--
305	200	50	50	150	N	70	--	--
306	200	150	70	200	N	100	--	--
307	150	70	50	300	N	45	--	--
308	<100	150	150	150	N	180	--	--
309	<100	70	30	300	N	170	--	--
310	100	100	20	300	N	90	--	--
311	100	10	15	30	N	15	--	--
312	100	100	100	300	N	100	--	--
313	150	100	20	300	N	90	--	--
314	100	100	70	500	N	50	--	--
315	300	70	50	300	N	25	--	--
316	300	100	15	300	N	65	--	--
317	300	<10	<10	N	N	10	--	--
318	N	10	N	N	N	50	--	--
319	200	50	50	500	N	70	--	--
320	150	10	30	N	N	10	--	--
321	200	70	70	500	N	70	--	--
322	200	70	30	300	N	50	--	--
323	150	70	15	300	N	55	--	--
324	200	100	30	200	N	90	--	--
325	100	150	100	300	N	140	--	--
326	150	100	30	200	N	75	--	--
327	100	100	15	500	N	30	--	--
328	150	100	20	500	N	85	--	--
329	150	150	50	300	N	35	--	--
330	300	150	30	300	N	90	--	--
331	150	70	70	150	N	70	--	--
332	150	100	50	500	N	75	--	--
333	200	100	30	500	N	50	--	--
334	150	100	30	200	N	65	--	--
335	100	300	30	70	N	35	--	--
336	500	30	10	70	N	25	--	--
337	100	150	20	300	N	60	--	--
338	1,000	300	20	50	N	10	--	--
339	100	70	20	300	N	10	--	--
340	100	100	30	300	N	55	--	--
341	150	150	30	150	N	80	--	--
342	200	200	70	200	N	65	--	--
343	N	150	<10	200	--	<5	--	N
344	200	50	10	70	--	55	--	N

ROCKS--continued

sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA
345	34.9825	83.1503	10.0	2.00	3.00	1.000	1,500	N	15(
346	34.9811	83.1481	7.0	3.00	3.00	.300	1,000	N	I
347	34.9803	83.1461	1.5	.30	1.00	.150	150	<10	50(
348	35.0167	83.1400	10.0	2.00	.70	.500	1,500	N	50(
349	35.0253	83.0908	7.0	1.50	.70	.300	1,000	N	50(
350	34.9444	85.0942	5.0	.20	2.00	.300	1,000	N	I
351	34.9583	85.0942	10.0	2.00	.30	.300	1,000	N	50(
352	34.9497	85.1117	.5	.05	.20	.007	300	N	30(
353	34.9950	83.1425	3.0	1.00	.07	.300	500	N	30(
354	34.9922	83.1408	1.5	.30	<.05	.150	150	<10	50(
355	34.9894	83.1308	.5	.15	.30	.050	70	<10	1,00(
356	34.9936	83.1269	3.0	1.00	1.50	.300	1,000	N	30(
357	34.9936	83.1269	1.5	.70	1.00	.200	200	N	20(
358	34.9736	83.0306	>20.0	.05	N	>1.000	2,000	N	<2(
359	34.9736	83.0306	>20.0	.07	N	>1.000	2,000	N	15(
360	34.9731	83.0308	>20.0	.02	N	>1.000	2,000	N	<2(
361	34.9753	83.0286	.7	.02	.05	.070	300	15	3(
362	34.9886	83.0542	10.0	5.00	1.00	.200	1,000	<10	I
363	34.9133	83.1128	3.0	.70	.50	.500	300	10	70(
364	34.9417	83.0706	2.0	.50	.50	.200	300	10	20(
365	34.9725	83.0314	1.5	.50	<.05	.150	300	10	30(
366	34.9719	83.0314	15.0	.15	<.05	.700	1,500	<10	10(
367	34.9958	83.0264	3.0	.50	1.00	.200	300	15	70(
368	34.9869	83.0278	3.0	.50	1.00	.150	200	15	50(
369	34.9561	83.0203	2.0	.50	.05	.200	300	15	15(
370	34.9339	83.0739	.7	<.02	.20	.070	100	10	<2(
371	34.9339	83.0739	10.0	.20	.70	.300	500	10	10
372	34.9339	83.0739	7.0	.15	.10	.300	700	<10	15
373	34.9489	83.0475	2.0	.50	1.00	.200	300	20	15

