TABLE 5. — CHEMICAL, MODAL, AND SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSES FOR SELECTED IGNEOUS AND METAIGNEOUS ROCKS OF PARK RANGE NORTHEAST OF STEAMBOAT SPRINGS, COLORADO

CHEMICAL ANALYSES, IN WEIGHT PERCENT

[Analysts: (1) George O. Riddle, 3-15-66; (2) E. Engleman, 7-18-67; (3) George O. Riddle, 10-5-70. For Rittmann (1952) nomenclature, some aphanitic equivalents (in quotes) are given for phaneritic rocks for comparative purposes. Blanks indicate not looked for.]

	Mount Ethel Pluton													
Rock unit	Leucogranite	Granite and quartz monzonite		Quartz monzonite of Roxy Ann Lake				Quartz monzonite porphyry of Rocky Peak						Grano-diorite
Field No. / Laboratory No.	528 D101650	521 D101643	522 D101644	527 D101649	523 D101645	526 D101648	347 D101640	437 D101641		157 D101278		525 D101647	520 D101642	551 D101655
SiO_2	75.40	73.88	73.98	70.62	70.19	71.03	73.22	67.09		68.70		69.42	70.52	56.74
Al_2O_3	13.68	13.73	13.88	14.78	14.66	14.74	14.04	15.02		14.62		14.68	14.40	15.83
Fe_2O_3	.47	.50	.61	1.15	1.05	.86	.80	2.12		1.91		1.73	1.24	3.81
FeO	.09	.94	.76	1.22	1.80	1.33	.99	1.87		1.47		1.28	1.44	4.01
MgO	.05	.27	.24	.64	.57	.48	.35	1.18		.97		.79	.75	3.34
CaO	.35	1.10	.89	1.82	1.68	1.72	1.21	2.85		2.27		2.02	1.76	5.81
Na_2O	3.79	3.45	3.42	3.65	3.55	3.43	3.58	3.70		3.50		3.43	3.60	3.36
K_2O	5.71	5.17	5.09	4.72	4.80	5.12	4.81	4.29		4.86		4.93	4.60	2.78
H_2O^+	.08	.36	.46	.48	.56	.29	.35	.29		.31		.43	.50	1.49
H_2O^-	.03	.03	.08	.07	.04	.09	.09	.05		.06		.05	.05	.09
TiO_2	.05	.14	.13	.34	.40	.30	.22	.67		.61		.48	.44	1.35
P_2O_5	.01	.05	.02	.09	.10	.08	.07	.23		.19		.13	.14	.52
MnO	.01	.04	.05	.04	.05	.04	.04	.06		.04		.04	.04	.11
CO_2	.00	.01	.00	.01	.03	.03	.01	.02		.02		.01	.02	.04
Cr_2O_3														
NiO														
Cl	.00	.01	.02	.01	.01	.01	.00	.02		.02		.02	.01	.03
F	.01	.15	.15	.11	.27	.15	.05	.25		.19		.20	.15	.37
Subtotal	99.73	99.83	99.78	99.75	99.76	99.70	99.83	99.71		99.74		99.64	99.66	99.68
Less O	.00	.06	.06	.05	.11	.06	.02	.11		.10		.08	.06	.16
Total	99.73	99.77	99.72	99.70	99.65	99.64	99.81	99.60		99.64		99.56	99.60	99.52
Analyst	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)		(1)		(2)	(2)	(2)
Johannsen (1950) nomenclature.	Leucogranite.	Adamellite.	Adamellite.	Adamellite.	Adamellite.	Adamellite.	Leuco-adamellite.	Adamellite.	Granodiorite.	Adamellite.	Adamellite.	Granite	Adamellite.	Granodiorite.
Rittmann (1952) nomenclature.	"Alkali rhyolite."	"Rhyolite."				"Rhyolite."		"Quartz latite"						"Trachy-andesite."
Streckeisen (1967) nomenclature.	Granite.	Granite.	Granite.	Granite.	Granite.	Granite.	Granite.	Granite.	Granodiorite.	Granite.	Granite.	Syenite.	Granite.	Granodiorite.
Irvine and Baragar (1971) nomenclature.														

