UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Chemical analyses of Precambrian rocks from St. Lawrence County, New York, made by the U.S. Geological Survey, 1963 through 1972

Compiled by

C. Ervin Brown

OPEN-FILE REPORT 80-664

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Chemical analyses of Precambrian rocks from St. Lawrence County, New York made by the U.S. Geological Survey, 1963 through 1972

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INTRODUCTION

Eighty-eight rapid rock analyses and 86 semiquantitative spectrographic analyses were done in the laboratories of the U.S. Geological Survey (USGS) in support of field research projects of Harold M. Bannerman from 1963 to 1967 and C.E. Brown from 1966 to 1972. These analyses have not been published, and in order to make them available to other researchers, this report was compiled from my files and from the field and laboratory notes of Harold Bannerman, deceased.

The analytical data are arranged in three tables. Table 1 gives the identification data and description of the rocks. My sample sites are accurately located in figure 1. Bannerman's sample sites are located as accurately as I could determine from his notes and from the distribution of geological units shown on USGS Miscellaneous Investigation Map I-664 (Bannerman, 1972). Table 1 includes UTM (Universal Transverse Mercator) coordinates for the sample sites so that they can be easily located by using the 2,000-meter grid overprinted on figure 1. The coordinates could also be used in computer filing and manipulation of the analyses.

The sample numbers in tables 1 and 2 and on the map are simple numbers used specifically for this report. They are correlated with laboratory and field numbers and other data in table 1.

Table 2 is arranged in broad lithologic categories so that like samples are listed together. These categories are: mafic dike rocks, gneissic granites and syenites, metagabbro and amphibolites, metasedimentary rocks, and marbles.

Only two samples of marbles are included here, and one of those is completely altered to diopside. Fourteen additional analyses of carbonate rocks from this area were published in USGS Circular 774 (Brown, 1978) and four analyses of talc-tremolite rocks were included U.S. Geological Survey Bulletin 1272-D (Brown, 1969). Spectrographic analyses of the 14 carbonate rocks for which chemical analyses are included in Circular 774 (Brown, 1978) are included in table 3 of this report because the spectrographic analyses are not published in Circular 774.

Most analyses are of rocks from five 7 1/2-min quadrangles in New York: Richville, Pope Mills, Bigelow, Heuvelton, and Natural Dam. Figure 1 shows all the Richville quadrangle and parts of the other four quadrangles. A few mafic dike rocks are from other quadrangles not included in figure 1. These few samples (4, 10, and 11) can be plotted by use of the UTM coordinates in table 1.

Chemical analyses were all done by rapid-rock analytical techniques. Analysts and the method used are listed in table 1 footnotes. For a few samples, B_2O_3, Cl, and F were determined by wet-chemical analytical methods. In addition, 68 minor elements were determined by semiquantitative spectrographic analyses for most of the samples. The laboratory reports on these analyses are given in table 3.

Table 1.--Sample identification data.

No.	Laboratory Sample No.	Field No. [1/]	Lab. No. [2/]	Quad. [3/]	Map Unit [4/]	UTM Coordinate [5/] Northing	Easting	Description
1	W179534	EB-71-63	73WRC104	Rich	--	27000	60640	Fine-grained diabase--4-foot wide dike. Strikes N. 77° E; dips 35° N. Outcrop.
2	W174850	EB-70-60	71WRC42	PM	--	22180	60000	Coarse-grained central part of diabase dike. Dike is 45 feet wide. Outcrop.
3	W173379	EB-69-129	70WRC59	Rich	--	15260	63800	Fine-grained, grayish-black dike 2 to 3 feet wide. Roadcut.
4	W173378	EB-69-118	70WRC59	Gov	--	07900	62780	Fine-grained dark-gray dike. 2 to 3 feet wide. Roadcut.
5	W173380	EB-69-130	70WRC59	Big	--	26860	72580	Dark-gray fine- to medium-grained dike rock. Grayish-red weathered surface. Outcrop.
6	W171808	EB-68-107	69WRC93	Rich	--	25440	65020	Medium-grained dark-gray diabase-textured dike rock from 50 foot wide dike. 10%-15% opaque minerals. Outcrop.
7	W171809	EB-68-108	69WRC93	Rich	--	25560	65180	Dark-greenish-gray, aphanitic chilled border of same dike as No. 6 above. Outcrop.
8	W176977	EB-71-64	72WRC114	PM	--	26450	59650	Fine-grained diabase--Similar to No. 1. Outcrop.
9	W176978	EB-71-104	72WRC114	PM	--	23600	57700	Brownish-red weathering, dusky, bluish-gray diabase. Chilled border of 30-foot-wide dike.
10	W186230	EB-81-2	767RERR0087	AB	--	22570	04000	Dark-gray diabase containing light colored plagioclase. 30-foot wide dike in roadcut along US 81.

See footnotes at end of table 1, p. 12.

Table 2.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1]	Lab No. [2]	Quad. [3]	Map Unit [4]	UTM Coordinate [5] Northing	Easting	Description
11	W186231	EB-2-1	76RERR0087	Red	--	35400	08270	Dark-gray diabase containing fresh glistening, plagioclase laths. Dike about 20-feet wide. Outcrop.
12	W171810	EB-66-26	69WRC93	Rich	--	22700	63920	Tourmaline-bearing granite. Granite sill. Roadcut.
13	W171811	EB-67-2	69WRC93	Rich	--	23750	65820	Biotite granite gneiss near contact with marble. Outcrop.
14	W171813	EB-68-26	69WRC93	Rich	--	20900	61280	Pink biotite granite. Outcrop.
15	W171814	EB-68-61	69WRC93	Rich	--	23380	62400	Tourmaline-rich pink granite from Huckleberry Mt. Outcrop.
16	W173381	EB-69-131	70WRC59	Rich	--	23950	64350	Granite sheet. Tourmaline-rich pink granite in contact with tourmaline-rich gneiss. Outcrop.
17	W173382	EB-69-132	70WRC59	Rich	--	23960	64300	Nos. 16 and 17 were collected from the same rock mass. Quartz-poor, plagioclase-rich rock in contact with calc-silicate bearing granofels. Outcrop.
18	W171815	EB-68-79	69WRC93	Rich	--	23960	63100	Microcline, oligoclase, quartz, biotite granite gneiss. Outcrop.
19	W174853	EB-70-43	71WRC42	Rich	--	24580	60680	Light-gray microcline, plagioclase quartz granite gneiss. Borrow pit
20	W174854	EB-70-78	71WRC42	Heu	--	27780	70140	Porphyroblastic, biotitic granite gneiss. Outcrop.
21	W179537	EB-72-15	73WRC104	Rich	--	21800	60230	Microcline, albite, quartz, biotite granitic gneiss--at places an augen gneiss.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1]	Lab No. [2]	Quad. [3]	Map Unit [4]	UTM Coordinate [5] Northing	Easting	Description
22	W179538	EB-72-5	73WRC104	Rich	--	21740	60400	Tourmaline-rich, pink, gneissic granite. Outcrop.
23	W179546	EB-70-7	73WRC104	Rich	--	20480	60220	Rose-colored, fine-grained, and strongly lineated alaskite.
24	W171812	EB-67-66	69WRC93	Rich	--	24860	65050	Granite dike. Gray, biotite, muscovite, albite, microcline syenite. Outcrop.
25	W176975	EB-71-37	72WRC114	Rich	--	26880	64100	Aplite containing millimeter-sized garnets. Felsic border zone of augen gneiss. Outcrop.
26	W176976	EB-71-50	72WRC114	Heu	--	28220	66100	Granitic augen gneiss--quartz, microcline, oligoclase and biotite. Borrowpit.
27	W166709	3144-65	66WRC91	Rich	obg_1	27120	69980	Granitic gneiss.
28	W166710	1212-61	66WRC91	Rich	obg_2	17050	63650	Microcline gneiss.
29	W166711	2231-65	66WRC91	Rich	obg_1	22450	67200	Microcline gneiss.
30	W166712	1718-61	66WRC91	Rich	obg_1	18600	65300	Oligoclase gneiss.
31	W166713	0115-65	66WRC91	Rich	obg_1	17880	60300	Oligoclase, biotite gneiss.
32	W179535	EB-71-67	73WRC104	PM	--	27040	59950	Coarse-grained, quartz-poor, brown and black mottled gneiss. containing biotite, hornblende, and albitic perthite. Trondjhemite (?). Outcrop.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--continued

No.	Laboratory Sample No.	Field No. [1/]	Lab No. [2/]	Quad. [3/]	Map Unit [4/]	UTM Coordinate [5/] Northing	Easting	Description
33	W179536	EB-71-68	73WRC104	PM	--	26980	59880	Syenite similar to No. 32, but fabric is crushed and more biotitic and has microcline. No. 33 is light grayish buff, spotted with biotite patches.
34	W166714	1121-61	66WRC91	Rich	--	19740	63650	Quartz syenite. Small sill along Rock Island road.
35	W174847	EB-70-10	71WRC42	PM	--	19800	59580	Metagabbro. Coarse-grained hornblende, biotite, plagioclase rock. Hornblende has clinopyroxene cores. Outcrop.
36	W174848	EB-70-18	71WRC42	PM	--	13200	55880	Very coarse hornblende rock with fine matrix of biotite, apatite, and albite. No quartz. Road cut.
37	W174849	EB-70-79	71WRC42	Heu	--	28220	69820	Biotite, hornblende, plagioclase, quartz gneiss. Outcrop.
38	W166705	B0835-63	66WRC91	Big	mg	22420	72470	Metagabbro. Hornblende, plagioclase gneiss.
39	W171805	EB-68-102	69WRC93	Rich	--	26550	65280	Quartz, biotite, scapolite granofels.
40	W171806	EB-68-67	69WRC93	Rich	--	24800	62790	Diopside, scapolite paragneiss. Outcrop.
41	W171807	EB-68-78	69WRC93	Rich	--	24950	62750	Diopside, tourmaline, sphene-bearing quartzite. Outcrop.
42	W171803	EB-66-34	69WRC93	Rich	--	22760	64060	Quartz, biotite, oligoclase, tourmaline, granofels. Outcrop.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1/]	Lab. No. [2/]	Quad. [3/]	Map Unit [4/]	UTM Coordinate [5/] Northing	Easting	Description
43	W171804	EB-67-24	69WRC93	Rich	--	22750	64520	Feldspathic tourmaline-rich quartzite. Outcrop.
44	W167085	B-0428-63	66WRC136	Big	ugs	21980	71500	Quartz, oligoclase biotite schist.
45	W166696	B-1529	66WRC91	Big	ugs	21880	74700	Feldspathic gneiss containing tourmaline.
46	W166697	B-1138	66WRC91	Big	ugs	24650	73460	Feldspathic gneiss containing tourmaline.
47	W166698	B-0735	66WRC91	Big	ugs	23620	72220	Tourmaline-bearing, layered, feldspathic quartzite.
48	W166699	B-0834	66WRC91	Big	ugs	23330	72440	Tourmaline-bearing, layered, feldspathic quartzite.
49	W166700	B-0434	66WRC91	Big	ugs	23600	71120	Greenish quartz mica schist containing minor amounts of tourmaline.
50	W166701	B-0410	66WRC91	Big	ugs	16040	71050	Quartz, mica, tourmaline schist.
51	W166702	B-0411	66WRC91	Big	ugs	16450	71260	Greenish quartz, mica tourmaline schist.
52	161477	3-62-HMB	63WRC122	Rich	ugs	13750	61380	Quartz, biotite, tourmaline granofels.
53	161478	48-62-HMB	63WRC122	Rich	ugs	15580	63860	Quartz, biotite, tourmaline granofels.
54	161479	52-62-HMB	63WRC122	Rich	ugs	15520	63880	Quartz, biotite, plagioclase tourmaline granofels.
55	161480	64-62-HMB	63WRC122	ND	ugs	11700	58900	Microcline, tourmaline quartz gneiss.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1]	Lab. No. [2]	Quad. [3]	Map Unit [4]	UTM Coordinate [5] Northing	Easting	Description
56	161481	104-62-HMB	63WRC122	Big	ugs	20720	70430	Quartz, microcline, tourmaline gneiss (10% tourmaline)
57	161482	105-62-HMB	63WRC122	Big	ugs	20720	70430	Quartz, microcline tourmaline gneiss.
58	161483	106-62-HMB	63WRC122	Big	ugs	21000	70460	Diopside, scapolite, sphene, tourmaline granofels.
59	161484	111-62-HMB	63WRC122	Rich	ugs	21120	69350	Quartz, biotite, plagioclase schist.
60	161485	122-62-HMB	63WRC122	Rich	ugs	18080	68320	Tremolite, quartz, feldspar, tourmaline gneiss.
61	161486	129-62-HMB	63WRC122	Rich	ugs	17280	66380	Microcline, tourmaline, quartz granofels.
62	161487	126-62-HMB	63WRC122	Rich	ugs	14450	61780	Quartz, oligoclase, microcline, tourmaline granofels. Brecciated.
63	161488	126A-62-HMB	63WRC122	Rich	ugs	14450	61780	Albite, quartz, tourmaline vein material in rock of sample 62.
64	161489	128-62-HMB	63WRC122	Rich	ugs	14450	61780	Biotite, quartz, plagioclase gneiss fragment from breccia of sample 62.
65	161490	132-62-HMB	63WRC122	Rich	ugs	15400	66020	Quartz, oligoclase, tourmaline gneiss.
66	161491	133-62-HMB	63WRC122	Rich	ugs	14180	66500	Quartz, oligoclase, tourmaline gneiss.
67	161492	134-62-HMB	63WRC122	Rich	ugs	15180	63220	Quartz, microcline, biotite, tourmaline gneiss.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1/]	Lab. No. [2/]	Quad. [3/]	Map Unit [4/]	UTM Coordinate [5/] Northing	Easting	Description
68	161494	18-57-HMB	63WRC122	Rich	ugs	15050	62800	Quartz, diopside, tourmaline granofels.
69	159860	17-57-HMB	WRC654	Rich	ugs	14800	62600	Quartz, microcline tourmaline granofels (24% tourmaline).
70	W167080	SW-405-65	66WRC136	ND	ugs	12050	59050	Microcline, tourmaline gneiss.
71	159861	44-60-HMB	WRC654	Rich	qmg	19480	68500	Biotite, sillimanite schist containing 6% tourmaline.
72	W166718	B1027-63	66WRC91	Big	qmg	21220	73020	Quartz, mica schist.
73	W167082	B1733-65	66WRC136	Big	qmg	23280	75260	Scapolite granofels.
74	W167084	B0219-63	66WRC136	Big	qmg	19340	70860	Quartz, oligoclase schist.
75	W166719	B0312-65	66WRC91	Big	ufg	16650	70980	Calc-silicate gneiss.
76	W167081	B0424-65	66WRC136	Big	fs	20500	71140	Alaskitic gneiss.
77	W166715	B0630-65	66WRC91	Big	ugs(?)	22260	71730	Quartz mica schist (Interbedded with marble).
78	W166716	B0425-65	66WRC91	Big	fs	20500	71140	Alaskitic gneiss (?).
79	W166717	B0324-65	66WRC91	Big	fs	20300	70980	Alaskitic gneiss (?).
80	W166707	3145-65	66WRC91	Rich	uag	26840	69620	Aplitic paragneiss. Interlayered with hornblendic gneiss.
81	W167079	B-0344-65	66WRC136	Big	uag	26860	71060	Orthoclase, hornblende gneiss. (Orthoclase porphyroblasts).

