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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

LARAMIDE-TERTIARY INTRUSIVE ROCKS OF COLORADO

By Edward J. Young

Prepared in cooperation with

The Colorado Mining Industrial Development Board

and the

Colorado Geological Survey

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

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Laramide-Tertiary intrusive rocks of Colorado

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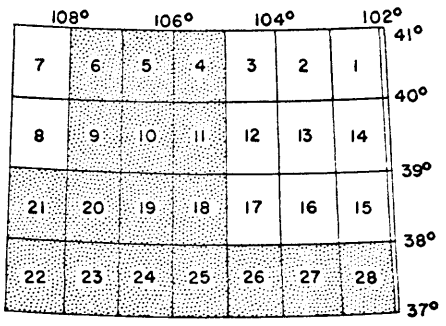
INTRODUCTION

The information gathered for this report includes the location of Laramide-Tertiary intrusive rocks in the State of Colorado, geologic age localities, mining districts, localities of chemically analyzed rock samples, and localities of igneous rock samples collected for this project. This information is shown on the State map of Colorado (scale 1:500,000) accompanying this report.

In order to handle data methodically, the State was divided into 1° quadrangles, as shown on the map below. Only those 17 quadrangles that



contain Laramide-Tertiary intrusive rocks are patterned. The following items of information are tabulated in this report only for those quadrangles:

A. Enumerated list of geologic age localities.

B. List of mining districts having a production greater than $10,000. These are subdivided according to their total value of production:

Class 1, more than 500 million dollars.

Class 2, 100-500 million dollars.

Class 3, 10-100 million dollars.

Class 4, 1-10 million dollars.

Class 5, 0.1 to 1 million dollars.

Class 6, less than 0.1 million dollars.

Mining districts having a production of less than $10,000 have been omitted.

Underlining of a metal indicates that it greatly predominates. Other metals are listed in descending order of production.

C. Tables of chemically analyzed rock samples, including locality and analytic data.

EXPLANATION FOR STATE MAP

	INTRUSIVE ROCK BODY
9-10.3	GEOLOGIC AGE LOCALITY--9 refers to citation 9 in the tabulation; 10.3 is the age in m.y.
15	CHEMICALLY ANALYZED ROCK LOCALITY
26-71	LOCALITY OF IGNEOUS ROCK SAMPLE COLLECTED IN CURRENT PROJECT
Beaver Creek -6	MINING DISTRICT--Number after mining district refers to total value of production: 1. More than 500 million dollars 2. 100 to 500 million dollars 3. 10 to 100 million dollars 4. 1 to 10 million dollars 5. 0.1 to 1 million dollars 6. 0.01 to 0.1 million dollars

GEOLOGIC AGE CLASSIFICATION

Ⓐ	Late Tertiary (8-12 m.y.)
Ⓑ	Middle Tertiary (25-40 m.y.)
Ⓒ	Laramide (broadened) (50-80 m.y.)

ROCK TYPES

		Felsic-mafic ratio[1/]
a	Alkali granite to extreme alkali granite	25 to >50
b	Granite (felsic)	15 to 25
c	Granodiorite to quartz monzonite (felsic intermediate)	7 to 15
d	Monzonite to quartz diorite (mafic intermediate)	3 to 7
e	Gabbro to diorite (mafic); ultramafic rocks (<1.4) included here also	1.4 to 3
f	Rocks undersaturated in silica (syenite, phonolite, and olivine-rich rocks)	Not applicable

[1/] Felsic-mafic ratio = $\frac{SiO_2 + K_2O + Na_2O}{FeO + Fe_2O_3 + MgO + CaO}$

NOTES:

Following samples are not shown on map: 93A, 168, 169, 170, 182, 219, 241, 324, 465.

Age dates for the following samples are not shown on map: 41, 42.

In the Spanish Peaks region more detailed sample locations are as follows:

418 is 500 feet E of 406
441 is 1/2 mile NW of 415
450 is 1/3 mile SW of 422
454 is just SW of 444
471 is just W of 466

BRIEF PRELIMINARY DISCUSSION OF RESULTS

The geologic time-scale of Holmes (1959) has been used for the Tertiary. He divided the Tertiary as follows:

Pleistocene

- - - - - - - - - - - - - 1.0 m.y.

Pliocene

- - - - - - - - - - - - - 11

Miocene

- - - - - - - - - - - - - 25

Oligocene

- - - - - - - - - - - - - 40

Eocene

- - - - - - - - - - - - - 60

Paleocene

- - - - - - - - - - - - - 70

Cretaceous

In a broad general classification three ages stand out for the Colorado Laramide-Tertiary intrusive rocks. They are a broadened "Laramide" age--50-80 m.y., an Oligocene age--25-40 m.y., and a Miocene-Pliocene border age of 8-12 m.y. Only a few ages deviate from the limits in this classification. Five are older than 80 m.y., but 2 of these, Nos. 107 and 109, are probably spuriously old. Five or six are in the 40 to 50 m.y. bracket, one is just less than 25 m.y. (No. 114), and one is a young dike of 5.3 m.y. (No. 124).