	Buffalo Pass Pluton													
Rock unit	Quartz monzonite and granodiorite augen gneiss of Buffalo Mountain			Quartz monzonite gneiss		Fine-grained porphyry dikes			Small mafic intrusive (dunite)			Felsic gneiss country rock		
Field No. / Laboratory No.	544 D101651	555 D101658	554 D101657	550 D101654	553 D101656	549 D101653	524 D101646	545 D101652	116 D101277	116 D141158	116 (Avg.)	631	593	616
SiO_2	64.14	65.46	65.80	70.09	74.32	52.83	56.58	61.40	37.16	36.63	36.90			
Al_2O_3	16.93	15.84	16.17	14.70	13.67	15.74	15.24	15.34	4.64	5.13	4.89			
Fe_2O_3	1.25	1.47	1.34	.72	.19	1.76	3.86	3.43	13.29	13.47	13.38			
FeO	2.57	2.25	2.16	2.09	1.06	8.17	4.66	2.92	5.47	5.38	5.43			
MgO	1.35	1.34	1.24	.65	.26	4.87	3.21	1.94	28.65	28.34	28.50			
CaO	3.44	3.07	3.13	1.50	1.06	7.17	5.60	4.12	2.40	2.41	2.41			
Na_2O	3.65	3.61	3.61	3.00	3.05	3.26	3.58	3.73	.31	.28	.30			
K_2O	5.17	4.64	5.01	5.48	5.29	2.06	2.91	3.71	.04	.05	.05			
H_2O^+	.39	.97	.40	.64	.39	1.41	.78	.62	6.58	6.72	6.65			
H_2O^-	.03	.03	.01	.08	.04	.03	.09	.09	.62	.98	.80			
TiO_2	.47	.46	.42	.39	.15	1.64	1.78	1.23	.18	.18	.18			
P_2O_5	.14	.14	.13	.11	.04	.52	.75	.56	.02	.02	.02			
MnO	.07	.09	.06	.04	.02	.15	.11	.08	.25	.25	.25			
CO_2	.05	.33	.09	.10	.17	.04	.01	.23	.07	.07	.07			
Cr_2O_3									.19					
NiO									.06					
Cl	.02	.02	.02	.02	.01	.04	.04	.03	.09		.09			
F	.08	.08	.07	.04	.02	.22	.39	.40	.01		.01			
Subtotal	99.75	99.80	99.66	99.65	99.74	99.91	99.59	99.83	100.03		99.93			
Less O	.03	.03	.03	.02	.01	.10	.17	.18	.02		.02			
Total	99.72	99.77	99.63	99.63	99.73	99.81	99.42	99.65	100.01	99.91	99.91			
Analyst	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(3)				
Johannsen (1950) nomenclature.	Adamellite.	Adamellite.	Adamellite.	Adamellite.	Leuco-adamellite.	Meladacite.	Dacite.	Trachyandesite.	Kimberlite			Leuco quartz latite.	Quartz latite.	Dacite.
Rittmann (1952) nomenclature.						Olivine andesine trachybasalt.	Trachyandesite.	Quartz latite.	"Picritic basalt."	"Picritic basalt."	"Picritic basalt."			
Streckeisen (1967) nomenclature.	Monzonite.	Granite.	Monzonite.	Granite.	Granite.	Andesine quartz basalt.	Andesite.	Latite andesite.	Amphibole peridotite			Rhyodacite-quartz latite.	Rhyodacite-quartz latite.	Quartz andesite.
Irvine and Baragar (1971) nomenclature.						Calc-alkaline basalt.	Calc-alkaline andesite.	Calc-alkaline andesite.			"Picrite basalt."			