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

No.	Laboratory Sample No.	Field No. [1/]	Lab. No. [2/]	Quad. [3/]	Map Unit [4/]	UTM Coordinate [5/] Northing	Easting	Description
82	W166704	B0344-65	66WRC91	Big	uag	27000	71300	Calc-silicate zone interlayered with orthoclase, hornblende gneiss.
83	W166703	2736-65	66WRC91	Rich	uag	24450	68500	Orthoclase, hornblende gneiss.
84	W166708	1519-61	66WRC91	Rich	pag	18650	64280	Paramphibolite.
85	W166706	3145-65	66WRC91	Rich	uag	26840	69620	Amphibolitic paragneiss.
86	161493	44-62-HMB	63WRC122	Rich	tq	15900	65300	Layered quartzite having biotite, tourmaline, sphene and scapolite.
87	W166720	B-0115-65	66WRC91	Big	cm	14500	70280	Rusty silicated dolomite. (Diopsidite).
88	W167083	1615-65	66WRC136	Rich	udm	18050	65000	Dolomite.

See footnotes at end of table 1, p. 12.

Table 1.--Sample identification data--Continued

Footnotes

1/ Prefix "EB" are samples collected by C.E. Brown.

All others were collected by H.M. Bannerman.

2/ U.S. Geological Survey analysts - Leonard Shapiro, Project Leader

Lab. Rept. No.	Date of Lab. Rept.	Method (USGS Pub.)	L.Artis	S.Botts	G.Chloe	P.Elmore	J.Glenn	H.Smith	D.Taylor	J.Kelsey	R.Moore
WRC654	6-14-1962	Bull. 1036-C (Shapiro and Brannock, 1956)		X	X	X					
63WRC122	11-12-1963	Bull. 1144-A (Shapiro and Brannock, 1962)	X	X	X	X		X			
66WRC91	5-19-1966	------do.-------	X	X	X	X	X	X	X		
69WRC93	7-18-1969	Prof. Paper 575-B (Shapiro, 1967)	X	X		X	X	X		X	
70WRC59	3-18-1970	Bull. 1144-A (Shapiro and Brannock, 1962)	X			X	X	X		X	
71WRC42	3-12-1971	------do.-------			X	X	X	X		X	
72WRC114	7-12-1972	------do.-------				X	X	X		X	X
73WRC104	11-21-1973	Prof. Paper 575-B (Shapiro, 1967)		X							
76RERR0087	2-11-76	Bull. 1401 (Shapiro, 1975)						X			

Table 1.--Sample identification data--Continued

Footnotes--Continued

3/ USGS 7 1/2-min quadrangle abbreviations.

AB - Alexandria Bay, N.Y.	ND - Natural Dam, N.Y.
Big - Bigelow, N.Y.	PM - Pope Mills, N.Y.
Gov - Gouverneur, N.Y.	Red - Redwood, N.Y.
Heu - Heuvelton, N.Y.	Rich - Richville, N.Y.

4/ Identity of geologic units shown on Misc. Investigations Map I-664 (Bannerman, 1972) for samples collected by H.M. Bannerman

5/ UTM Coordinates Zone 18

Northings are plus 4,900,000 meters

Eastings are plus 400,000 meters

Table 2.--Chemical analyses of rocks.

Rock type: Mafic dike rocks

	Chemical analysis no. (see table 1 for identification data) n.d. - not determined										
	1	2	3	4	5	6	7	8	9	10	11
SiO_2	50.2	43.5	48.0	45.0	45.5	43.5	44.0	48.9	44.5	44.8	54.2
Al_2O_3	16.9	14.5	15.4	14.8	15.7	14.7	15.6	16.9	15.8	16.2	15.7
Fe_2O_3	.90	4.4	2.4	1.5	5.2	3.4	3.6	.83	5.1	5.0	2.4
FeO	6.2	10.3	8.1	9.8	9.0	12.9	10.9	6.7	10.0	9.3	7.2
MgO	6.4	4.2	9.0	8.8	7.3	5.0	5.3	4.9	6.5	5.3	4.7
CaO	5.9	6.5	1.6	3.0	2.9	7.3	5.1	9.4	3.2	6.1	.0
Na_2O	3.7	2.9	1.3	2.1	2.2	3.3	3.7	3.5	2.4	3.1	3.9
K_2O	.89	2.3	3.8	4.1	2.6	2.1	1.9	.77	2.5	1.9	.70
H_2O^+	3.4	4.5	4.7	4.8	3.9	.00	4.7	2.5	4.8	3.4	.45
H_2O^-	.60	.85	.56	.97	.42	.25	.45	.15	.29	.51	.08
TiO_2	1.6	5.0	3.3	3.5	4.2	5.4	4.7	1.5	4.5	4.6	2.1
P_2O_5	.20	.90	.51	.82	.85	1.1	.20	.21	.10	.87	.24
MnO	.01	.14	.03	.17	.06	.08	.02	.08	.05	.25	.11
CO_2	1.7	<.05	.61	.58	.14	.11	.15	3.5	.25	.04	.22
Aqua Regia Sol. as SO_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	.13	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.											
B_2O_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Cl	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
F	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sum	99	100	99	100	100	99	100	100	100	101	100

Table 2.--Chemical analyses of rocks--Continued

Rock type: Gneissic granites and syenites

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	12	13	14	15	16	17	18	19	20	21	22
SiO_2	65.7	70.2	71.7	71.6	67.3	61.7	71.3	65.6	69.4	72.5	72.2
Al_2O_3	16.8	14.6	14.7	14.8	17.8	22.5	15.0	15.6	15.0	14.4	14.7
Fe_2O_3	1.0	1.0	.10	.91	.12	.44	.49	.58	1.3	.46	.73
FeO	1.3	1.5	1.0	.72	.56	1.6	.92	3.2	1.7	.68	.24
MgO	.78	1.1	.50	.30	.24	.24	.30	1.1	.93	.35	.40
CaO	2.3	2.4	1.0	1.3	.44	2.0	1.0	2.2	2.2	1.1	.90
Na_2O	3.8	4.1	3.7	3.5	4.6	8.2	3.7	3.7	3.7	3.6	2.4
K_2O	6.7	4.1	5.6	5.8	8.0	1.9	5.8	5.2	4.0	5.6	6.2
H_2O^+	.50	.35	.90	.05	.68	.79	.96	.82	.67	.17	.56
H_2O^-	.05	.06	.05	.63	.04	.00	.04	.04	.02	.14	.17
TiO_2	.42	.33	.26	.24	.15	.23	.21	.70	.40	.14	.21
P_2O_5	.19	.15	.18	.14	.00	.05	.16	.24	.08	.04	.21
MnO	.05	.02	.08	.02	.02	.11	.07	.00	.00	.00	.00
CO_2	.11	.05	<.05	.05	<.05	<.05	<.05	.36	.12	.03	.03
Aqua Regia Sol. as SO_3	.21	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.											
B_2O_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	.58
Cl	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
F	0.14	.034	.068	.039	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sum	100	100	100	100	100	100	100	99	100	99	99

Table 2.--Chemical analyses of rocks--Continued

Rock type: Gneissic granites and syenites--Continued

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	23	24	25	26	27	28	29	30	31	32	33	34
SiO_2	72.1	63.5	74.3	69.3	80.3	71.5	74.4	74.8	74.8	59.9	60.9	72.5
Al_2O_3	14.6	20.7	14.6	15.7	10.5	14.9	13.7	13.5	14.1	16.6	16.5	14.4
Fe_2O_3	.79	.30	.00	.74	1.3	1.0	.69	.63	.19	1.6	1.3	.66
FeO	.56	1.0	.54	1.6	.24	.66	.26	.34	.68	4.2	4.3	.42
MgO	.34	.30	.04	.60	.15	.54	.15	.12	.53	1.2	1.1	.28
CaO	.69	1.0	1.3	2.6	.35	1.6	.96	.98	.84	2.8	2.3	.87
Na_2O	4.5	7.0	4.7	4.0	1.4	3.7	3.8	3.7	3.3	3.6	4.0	4.0
K_2O	5.0	5.2	3.8	3.9	4.6	4.8	4.8	4.6	5.0	6.4	5.9	5.0
H_2O^+	.50	.75	.58	.72	.28	.41	.30	.22	.39	.81	1.2	.56
H_2O^-	.15	.02	.02	.02	.10	.11	.09	.11	.08	.19	.26	.13
TiO_2	.10	.07	.00	.37	.34	.23	.12	.13	.14	.87	.93	.20
P_2O_5	.02	.02	.00	.16	.06	.05	.00	.00	.00	.25	.27	.05
MnO	.00	.08	.21	.03	.02	.03	.02	.02	.00	.05	.07	.02
CO_2	.04	.06	<.05	.08	<.05	<.05	<.05	<.05	<.05	.22	.02	.08
Aqua Regia Sol. as SO_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.												
B_2O_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d
Cl	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d	n.d.	n.d.	n.d.	n.d
F	n.d.	.020	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sum	99	100	100	100	100	99	99	99	100	99	99	99

Table 2.--Chemical analyses of rocks--Continued

Rock type: Metagabbro and amphibolite

	Chemical analysis no. (see table 1 for identification data)			
	35	36	37	38
SiO_2	45.3	39.7	54.3	48.6
Al_2O_3	16.4	12.8	19.1	14.5
Fe_2O_3	3.9	4.7	1.7	4.1
FeO	9.0	9.0	5.9	9.1
MgO	5.4	7.0	3.6	5.6
CaO	7.9	13.2	6.4	9.2
Na_2O	2.6	2.0	4.2	3.5
K_2O	3.0	3.8	2.0	.92
H_2O^+	1.6	1.0	.77	.66
H_2O^-	.11	.12	.07	.14
TiO_2	3.0	1.7	1.1	2.4
P_2O_5	.88	2.7	.20	.23
MnO	.08	.25	.00	.15
CO_2	.20	1.4	.05	.08
Sum	99	99	99	99

Table 2.--Chemical analyses of rocks--Continued

Rock type: Metasedimentary schists, gneisses, quartzites, and paramphibolites

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	39	40	41	42	43	44	45	46	47	48	49	50
SiO_2	60.0	57.4	88.3	80.0	77.2	67.4	57.8	60.6	65.4	62.6	72.2	58.0
Al_2O_3	18.1	10.9	3.0	6.9	11.7	13.3	17.3	14.0	13.6	17.8	9.7	18.2
Fe_2O_3	.73	1.4	.64	1.5	.65	1.1	2.5	3.2	3.9	2.1	3.3	1.9
FeO	4.7	2.7	.60	3.3	.32	3.3	2.5	1.8	1.2	2.8	2.3	2.2
MgO	2.5	7.6	.90	2.7	1.3	3.9	4.2	6.2	3.4	2.6	4.1	4.1
CaO	.60	11.9	1.9	.50	1.5	.54	.52	3.8	.51	.45	.70	.51
Na_2O	5.0	3.3	1.1	.20	4.4	1.1	.70	3.0	.81	.50	.09	.79
K_2O	6.4	2.6	.11	2.6	1.0	6.3	10.4	.72	7.0	5.5	3.2	8.4
H_2O^+	.49	.38	.57	.34	.54	2.1	2.0	1.0	1.2	2.0	2.3	1.9
H_2O^-	.06	.17	.07	.11	.06	.14	.22	.30	.19	.23	.33	.27
TiO_2	1.2	1.2	1.0	.71	.93	.59	1.0	1.2	.70	1.2	.81	1.2
P_2O_5	.16	.31	.10	.13	.17	.10	.12	.11	.11	.11	.11	.13
MnO	.07	.10	.05	.05	.05	.00	.03	.08	.03	.04	.08	.06
CO_2	<.05	<.05	.78	<.05	.06	<.05	<.05	.24	<.05	<.05	<.05	<.05
Aqua Regia Sol. as SO_3	n.d.	n.d.	.24	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d	n.d.	n.d.
Wet anal.												
B_2O_3	n.d.	n.d.	0.32	0.38	0.38	n.d.	0.53	2.41	0.96	1.06	0.08	1.02
Cl	0.08	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
F	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sum	100	100	100	99	100	100	100	99	99	99	99	99