The Colorado Mineral Belt proper, as outlined by Tweto (1968) contains predominantly "Laramide" ages (50-80 m.y.) with several notable exceptions such as the Oligocene ages at Silverton, The Elk Mountains, Climax, Urad, and Montezuma. Treasure Mountain, near Marble, is unique in showing the youngest age in the Mineral Belt (Late Miocene).

Major ore deposits such as Leadville, Central City, Ralston Creek, and Aspen are associated with Laramide intrusives, and major ore deposits such as Climax, Cripple Creek, and Silverton are associated with Oligocene intrusives, but no important deposits have been found related to rocks of the 8-12 m.y. age group.

If one tries to correlate metals with time episodes, only Mo stands out as being peculiar to Oligocene time. The rest of the important metals, Au, Ag, Pb, Zn, and minor Cu show no such preference.

Batholiths and stocks generally are composed of intermediate rocks, quartz diorite, granodiorite, or quartz monzonite. Of 486 analyzed rocks, 9 are ultramafic, most of which occur as dikes. At the other extreme 10 are classed as extreme alkali rhyolite or extreme alkali granite. Representatives of this type rock are found at Hahns Peak (quad. 5), Specimen Mountain (quad. 4), and Treasure Mountain (quad. 9). Alkali rhyolites or alkali granites comprise 25 analyses.

The largest diversity of rock types is shown by the dikes, best studied and exemplified in the Spanish Peaks region. Dike compositions run the gamut from granite to basalt, and many are undersaturated in silica.

In compiling this report all available data have been incorporated without an attempt to evaluate their relative validity. For example, radiometric data on ages of individual intrusive rock bodies are included even where only one age date is available and the reliability of that age date may be in question. Such age dates should be evaluated cautiously. Some age dates of specific intrusive rock bodies, made on several different samples or by a variety of age dating methods, are discordant.

Laramide-Tertiary igneous rocks collected during project

T. S. - thin section completed.

R. R. - rapid rock analysis completed.

Sample No.	Quadrangle No.	Remarks
29-71	4	Float of hornblende porphyry found in NW 1/4 sec. 20, T. 9 N., R. 73 W.; no outcrop. T.S.
28-71	4	Float of altered cream-colored porphyry with flattened discoid quartz phenocrysts up to 1/2" across near Center sec. 19, T. 9 N., R. 73 W.; no outcrop. T.S. No outcrops of the three bodies outlined on sheet 4 were seen.
20-71	9	Satellitic pluton near Sopris pluton; light gray, fine to medium-grained (quartz monzonite?). T.S. R.R.
21-71	9	NE end of same pluton as 20; slightly pink, fine to medium-grained (quartz monzonite?). T.S. R.R.
22-71	9	Near mine about 600 feet NE of NE corner of sec. 34, T. 9 S., R. 88 W.; light gray, fine to medium-grained (quartz monzonite?). T.S. R.R.
23-71	10	Gray, medium-grained granodiorite in SW 1/4 sec. 24, T. 6 S., R. 83 W. T.S. R.R.
24-71	10	Similar to 23; SE corner sec. 14, T. 6 S., R. 83 W. T.S. R.R.
25-71	10	Similar to 23; near head of Devils Canyon. T.S. R.R.
26-71	11	Gray, medium to coarse-grained granodiorite 1.2 miles SW of Porcupine Peak; Montezuma stock. T.S. R.R.
27-71	11	Grayish pink, medium to coarse-grained (quartz monzonite?) 0.9 miles SSW of Cooper Mtn., Montezuma stock. T.S. R.R.
15-71	18	Gray, medium-grained (quartz diorite?) from quarry in SE 1/4 sec. 6, T. 50 N., R. 10 E.; Cameron Mtn. stock. T.S. R.R.
16-71	18	Rock similar to 15; from small quarry on Ute Trail road; Cameron Mtn. stock. T.S. R.R.
17-71	19	Light gray, very fine-grained rhyolite from talus at base of steep slopes of Tomichi Dome at 9925 feet. T.S. R.R.

Laramide-Tertiary igneous rocks collected during project (cont'd)