	Tertiary intrusives								
Field No. / Laboratory No.	226 D101279	226 D141162	226 (Avg.)	22 D101276	22 D141156	22 (Avg.)	19 D101275	19 D141155	19 (Avg.)
SiO_2	49.07	48.85	48.96	56.40	56.27	56.34	58.31	57.29	57.80
Al_2O_3	13.97	14.09	14.03	15.19	15.09	15.14	15.09	15.04	15.07
Fe_2O_3	3.73	3.85	3.79	5.41	5.37	5.39	2.47	2.45	2.46
FeO	5.05	4.96	5.01	2.13	2.16	2.15	3.43	3.45	3.44
MgO	8.18	8.03	8.11	5.37	5.39	5.38	4.74	4.64	4.69
CaO	7.92	7.91	7.92	6.39	6.48	6.44	5.82	6.22	6.02
Na_2O	3.47	3.36	3.42	4.28	4.19	4.24	4.17	4.12	4.15
K_2O	3.19	3.11	3.15	2.24	2.26	2.25	2.47	2.50	2.49
H_2O^+	2.12	2.07	2.10	.37	.42	.40	1.11	.84	.98
H_2O^-	.35	.59	.47	.30	.36	.33	.55	.80	.68
TiO_2	1.70	1.62	1.66	1.09	1.10	1.10	.93	.90	.92
P_2O_5	.67	.65	.66	.38	.38	.38	.33	.56	.45
MnO	.13	.13	.13	.11	.11	.11	.10	.10	.10
CO_2	.05	.08	.07	.01	.06	.04	.25	.56	.41
Cr_2O_3									
NiO									
Cl	.01		.01	.02		.02	.03		.03
F	.13		.13	.06		.06	.07		.07
Subtotal	99.74		99.62	99.75		99.77	99.87		99.76
Less O	.05		.05	.03		.03	.04		.04
Total	99.69	99.30	99.57	99.72	99.64	99.74	99.83	99.47	99.72
Analyst	(1)	(3)		(1)	(3)		(1)	(3)	
Johannsen (1950) nomenclature.	Trachyte andesite or Mugearite			Andesite			Dacite(?)		
Rittmann (1952) nomenclature.	Dark latite.	Dark latite.		Trachy-andesite.	Trachy-andesite.	Trachy-andesite.	Trachy-andesite.	Trachy-andesite.	Trachy-andesite.
Streckeisen (1967) nomenclature.	Latite			Latite-andesite			Latite-andesite		
Irvine and Baragar (1971) nomenclature.			Alkaline (potassic) trachybasalt.			Calc-alkaline andesite.			Calc-alkaline andesite.

MODAL (POINT-COUNT) ANALYSES, IN VOLUME PERCENT

[Petrographic data compiled by G. L. Snyder, 1970. Figures in reading material are volume percent also, except NORMS, which are weight percent.]