Table 2.--Chemical analyses of rocks--Continued

Rock type: Metasedimentary schists, gneisses, quartzites, and paramphibolites--Continued

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	51	52	53	54	55	56	57	58	59	60	61	62
SiO_2	60.7	59.7	63.4	60.9	55.2	77.6	82.4	58.1	61.8	60.6	60.4	60.8
Al_2O_3	17.2	16.5	15.6	17.2	18.2	11.7	7.9	10.7	16.1	15.8	17.3	20.5
Fe_2O_3	1.5	3.9	3.2	3.1	3.4	1.1	.60	1.3	.86	1.5	4.5	2.1
FeO	2.4	1.0	1.2	.61	.73	.40	.56	3.6	6.4	1.0	.28	.15
MgO	3.7	3.9	3.6	2.2	4.6	1.6	1.4	6.7	3.4	6.4	2.2	2.2
CaO	.36	.49	.78	1.6	1.2	.58	2.0	12.3	1.9	3.5	.63	.54
Na_2O	.51	.68	.63	.57	.68	4.7	1.8	2.3	2.1	7.3	.82	6.6
K_2O	9.8	9.9	8.0	9.1	9.6	.72	.79	2.4	4.2	.55	9.8	2.3
H_2O^+	1.8	1.7	1.6	1.0	1.7	.79	.67	.89	1.6	.67	.78	.69
H_2O^-	.21	.18	.08	.04	.33	.05	.04	.14	.08	.13	.12	.08
TiO_2	1.0	1.3	1.2	1.2	1.8	.34	.38	.78	1.2	1.0	1.2	1.8
P_2O_5	.11	.12	.14	.12	.16	.04	.01	.10	.15	.19	.07	.06
MnO	.06	.05	.04	.06	.05	.04	.04	.12	.09	.04	.06	.04
CO_2	<.05	<.05	<.05	1.5	.20	<.05	.84	.18	<.05	<.05	<.05	<.05
Aqua Regia Sol. as SO_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.												
B_2O_3	0.61	1.25	1.38	1.73	2.00	0.64	0.28	n.d.	n.d.	0.62	2.32	n.d.
Cl	n.d.	n.d.	n.d.	0.03	n.d.	n.d.	n.d.	0.49	n.d.	n.d.	n.d.	n.d.
F	n.d.	n.d.	n.d.	0.83	n.d.	n.d.	n.d.	0.042	n.d.	n.d.	n.d.	n.d.
Sum	100	101	100	102	100	100	100	100	100	99	100	100

Table 2.--Chemical analyses of rocks--Continued

Rock type: Metasedimentary schists, gneisses, quartzites, and paramphibolites--Continued

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	63	64	65	66	67	68	69	70	71	72	73	74
SiO_2	81.2	60.0	73.4	62.5	61.5	47.2	61.0	60.8	57.1	61.3	56.4	63.7
Al_2O_3	8.7	15.4	14.1	17.9	14.4	10.0	17.0	18.1	17.0	12.1	16.4	14.4
Fe_2O_3	1.6	4.7	1.1	1.4	2.6	4.6	3.7	3.4	1.0	1.9	.27	3.0
FeO	.15	2.2	.42	2.0	3.1	.51	.49	.38	7.6	2.1	.66	2.5
MgO	.90	3.7	1.6	2.9	5.1	4.6	2.5	2.3	4.5	7.7	6.0	3.0
CaO	.24	.19	.40	.20	.33	14.0	.58	1.3	1.7	5.9	7.4	1.4
Na_2O	2.0	.60	5.3	5.8	.44	.50	.70	.76	3.3	6.1	6.4	1.4
K_2O	2.3	10.0	.57	3.8	8.2	.28	9.3	8.3	4.2	.42	1.8	7.6
H_2O^+	.44	1.8	.63	1.2	2.4	1.4	.91	.83	1.2	.57	1.6	1.0
H_2O^-	.04	.12	.03	.04	.41	.08	.07	.17	.09	.22	.30	.17
TiO_2	.92	1.2	1.2	1.5	1.1	1.1	1.2	1.2	1.2	.99	.68	.76
P_2O_5	.10	.14	.14	.04	.16	.16	.10	.09	.15	.14	.00	.14
Mno	.04	.14	.03	.04	.16	.24	.06	.06	.08	.06	.12	.11
CO_2	<.05	<.05	<.05	<.05	<.05	9.7	<.05	.15	<.05	<.05	.50	.11
Aqua Regia Sol. as SO_3	n.d.	n.d.	n.d..	n.d.	n.d.	5.1.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.												
B_2O_3	0.89	0.21	0.97	0.88	0.19	3.47	2.31	2.58	0.39	n.d.	0.02	n.d.
Cl	n.d.	n.d.	n.d.	n.d.	0.05	n.d.	n.d.	n.d.	n.d.	n.d.	1.58	n.d.
F	n.d.	n.d	n.d.	n.d.	0.14	n.d.	n.d.	n.d.	n.d.	n.d.	0.05	n.d.
Sum	100	100	100	100	100	103	100	100	100	100	100	99

Table 2.--Chemical analyses of rocks--Continued

Rock type: Metasedimentary schists, gneisses, quartzites, and paramphibolites--Continued

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	75	76	77	78	79	80	81	82	83	84	85	86
SiO_2	55.3	82.0	65.2	82.7	81.3	73.8	53.0	59.6	55.6	57.6	61.4	62.2
Al_2O_3	13.9	8.4	15.1	8.0	7.9	14.9	12.1	14.0	17.5	14.3	13.0	14.2
Fe_2O_e	1.7	.12	.66	.14	1.2	.33	1.8	3.8	2.4	2.5	2.5	2.2
FeO	4.9	.38	1.4	.34	.42	.30	6.0	3.3	3.8	4.9	2.8	2.0
MgO	4.4	.30	3.8	.62	.43	.33	6.5	3.4	3.0	5.8	5.5	5.2
CaO	10.4	2.3	2.2	1.8	1.0	1.4	7.0	2.6	4.9	6.5	5.7	.72
Na_2O	.25	3.5	7.3	3.5	1.3	6.3	.37	1.3	4.1	2.6	5.1	.57
K_2O	3.6	.47	.67	.48	3.7	1.2	2.4	7.1	4.7	2.7	1.3	8.3
H_2O^+	1.9	.43	1.4	.49	.47	.35	4.5	1.6	.58	.70	.79	2.4
H_2O^-	.34	.08	.27	.10	.13	.11	.54	.23	.16	.22	.21	.18
TiO_2	.97	1.8	.85	.17	.74	.18	.76	.68	1.0	.92	.94	1.0
P_2O_5	.17	.10	.09	.05	.12	.02	.17	.17	.74	.19	.17	.11
MnO	.05	.03	.02	.03	.04	.02	.09	.07	.11	.13	.04	.06
Co_2	.74	1.4	.68	.80	.30	<.05	4.6	.78	.06	<.05	<.05	.72
Aqua Regia Sol. as SO_3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Wet anal.												
B_2O_3	n.d.	0.00	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Cl	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
F	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sum	99	101	100	99	99	99	100	99	99	99	99	100

Table 2.--Chemical analyses of rocks--Continued

Rock type: Diopsidite and dolomitic marble

Chemical analysis no. (see table 1 for identification data)
n.d. - not determined

	87	88
SiO_2	54.8	1.3
Al_2O_3	2.2	.27
Fe_2O_3	3.3	.00
FeO	1.4	.23
MgO	21.8	18.6
CaO	11.5	32.5
Na_2O	.54	.00
K_2O	.12	.06
H_2O^+	2.7	.16
H_2O^-	.71	.07
TiO_2	.19	.00
P_2O_5	.02	.00
MnO	.04	.04
CO_2	<.05	46.5
Aqua Regia Sol. as SO_3	n.d.	n.d.
Volatiles other than CO_2 and H_2O	n.d.	n.d.
Wet anal.		
B_2O_3	n.d.	n.d.
Cl	n.d.	n.d.
F	n.d.	n.d.
Sum	99	100

Table 3.--Semiquantitative spectrographic analyses

Index to table 3

*These nos. refer to analyses in USGS Circular 774 (Brown, 1978).

9-011
(Rev. May 1958)

Table 3.--Semiquantitative spectrographic analyses.

REPORT NO. 63-WS-141 FOR Harold M. Bannerman DATE September 17, 1963

JOB NO. 6263 PROJECT OR ORGANIZATION Exp. Geochem. and Min. 7106, Exp. Geol.

LOT NO. 5030 REFER TO OTHER REPORTS

Spec. Lab. No. 3760
Plate No. III 3222

Semiquantitative Spectrographic Analysis of
18 Samples from New York

Lab. No.	Sample No. Tables 1&2	Field No.	Description and Location
161477	52	3/62/HMB	Fine grained feldspar-biotite stained by oxides of iron, from Richville Quadrangle.
161478	53	48/62/HMB	Iron oxide stained feldspar-biotite gneiss from Richville Quadrangle.
161479	54	52/62/HMB	Quartz - microcline gneiss from Richville Quadrangle.
161480	55	64/62/HMB	Microcline gneiss from Natural Dam Quadrangle.
161481	56	104/62/HMB	Quartz - oligoclase gneiss from Bigelow Quadrangle.
161482	57	105/62/HMB	Quartz-feldspar gneiss from Bigelow Quadrangle.
161483	58	106/62/HMB	Fine grained granulite from Bigelow Quadrangle.
161484	59	111/62/HMB	Biotite schist from Richville Quadrangle.
161485	60	122/62/HMB	Tremolite quartz feldspar gneiss from Richville Quadrangle.
161486	61	125/62/HMB	Microcline gneiss from Richville Quadrangle.
161487	62	126/62/HMB	Quartz, feldspar breccia from Richville Quadrangle.
161488	63	126A/62/HMB	Vein material in 126-62 from Richville Quadrangle.
161489	64	128/62/HMB	Fine grained fragment of biotite gneiss from Richville Quadrangle.
161490	65	132/62/HMB	Quartz-plagioclase gneiss from Richville Quadrangle.

9-011
(Rev. May 1958)

Table 3.--Semiquantitative spectrographic analyses--Continued

REPORT NO. 63-WS-141 Page 2 FOR Harold M. Bannerman DATE September 17, 1963

JOB NO. 6263 PROJECT OR ORGANIZATION Exp. Geochem. and Min. 7106, Exp. Geol.

LOT NO. 5030 REFER TO OTHER REPORTS

Spec. Lab. No. 3760
Plate No. III 3222

Lab. No.	Sample No. Tables 1&2	Field No.	Description and Location
161491	66	133/62/HMB	Quartz-plagioclase gneiss from Richville Quadrangle.
161492	67	134/62/HMB	Quartz-microcline biotite schist., from Richville Quadrangle.
161493	86	44/62/HMB	Banded quartzite from Richville Quadrangle.
161494	68	18/57/HMB	Granulite from Richville Quadrangle.