Sample No.	Quadrangle No.	Remarks
18-71	19	Gray, fine-grained porphyry S. of Doyleville. T.S. R.R.
19-71	20	Gray porphyry (quartz monzonite?) dike in NW 1/4 T. 14 S., R. 87 W.; E of East Beckwith Mtn., on road. T.S. R.R.
13-71	24	Porous altered porphyry, gray-white-brown near W edge of sec. 30, T. 39 N., R. 5 E. at about 9600 feet. T.S. R.R.
14-71	24	Pinkish, fine-grained (monzonite?) with hornblende phenocrysts in NE 1/4 sec. 25, T. 39 N., R. 4 E. near 9600 feet. T.S. R.R.
5-71	25	Float boulders at base of mountain (stock in SW 1/4 T. 33 N., R. 11 E.); light gray, medium-grained (granodiorite?) T.S.
6-71	25	Fresh rock from stock of 5-71. T.S. R.R.
7-71	25	Gray, medium-grained (monzonite?) from stock near W side of T. 33 N., R. 11 E. T.S. R.R.
8-71	25	Medium-grained (granite?); 1200 feet E of 7-71. T.S. R.R.
9-71	25	Light gray (granodiorite?) from stock in N 1/2 T. 33 N., R. 11 E. T.S. R.R.
10-71	25	Collected downhill from 9-71; fresher rock. T.S. R.R.
11-71	25	Dark, heavy, fine-grained basalt surrounding stock in SW 1/4 T. 34 N., R. 11 E.; extrusive. T.S.
12-71	25	Light gray, medium-grained granodiorite about 100 feet vertically above 11-71 and 400 feet SW. T.S. R.R.
4-71	25	Mount Mestas stock; light gray, very fine-grained (rhyolite?) T.S. R.R.
3-71	26	Light gray, fine-grained (granodiorite?) from Black Hills stock. T.S. R.R.
1-71	28	Light gray hornblende porphyry; Two Buttes (stock?). T.S. R.R.
2-71	28	Dark gray, heavy, fine-grained, mafic rock about 1000 feet SE of 1-71 (mafic differentiate of 1-71?). T.S. R.R.

TABLE OF CHEMICALLY ANALYZED INTRUSIVE ROCKS

Felsic-mafic index has been used by Segerstrom and Young (in press) as a workable and facile indicator of rock composition (and, therefore, rock type). In the case of the under-saturated rocks the index merely yields an equivalent name. For example, a phonolite yielding a felsic-mafic index of 4.0 may be termed a latite equivalent as regards chemical composition. The actual breakdown of names and felsic-mafic indices or ratios is as follows:

Rock type	Felsic-mafic ratio
Extreme alkali granite	>50
Alkali granite (alkali rhyolite)	25-50
Granite (rhyolite)	15-25
Quartz monzonite (quartz latite)	10-15
Granodiorite (dacite)	7-10
Quartz diorite (quartz andesite)	5- 7
Monzonite (latite)	3- 5
Diorite (andesite)	2.1- 3
Gabbro (basalt)	1.4- 2.1
Ultramafics	<1.4

Specific gravity is bulk specific gravity, unless indicated otherwise as powder density.

Table of chemically analyzed intrusive rocks collected in current project.

Sample number (location identified on map with this number, e.g. (1-71))	1-71	2-71	3-71	4-71	6-71	7-71	8-71
Location and rock form (dike, etc.)	Two Buttes, Prowers County, stock?	Two Buttes, Prowers County, stock?	Black Hills, Huerfano County, stock	Mt. Mestas, Huerfano County, stock	Pinyon Hills, Conejos County, stock	Pinyon Hills, Conejos County, stock	Pinyon Hills, Conejos County, stock
Analyst	1/	1/	1/	1/	1/	1/	1/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nephaline; Ol-olivine	N Ol - 2.03	N Ne - 0.39 N Ol - 10.47	N Ne - 2.83 N Ol - 0.77	NQ - 21.93	NQ - 14.73	NQ - 5.64	NQ - 10.66
Texture; P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	F	F	M	M	M
Felsic-mafic index	3.10	2.41	3.22	34.2	7.02	5.45	6.73
Rock name according to felsic-mafic index	Monzonite (equivalent)	Diorite (equivalent)	Monzonite (equivalent)	Alkali rhyolite	Granodiorite	Quartz diorite	Quartz diorite

1/ Rapid rock analyses by P. Elmore, J. Kelsey, H. Smith, R. Moore, and J. Glenn.

Table of chemically analyzed intrusive rocks collected in current project.

Sample number (location identified on map with this number, e.g.(1-71))	9-71	10-71	12-71	13-71	14-71	15-71	16-71
Location and rock form (dike, etc.)	Pinyon Hills, Conejos County, stock	Pinyon Hills, Conejos County, stock	Pinyon Hills, Conejos County, stock	9 miles SW of Del Norte, stock	9 miles SW of Del Norte, stock	Cameron Mountain, stock	Cameron Mountain, stock
Analyst	1/	1/	1/	1/	1/	1/	1/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nephaline; Ol-olivine	NQ - 1170	NQ - 11.15	NQ - 5.32	NQ - 21.87	NQ - 18.21	NQ - 12.44	NQ - 21.96
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	M	P	F	M	M
Felsic-mafic index	7.18	8.04	4.87	5.47	4.56	3.50	4.54
Rock name according to felsic-mafic index	Granodiorite	Granodiorite	Monzonite	Quartz diorite	Monzonite	Monzonite	Monzonite

1/ Rapid rock analyses by P. Elmore, J. Kelsey, H. Smith, R. Moore, and J. Glenn.

Table of chemically analyzed intrusive rocks collected in current project.