Field No.	528	521	522	527	523	526	347	437		157		525	520	551
Number of points.	1,518	3,016	2,998	2,905	2,897	2,813	3,001	2,797	2,270	6,440	2,243	3,003	2,887	2,195
Plagioclase	22.33 An_{12} altered to 0.13 sericite.	33.81 An_{16} altered to 5.20 sericite, 0.19 kaolin, and 0.51 coarse muscovite.	25.59 An_{10} altered to 3.37 sericite, 0.07 kaolin, and 0.45 coarse muscovite.	36.62 An_{21} altered to 5.84 sericite, 0.06 kaolin, and 0.13 coarse muscovite.	41.03 An_{23} altered to 7.72 sericite, 0.20 kaolin, 0.52 coarse muscovite, and 0.07 epidote.	33.58 An_{13} (An_{22} center to An_4 rim) altered to 2.89 sericite, 0.34 coarse muscovite, and 0.14 epidote.	29.50 An_{24} altered to 2.40 sericite and 0.51 coarse muscovite.	36.85 An_{23} altered to 3.18 sericite and 0.55 epidote.	43.13 An_{23} altered to 3.09 sericite and 0.48 epidote.	26.33 An_{23} altered to 3.70 sericite, <0.08 kaolin, and 0.25 epidote.	33.08 An_{27} altered to 1.62 sericite, <0.08 kaolin, and 0.33 epidote.	24.22 An_{24} altered to 4.59 sericite and 0.20 coarse muscovite.	41.10 An_{25} altered to 12.50 sericite, <0.07 coarse muscovite, 0.07 epidote, and 0.46 carbonate.	36.15 An_{26} altered to 14.71 sericite, 0.15 coarse muscovite, and 3.98 epidote.
Potassium feldspar	46.91 microcline.	30.15 microcline.	35.33 microcline.	28.71 microcline.	26.75 microcline.	32.15 microcline.	37.54 microcline.	25.17 microcline.	17.24 microcline.	24.01 microcline altered to 0.15 sericite.	25.50 microcline altered to <0.08 sericite.	52.49 microcline includes 0.20 carbonate veins and 0.06 muscovite veins.	23.68 microcline.	10.82 microcline.
Quartz	28.19	29.00	30.07	26.42	22.71	28.63	28.42	31.25	28.14	38.68	31.05	17.55	25.06	18.91
Muscovite	2.24	1.35	2.27	0.39	0.72	0.55	0.07	0	0	0	0	0	<0.07	0
Unknown (pods in biotite).	<0.07	0	<0.07	0	0	0	0	0	0	0	0	0	0	0.07
Prehnite (pods in biotite).	0	0	0	0	0	0.14 (plus veins in microcline).	0	0	0	0	0	0	0	0
Olivine	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthopyroxene	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinopyroxene	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphibole	0	0	0	0	0	0	0	0.07 green hornblende.	0.48 green hornblende.	<0.02 green hornblende.	0.17 green hornblende.	0	0	8.90 blue-green hornblende altered to 0.87 light green to colorless actinolite-tremolite.
Garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biotite	0.13	4.47 altered to 0.52 chlorite and <0.06 sphene.	4.71 altered to 1.44 chlorite and 0.13 sphene.	5.85 altered to 0.40 chlorite, <0.07 sphene, and 0.13 epidote.	6.98 altered to 1.66 chlorite and 0.27 sphene.	4.32 altered to 0.21 chlorite.	3.84 altered to 0.25 chlorite and 0.06 sphene.	4.60 altered to <0.07 chlorite.	6.67 altered to <0.08 chlorite, <0.08 sphene, and <0.08 epidote.	5.59 altered to 0.32 chlorite, 0.06 sphene, and 0.02 kaolin.	6.94 altered to 0.17 chlorite, <0.08 sphene, and <0.08 kaolin.	4.78 altered to 0.58 chlorite, 0.06 sphene, <0.06 muscovite, and 0.06 epidote.	7.26 altered to 1.25 chlorite and 0.66 sphene.	12.63 altered to 5.42 chlorite, 1.08 sphene, and 0.51 epidote.
Chlorite	0	0	0	0	0	0	0	0	0	<0.02	<0.08	0	0	0
Magnetite-ilmenite.	0.13	0.26	0.26	0.40	0.60	0.42	0.38	0.82	1.45	1.81	1.25	0.32	0.20	2.60
Pyrite	<0.07 altered to hematite.	<0.06 altered to hematite.	0	0	0	0	0	0.07 altered to hematite.	0.08 altered to <0.08 hematite.	0.13 altered to 0.11 hematite.	<0.08 altered to hematite.	0	0.07 altered to hematite.	<0.07 partly altered to hematite.
Sphene	0.07 altered to leucoxene.	0	0	0.47	0.27	0	0	0.69 altered to 0.14 leucoxene.	0.96 altered to <0.08 leucoxene.	2.25 altered to 0.29 leucoxene.	1.59 altered to 0.25 leucoxene.	0.39	1.58	2.96 (zoned).
Epidote	0	0.19	0.26	0.87	<0.07	0	0	0.21	1.37	0.61	0.17	<0.06	0.13	5.42
Allanite	0	<0.06	0.07	<0.07	0.47	0.07	0.19	<0.07	<0.08	0.06	<0.08	0.06	0.59	0.29
Apatite	0	0.06	<0.07	0.20	0.07	0.07	0.06	0.27	0.40	0.40	0.25	0.19	0.20	1.16
Zircon	0	<0.06	0	<0.07	0.07	<0.07	<0.06	<0.07	<0.08	0.11 (zoned)	<0.08	<0.06	0.13	0.07
Fluorite	0	0.71	1.44 (purple near allanite).	0.07	0.33	0.07	0	0	0	0	0	<0.06	0	0
Carbonate	0	0	0	<0.07	0	0	0	0	0.08	0	0	<0.06	0	0
Spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vein	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vesicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field No.	544	555	554	550	553	549	524	545	116			631	593	616
Number of points.	2,483	2,777	2,705	2,824	1,441	2,135	2,534	2,619	3,243			2,095	2,734	2,761