The ten "major" elements were not determined, see "Rapids" reports for these.

cc: W. C. Schlecht, R. E. Stevens, D. Davidson

(Rev. 6-1961)

Table 3.--SEMIQUANTITATIVE SPECTROGRAPH. ANALYSIS -- Continued

Report No.	For	Date
63-WS-141 P. 3	Harold M. Bannerman	September 16, 19*

Lot No.	Spec. Lab. No.	Plate No.	Refer.
5030	2760	III 3222	

* Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected (*see table of detectabilities*)
– = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No.							
Tables 1&2	52	53	54		52	53	54
Field No.	3/62/HMB	48/62/HMB	52/62/HMB		3/62/HMB	48/62/HMB	52/62/HMB
Lab. No.	161477	161478	161479		161477	161478	161479
Si	–	–	–	Re	O	O	O
Al	–	–	–	Sb	O	O	O
Fe	–	–	–	Sc	.003	.002	.002
Mg	–	–	–	Sn	O	O	O
Ca	–	–	–	Sr	.03	.015	.02
Na	–	–	–	Ta	O	O	O
K	–	–	–	Te	O	O	O
Ti	–	–	–	Th	O	O	O
P	–	–	–	Tl	O	O	O
Mn	–	–	–	U	O	O	O
Ag	O	O	O	V	.015	.015	.015
As	O	O	O	W	O	O	O
Au	O	O	O	Y	.001	.003	.0015
B	2.	2.	2.	Yb	.0001	.0003	.00015
Ba	.15	.07	.1	Zn	O	O	O
				Zr	.02	.02	.02
Be	.00015	O	O	Looked for only when La or Ce found:			
Bi	O	O	O	Pr	O	O	O
Cd	O	O	O	Nd	O	O	O
Ce	O	O	O	Sm	O	O	O
Co	.003	.002	.0015	Eu	O	O	O
				Looked for only when Y is found above .005%:			
Cr	.015	.015	.015	Gd	O	O	O
Cu	.0005	.0005	.001	Tb	O	O	O
Ga	.002	.002	.002	Dy	O	O	O
Ge	O	O	O	Ho	O	O	O
Hf	O	O	O	Er	O	O	O
				Tm	O	O	O
Hg	O	O	O	Lu	O	O	O
In	O	O	O	Looked for only when Pd or Pt found:			
La	O	.005	O	Ir	–	–	–
Li	O	O	O	Os	–	–	–
Mo	O	O	O	Rh	–	–	–
				Ru	–	–	–
Nb	.001	.001	.001	Looked for only when requested:			
Ni	.001	.001	.005	Cs	–	–	–
Pb	.001	.001	.002	Rb	–	–	–
Pd	O	O	O	F	–	–	–
Pt	O	O	O				

Form 9-1.4.A
(REV. 6-1961)
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Table 8.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
63-WS-141 P. 4	Harold M. Bannerman	September 17, 19

Lot No.	Spec. Lab. No.	Plate No.	Refer.
5030	3760	III 3222	

* Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected (*see table of detectabilities*)
- = not looked for
< with number, less than number shown--here usual detectabilities do not apply

Sample No. Tables 1&2	55	56	57
Field No.	64/62/HMB	104/62/HMB	105/62/HMB
Lab. No.	161480	161481	161482
Si	-	-	-
Al	-	-	-
Fe	-	-	-
Mg	-	-	-
Ca	-	-	-
Na	-	-	-
K	-	-	-
Ti	-	-	-
P	-	-	-
Mn	-	-	-
Ag	<.00007	0	0
As	0	0	0
Au	0	0	0
B	2.	.7	.3
Ba	.1	.005	.02
Be	0	0	0
Bi	0	0	0
Cd	0	0	0
Ce	0	0	0
Co	.003	.0005	0
Cr	.03	.007	.003
Cu	.0002	.002	.0015
Ga	.003	.0015	.001
Ge	0	0	0
Hf	0	0	0
Hg	0	0	0
In	0	0	0
La	.005	0	0
Li	0	0	0
Mo	0	0	0
Nb	.0007	.0003	.0007
Ni	.007	0	0
Pb	.0007	.0015	.0007
Pd	0	0	0
Pt	0	0	0

Sample No.	55	56	57
Field No.	64/62/HMB	104/62/HMB	105/62/HMB
Lab. No.	161480	161481	161482
Re	0	0	0
Sb	0	0	0
Sc	.003	.0005	.0005
Sn	0	0	0
Sr	.05	.02	.007
Ta	0	0	0
Te	0	0	0
Th	0	0	0
Tl	0	0	0
U	0	0	0
V	.02	.007	.002
W	0	0	0
Y	.0015	.0007	.0015
Yb	.00015	.0001	.00015
Zn	0	0	0
Zr	.03	.02	.02
Looked for only when La or Ce found:			
Pr	0	0	0
Nd	0	0	0
Sm	0	0	0
Eu	0	0	0
Looked for only when Y is found above .005%:			
Gd	0	0	0
Tb	0	0	0
Dy	0	0	0
Ho	0	0	0
Er	0	0	0
Tm	0	0	0
Lu	0	0	0
Looked for only when Pd or Pt found:			
Ir	-	-	-
Os	-	-	-
Rh	-	-	-
Ru	-	-	-
Looked for only when requested:			
Cs	-	-	-
Rb	-	-	-
F	-	-	-

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Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For		Date
63-WS-141 P. 5	Harold M. Bannerman		September 17, 19
Lot No.	**Spec. Lab. No.**	**Plate No.**	**Refer.**
5030	3760	III 3222	

* Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M = major constituent--greater than 10%
0 = looked for but not detected (*see table of detectabilities*)
– = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No. Tables 1&2	58	59	60
Field No.	106/62/HMB	111/62/HMB	122/62/HMB
Lab. No.	161483	161484	161485
Si	-	-	-
Al	-	-	-
Fe	-	-	-
Mg	-	-	-
Ca	-	-	-
Na	-	-	-
K	-	-	-
Ti	-	-	-
P	-	-	-
Mn	-	-	-
Ag	<.00007	<.00007	0
As	0	0	0
Au	0	0	0
B	.005	.05	1.
Ba	.05	.05	.007
Be	.0001	.0003	.0002
Bi	0	0	0
Cd	0	0	0
Ce	.015	.01	0
Co	.0015	.002	0
Cr	.01	.015	.015
Cu	.003	.002	.002
Ga	.0015	.002	.002
Ge	0	0	0
Hf	0	0	0
Hg	0	0	0
In	0	0	0
La	.007	.007	0
Li	0	0	0
Mo	0	.0007	0
Nb	.0007	.001	.0007
Ni	.007	.01	.007
Pb	.001	.007	.005
Pd	0	0	0
Pt	0	0	0

	58	59	60
Field No.	106/62/HMB	111/62/HMB	122/62/
Lab. No.	161483	161484	161485
Re	0	0	0
Sb	0	0	0
Sc	.001	.002	.003
Sn	0	.0007	.001
Sr	.15	.02	.015
Ta	0	0	0
Te	0	0	0
Th	0	0	0
Tl	0	0	0
U	0	0	0
V	.007	.015	.015
W	0	0	0
Y	.007	.005	.003
Yb	.0005	.0005	.0003
Zn	0	0	0
Zr	.03	.03	.02
Looked for only when La or Ce found:			
Pr	0	0	0
Nd	0	0	0
Sm	0	0	0
Eu	0	0	0
Looked for only when Y is found above .005%:			
Gd	0	0	0
Tb	0	0	0
Dy	0	0	0
Ho	0	0	0
Er	0	0	0
Tm	0	0	0
Lu	0	0	0
Looked for only when Pd or Pt found:			
Ir	-	-	-
Os	-	-	-
Rh	-	-	-
Ru	-	-	-
Looked for only when requested:			
Cs	-	-	-
Rb	-	-	-
F	-	-	-

(Rev 8-561)

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Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
63-WS-141 P. 6	Harold M. Bannerman	September 17, 1963

Lot No.	Spec. Lab. No.	Plate No.	Refer.
5030	3760	III 3222	

*Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected (*see table of detectabilities*)
– = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No.						
Tables 1&2	61	62	63	61	62	63
Field No.	125/62/HMB	126/62/HMB	126A/62/HMB	125/62/HMB	126/62/HMB	126A/62/HMB
Lab. No.	161486	161487	161488	161486	161487	161488
Si	–	–	–	Re	0	0	0
Al	–	–	–	Sb	0	0	0
Fe	–	–	–	Sc	.003	.003	.001
Mg	–	–	–	Sn	0	0	0
Ca	–	–	–	Sr	.05	.02	.01
Na	–	–	–	Ta	0	0	0
K	–	–	–	Te	0	0	0
Ti	–	–	–	Th	0	0	0
P	–	–	–	Tl	0	0	0
Mn	–	–	–	U	0	0	0
Ag	0	<.00007	<.00007	V	.015	.03	.01
As	0	0	0	W	0	0	0
Au	0	0	0	Y	.002	.002	.002
B	3.	2.	1.	Yb	.0002	.0002	.0003
Ba	.15	.05	.07	Zn	0	0	0
				Zr	.02	.03	.1
Be	0	.0002	0	Looked for only when La or Ce found:			
Bi	0	0	0	Pr	0	0	0
Cd	0	0	0	Nd	0	0	0
Ce	.015	0	0	Sm	0	0	0
Co	.0015	0	0	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	.02	.03	.007	Gd	0	0	0
Cu	<.00007	.0005	.0003	Tb	0	0	0
Ga	.002	.003	.001	Dy	0	0	0
Ge	0	0	0	Ho	0	0	0
Hf	0	0	0	Er	0	0	0
				Tm	0	0	0
Hg	0	0	0	Lu	0	0	0
In	0	0	0	Looked for only when Pd or Pt found:			
La	.007	0	0	Ir	–	–	–
Li	0	0	0	Os	–	–	–
Mo	0	0	0	Rh	–	–	–
				Ru	–	–	–
Nb	.0007	.001	.0005	Looked for only when requested:			
Ni	.005	.005	.003	Cs	–	–	–
Pb	.0007	.0007	.0007	Rb	–	–	–
Pd	0	0	0	F	–	–	–
Pt	0	0	0				

Report No.	For	Date
63-WS-141 P. 7	Harold M. Bannerman	September 17, 1963

Lot No.	Spec. Lab. No.	Plate No.	Refer.
5030	3760	III 3222	

*Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M : major constituent--greater than 10%
O = looked for but not detected *(see table of detectabilities)*
– = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No.

Tables 1&2

	64	65	66	64	65	66
Field No.	128/62/HMB	132/62/HMB	133/62/HMB	128/62/HMB	132/62/HMB	133/62/HMB
Lab. No.	161489	161490	161491	161489	161490	161491
Si	–	–	–	Re	0	0	0
Al	–	–	–	Sb	0	0	0
Fe	–	–	–	Sc	.0015	.002	.002
Mg	–	–	–	Sn	0	0	0
Ca	–	–	–	Sr	.02	.005	.002
Na	–	–	–	Ta	0	0	0
K	–	–	–	Te	0	0	0
Ti	–	–	–	Th	0	0	0
P	–	–	–	Tl	0	0	0
Mn	–	–	–	U	0	0	0
Ag	<.00007	0	0	V	.01	.015	.015
As	0	0	0	W	0	0	0
Au	0	0	0	Y	.005	.003	.007
B	.03	1.	1.5	Yb	.0005	.0003	.0005
Ba	.3	.005	.007	Zn	0	0	0
				Zr	.03	.02	.02
Be	0	0	.0002	Looked for only when La or Ce found:			
Bi	0	0	0	Pr	0	0	0
Cd	0	0	0	Nd	0	0	0
Ce	.015	0	0	Sm	0	0	0
Co	.002	.001	.0007	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	.015	.01	.015	Gd	0	0	0
Cu	.001	.0005	.0005	Tb	0	0	0
Ga	.0015	.0015	.002	Dy	0	0	0
Ge	0	0	0	Ho	0	0	0
Hf	0	0	0	Er	0	0	0
				Tm	0	0	0
Hg	0	0	0	Lu	0	0	0
In	0	0	0	Looked for only when Pd or Pt found:			
La	.007	0	.005	Ir	–	–	–
Li	0	0	0	Os	–	–	–
Mo	.0003	0	0	Rh	–	–	–
				Ru	–	–	–
Nb	.001	.001	.002	Looked for only when requested:			
Ni	.007	.003	.007	Cs	–	–	–
Pb	.0015	.0007	.0007	Rb	–	–	–
Pd	0	0	0	F	–	–	–
Pt	0	0	0				

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
63-WS-141 P. 8	Harold M. Bannerman	September 17, 196

Lot No.	Spec. Lab. No.	Plate No.	Refer.
5030	3760	III 3222	

*Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of group data on a geometric scale. The assigned group for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating these limitations.

Symbols used are: M = major constituent--greater than 10%
0 = looked for but not detected (*see table of detectabilities*)
- = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No. Tables 1&2	67	86	68
Field No.	134/62/HMB	44/62/HMB	18/57/HMB
Lab. No.	161492	161493	161494
Si	-	-	-
Al	-	-	-
Fe	-	-	-
Mg	-	-	-
Ca	-	-	-
Na	-	-	-
K	-	-	-
Ti	-	-	-
P	-	-	-
Mn	-	-	-
Ag	<.00007	0	<.00007
As	0	0	0
Au	0	0	0
B	.07	.5	3.
Ba	.15	.15	.01
Be	0	0	0
Bi	0	0	0
Cd	0	0	0
Ce	0	0	0
Co	.003	.002	.003
Cr	.01	.01	.01
Cu	.0005	.0005	.0005
Ga	.0015	.002	.002
Ge	0	0	0
Hf	0	0	0
Hg	0	0	0
In	0	0	0
La	0	0	0
Li	0	0	0
Mo	0	0	.0003
Nb	.0007	.0005	0
Ni	.007	.007	.007
Pb	.0015	.001	.0007
Pd	0	0	0
Pt	0	0	0

Sample No. Tables 1&2	67	86	68
Field No.	134/62/HMB	44/62/HMB	18/57/HMB
Lab. No.	161492	161493	161494
Re	0	0	0
Sb	0	0	0
Sc	.0015	.0015	.002
Sn	0	0	0
Sr	.007	.07	.03
Ta	0	0	0
Te	0	0	0
Th	0	0	0
Tl	0	0	0
U	0	0	0
V	.015	.01	.01
W	0	0	0
Y	.001	.001	.003
Yb	.00015	.00015	.0003
Zn	0	0	0
Zr	.02	.02	.015
Looked for only when La or Ce found:			
Pr	0	0	0
Nd	0	0	0
Sm	0	0	0
Eu	0	0	0
Looked for only when Y is found above .005%:			
Gd	0	0	0
Tb	0	0	0
Dy	0	0	0
Ho	0	0	0
Er	0	0	0
Tm	0	0	0
Lu	0	0	0
Looked for only when Pd or Pt found:			
Ir	-	-	-
Os	-	-	-
Rh	-	-	-
Ru	-	-	-
Looked for only when requested:			
Cs	-	-	-
Rb	-	-	-
F	-	-	-

* Designed specifically for direct quotation in reports.