Sample number (location identified on map with this number, e.g.(1-71))	17-71	18-71	19-71	20-71	21-71	22-71	23-71
Location and rock form (dike, etc.)	Tomichi Dome stock?	9 miles S of Tomichi Dome stock	9 miles E of East Beckwith Mountain, dike	8 miles WSW of Sopris Peak, stock	5 miles WSW of Sopris Peak, stock	4 miles WSW of Sopris Peak, stock	1/2 mile NE of Fulford, stock
Analyst	1/	1/	1/	1/	1/	1/	1/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nephaline; Ol-olivine	NQ - 33.90	NQ - 10.08	NQ - 21.50	NQ - 26.54	NQ - 23.72	NQ - 21.30	NQ - 21.69
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	F	F	M	M
Felsic-mafic index	75.1	3.58	7.34	6.78	7.47	10.3	7.02
Rock name according to felsic-mafic index	Extreme alkali rhyolite	Monzonite	Granodiorite	Quartz diorite	Granodiorite	Quartz monzonite	Granodiorite

1/ Rapid rock analyses by P. Elmore, J. Kelsey, H. Smith, R. Moore, and J. Glenn.

Table of chemically analyzed intrusive rocks collected in current project.

Sample number (location identified on map with this number e.g.(1-71))	24-71	25-71	26-71	27-71			
Location and rock form (dike, etc.)	2 miles N of Fulford, stock	5 miles N of Fulford, stock	6 miles WNW of Montezuma, stock	4 miles NE of Montezuma, stock			
Analyst	1/	1/	1/	1/			
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nephaline; Ol-olivine	NQ - 29.10	NQ - 23.25	NQ - 23.50	NQ - 25.27			
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M	M	M-C	M-C			
Felsic-mafic index	15.2	7.55	9.62	10.9			
Rock name according to felsic-mafic index	Granite	Granodiorite	Granodiorite	Quartz monzonite			

1/ Rapid rock analyses by P. Elmore, J. Kelsey, H. Smith, R. Moore, and J. Glenn.

Table of chemically analyzed intrusive rocks collected in current project.

Sample No.	1-71	2-71	3-71	4-71	6-71	7-71	8-71
SiO_2	54.4	52.4	51.5	73.1	63.8	58.9	61.4
Al_2O_3	13.0	12.3	15.6	14.4	15.3	16.2	15.6
Fe_2O_3	4.4	3.3	5.2	0.43	2.5	3.8	3.3
FeO	2.4	4.1	3.2	0.52	1.9	2.3	2.1
MgO	6.4	9.0	3.0	0.14	1.9	2.2	1.9
CaO	7.1	8.3	7.2	1.3	4.0	4.2	3.2
Na_2O	2.8	2.3	4.8	4.2	3.9	4.5	4.0
K_2O	5.7	4.8	3.5	4.5	4.6	4.7	5.2
H_2O^-	0.49	0.09	0.23	0.09	0.32	0.50	0.31
H_2O^+	1.3	0.86	3.1	0.44	0.31	0.90	0.65
TiO_2	0.94	1.1	1.2	0.08	0.72	1.00	0.97
P_2O_5	0.42	0.37	0.76	0.02	0.34	0.61	0.42
MnO	0.13	0.14	0.20	0.05	0.09	0.10	0.08
CO_2	0.51	<0.05	0.38	<0.05	0.24	<0.05	<0.05
	100	99	100	99	100	100	99

Table of chemically analyzed intrusive rocks collected in current project.

Sample No.	9-71	10-71	12-71	13-71	14-71	15-71	16-71
SiO_2	62.4	63.1	57.9	62.2	59.3	57.6	62.4
Al_2O_3	16.5	16.3	16.6	16.2	15.4	15.6	15.4
Fe_2O_3	2.6	2.8	2.7	6.0	4.6	3.6	3.4
FeO	2.1	1.7	3.6	0.36	0.48	4.9	3.5
MgO	1.6	1.4	2.6	1.3	1.7	3.0	2.1
CaO	3.6	3.1	4.7	4.8	7.5	6.6	5.9
Na_2O	4.4	4.7	4.2	3.3	3.3	3.1	2.9
K_2O	4.3	4.6	4.1	2.6	2.5	2.6	2.3
H_2O^-	0.33	0.23	0.21	1.0	0.69	0.10	0.18
H_2O^+	0.60	0.53	0.77	1.1	1.2	0.42	0.66
TiO_2	0.78	0.72	1.1	0.68	0.64	1.00	0.68
P_2O_5	0.39	0.33	0.53	0.37	0.35	0.68	0.50
MnO	0.10	0.09	0.10	.10	0.29	0.18	0.10
CO_2	<0.05	<0.05	<0.05	<0.05	1.4	<0.05	<0.05
	100	100	99	100	99	99	100

Table of chemically analyzed intrusive rocks collected in current project.