Plagioclase	39.33 An_{26} altered to 0.90 sericite.	34.03 An_{24} altered to 1.86 sericite.	28.00 An_{25} altered to 0.27 sericite, and 0.21 epidote.	27.52 An_{25} altered to 3.85 sericite, 0.28 kaolin, 0.42 coarse muscovite, and 0.33 epidote.	28.05 An_{15} altered to 0.56 sericite and 0.49 coarse muscovite.	39.16 An_{40} altered to 1.77 sericite and 0.14 epidote.	49.74 An_{28} (1.35 large phenocrysts, 44.71 small groundmass crystals, 1.30 large xenocrysts) 2.38 altered mainly to sericite and epidote.	61.62 An_{35} (5.03 large phenocrysts altered to 1.89 sericite, <0.07 large muscovite, 0.14 epidote; 56.59 small groundmass crystals altered to 0.84 sericite).	0.06 An_{78} nearly all altered to kaolin			29.99 An_{17} altered to 0.19 sericite and <0.09 kaolin.	35.25 An_{23} altered to 0.71 sericite.	53.59 An_{15} altered to 0.07 sericite and 0.13 coarse muscovite.
Potassium feldspar	26.45 orthoclase to microcline.	29.05 microcline.	40.44 microcline.	36.05 microcline.	29.42 microcline.	0	5.06 microcline (3.89 groundmass, 1.17 xenocrysts).	8.03 orthoclase	0			35.93 microcline.	20.11 microcline.	2.75 microcline.
Quartz	16.12	21.92	15.22	26.55	35.39	8.05	6.62	5.52	0			32.85	35.40	32.47
Muscovite	0	0	0	0	2.91	0	0	0.07	0			0.29	0.15	0
Unknown (pods in biotite).	0	0	0	0	<0.07	0	0	0	0			0	0	<0.07
Prehnite (pods in biotite).	0.07	0	0	0	0	0	0	0	0			0	0	0
Olivine	0	0	0	0	0	0	0	0	75.54 chrysolite ($Mg_{75}Fe_{25}$) altered to a mixture of yellowish serpentine and goethite (19.64) and then further to a mixture of chlorite (31.57) and magnetite (11.22).			0	0	0
Orthopyroxene	0	0	0	0	0	0	0	0	7.13 bronzite ($Mg_{82}Fe_{18}$) 3.24 in isolated grains in olivine, 3.89 in outermost corona rings between olivine and either diopside or pargasite(?), altered to serpentine or chlorite (0.59 and pargasite(?) (0.25).			0	0	0
Clinopyroxene	0	0	0	0	0	0	0	0	0.34 diopside ($Mg_{90}Fe_{10}$) <0.03 in isolated grains in olivine, 0.34 in discontinuous corona rings between bronzite and pargasite(?).			0	0	0
Amphibole	3.80 blue-green ferro-hasting-site.	3.35 blue-green ferro-hastingsite altered to 0.07 light-green actinolite-tremolite, <0.07 chlorite.	2.87 blue-green ferro-hasting-site.	0	0	27.83 blue-green hornblende to light-green actinolite.	8.44 (0.13 large brown hornblende; 8.25 small green hornblende) altered to 0.06 chlorite.	0	13.75 pargasite(?) ($Mg_{93}Fe_7$) 3.27 as a myrmekitic intergrowth with spinel in corona centers, 3.05 in a clear corona ring between the spinel myrmekite and either diopside or bronzite, 7.18 as isolated grains in olivine, 0.25 altered to chlorite.			0	0.21 green hornblende.	6.07 blue-green ferrohastingsite altered to 0.20 chlorite.
Garnet	0	0	0	0	0	0	0	0	0			0.66 altered to 0.19 chlorite.	0	0
Biotite	12.27 altered to 0.14 chlorite.	7.69 altered to 6.89 chlorite, 0.40 sphene, and 0.20 epidote.	9.16 altered to 0.27 chlorite and 0.07 sphene.	8.73 altered to 1.76 chlorite and 0.26 sphene.	4.09 altered to 0.62 chlorite and 0.14 sphene.	21.78 altered to 0.14 chlorite.	16.55 altered to 1.56 chlorite and 0.06 sphene.	15.30 altered to 0.19 chlorite.	0			0.09 altered to <0.09 chlorite.	7.49 altered to 0.34 chlorite.	3.82 altered to 0.27 chlorite.
Chlorite	0	0	0	0	0	0	0	0	0			0	0	0
Magnetite-ilmenite.	0.14	0.67	0.68	0.20	0.07	0.84	3.38	4.35	0.56			0.19	0.62	0.27
Pyrite	0	0	0.07	0	0	0	0.19 altered to 0.13 hematite.	0.25 altered to 0.06 hematite.	0.06 altered to hematite			0	0	0
Sphene	0.36	1.01 (zoned) altered to 0.07 leucoxene.	0.62 altered to 0.14 leucoxene.	0.27 altered to 0.20 leucoxene.	<0.07	0.70	5.56	2.46	0			0	0.28 altered to 0.07 leucoxene.	0.27
Epidote	1.01	1.34	2.19	0.07	0	0.28	1.75	1.10	0			<0.09	0.07	0.14
Allanite	<0.07	<0.07	0.21	0.20	0.07	0	0	0.26	0			<0.09	0.14	<0.07
Apatite	0.22	0.47	0.41	0.13	<0.07	0.84	0.19	1.04	0			0	0.14	0.20
Zircon	<0.07 (zoned).	<0.07	<0.07	0	<0.07 (monazite?).	0	0	0	0			<0.09	<0.07 (zoned).	<0.07
Fluorite	0	0	0	0	0	0	0	0	0			0	0.14	0.07
Carbonate	0.23	0.47 (some in veins).	0.13	0.28 (half in veins).	0	0.07	0.07	0	0			0	0	0.35
Spinel	0	0	0	0	0	0	0	0	2.28 green spinel or ceylonite (≈ $Mg_{80}Fe_{20}$), 1.63 in myrmekite with pargasite(?), and 0.65 in isolated grains.			0	0	0
Chromite	0	0	0	0	0	0	0	0	0.25			0	0	0
Vein	0	0	0	0	0	0	2.45 (0.13 chlorite, 1.94 epidote, 0.19 carbonate, 0.13 quartz, and 0.06 magnetite-ilmenite).	0	0.03 (chalcedony)			0	0	0
Vesicle	0	0	0	0	0	0	0	0	0			0	0	0
Glass	0	0	0	0	0	0	0	0	0			0	0	0