By Spectrographic Services and Research (IWP)
Analyst : Ivan Barlow 9/4/63
Project Leader : Armin W. Helz
Approved [signature]

Table 3.--Semiquantitative spectrographic analyses--Continued

REPORT NO. 66-WS-70 FOR H. M. Bannerman DATE April 28, 1966

JOB NO. 7746 PROJECT OR ORGANIZATION Exp. Geol. - EGM -Richville Quad New York - 7106

LOT NO. 30-089 REFER TO OTHER REPORTS

Spec. Lab. No. 4323
Plate No. III-3631

Semiquantitative Spectrographic Analysis of Twenty-five (25) Grenville Formation Samples, from St. Lawrence County, New York.

Lab. No.	Sample No. Tables 1 & 2	Field No.	Description
W166696	45	3-B 1529	fine grained feldspar gneiss with tourmaline
W166697	46	1-B 1138	do
W166698	47	1-B 0735	banded feldspathic quartzite w/tourmaline
W166699	48	5-B 0834	fine grained feldspar gneiss w/tourmaline
W166700	49	1-B 0434	greenish qtz mica schist with minor tourmaline
W166701	50	4-B 0410	banded qtz-mica schist plus tourmaline
W166702	51	3-B 0411	greenish facies qtz mica schist plus tourmaline
W166703	83	4-2736-65	Orthoclase-hornblende gneiss
W166704	82	1-B 0344-65	same, with lime silicates
W166705	38	1-B 0830-63	gabbro-amphibolite
W166706	85	2-3145-65	amphibolitic facies banded gneiss
W166707	80	1-3145-65	aplitic facies banded gneiss

9-011
(Rev. July 1962)

Table 3.--Semiquantitative spectrographic analyses--Continued

REPORT NO. 66-WS-70 FOR H. M. Bannerman DATE April 28, 1966

JOB NO. 7746 PROJECT OR ORGANIZATION Exp. Geol. - EGM - Richville Quad, New York - 7106

LOT NO. 30-089 (Page 2) REFER TO OTHER REPORTS

Spec. Lab. No. 4323
Plate No. III-3631

Lab. No.	Sample No. Tables 1 & 2	Field No.	Description
W166708	84	4-1519-61	amphibolite
W166709	27	3-3144-65	fine grained granitic gneiss
W166710	28	1-1212-61	microcline gneiss
W166711	29	6-2231-65	do
W166712	30	3-1718-61	oligoclase gneiss
W166713	31	2-0115-65	do
W166714	34	1-1121-61	qtz syenite dike
W166715	77	1-B 0630-65	qtz mica schist interbedded w/marble
W166716	78	2-B 04024-65	coarser grained alaskite gneiss
W166717	79	5-B 0324-65	fine grained facies, alaskite
W166718	72	1-B 1027-63	greyish facies qtz mica schist
W166719	75	1-B 0312-65	lime-silicate-rich gneiss in marble
W166720	87	1-B 0105-65	rusty marble

cc: L. Shapiro, J. Fahey, I. May, W. G. Schlecht, H. Bastron and J. Calkins

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
66-WS-70	H. M. Bannerman	April 28, 1966

Lot No.	Spec. Lab. No.	Plate No.	Refer.
30-089	4323	III-3631	

Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of interval data on a geometric scale. The assigned interval for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating the above limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected *(see table of detectabilities)*
- = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No. Tables 1 & 2	45	46	47	45	46	47
Field No.	3-B 1529	1-B 1138	1-B 0735	3-B 1529	1-B 1138	1-B 0735
Lab. No.	W166696	W166697	W166698	W166696	W166697	W166698
Si	-	-	-	Re	0	0	0
Al	-	-	-	Sb	0	0	0
Fe	-	-	-	Sc	.002	.001	.0015
Mg	-	-	-	Sn	0	0	0
Ca	-	-	-	Sr	.015	.07	.0015
Na	-	-	-	Ta	0	0	0
K	-	-	-	Te	0	0	0
Ti	-	-	-	Th	0	0	0
P	-	-	-	Tl	0	0	0
Mn	-	-	-	U	0	0	0
Ag	0	0	0	V	.01	.007	.007
As	0	0	0	W	0	0	0
Au	0	0	0	Y	.001	.003	.0015
B	.3	2.	1.	Yb	.0001	.0003	.00015
Ba	.15	.2	.03	Zn	0	0	0
				Zr	.03	.05	.015
Be	0	.0003	0	Looked for only when La or Ce found:			
Bi	0	0	0	Pr	-	-	0
Cd	0	0	0	Nd	-	-	0
Ce	0	0	0	Sm	-	-	0
Co	.002	.0015	.001	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	.007	.007	.005	Gd	-	-	-
Cu	0	.0001	.00005	Tb	-	-	-
Ga	.0015	.0015	.001	Dy	-	-	-
Ge	0	0	0	Ho	-	-	-
Hf	0	0	0	Er	-	-	-
				Tm	-	-	-
Hg	0	0	0	Lu	-	-	-
In	0	0	0	Looked for only when Pd or Pt found:			
La	0	0	.007	Ir	-	-	-
Li	0	0	0	Os	-	-	-
Mo	0	0	0	Rh	-	-	-
				Ru	-	-	-
Nb	.0005	.0005	.0003	Looked for only when requested:			
Ni	.005	.003	<.003	Cs	-	-	-
Pb	0	0	.0003	Rb	-	-	-
Pd	0	0	0	F	-	-	-
Pt	0	0	0				

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
66-WS-70	H. M. Bannerman	April 28, 1966

Lot No.	Spec. Lab. No.	Plate No.	Refer.
30-089	4323	III-3631	

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Sample No.	48	49	50	48	49	50
Tables 1 & 2 Field No.	5-B-0834	1-B-0434	4-B-0410	5-B-0834	1-B-0434	4-B-0410
Lab. No.	W166699	W166700	W166701	W166699	W166700	W166701
Si	-	-	-	Re 0	0	0
Al	-	-	-	Sb 0	0	0
Fe	-	-	-	Sc .002	.0007	.0015
Mg	-	-	-	Sn .001	0	.0005
Ca	-	-	-	Sr .002	.003	.005
Na	-	-	-	Ta 0	0	0
K	-	-	-	Te 0	0	0
Ti	-	-	-	Th 0	0	0
P	-	-	-	Tl 0	0	0
Mn	-	-	-	U 0	0	0
Ag	0	0	0	V .01	.005	.01
As	0	0	0	W 0	0	0
Au	0	0	0	Y .002	.0015	.0015
B	1.	.015	.7	Yb .0002	.0002	.00015
Ba	.05	.05	.1	Zn 0	0	0
				Zr .02	.02	.02
Be	0	0	0	Looked for only when La or Ce found:		
Bi	0	0	0	Pr 0	-	0
Cd	0	0	0	Nd .01	-	0
Ce	.05	0	.02	Sm 0	-	0
Co	.002	.0015	.002	Eu 0	0	0
				Looked for only when Y is found above .005%:		
Cr	.007	.002	.007	Gd -	-	-
Cu	.00005	.0005	.00007	Tb -	-	-
Ga	.0015	.0007	.0015	Dy -	-	-
Ge	0	0	0	Ho -	-	-
Hf	0	0	0	Er -	-	-
				Tm -	-	-
Hg	0	0	0	Lu -	-	-
In	0	0	0	Looked for only when Pd or Pt found:		
La	.015	0	.007	Ir -	-	-
Li	0	0	0	Os -	-	-
Mo	0	0	0	Rh -	-	-
				Ru -	-	-
Nb	.0007	.0003	.0005	Looked for only when requested:		
Ni	.005	.003	.003	Cs -	-	-
Pb	.003	0	.0015	Rb -	-	-
Pd	0	0	0	F -	-	-
Pt	0	0	0			

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Sample No.	51	83	82	51	83	82
Tables 1 & 2						
Field No.	3-B-0411	4-2736-65	1-B-0344-65	3-B-0411	4-2736-65	1-B0344-65
Lab. No.	W166702	W166703	W166704	W166702	W166703	W166704
Si	-	-	-	Re 0	0	0
Al	-	-	-	Sb 0	0	0
Fe	-	-	-	Sc .0015	.001	.001
Mg	-	-	-	Sn 0	0	0
Ca	-	-	-	Sr .003	.1	.03
Na	-	-	-	Ta 0	0	0
K	-	-	-	Te 0	0	0
Ti	-	-	-	Th 0	0	0
P	-	-	-	Tl 0	0	0
Mn	-	-	-	U 0	0	0
Ag	0	0	0	V .01	.015	.007
As	0	0	0	W 0	0	0
Au	0	0	0	Y .001	.003	.002
B	.5	0	0	Yb .0001	.0003	.0002
Ba	.1	.15	.1	Zn 0	0	0
				Zr .02	.07	.03
Be	0	.0002	<.0001	Looked for only when La or Ce found:		
Bi	0	0	0	Pr 0	0	0
Cd	0	0	0	Nd 0	.015	0
Ce	.03	.05	.02	Sm 0	0	0
Co	.002	.002	.0015	Eu 0	0	0
				Looked for only when Y is found above .005%:		
Cr	.007	.007	.007	Gd -	-	-
Cu	.0003	.003	.00005	Tb -	-	-
Ga	.001	.001	.001	Dy -	-	-
Ge	0	0	0	Ho -	-	-
Hf	0	0	0	Er -	-	-
				Tm -	-	-
Hg	0	0	0	Lu -	-	-
In	0	0	0	Looked for only when Pd or Pt found:		
La	.005	.01	.005	Ir -	-	-
Li	0	0	0	Os -	-	-
Mo	0	0	0	Rh -	-	-
				Ru -	-	-
Nb	.0003	0	.0003	Looked for only when requested:		
Ni	.005	<.003	.003	Cs -	-	-
Pb	0	.001	.0007	Rb -	-	-
Pd	0	0	0	F -	-	-
Pt	0	0	0			

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Sample No.						
Tables 1 & 2	38	85	80	38	85	80
Field No.	1-B 0830-65	2-3145-65	1-3145-65	1-B 0830-65	2-3145-65	1-3145-65
Lab. No.	W166705	W166706	W166707	W166705	W166706	W166707
Si	-	-	-	Re	0	0	0
Al	-	-	-	Sb	0	0	0
Fe	-	-	-	Sc	.002	.0015	0
Mg	-	-	-	Sn	0	.0003	0
Ca	-	-	-	Sr	.03	.015	.015
Na	-	-	-	Ta	0	0	0
K	-	-	-	Te	0	0	0
Ti	-	-	-	Th	0	0	0
P	-	-	-	Tl	0	0	0
Mn	-	-	-	U	0	0	0
Ag	0	0	0	V	.05	.007	.001
As	0	0	0	W	0	0	0
Au	0	0	0	Y	.002	.003	.001
B	0	.003	.01	Yb	.0002	.0003	.0001
Ba	.02	.015	.015	Zn	0	0	0
				Zr	.01	.03	.02
Be	0	.00015	.0002	Looked for only when La or Ce found:			
Bi	0	0	0	Pr	-	-	-
Cd	0	0	0	Nd	-	-	-
Ce	0	0	0	Sm	-	-	-
Co	.005	.002	0	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	.007	.007	0	Gd	-	-	-
Cu	.003	.0005	.002	Tb	-	-	-
Ga	.0015	.001	.001	Dy	-	-	-
Ge	0	0	0	Ho	-	-	-
Hf	0	0	0	Er	-	-	-
				Tm	-	-	-
Hg	0	0	0	Lu	-	-	-
In	0	0	0	Looked for only when Pd or Pt found:			
La	0	0	0	Ir	-	-	-
Li	0	0	0	Os	-	-	-
Mo	.0003	0	0	Rh	-	-	-
				Ru	-	-	-
Nb	.0003	.0003	.0003	Looked for only when requested:			
Ni	.005	.005	0	Cs	-	-	-
Pb	0	.0005	.002	Rb	-	-	-
Pd	0	0	0	F	-	-	-
Pt	0	0	0				

Table 3.-- SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS --Continued

Report No.	For	Date
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Sample No. Tables 1 & 2	84	27	28	84	27	28
Field No.	4-1519)61	3-3144-65	1-1212-61	4-1519-61	3-3144-65	1-1212-61
Lab. No.	W166708	W166709	W166710	W166708	W166709	W166710
Si	-	-	-	Re 0	0	0
Al	-	-	-	Sb 0	0	0
Fe	-	-	-	Sc .002	0	0
Mg	-	-	-	Sn .0003	0	.0003
Ca	-	-	-	Sr .01	.003	.02
Na	-	-	-	Ta 0	0	0
K	-	-	-	Te 0	0	0
Ti	-	-	-	Th 0	0	0
P	-	-	-	Tl 0	0	0
Mn	-	-	-	U 0	0	0
Ag	0	0	0	V .01	.003	.002
As	0	0	0	W 0	0	0
Au	0	0	0	Y .003	.0015	.001
B	<.003	0	0	Yb .0003	.00015	.0001
Ba	.05	.05	.07	Zn 0	0	0
				Zr .03	.05	.02
Be	.00015	0	.0003	Looked for only when La or Ce found:		
Bi	0	0	0	Pr 0	-	0
Cd	0	0	0	Nd 0	-	0
Ce	0	0	.01	Sm 0	-	0
Co	.003	0	0	Eu 0	0	0
				Looked for only when Y is found above .005%:		
Cr	.007	.002	0	Gd -	-	-
Cu	.00007	.0003	.0002	Tb -	-	-
Ga	.001	.0005	.0015	Dy -	-	-
Ge	0	0	0	Ho -	-	-
Hf	0	0	0	Er -	-	-
				Tm -	-	-
Hg	0	0	0	Lu -	-	-
In	0	0	0	Looked for only when Pd or Pt found:		
La	.003	0	.005	Ir -	-	-
Li	0	0	0	Os -	-	-
Mo	0	0	0	Rh -	-	-
				Ru -	-	-
Nb	.0005	.0003	.0003	Looked for only when requested:		
Ni	.007	0	0	Cs -	-	-
Pb	.0007	0	.002	Rb -	-	-
Pd	0	0	0	F -	-	-
Pt	0	0	0			

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Sample No.