Sample No.	17-71	18-71	19-71	20-71	21-71	22-71	23-71
SiO_2	75.7	56.3	64.9	65.1	65.7	67.1	63.1
Al_2O_3	13.3	15.7	15.5	15.5	14.8	15.8	16.7
Fe_2O_3	0.26	4.8	2.4	2.9	3.1	2.2	0.61
FeO	0.28	2.9	2.1	2.2	2.1	1.6	3.7
MgO	0.12	3.4	1.3	1.0	1.1	0.79	1.5
CaO	0.46	6.4	4.0	4.4	3.4	2.7	4.1
Na_2O	4.10	3.6	3.7	3.7	5.4	5.1	3.1
K_2O	4.4	2.8	3.3	2.3	1.4	2.6	3.4
H_2O^-	0.13	0.74	0.19	0.08	0.09	0.19	0.24
H_2O^+	0.63	0.66	0.60	1.1	0.62	0.71	1.7
TiO_2	0.11	1.00	0.51	0.35	0.48	0.46	0.54
P_2O_5	0.02	0.56	0.33	0.37	0.34	0.32	0.42
MnO	0.10	0.14	0.12	0.10	0.10	0.05	0.12
CO_2	<0.05	0.35	0.26	0.80	1.1	<0.05	0.74
	100	99	99	100	100	100	100

Table of chemically analyzed intrusive rocks collected in current project.

Sample No.	24-71	25-71	26-71	27-71			
SiO_2	69.6	64.7	67.5	67.8			
Al_2O_3	15.4	16.2	15.5	15.2			
Fe_2O_3	1.3	2.5	2.2	2.1			
FeO	0.92	2.0	1.6	1.5			
MgO	0.64	1.2	0.72	0.61			
CaO	2.2	3.8	3.3	2.7			
Na_2O	3.3	2.8	3.6	3.4			
K_2O	4.2	4.2	4.1	4.4			
H_2O^-	0.54	0.40	0.08	0.13			
H_2O^+	0.76	1.0	0.26	1.0			
TiO_2	0.26	0.59	0.49	0.44			
P_2O_5	0.15	0.42	0.35	0.32			
MnO	0.10	0.09	0.14	0.08			
CO_2	<0.05	<0.05	<0.05	<0.05			
	99	100	100	100			

Table of spectrographic analyses of intrusive rocks collected in current project (in ppm).

Sample No.	1-71	2-71	3-71	4-71	6-71	7-71	8-71	9-71	10-71	12-71	13-71	14-71	15-71
Ba	3000	2000	2000	2000	2000	5000	2000	3000	1500	2000	1500	1500	1500
Be	N	N	N	N	2	2	5	1	3	3	N	N	N
Ce	300	N[1/]	N	N	N	N	N	N	N	N	N	N	N
Co	30	70	20	N	15	20	15	15	15	20	15	15	20
Cr	70	1500	15	50	100	50	70	70	50	15	7	7	30
Cu	20	150	50	7	70	50	100	50	50	150	20	15	70
Ga	15	15	20	20	20	20	20	20	10	10	10	10	15
La	70	70	70	N	70	70	150	100	50	70	N	N	N
Mn	700	1000	1500	50	50	70	50	50	200	500	500	1500	1000
Nb	N	N	30	10	10	10	20	N	N	N	N	N	N
Ni	300	300	L[2/]	N	70	L	30	L	30	50	L	L	30
Pb	N	N	N	20	30	15	30	30	30	30	N	N	N
Sc	30	50	20	N	15	15	15	15	7	10	15	15	20
Sr	500	1000	1500	300	700	1000	700	1000	1000	1000	1000	700	700
V	300	300	500	N	200	500	200	200	100	150	100	100	200
Y	15	20	30	N	15	20	30	15	L	L	L	L	3
Yb	3	3	3	N	3	3	5	3	2	2	3	2	3
Zr	150	150	150	100	200	150	500	200	200	200	100	100	150

1/ N = not detected. 2/ L = Detected, but below limit of determination.

Also looked for, but not found: Ag, As, Au, B, Bi, Cd, Eu, Ge, Hf, In, Li, Mo, Nd, Pd, Pr, Pt, Re, Sb, Sn, Ta, Te, Th, Tl, U, W, Zn.

Table of spectrographic analyses of intrusive rocks collected in current project (in ppm).

Sample No.	16-71	17-71	18-71	19-71	20-71	21-71	22-71	23-71	24-71	25-71	26-71	27-71	
Ba	700	100	1500	1000	1000	1000	1500	1500	1500	1500	1000	1500	
Be	N	N	N	N	N	N	N	N	N	N	N	N	
Ce	N	N	N	N	N	N	N	N	N	N	N	N	
Co	15	N	20	10	N	N	10	10	N	N	N	N	
Cr	20	15	70	7	5	5	5	7	20	L	7	7	
Cu	20	3	700	50	15	5	7	7	7	3	5	10	
Ga	10	20	10	7	7	10	10	7	7	7	7	7	
La	N	N	N	70	N	100	50	50	150	N	150	N	
Mn	700	700	700	700	500	300	150	700	200	300	300	200	
Nb	N	30	N	N	N	N	N	N	N	N	10	10	
Ni	L	N	30	L	N	N	N	L	L	N	N	N	
Pb	N	30	N	30	N	N	N	30	N	N	N	20	
Sc	15	10	15	10	10	10	10	10	10	10	10	7	
Sr	700	10	1000	700	500	700	700	1000	700	700	700	700	
V	150	N	20	70	50	70	70	70	10	50	70	70	
Y	3	3	L	L	L	L	L	L	L	L	L	L	
Yb	3	3	3	3	3	3	3	3	3	5	3	3	
Zr	150	30	150	150	150	150	150	150	150	200	70	200	

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[The numbers in parentheses following a specific reference--for example, (9, 10, 19, 20)--refer to the specific one-degree quadrangles for which that particular reference is pertinent.]