Field No.	226	22	19
Number of points.	1,442	1,482	1,447
Plagioclase and Potassium feldspar.	52.02 unresolved mesostasis consisting mainly of andesine microlites plus significant potassium feldspar and possibly minor nepheline. (NORM contains 46.76 An_{35}, 18.81 or, 2.90 ne, and 0.30 C).	57.42 consisting of: 1) 55.59 oligoclase or andesine groundmass lathes and 2) 1.83 albite or anorthoclase plates growing into vesicles and grading locally into groundmass. (NORM contains 51.86 An_{30}, 13.36 or.).	17.07 recognizable plagioclase, 2.07 as large, fretted An_{47} xenocrysts or unstable phenocrysts, 15.00 as groundmass crystals. 65.92 crystal mush where individual minerals not resolvable probably largely plagioclase. (NORM contains 50.74 An_{30}, 14.91 or.).
Quartz	1.73 xenocrystic material consisting of 1.45 quartz cores (altered to 0.62 sericite and <0.07 zeolite or albite) surrounded by either single reaction rims of clinopyroxene or triple reaction rims of 0.07 inner clinopyroxene, 0.21 medial aegirine and sanidine, and outer clinopyroxene. Outer clinopyroxene percentages given below.	0.30 cristobalite crystals projecting into cavities. (NORM contains 5.44 Q.).	0.90 large xenocrysts altered (melted) to 0.07 brown glass inner reaction rim and pyroxene outer reaction rim (percentage given below).
Muscovite.	0	0	0
Unknown (pods in biotite).	0	0	0
Prehnite (pods in biotite).	0	0	0
Olivine.	8.88 colorless olivine near chrysolite altered to 4.72 yellowish nontronite(?). (10.40 olivine in NORM.).	6.94 large olivines altered to 6.25 red iddingsite. (No olivine in NORM.).	0.42(?) completely altered to pyroxene 0.21 and magnetite-ilmenite 0.21. (No olivine in NORM.).
Orthopyroxene.	0	1.06 elongate crystals projecting into cavities, altered to 0.15 limonite on rims.	0
Clinopyroxene.	27.11 yellowish clinopyroxene with hourglass twins, 26.42 in groundmass, 0.69 as outer reaction rims around quartz xenocrysts.	29.86 (equidimensional)	4.70 consisting of 4.22 in groundmass and 0.48 as outer reaction rims around quartz xenocrysts.
Amphibole.	0	0	3.66 olive-brown hornblende, mostly separate crystals, some as rims on pyroxene.
Garnet.	0	0	0
Biotite.	3.88	0	0
Chlorite.	0	0	0
Magnetite-ilmenite.	6.24	4.27	0.48
Pyrite.	0	0	0
Sphene.	0	0	0
Epidote.	0	0.15	0
Allanite.	0	0	0
Apatite.	0	0	0.07
Zircon.	0	0	0
Fluorite.	0	0	0
Carbonate.	0	0	0
Spinel.	0	0	0
Chromite.	0	0	0
Vein.	0.14 (carbonate)	0	0
Vesicle.	0	11.40 (not included with mineral percentages).	0
Glass.	0	0	6.50