Tables 1 & 2

	29	30	31	29	30	31
Field No.	6-2231-65	3-1718-61	2-0115-65	6-2231-65	3-1718-61	2-0115-65
Lab. No.	W166711	W166712	W166713	W166711	W166712	W166713
Si	-	-	-	he 0	0	0
Al	-	-	-	Sb 0	0	0
Fe	-	-	-	Sc 0	0	0
Mg	-	-	-	Sn 0	.0005	0
Ca	-	-	-	Sr .005	.005	.003
Na	-	-	-	Ta 0	0	0
K	-	-	-	Te 0	0	0
Ti	-	-	-	Th 0	0	0
P	-	-	-	Tl 0	0	0
Mn	-	-	-	U 0	0	0
Ag	0	0	0	V 0	.0007	.0003
As	0	0	0	W 0	0	0
Au	0	0	0	Y .001	.0015	0
B	0	0	.003	Yb .0001	.00015	0
Ba	.015	.02	.015	Zn 0	0	0
				Zr .015	.03	.001
Be	.0002	.0002	.00015	Looked for only when La or Ce found:		
Bi	0	0	0	Pr -	0	-
Cd	0	0	0	Nd -	0	-
Ce	0	0	0	Sm -	0	-
Co	0	0	0	Eu 0	0	0
				Looked for only when Y is found above .005%:		
Cr	0	.0007	0	Gd -	-	-
Cu	.00003	.0001	.0002	Tb -	-	-
Ga	.0015	.001	.0015	Dy -	-	-
Ge	0	0	0	Ho -	-	-
Hf	0	0	0	Er -	-	-
				Tm -	-	-
Hg	0	0	0	Lu -	-	-
In	0	0	0	Looked for only when Pd or Pt found:		
La	0	.003	0	Ir -	-	-
Li	0	0	0	Os -	-	-
Mo	0	0	0	Rh -	-	-
				Ru -	-	-
Nb	.0003	.0003	.0005	Looked for only when requested:		
Ni	0	0	0	Cs -	-	-
Pb	.003	.005	.0005	Rb -	-	-
Pd	0	0	0	F -	-	-
Pt	0	0	0			

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

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Sample No.	34	77	78	34	77	78
Tables 1 & 2 Field No.	1-1121-61	1-B-0630-65	2-B-0424-65	1-1121-61	1-B0630-65	2-B-0424-65
Lab. No.	W166714	W166715	W166716	W166714	W166715	W166716
Si	–	–	–	Re	0	0	0
Al	–	–	–	Sb	0	0	0
Fe	–	–	–	Sc	.0003	.0015	.0003
Mg	–	–	–	Sn	.0015	0	0
Ca	–	–	–	Sr	.015	.007	.001
	–	–	–				
Na	–	–	–	Ta	0	0	0
K	–	–	–	Te	0	0	0
Ti	–	–	–	Th	0	0	0
P	–	–	–	Tl	0	0	0
Mn	–	–	–	U	0	0	0
Ag	0	0	0	V	.001	.01	.001
As	0	0	0	W	00	0	0
Au	0	0	0	Y	.0005	.0015	.002
B	<.003	.003	0	Yb	0	.00015	.0002
Ba	.07	.007	.003	Zn	0	0	0
				Zr	.02	.02	.007
Be	.0001	.0001	0	Looked for only when La or Ce found:			–
Bi	0	0	0	Pr	0	0	–
Cd	0	0	0	Nd	0	0	–
Ce	.02	.01	0	Sm	0	0	–
Co	.0003	.0005	0	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	0	.007	.001	Gd	–	–	–
Cu	.0005	.0005	.00005	Tb	–	–	–
Ga	.002	.0015	.0005	Dy	–	–	–
Ge	0	0	0	Ho	–	–	–
Hf	0	0	0	Er	–	–	–
				Tm	–	–	–
Hg	0	0	0	Lu	–	–	–
In	0	0	0	Looked for only when Pd or Pt found:			
La	.007	.003	0	Ir	–	–	–
Li	0	0	0	Os	–	–	–
Mo	0	0	0	Rh	–	–	–
				Ru	–	–	–
Nb	.0003	.0003	.0003	Looked for only when requested:			
Ni	0	<.003	0	Cs	–	–	–
Pb	.01	0	.0005	Rb	–	–	–
Pd	0	0	0	F	–	–	–
Pt	0	0	0				

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS --Continued

Report No.	For	Date
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Lot No.	Spec. Lab. No.	Plate No.	Refer.
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Sample No.						
Tables 1 & 2	79	72	75	79	72	75
Field No.	5-B-0324-65	1-B-1027-63	1-B-0312-65	5-B-0324-65	1-R1027-63	1-B-0324-6
Lab. No.	W166717	W166718	W166719	W166717	W166718	W166719
Si	–	–	–	Re	0	0	0
Al	–	–	–	Sb	0	0	0
Fe	–	–	–	Sc	.0005	.001	.0015
Mg	–	–	–	Sn	0	0	0
Ca	–	–	–	Sr	.003	.007	.015
Na	–	–	–	Ta	0	0	0
K	–	–	–	Te	0	0	0
Ti	–	–	–	Th	0	0	0
P	–	–	–	Tl	0	0	0
Mn	–	–	–	U	0	0	0
Ag	0	0	0	V	.003	.007	.007
As	0	0	0	W	0	0	0
Au	0	0	0	Y	.002	.003	.003
B	0	.005	.05	Yb	.0002	.0003	.0003
Ba	.1	.003	.03	Zn	0	0	0
				Zr	.05	.03	.015
Be	<.0001	.0001	.0002	Looked for only when La or Ce found:			
Bi	0	0	0	Pr	–	–	0
Cd	0	0	0	Nd	–	–	0
Ce	0	0	.03	Sm	–	–	0
Co	0	.001	.0015	Eu	0	0	0
				Looked for only when Y is found above .005%:			
Cr	.003	.005	.005	Gd	–	–	–
Cu	.0002	.001	.0007	Tb	–	–	–
Ga	.0005	.001	.0015	Dy	–	–	–
Ge	0	0	0	Ho	–	–	–
Hf	0	0	0	Er	–	–	–
				Tm	–	–	–
Hg	0	0	0	Lu	–	–	–
In	0	0	0	Looked for only when Pd or Pt found:			
La	0	0	.007	Ir	–	–	–
Li	0	0	0	Os	–	–	–
Mo	0	0	.0003	Rh	–	–	–
				Ru	–	–	–
Nb	.0005	.0003	.0003	Looked for only when requested:			
Ni	0	.003	.005	Cs	–	–	–
Pb	.0007	0	.0015	Rb	–	–	–
Pd	0	0	0	F	–	–	–
Pt	0	0	0				

Report No.	For	Date
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Sample No. Tables 1 & 2	87	87
Field No.	1-B-0105-65	1-B-0105-65
Lab. No.	W166720	W166720
Si	–	Fe O
Al	–	Sb O
Fe	–	Sc .0005
Mg	–	Sn O
Ca	–	Sr .0005
	–	
Na	–	Ta O
K	–	Te O
Ti	–	Th O
P	–	Tl O
Mn	–	U O
Ag	O	V .005
As	O	W O
Au	O	Y .001
B	.007	Yb .0001
Ba	.0015	Zn O
		Zr .003
Be	O	Looked for only when La or Ce found:
Bi	O	Pr –
Cd	O	Nd –
Ce	O	Sm –
Co	O	Eu O
		Looked for only when Y is found above .005%:
Cr	.0015	Gd –
Cu	.0005	Tb –
Ga	.0003	Dy –
Ge	O	Ho –
Hf	O	Er –
		Tm –
Hg	O	Lu –
In	O	Looked for only when Pd or Pt found:
La	O	Ir –
Li	O	Os –
Mo	O	Rh –
		Ru –
Nb	O	Looked for only when requested:
Ni	O	Cs –
Pb	.0005	Rb –
Pd	O	F –
Pt	O	

By abd
Spectrographic Services and Research WASH-NYA
Analyst: William B. Crandell
Project Leader: Armin W. Helz
Approved Francis J. Flanagan
Senior Analytical Laboratory Director

0-011
(Rev. July 1962)

Table 3.--Semiquantitative spectrographic analyses--Continued

REPORT NO. 66-WB-112 FOR H. E. Bannerman DATE July 7, 1966

JOB NO. 7870 PROJECT OR ORGANIZATION Exp. Geochem. + Min. Br. - Richville, N. Y. Quad. - 7106

LOT NO. 30-089 REFER TO OTHER REPORTS

Spec. Lab. No. 4365
Plate No. 3669

Semiquantitative Spectrographic Analysis of Seven (7) Samples from Grenville Formation; from St. Lawrence County, New York.

Lab. No.	Sample No. Tables 1&2	Field No.	Description
W-167079	81	1-B 0344-65	Orthoclase gneiss
W-167080	70	1-SW 0405-65	Microcline tourmaline gneiss
W-167081	76	1-B 0424-65	"alaskitic" gneiss
W-167082	73	1-B 1733-65	scopolitic skarn
W-167083	88	7-1615-65	dolomite
W-167084	74	2-B 0219-63	qtz oligoclase schist
W-167085	44	B 0428-63	qtz oligoclase biotite schist

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	For	Date
66-WS-112	H. M. Bannerman	July 7, 1966
t No.	Spec. Lab. No.	Plate No. / Refer.
30-089	4365	3669

Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc., which represent approximate midpoints of interval data on a geometric scale. The assigned interval for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating the above limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected (*see table of detectabilities*)
- = not looked for
<, with number = less than number shown--here usual detectabilities do not apply

Sample No. -								
Tables 1&2	81	70	76	73	81	70	76	73
Field No.	1-B0344-65	1SW 405 65	1-B0424-65	1-B1733-65	1-B0344-65	1SW0405-65	1-B0424-65	1B1733-65
Lab. No.	W-167079	W-167080	W-167081	W-167082	W-167079	W-167080	W-167081	W-167082
Si	-	-	-	-				
Al	-	-	-	-				
Fe	-	-	-	-				
Mg	-	-	-	-				
Ca	-	-	-	-				
Na	-	-	-	-				
K	-	-	-	-				
Ti	-	-	-	-				
P	-	-	-	-				
Mn	-	-	-	-				
Ag	0	0	0	0				
As	0	0	0	0				
Au	0	0	0	0				
B	<.003	1	0	.005				
Ba	.007	.03	.002	.07				
Be	.0003	.00015	.0001	.00015				
Bi	0	0	0	0				
Cd	0	0	0	0				
Ce	0	0	0	0				
Co	.0015	.001	0	0				
Cr	.003	.007	.0007	.005				
Cu	.0003	.0001	.0002	.0001				
Ga	.001	.0015	.0007	.0015				
Ge	0	0	0	0				
Hf	0	0	0	0				
Hg	0	0	0	0				
In	0	0	0	0				
La	0	0	0	0				
Li	0	0	0	0				
Mo	0	0	0	0				
Nb	.0015	.001	0	0				
Ni	<.003	<.003	0	0				
Pb	.007	0	0	0				
Pd	0	0	0	0				
Pt	0	0	0	0				
Re	0	0	0	0				
Sb	0	0	0	0				
Sc	.0007	.0015	0	0				
Sn	.002	0	0	0				
Sr	.005	.007	.002	.05				
Ta	0	0	0	0				
Te	0	0	0	0				
Th	0	0	0	0				
Tl	0	0	0	0				
U	0	0	0	0				
V	.003	.007	.0015	.002				
W	0	0	0	0				
Y	.003	0	.001	.0015				
Yb	.0003	0	.0001	.0001				
Zn	0	0	0	0				
Zr	.007	.015	.007	.007				
Looked for only when La or Ce found:								
Pr	-	-	-	-				
Nd	-	-	-	-				
Sm	-	-	-	-				
Eu	0	0	0	0				
Looked for only when Y is found above .005%:								
Gd	-	-	-	-				
Tb	-	-	-	-				
Dy	-	-	-	-				
Ho	-	-	-	-				
Er	-	-	-	-				
Tm	-	-	-	-				
Lu	-	-	-	-				
Looked for only when Pd or Pt found:								
Ir	-	-	-	-				
Os	-	-	-	-				
Rh	-	-	-	-				
Ru	-	-	-	-				
Looked for only when requested:								
Cs	-	-	-	-				
Rb	-	-	-	-				
F	-	-	-	-				

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	for	Date
66-WS-112	H. M. Bannerman	July 7, 1966
Lot No.	**Spec. Lab. No.**	**Plate No.** **Refer.**
30-089	4365	3669

Results are reported in percent to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.1, etc.; which represent approximate midpoints of interval data on a geometric scale. The assigned interval for semiquantitative results will include the quantitative value about 30% of the time.