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1-degree quadrangle No. 4

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
1	Middle of diorite-monzonite stock in T. 1 N., R. 72 W., near Sunset	K-Ar	Hornblende	44	Carl Hedge, oral commun., Nov. 7, 1970
2	Near Jamestown, granodiorite stock	K-Ar	Hornblende	78	Gast and others (1966)
3	Lead Mountain, granodiorite stock	K-Ar	Biotite	28	Corbett (1968)
4	Audubon-Albion contact zone	K-Ar	Biotite	66.3	Hart (1964) (average of 5 ages ranging from 63 to 70)

For Nos. 62, 63, 67, and 68 see data for quadrangle 11.

Mining Districts

Mining district	Class	Metals	Type of ore deposit
GOLD HILL--includes camps of Sunshine, Salina, as well as the greater part of what was formerly known as the Sugarloaf District.	3	Au, Ag Pb, Zn, Cu, W (Ni, Co)	Vein fissures in Laramide breccia reefs
WARD--includes mines around Sunset and Copper Rock.	4	Au, Ag Pb (Cu, Zn, W)	Laramide vein fissures
JAMESTOWN	4	Au, Ag Pb, Fluorspar	Laramide vein fissures. Fluorspar in breccia zones and veins

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	1	2	3	4	5	6	7
Original author's identifying number	-	-	-	-	-	8	35
Location and rock form (dike, etc.)	Valmont Dike	Flag-staff Hill, dike.	Mount Sugar Loaf, laccolithic cone?	West Sugar Loaf Mountain, dike.	Near Sunset, stock?	Sugarloaf exposure. Iron Dike.	Fall River Road exposure. Iron Dike.
Analyst	L. G. Eakins	C. S. Palmer and Henry Fulton	Barry Hogarty	J. C. Blake	R. S. Breed	E. E. Wahlstrom	E. E. Wahlstrom
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	NQ - 7-8%	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	M	M
Original author's rock name	doleritic basalt	quartz porphyry	andesite	mica andesite	trachyte	diabase	diabase
Felsic-mafic index	2.28	9.15	8.67	5.28	20.7	2.03	1.97
Rock name according to felsic-mafic index	andesite	dacite	dacite	quartz andesite	rhyolite	gabbro	gabbro
Specific gravity	-	2.43	2.568	2.601	2.58	-	-
Reference	Emmons and others (1896, p. 301)	Palmer and Fulton (1890)	Hogarty (1899)	Blake (1901)	Breed (1899)	Wahlstrom (1956)	Wahlstrom (1956)

1-degree quadrangle No. 4

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	8	9	10	11	12	13	13A
Original author's identifying number	40	52	-	12	13	14	
Location and rock form (dike, etc.)	Trail Ridge Road exposure. Iron Dike.	Trail Ridge Road exposure. Iron Dike.	Ward, dike.	Specimen Mountain Plug.	Specimen Mountain Plug.	Specimen Mountain Plug.	East of Sugar Loaf. Iron Dike.
Analyst	E. E. Wahlstrom	E. E. Wahlstrom	C. S. Palmer and W. B. Stoddard	E. E. Wahlstrom	E. E. Wahlstrom	E. E. Wahlstrom	L. G. Eakins
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	NQ - 35%	NQ - 15.66%	NQ - 40.26%	NQ - 40.62%	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M	M	P	P	P	P	-
Original author's rock name	diabase	diabase	felsite porphyrite	rhyolite	rhyolite	rhyolite	diabase
Felsic-mafic index	1.97	2.00	6.12	26.0	59.2	38.5	2.26
Rock name according to felsic-mafic index	gabbro	gabbro	quartz andesite	alkali rhyolite	extreme alkali rhyolite	alkali rhyolite	diorite
Specific gravity	-	-	-	-	-	-	3.027 (23°)
Reference	Wahlstrom (1956)	Wahlstrom (1956)	Palmer and Stoddard (1895)	Wahlstrom (1944)	Wahlstrom (1944)	Wahlstrom (1944)	Clarke (1904)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	13B	13C	13D	14			
Original author's identifying number	-	-	-	137			
Location and rock form (dike, etc.)	0.9 miles southeast of Sugarloaf Mountain, dike.	Yellow Pine Mine, fifth level, dike.	Yellow Pine Mine, fifth level, intrusive breccia.	Mount Lulu, plug.			
Analyst	J. G. Fairchild	J. G. Fairchild	J. G. Fairchild	Takuya Imai			
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	contains olivine	-	-	NQ - 22.98%			
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	Breccia	P			
Original author's rock name	limburgite	biotite latite	biotite latite	rhyolite			
Felsic-mafic index	1.12	5.79	13.3	22.6			
Rock name according to felsic-mafic index	ultramafic	quartz andesite	quartz latite	rhyolite			
Specific gravity	-	-	-	-			
Reference	Lovering and Tweto (1953, p. 19)	Lovering and Tweto (1953, p. 19)	Lovering and Tweto (1953, p. 19)	Corbett (1968)			