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSES, IN WEIGHT PERCENT

[Analysts: (1) J. C. Hamilton, 1-20-66; (2) G. W. Sears, Jr., 3-3-67; (3) B. Wayne Lanthorn, 1-8-70; (4) L. B. Riley, W. D. Goss, L. B. Breeden, Joseph Haffty, and Harriet Neiman, 12-8-69 (Pd, Pt, and Rh determined by method described by Haffty and Riley, 1968). Results, reported in weight percent, are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, and others, but results are reported arbitrarily as midpoints of these brackets, 1.0, 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 percent, or two brackets at 95 percent confidence. Symbols used are: 0, not detected or at limit of detection; L, detected, but below limit of determination or below value shown; (blank) = not looked for; *, usual limits of determinations do not apply owing to use of dilution techniques; +, Lithium present but could not be further evaluated at date of these analyses; <, less than, but usual detectabilities do not apply. Looked for but not found: Ag, As, Au, Bi, Cd, Eu, Ge, Hf, Hg, In, Pr, Re, Sb, Sm, Sn, Ta, Te, Th, Tl, U, W, and Zn]

Field No. / Laboratory No.	528 D101650	521 D101643	522 D101644	527 D101649	523 D101645	526 D101648	347 D101640	437 D101641	157 *D101278	525 D101647	520 D101642	551 D101655
B	0	0	0	0	0	0	0	0	0	0	0	0
Ba	.005	.1	.05	.2	.15	.2	.1	.2	.15	.2	.15	.2
Be	.0003	.0003	.0003	.0003	.0003	.0002	.0003	.0002	0	.0002	.0002	.00015
Ce	0	0	0	.02	.03	.02	0	.03	.02	.03	.02	.02
Co	0	0	0	.0005	.0005	.0007	.0003	.001	.001	.0005	.0005	.002
Cr	.0001	.0002	.0002	.001	.0005	.0005	.0005	.002	.002	.0007	.0015	.003
Cu	0	0	.0001	.0003	.0003	.0001	.0003	.001	.002	.0005	.0015	.007
Ga	.005	.003	.003	.003	.003	.003	.003	.003	.005	.003	.003	.002
La	0	.005	.005	.015	.015	.01	.007	.03	.01	.015	.015	.015
Li	0	+	+	+	+	+	+	+	0	0	+	0
Mo	0	0	0	0	0	0	0	.0003	0	.0003	0	0
Nb	.005	.001	.001	.001	.001	.001	.001	.001	.002	.001	.001	.001
Ni	.0003	0	0	.0003	0	.0003	0	.0007	.001	.0005	.0005	.003
Pb	.003	.005	.005	.003	.005	.003	.003	.002	.003	.002	.002	.001
Pd	0	0	0	0	0	0	0	0	0	0	0	0
Pt	0	0	0	0	0	0	0	0	0	0	0	0
Rh												
Sc	0	.0005	.0005	.0005	.0005	.0005	.0005	.001	.0007	.0005	.0005	.002
Sr	.002	.015	.007	.03	.02	.02	.015	.05	.05	.03	.03	.05
V	.001	.0015	.001	.005	.003	.003	.002	.01	.005	.007	.005	.015
Y	.002	.002	.005	.0015	.005	.001	.003	.002	.0015	.003	.0015	.003
Yb	.0002	.0003	.0005	.0001	.0003	.0001	.0003	.0002	.00015	.0003	.00015	<.0003
Zr	.007	.01	.003	.02	.03	.02	.015	.015	.01	.015	.015	.015
Looked for only when La or Ce found												
Nd	0	0	0	.007	.015	.007	0	.015	.015	.015	.007	.015
Analyst	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(2)	(2)