These data should not be quoted without stating the above limitations.

Symbols used are: M = major constituent--greater than 10%
O = looked for but not detected *(see table of detectabilities)*
– = not looked for
<, with number, less than number shown--here usual detectabilities do not apply

Sample No.						
Tables 1 & 2	88	74	44	88	74	44
Field No.	7-1615-65	2-B-0219-63	B-0428-63	7-1615-65	2-B-0219-63	B-0428-63
Lab. No.	W-167083	W-167084	W-167085	W-167083	W-167084	W-167085
Si	–	–	–	Re 0	0	0
Al	–	–	–	Sb 0	0	0
Fe	–	–	–	Sc 0	.001	.0007
Mg	–	–	–	Sn 0	0	0
Ca	–	–	–	Sr .005	.03	.005
Na	–	–	–	Ta 0	0	0
K	–	–	–	Te 0	0	0
Ti	–	–	–	Th 0	0	0
P	–	–	–	Tl 0	0	0
Mn	–	–	–	U 0	0	0
Ag	0	0	0	V 0	.007	.005
As	0	0	0	W 0	0	0
Au	0	0	0	Y 0	.002	.003
B	0	.01	.015	Yb 0	.0002	.0002
Ba	.0003	.07	.03	Zn 0	0	0
				Zr 0	.02	.02
Be	0	.0001	.0001	Looked for only when La or Ce found:		
Bi	0	0	0	Pr –	–	–
Cd	0	0	0	Nd –	–	–
Ce	0	0	0	Sm –	–	–
Co	0	.0015	.001	Eu 0	0	0
				Looked for only when Y is found above .005%:		
Cr	0	.005	.003	Gd –	–	–
Cu	0	.0001	.0007	Tb –	–	–
Ga	0	.001	.0015	Dy –	–	–
Ge	0	0	0	Ho –	–	–
Hf	0	0	0	Er –	–	–
				Tm –	–	–
Hg	0	0	0	Lu –	–	–
In	0	0	0	Looked for only when Pd or Pt found:		
La	0	0	0	Ir –	–	–
Li	0	0	0	Os –	–	–
Mo	0	0	0	Rh –	–	–
				Ru –	–	–
Nb	0	.0015	.001	Looked for only when requested:		
Ni	0	.005	.005	Cs –	–	–
Pb	0	.005	0	Rb –	–	–
Pd	0	0	0	F –	–	–
Pt	0	0	0			

By Spectrographic Services and Research
Analyst: Joseph L. Harris
Project Leader: Armin W. Helz

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Analytical Labs. Branch

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	69-WS-56	For	C. Erwin Brown	Spec. Lab. No.	4941	Date	April 17, 19
Lot No.	30-089	Analyst	Joseph L. Harris	Plate No.	3921	Job No.	9400

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
* = Usual limits of determinations do not apply due to use of dilution techniques
– = Not looked for
H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Sample No.	42	43	39	40	41	6	7	12

Tables 1 & 2

Field No.	EE-66-34	-67-24	-68-102	-68-67	-68-78	-68-107	-68-108	-66-26
Lab No.	W-171803	804	805	806	807	808	809	810
Fe %	–	–	–	–	–	–	–	–
Mg %	–	–	–	–	–	–	–	–
Ca %	–	–	–	–	–	–	–	–
Ti %	–	–	–	–	–	–	–	–
Mn (ppm)	–	–	–	–	–	–	–	–
Ag	L	L	N	L	L	L	L	L
As	N	N	N	N	N	N	N	N
Au	N	N	N	N	N	N	N	N
B	1000	500	1000	700	500	N	N	50
Ba	300	200	300	500	30	500	300	1000
Be	1	3	3	3	N	2	2	7
Bi	N	N	N	N	N	N	N	N
Cd	N	N	N	N	N	N	N	N
Co	10	N	20	15	N	70	50	N
Cr	20	50	150	50	30	3	3	3
Cu	5	5	1	5	15	30	20	200
La	N	N	100	100	N	100	100	150
Mo	N	N	N	N	N	5	5	N
Nb	10	10	10	10	10	15	15	15
Ni	L	L	50	L	N	70	70	N
Pb	N	N	3	N	N	N	N	30
Pd	N	N	N	N	N	N	N	N
Pt	N	N	N	N	N	N	N	N
Sb	N	N	N	N	N	N	N	N
Sc	7	7	20	10	3	15	15	7
Sn	N	N	N	N	N	N	N	20
Sr	30	30	30	700	10	1000	500	1000
Te	N	N	N	N	N	N	N	N
U	N	N	N	N	N	N	N	N
V	70	70	150	70	50	150	150	30
W	N	N	N	N	N	N	N	N
Y	20	15	50	70	20	70	70	50
Zn	N	N	N	N	N	N	N	N
Zr	150	150	200	200	150	300	300	700

Approved _____ Project Leader

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Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 69-WS-56 Job. No. 9400

Tables 1&2

Sample No.	42	43	39	40	41	6	7	12
Field No.	EB-66-34	-67-24	-68-102	-68-67	-68-78	-68-107	-68-108	-66-26
Lab. No	W-171803	804	805	806	807	808	809	810
Si %	-	-	-	-	-	-	-	-
Al %	-	-	-	-	-	-	-	-
Na %	-	-	-	-	-	-	-	-
K %	-	-	-	-	-	-	-	-
P %	-	-	-	-	-	-	-	-
Ce (ppm)	N	N	300	300	N	300	300	500
Ga	10	15	20	10	5	20	20	20
Ge	N	N	N	N	N	N	N	N
Hf	N	N	N	N	N	N	N	N
In	N	N	N	N	N	N	N	N
Li	N	N	N	N	N	N	N	N
Re	N	N	N	N	N	N	N	N
Ta	N	N	N	N	N	N	N	N
Th	N	N	N	N	N	N	N	N
Tl	N	N	N	N	N	N	N	N
Yb	2	1.5	5	7	2	7	7	5
Looked for only when La or Ce found								
Pr	-	-	N	N	-	N	N	N
Nd	-	-	N	N	-	N	N	N
Sm	-	-	N	N	-	N	N	N
Eu	N	N	N	N	N	N	N	N
Looked for only when Y is found above 50 ppm								
Gd	-	-	-	-	-	-	-	-
Tb	-	-	-	-	-	-	-	-
Dy	-	-	-	-	-	-	-	-
Ho	-	-	-	-	-	-	-	-
Er	-	-	-	-	-	-	-	-
Tm	-	-	-	-	-	-	-	-
Lu								
Looked for only when Pd or Pt found								
Ir	-	-	-	-	-	-	-	-
Os	-	-	-	-	-	-	-	-
Rh	-	-	-	-	-	-	-	-
Ru	-	-	-	-	-	-	-	-
Looked for only when requested								
Cs	-	-	-	-	-	-	-	-
Rb	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-
Hg	-	-	-	-	-	-	-	-

* U. S. GOVERNMENT PRINTING OFFICE : 1968 O - 282-274

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	69-WS-56	For	C. Erwin Brown	Spec. Lab. No.	4941	Date	April 17, 19
Lot No.	30-089	Analyst	Joseph L. Harris	Plate No.	3921	Job No.	9400

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
* = Usual limits of determinations do not apply due to use of dilution techniques
\- = Not looked for
H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Sample No.	13	24	14	15	18	(9)*	(10)*	(11)*
Tables 1&2								
Field No.	-67-2	-67-66	-68-26	-68-61	-68-79	-67-6	-67-16	-68-19
Lab No.	811	812	813	814	815	816	817	818
Fe %	-	-	-	-	-	-	-	-
Mg %	-	-	-	-	-	-	-	-
Ca %	-	-	-	-	-	-	-	-
Ti %	-	-	-	-	-	-	-	-
Mn (ppm)	-	-	-	-	-	-	-	-
Ag	L	L	L	N	L	N	N	N
As	N	N	N	N	N	N	N	N
Au	N	N	N	N	N	N	N	N
B	L	30	50	N	500	30	N	N
Ba	1000	200	700	50	500	5	15	50
Be	3	2	7	N	10	N	N	N
Bi	N	N	N	N	N	N	N	N
Cd	N	N	N	N	N	N	N	N
Co	N	N	N	N	N	N	N	N
Cr	N	N	N	N	N	N	N	N
Cu	2	1	5	10	3	5	1	7
La	50	70	100	N	70	N	N	N
Mo	N	N	N	N	N	N	N	N
Nb	7	10	10	N	7	N	N	N
Ni	N	N	N	N	N	N	N	N
Pb	20	50	20	N	30	N	N	N
Pd	N	N	N	N	N	N	N	N
Pt	N	N	N	N	N	N	N	N
Sb	N	N	N	N	N	N	N	N
Sc	5	N	5	N	5	N	N	N
Sn	N	N	N	N	N	N	N	N
Sr	500	200	200	1000	150	70	700	150
Te	N	N	N	N	N	N	N	N
U	N	N	N	N	N	N	N	N
V	30	15	15	7	10	10	10	10
W	N	N	N	N	N	N	N	N
Y	15	20	30	N	30	N	N	N
Zn	N	N	N	N	N	N	N	N
Zr	70	700	200	N	150	N	N	N

Approved

nos. refer to analyses in Circular 774

Approved

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 69-WS-56 Job. No. 9400

Tables 1&2

Sample No.	13	24	14	15	18	(9)*	(10)*	(11)*
Field No.	-67-2	-67-66	-68-26	-68-61	-68-79	-67-6	-67-16	-68-19
Lab. No	811	812	813	814	815	816	817	818
Si %	-	-	-	-	-	-	-	-
Al %	-	-	-	-	-	-	-	-
Na %	-	-	-	-	-	-	-	-
K %	-	-	-	-	-	-	-	-
P %	-	-	-	-	-	-	-	-
Ce (ppm)	100	300	500	N	200	N	N	N
Ga	15	20	20	N	20	N	N	N
Ge	N	N	N	N	N	N	N	N
Hf	N	N	N	N	N	N	N	N
In	N	N	N	N	N	N	N	N
Li	N	N	N	N	N	N	N	N
Re	N	N	N	N	N	N	N	N
Ta	N	N	N	N	N	N	N	N
Th	N	N	N	N	N	N	N	N
Tl	N	N	N	N	N	N	N	N
Yb	1.5	2	3	N	3	N	N	N
Looked for only when La or Ce found								
Pr	N	N	N	-	-	-	-	-
Nd	N	N	N	-	-	-	-	-
Sm	N	N	N	-	-	-	-	-
Eu	N	N	N	N	N	N	N	N
Looked for only when Y is found above 50 ppm.					-		-	
Gd	-	-	-	-	-	-	-	-
Tb	-	-	-	-	-	-	-	-
Dy	-	-	-	-	-	-	-	-
Ho	-	-	-	-	-	-	-	-
Er	-	-	-	-	-	-	-	-
Tm	-	-	-	-	-	-	-	-
Lu	-	-	-	-	-	-	-	-
Looked for only when Pd or Pt found	-	-	-	-	-	-	-	
Ir	-	-	-	-	-	-	-	-
Os	-	-	-	-	-	-	-	-
Rh	-	-	-	-	-	-	-	-
Ru	-	-	-	-	-	-	-	-
Looked for only when requested							-	
Cs	-	-	-	-	-	-	-	-
Rb	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-
Hg	-	-	-	-	-	-	-	-

* U. S. GOVERNMENT PRINTING OFFICE : 1968 O - 282-274

*These nos. refer to analyses in USGS Circular 774

Table 3.--SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS--Continued

Report No.	69-WS-56	For	C. Erwin Brown	Spec. Lab. No.	4941	Date	April 17,
Lot No.	30-089	Analyst	Joseph L. Harris	Plate No.	3921	Job No.	9400

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

- G = Greater than 10%, or greater than value shown
- * = Usual limits of determinations do not apply due to use of dilution techniques
- - = Not looked for
- H = Interference
- N = Not detected, at limit of detection or at value shown
- L = Detected, but below limit of determination or below value shown