1-degree quadrangle No. 4

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	1	2	3	4 1/	5 2/	6	7
SiO_2	48.25	67.20	63.64	57.55	64.82	48.75	49.05
Al_2O_3	16.73	14.95	18.05	15.52	17.71	17.64	16.32
Fe_2O_3	3.99	(5.19	2.14	2.68	1.95	1.51	2.78
FeO	6.28	(	1.80	2.48	0.44	11.64	11.49
MgO	5.77	2.39	1.01	1.37	0.22	5.02	4.56
CaO	8.32	0.30	3.36	5.85	1.03	8.34	8.92
Na_2O	3.24	4.00	3.65	4.90	4.37	3.80	4.11
K_2O	4.08	0.89	4.73	2.95	6.09	1.32	1.53
H_2O^-	(	(	(	(	(	0.18	0.18
H_2O^+	(1.72	(2.13	(1.07	(2.15	(1.17	0.42	0.50
TiO_2	0.89	-	0.43	0.24	0.20	0.74	0.73
P_2O_5	0.68	-	0.18	0.83	0.05	0.41	0.41
MnO	-	-	0.46	0.10	0.10	0.15	0.14
CO_2	-	0.40	-	3.57	1.32	tr	tr
BaO	0.013	-	-	-	0.10	-	-
SrO	-	-	-	-	tr?	-	-
SO_3	0.12	-	-	(	none	-	-
S	-	-	-	(tr	-	-	-
Cl	0.08	-	-	tr	0.23	-	-
F	-	-	-	-	-	-	-
	100.163	97.45	100.52	100.21	99.80	99.92	100.72

1/ Also contains ZrO_2 - tr, and V_2O_5 - .02

2/ Also contains ZrO_2 - .04. Less O_2 for Cl .04

1-degree quadrangle No. 4

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	8	9	10[3/]	11	12	13	13A
SiO_2	48.11	48.71	63.85	68.93	77.83	77.35	48.93
Al_2O_3	16.35	16.47	15.44	15.69	11.71	11.83	20.99
Fe_2O_3	5.88	2.90	3.14	1.56	0.88	1.11	2.02
FeO	9.03	12.01	1.66	0.18	0.37	0.48	9.36
MgO	4.27	4.47	1.16	0.15	0.03	0.19	4.39
CaO	8.55	7.85	4.81	1.18	0.17	0.43	8.03
Na_2O	5.39	4.60	1.90	4.66	3.31	3.11	3.06
K_2O	1.13	1.17	0.08	6.35	4.67	4.65	1.80
H_2O^-	0.22	0.15	0.00	(	(	(	(
H_2O^+	0.22	0.63	7.45	(0.51	(0.57	(1.30	(1.18
TiO_2	0.73	0.74	-	0.34	0.07	.12	-
P_2O_5	0.44	0.53	-	-	-	-	0.15
MnO	0.10	0.19	-	-	-	-	0.31
CO_2	tr	none	tr	none	none	none	-
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	tr
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.42	100.42	100.47	99.55	99.61	100.57	100.22

3/ Also contains sulphides - 0.98

1-degree quadrangle No. 4

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	13B	13C[4/]	13D[5/]	14			
SiO_2	37.83	57.65	68.23	69.7			
Al_2O_3	8.52	15.64	13.59	15.3			
Fe_2O_3	6.48	3.08	1.95	1.4			
FeO	5.52	2.78	0.98	0.4			
MgO	11.44	1.17	1.39	0.8			
CaO	13.80	4.33	1.11	0.9			
Na_2O	2.82	3.80	0.18	4.0			
K_2O	1.15	4.28	3.74	5.4			
H_2O^-	1.24	1.44	3.59	(			
H_2O^+	2.56	1.68	3.48	(1.7 (			
TiO_2	1.35	0.75	0.43	0.3			
P_2O_5	1.02	0.45	0.16	0.2			
MnO	0.21	0.11	0.05	-			
CO_2	6.08	3.31	1.20	-			
BaO	-	0.11	0.03	-			
SrO	-	-	-	-			
SO_3	-	-	-	-			
S	-	-	-	-			
Cl	-	-	-	-			
F	-	-	-	-			
	100.02	100.58	100.11	100.1			

4/ Also contains Au - tr.