Field No. / Laboratory No.	544 D101651	555 D101658	554 D101657	550 D101654	553 D101656	549 D101653	524 D101646	545 D101652	116 *D101277	116 D141158	116 D141158	631	593	616
B	0	0	0	0	0	0	0	0	0	0				
Ba	.15	.1	.1	.2	.1	.1	.2	.2	.002	.005				
Be	.00015	.0002	.00015	.00015	.0001	.0001	.0002	.00015	0	0				
Ce	0	0	0	.03	.02	.015	.03	.03	0	0				
Co	.001	.0007	.0007	.0005	0	.003	.002	.001	.015	.015				
Cr	.003	.003	.002	.0007	.0001	.01	.007	.0015	.1	.1				
Cu	.0003	.0001	0	.0003	0	.003	.002	.005	.007	.01				
Ga	.002	.002	.002	.002	.002	.003	.003	.003	.001	.001				
La	.007	.003	.005	.02	.015	.01	.015	.02	0	0				
Li	0	0	0	0	0	0	0	0	0	0				
Mo	0	0	0	0	0	<.0005	<.0005	.0003	.0005	.001				
Nb	.001	.001	.001	.001	.001	.001	.001	.001	0	L.002				
Ni	.0007	.0007	.0007	.0003	0	.005	.003	.001	.03	.07				
Pb	.002	.002	.002	.002	.005	.0015	.001	.0015	0	0				
Pd	0	0	0	0	0	0	0	0	0	0	0.014			
Pt	0	0	0	0	0	0	0	0	0	0	0.014			
Rh											<.005			
Sc	.0015	.0007	.0007	.0005	0	.002	.002	.0015	.001	.0015				
Sr	.07	.05	.05	.03	.01	.05	.1	.07	.007	.007				
V	.007	.005	.005	.005	.0007	.02	.02	.01	.01	.01				
Y	.003	.003	.002	.002	.0015	.003	.003	.003	0	0				
Yb	.0003	.0003	.0002	.0002	.0001	<.0003	<.0003	.0002		.0002				
Zr	.007	.015	.007	.02	.01	.02	.03	.03	0	0				
Looked for only when La or Ce found														
Nd	.007	0	0	.015	.01	.007	.015	.015	0					
Analyst	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(3)	(4)			

Field No. / Laboratory No.	226 *D101279	226 D141162	226 D141162	22 *D101276	22 D141156	22 D141156	19 *D101275	19 D141155	19 D141155
B	0	L		0	0		0	L	
Ba	.5	.3		.15	.15		.2	.2	
Be	0	.0002		0	.00015		0	.00015	
Ce	.02	.03		0	.015		0	.015	
Co	.005	.005		.003	.005		.003	.003	
Cr	.03	.02		.03	.02		.02	.015	
Cu	.007	.005		.003	.003		.003	.003	
Ga	.005	.003		.005	.003		.003	.003	
La	.01	.015		.005	.007		.003	.007	
Li	0	0		0	0		0	0	
Mo	0	.0005		0	.0005		0	.0005	
Nb	.002	.002		.0015	.002		.0015	.0015	
Ni	.02	.03		.015	.015		.01	.015	
Pb	.003	.003		.002	.002		.003	.003	
Pd	0	0	<0.004	0	0	<0.004	0	0	<0.004
Pt	0	0	<.010	0	0	<.010	0	0	<.010
Rh			<.005			<.005			<.005
Sc	.0015	.002		.003	.002		.0015	.002	
Sr	.3	.2		.15	.15		.15	.15	
V	.03	.02		.015	.015		.015	.015	
Y	.002	.003		.002	.003		.0015	.002	
Yb		.0002		.00015	.0002		.00015	.0002	
Zr	.01	.02		.005	.015		.007	.015	
Looked for only when La or Ce found.									
Nd	.015	.015		.007	.007		.007	0	
Analyst.	(1)	(3)	(4)	(1)	(3)	(4)	(1)	(3)	(4)

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