sample	S-BE	S-CO	S-CR	S-CU	S-LA	S-NB	S-NI	S-PB	S-SC
345	1.0	30	70	100	30	N	50	10	20
346	<1.0	30	300	N	N	N	70	10	20
347	1.0	N	N	N	50	N	<5	20	10
348	1.0	20	150	150	100	<20	30	30	20
349	1.5	20	70	N	20	N	30	20	15
350	1.0	10	50	10	30	N	10	15	7
351	1.0	20	150	100	50	N	30	20	20
352	1.0	N	N	<5	N	N	<5	50	N
353	1.0	15	50	30	30	N	30	15	10
354	1.0	N	N	<5	100	<20	<5	<10	20
355	1.0	N	N	N	N	N	<5	50	5
356	1.0	7	30	5	<20	N	10	10	7
357	1.0	7	20	5	20	N	5	15	5
358	N	50	10	7	N	30	10	10	15
359	N	30	10	10	700	50	15	50	15
360	N	30	10	10	N	50	10	10	15
361	N	N	N	N	N	20	<5	150	5
362	N	100	1,500	15	N	N	700	N	10
363	1.0	10	30	N	70	<20	10	70	10
364	5.0	7	15	7	70	N	20	30	5
365	2.0	7	N	15	1,000	<20	5	150	7
366	1.0	15	N	30	70	<20	7	70	10
367	2.0	5	N	N	100	N	<5	50	7
368	1.0	5	<10	N	70	N	<5	30	7
369	1.5	5	10	N	20	N	7	20	5
370	<1.0	N	N	<5	N	N	<5	N	N
371	5.0	10	15	30	50	20	30	20	10
372	3.0	15	10	30	100	<20	50	30	7
373	1.5	7	20	30	20	N	20	30	5

sample	S-SR	S-V	S-Y	S-ZR	AA-AU-P	AA-ZN-P	U-INST	AA-AU-T
345	100	300	50	100	--	10	--	N
346	100	200	15	20	--	<5	--	N
347	300	10	20	50	--	25	--	N
348	100	200	30	150	--	220	--	.018
349	150	150	70	70	--	70	--	N
350	200	100	20	200	--	<5	--	N
351	<100	150	50	200	--	210	--	N
352	<100	<10	N	N	--	N	--	N
353	<100	100	30	100	--	85	--	N
354	<100	20	<10	20	--	15	--	N
355	500	<10	<10	N	--	10	--	N
356	300	70	20	300	--	30	--	N
357	300	50	15	70	--	75	--	N
358	N	300	N	N	N	45	6.7	--
359	N	300	50	N	N	40	2.1	--
360	N	300	10	N	<.05	20	11.2	--
361	N	15	15	15	N	5	7.5	--
362	N	150	50	15	<.05	10	<.1	--
363	150	70	10	200	N	50	.6	--
364	100	30	10	150	N	35	.1	--
365	<100	50	200	15	N	40	1.6	--
366	N	150	70	700	N	55	4.0	--
367	200	50	30	70	N	15	.1	--
368	150	50	30	70	N	40	.1	--
369	<100	50	10	150	N	30	4.5	--
370	N	50	N	<10	N	N	.9	--
371	150	150	20	150	N	25	7.5	--
372	200	100	30	150	N	25	10.7	--
373	200	70	15	50	<.05	30	.8	--

Table 4.--X-ray fluorescence analyses of selected rock samples

[All values are in percent]

Sample No.	310	315	316	321	325	338	374
Sample name	Metagraywacke	Garnet epidote hornblende gneiss	Metagraywacke	Quartz biotite gneiss	Garnet aluminous schist	Amphibolite	Toxaway Gneiss
SiO_2	69.8	75.4	67.3	73.0	56.1	43.5	75.0
Al_2O_3	12.8	10.4	15.7	12.1	19.7	16.1	12.6
Fe_2O_3	5.40	3.93	4.04	4.46	9.35	10.60	1.97
MgO	1.5	1.4	1.4	0.08	2.6	10.0	0.2
CaO	1.73	5.38	2.48	1.57	0.34	13.84	1.34
Na_2O	2.2	1.1	3.3	2.7	0.5	0.8	3.1
K_2O	3.14	0.35	2.94	2.74	6.54	0.51	5.56
TiO_2	0.83	0.78	0.64	0.96	0.93	1.16	0.24
P_2O_5	0.14	0.04	0.11	0.24	0.16	0.45	0.03
MnO	0.09	0.16	0.06	0.24	0.23	0.14	0.04
Oxide Sum	97.63	98.94	97.97	98.09	96.45	97.10	100.08

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