Sample No. (14)* (13)* (12)*

Circular 774

Field No.	-68-1	-67-102	-68-46
Lab No.	819	820	821
Fe %	-	-	-
Mg %	-	-	-
Ca %	-	-	-
Ti %	-	-	-
Mn (ppm)	-	-	-
Ag	L	N	N
As	N	N	N
Au	N	N	N
B	150	N	30
Ba	1000	50	150
Be	7	N	N
Bi	N	N	N
Cd	N	N	N
Co	N	N	N
Cr	N	N	10
Cu	3	7	15
La	150	N	N
Mo	N	N	N
Nb	5	N	N
Ni	N	N	L
Pb	20	N	N
Pd	N	N	N
Pt	N	N	N
Sb	N	N	N
Sc	3	N	N
Sn	N	N	N
Sr	150	700	300
Te	N	N	N
U	N	N	N
V	20	10	20
W	N	N	N
Y	50	N	15
Zn	N	N	N
Zr	200	N	30

Approved _____ Project Leader

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*Sample No. in USGS Circular 774

Table 3.--SEMIQUANTITATIVE [illegible] SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 69-WS-56 Job. No. 9400

Sample No. (14)* (13)* (12)*
Circular 774

Field No.	-69-1	-67-102	-68-46
Lab. No	819	820	821
Si %	-	-	-
Al %	-	-	-
Na %	-	-	-
K %	-	-	-
P %	-	-	-
Ce (ppm)	500	N	N
Ga	15	N	3
Ge	N	N	N
Hf	N	N	N
Io	N	N	N
Li	N	N	N
Nb	N	N	N
Ta	N	N	N
Th	N	N	N
Tl	N	N	N
Yb	3	N	1.5
Looked for only when La or Ce found			
Pr	N	-	-
Nd	N	-	-
Sm	N	-	-
Eu	N	N	N
Looked for only when Y is found above 50 ppm			
Gd	-	-	-
Tb	-	-	-
Dy	-	-	-
Ho	-	-	-
Er	-	-	-
Tm	-	-	-
Lu	-	-	-
Looked for only when Pd or Pt found			
Ir	-	-	-
Os	-	-	-
Rh	-	-	-
Ru	-	-	-
Looked for only when requested			
Cs	-	-	-
Rb	-	-	-
F	-	-	-
Hg	-	-	-

Spectrographic Services and Research, WVA
Analyst: Joseph L. Harris
Project Leader: Arvin W. Helz
rdj

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Liaison Officer
Branch of Analytical Laboratories

*Sample No. in USGS Circular 774

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	70-15-11	For	C. Ervin Brown	Spec. Lab. No	5083	Date	1/22/70
Lot No.	30-089	Analyst	Joseph L. Harris	Plate No.	III 3978	Job No.	9746

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
* = Usual limits of determinations do not apply due to use of dilution techniques
– = Not looked for
H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Sample No.	4	3	5	16	17
Tables 1 & 2					
Field No.	[illegible]-69-118	-69-129	-69-130	-69-131	-69-132
Lab No.	[illegible]-175278	279	280	281	282
Fe %	–	–	–	–	–
Mg %	–	–	–	–	–
Ca %	–	–	–	–	–
Ti %	–	–	–	–	–
Mn (ppm)	–	–	–	–	–
Ag	L	L	L	L	L
As	N	N	N	N	N
Au	N	N	N	N	N
B	N	N	N	30	200
Ba	500	500	500	500	100
Be	N	N	N	3	5
Bi	N	N	N	N	N
Cd	N	N	N	N	N
Co	15	70	30	N	N
Cr	200	300	100	50	30
Cu	50	15	15	3	N
La	70	70	70	70	150
Mo	5	5	5	N	N
Nb	15	15	15	15	15
Ni	70	50	70	N	N
Pb	N	1	7	20	30
Pd	N	N	N	N	N
Pt	N	N	N	N	N
Sb	N	N	N	N	N
Sc	15	20	15	N	N
Sn	N	N	N	N	N
Sr	200	300	500	150	500
Te	N	N	N	N	N
U	N	N	N	N	N
V	200	200	200	20	20
W	N	N	N	N	N
Y	50	50	50	50	15
Zn	N	N	N	N	N
Zr	200	200	200	300	300

Approved _____ Project Leader

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Table 3.--SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 70-55-11 Job. No. 9746

Sample No. 4 3 5 16 17

Tables 1&2

Field No.	ED-69-118	-69-129	-69-130	-69-131	-69-132			
Lab. No	W-173378	379	380	381	382			
Si %	-	-	-	-	-			
Al %	-	-	-	-	-			
Na %	-	-	-	-	-			
K %	-	-	-	-	-			
P %	-	-	-	-	-			
Ce (ppm)	100	100	100	100	500			
Ga	15	15	15	15	15			
Ge	N	N	N	N	N			
Hf	N	N	N	N	N			
In	N	N	N	N	N			
Li	N	N	N	N	N			
Re	N	N	N	N	N			
Ta	N	N	N	N	N			
Th	N	N	N	N	N			
Tl	N	N	N	N	N			
Yb	5	5	5	5	1.5			
Looked for only when La or Ce found								
Pr	N	N	N	N	N			
Nd	N	N	N	N	N			
Sm	N	N	N	N	N			
Eu	N	N	N	N	N			
Looked for only when Y is found above 50 ppm	-	-	-	-	-			
Gd	-	-	-	-	-			
Tb	-	-	-	-	-			
Dy	-	-	-	-	-			
Ho	-	-	-	-	-			
Er	-	-	-	-	5			
Tm	-	-	-	-	-			
Lu	-	-	-	-	-			
Looked for only when Pd or Pt found	-	-	-	-	-			
Ir	-	-	-	-	-			
Os	-	-	-	-	-			
Rh	-	-	-	-	-			
Ru	-	-	-	-	-			
Looked for only when requested	-	-	-	-	-			
Cs	-	-	-	-	-			
Rb	-	-	-	-	-			
F	-	-	-	-	-			
Hg	-	-	-	-	-			

Spectrographic Services and Research, WVA
Analyst: Joseph L. Harrison JLH
Project Leader: Armin W. Helz AWH
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Liaison Officer
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Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No.	70 WS 207	For	C. Ervin Brown	Spec. Lab. No	5267	Date	Jan. 5, 197
Lot No.	30-089	Analyst	Joseph L. Harris	Plate No.	III 4089	Job No.	10,195

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
• = Usual limits of determinations do not apply due to use of dilution techniques
- = Not looked for
H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Sample No.	35	36	37	2		19	20
Tables 1&2							
Field No.	EE-70-10	-18	-79	-60		-43	-78
Lab No.	W174847	848	849	850		853	854
Fe %	-	-	-	-		-	-
Mg %	-	-	-	-		-	-
Ca %	-	-	-	-		-	-
Ti %	-	-	-	-		-	-
Mn (ppm)	-	-	-	-		-	-
Ag	L	L	L	L		L	L
As	N	N	N	N		N	N
Au	N	N	N	N		N	N
B	N	N	N	N		N	N
Ba	1000	1500	300	500		1500	1500
Be	N	2	1	1		3	2
Bi	N	N	N	N		N	N
Cd	N	N	N	N		N	N
Co	70	30	20	30		7	N
Cr	3	5	10	5		7	7
Cu	7	7	5	30		7	1
La	70	200	N	N		150	100
Mo	5	5	3	5		3	N
Nb	N	N	N	10		10	7
Ni	N	7	7	30		N	N
Pb	N	N	N	N		50	15
Pd	N	N	N	N		N	N
Pt	N	N	N	N		N	N
Sb	N	N	N	N		N	N
Sc	20	15	15	15		7	7
Sn	N	N	N	N		N	N
Sr	3000	5000	1500	1000		700	700
Te	N	N	N	N		N	N
U	N	N	N	N		N	N
V	300	200	100	100		50	30
W	N	N	N	N		N	N
Y	30	70	50	50		70	30
Zn	N	N	N	N		N	-
Zr	70	300	150	200		700	200

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Project Leader

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Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 70 WS 207 Job. No. 10,195

Sample No. Tables 1&2	35	36	37	2	19	20
Field No.	EB-70-10	-18	-79	-60	-43	-78
Lab. No	W174847	848	849	850	853	854
Si %	-	-	-	-	-	-
Al %	-	-	-	-	-	-
Na %	-	-	-	-	-	-
K %	-	-	-	-	-	-
P %	-	-	-	-	-	-
Ce (ppm)	300	700	N	N	500	200
Ga	15	15	15	20	20	15
Ge	N	N	N	N	N	N
Hf	N	N	N	N	N	N
In	N	N	N	N	N	N
Li	N	N	N	N	N	N
Re	N	N	N	N	N	N
Ta	N	N	N	N	N	N
Th	N	N	N	N	N	N
Tl	N	N	N	N	N	N
Yb	3	7	5	5	7	3
Looked for only when La or Ce found				-		
Pr	N	N	-	-	N	N
Nd	N	N	-	-	N	N
Sm	N	N	-	-	N	N
Eu	N	N	N	N	N	N
Looked for only when Y is found above 50 ppm			-	-		-
Gd	-	N	-	-	N	-
Tb	-	N	-	-	N	-
Dy	-	N	-	-	N	-
Ho	-	N	-	-	N	-
Er	-	N	-	-	N	-
Tm	-	N	-	-	N	-
Lu	-	N	-	-	N	-
Looked for only when Pd or Pt found	-	-	-	-	-	-
Ir	-	-	-	-	-	-
Os	-	-	-	-	-	-
Rh	-	-	-	-	-	-
Ru	-	-	-	-	-	-
Looked for only when requested	-	-	-	-	-	-
Cs	-	-	-	-	-	-
Rb	-	-	-	-	-	-
F	-	-	-	-	-	-
Hg	-	-	-	-	-	-

Spectrographic Services and Research, WA
Analyst: Joseph L. Harris
Project Leader: Armin W. Helz

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Liaison Officer
Analytical Laboratories

Table 3.--SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS--Continued

Report No. 73-WS-32	For C. Ervin Brown	Spec. Lab. No 5553	Date March 15,
Lot No. 30-039	Analyst Janet D. Fletcher	Plate No. III 4042	Job No. 11,263

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
• = Usual limits of determinations do not apply due to use of dilution techniques
- = Not looked for
H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Sample No. 1 32 33 21 22 23
Tables 1 & 2

Field No.	EB-71-63	EB-71-67	EB-71-68	EB-72-15	EB-72-5	EB-70-7
Lab No.	W-170534	535	536	537	538	546
Fe %	5	3	3	1	.7	1
Mg %	5	.7	.7	.15	.2	.15
Ca %	5	3	2	1	1	.7
Ti %	.7	.3	.7	.07	.07	.1
Mn (ppm)	200	300	500	200	30	70
Ag	N	L.8	L.8	N	N	N
As	N	N	N	N	N	N
Au	N	N	N	N	N	N
B	20	10	15	N	3000	50
Ba	200	2000	2000	500	300	300
Be	3	2	2	3	1.5	5
Bi	N	N	N	N	N	N
Cd	N	N	N	N	N	N
Co	70	7	7	N	N	N
Cr	150	5	2	5	2	15
Cu	70	10	15	L1	3	1.5
La	N	70	150	N	70	70
Mo	N	N	N	N	N	N
Nb	L5	10	10	L5	L5	30
Ni	150	N	L10	L10	L10	N
Pb	5	20	20	70	20	20
Pd	N	N	N	N	N	N
Pt	N	N	N	N	N	N
Sb	N	N	N	N	N	N
Sc	30	15	15	10	N	N
Sn	N	N	N	N	N	N
Sr	300	500	500	200	70	200
Te	N	N	N	N	N	N
U	N	N	N	N	N	N
V	200	20	30	10	10	10
W	N	N	N	N	N	N
Y	30	70	50	15	30	50
Zn	N	N	N	N	N	N
Zr	50	1500	700	50	100	200

Table 3.-- SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. 73-WS-32 Job. No. 11,263

Sample No. 1 32 33 21 22 23

Tables 1 & 2

Field No.	EB-71-63	EB-71-67	EB-71-68	EB-72-15	EB-72-5	EB-70-7
Lab. No	W-179534	535	536	537	538	546
Si %	G	G	G	G	G	G
Al %	7	7	5	5	5	7
Na %	2	2	2	3	2	3
K %	N	5	3	3	5	3
P %	N	N	N	N	N	N
Ce (ppm)	N	150	200	N	100	100
Ga	20	20	20	20	15	20
Ge	N	N	N	N	N	N
Hf	N	N	N	N	N	N
In	N	N	N	N	N	N
Li	N	N	N	N	N	N
Re	N	N	N	N	N	N
Ta	N	N	N	N	N	N
Th	N	N	N	N	N	N
Tl	N	N	N	N	N	N
Yb	2	5	5	1	1.5	3
Looked for only when La or Ce found						
Pr	-	N N	N N	-	N N	100 N
Nd	-	100	100	-	N	N
Sm	-	N	N	-	N	N
Eu	-	N	N	-	N	N
Looked for only when Y is found above 50 ppm						
Gd	-	N	-	-	-	-
Tb	-	N	-	-	-	-
Dy	-	N	-	-	-	-
Ho	-	N	-	-	-	-
Er	-	N	-	-	-	-
Tm	-	N	-	-	-	-
Lu	-	N	-	-	-	-
Looked for only when Pd or Pt found						
Ir	-	-	-	-	-	-
Os	-	-	-	-	-	-
Rh	-	-	-	-	-	-
Ru	-	-	-	-	-	-
Looked for only when requested						
Cs	-	-	-	-	-	-
Rb	-	-	-	-	-	-
F	-	-	-	-	-	-
Hg	-	-	-	-	-	-

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