5/ Also contains Au - 0.01 oz/ton

1-degree quadrangle No. 5

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference remarks
5	Center of sec. 23, T. 23 N., R. 79 W., rhyolitic welded tuff	K-Ar	Sanidine	33±3	Izett (1968), extrusive rock
6	30 miles north of Steamboat Springs, Hahns Peak rhyolite porphyry float	K-Ar	Biotite	9.5±0.3	McDowell (1966)
7	Quartz andesite dike intruding Hahns Peak porphyry	K-Ar	Biotite	10.7±0.4	Segerstrom and Young (in press)
8	Same rock as 7	K-Ar	Sanidine	11.5±0.4	do.
9	Dacite porphyry dike in sec. 35,T. 11 N., R. 85 W.	K-Ar	Sanidine	10.3±0.3	do.
10	Hahns Peak rhyolite porphyry	K-Ar	Sanidine	10.0±0.3	do.

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Northgate	4	Fluorite	Veins of late Tertiary(?) age in sedimentary and plutonic rocks.
Hahns Peak	6	Au, Ag, Pb, Zn	Placer and disseminations and minor veins in Late Tertiary porphyry.

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	14A	14B	14C	15	16	17	18
Original author's identifying number	14	19	20	25	37	38	4
Location and rock form (dike, etc.)	Sec. 28, T. 3 N., R. 78 W., plug.	Sec.20,T. 3 N., R. 78 W., dike	Sec. 21, T. 1 N., R. 78 W., dike.	NE 1/4 sec. 2, T. 6 N.,R. 82 W., sill.	NW 1/4 sec. 23, T. 6 N.,R. 82 W. plug?	NE 1/4 sec. 27, T. 6 N., R. 82 W. plug?	SW 1/4 sec. 21, T. 5 N., R. 80 W. laccolith?
Analyst	6/	6/	6/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 7.5	N Ol - 2.2	NQ - 4.8	N Ne - 2.0 N Ol - 4.2	NQ - 3.9	NQ - 7.1	NQ - 25.6
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	F	F	F	F	F
Original author's rock name	trachyandesite	basalt	basalt	latite	olivine trachyandesite	labrodorite andesite	rhyolite
Felsic-mafic index	4.39	2.03	2.55	4.16	2.27	2.28	24.6
Rock name according to felsic-mafic index	latite	basalt	andesite	latite	andesite	andesite	rhyolite
Specific gravity	-	-	2.85 powder density	-	-	-	-
Reference	Izett (1968)	Izett (1968)	Izett (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

6/ Rapid rock analyses by P. Elmore, S. Botts, G. Chloe, L. Artis, and H. Smith.
7/ Rapid rock analyses by P. Elmore, I. Barlow, S. Botts, L. Artis, and H. Smith.

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	19	20	21	22	23	24	25
Original author's identifying number	11	13	19	30	34	41	42
Location and rock form (dike, etc.)	SE 1/4 sec. 23, T. 5 N., R. 82 W. dike.	NE 1/4 sec. 22, T. 5 N., R. 82 W. dike.	SE 1/4 sec. 21, T. 5 N., R. 82 W. sill?	NW 1/4 sec. 19, T. 5 N., R. 81 W. dike?	NE 1/4 sec. 20, T. 5 N., R. 81 W. irregular body.	SW 1/4 sec. 35, T. 6 N., R. 82 W. dike?	NW 1/4 sec. 4, T. 5 N.,R.82 W., plug
Analyst	7/	7/	7/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 12.9	NQ - 11.8	NQ - 8.4	NQ - 3.8	NQ - 1.5	NQ - 0.2	NQ - 2.9
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	F	F	F	F	F
Original author's rock name	rhyodacite	rhyodacite	olivine trachyte	trachyandesite	trachyandesite	andesine basalt	olivine andesine trachybasalt
Felsic-mafic index	5.59	4.67	4.24	3.78	3.36	2.17	2.40
Rock name according to felsic-mafic index	quartz andesite	latite	latite	latite	latite	andesite	andesite
Specific gravity	-	-	-	-	-	-	-
Reference	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	26	27	28	29	30	31	32
Original author's identifying number	45	49	50	51	1	2	3
Location and rock form (dike, etc.)	NE 1/4 sec. 5, T. 5 N.,R. 81 W., plug.	NE 1/4 sec. 6, T. 5 N.,R. 81 W., plug.	NW 1/4 sec.17, T. 6 N.,R. 81 W., dike.	NW 1/4 sec.20, T. 5 N.,R. 81 W., dike.	NW 1/4 sec. 6, T. 4 N.,R. 81 W., sill?	NW 1/4 sec. 9, T 4 N.,R. 81 W., laccolith?	NE 1/4 sec. 25, T. 5 N.,R.81 W., plug?
Analyst	7/	7/	7/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 0.9	N Ne - 4.9 N Ol - 10.8	N Ne - 1.3 N Ol - 15.5	N Ne - 2.6 N Ol - 8.9	NQ - 34.9	NQ - 32.0	NQ - 30.3
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	P	F	F	F
Original author's rock name	olivine andesine trachybasalt	olivine andesine trachybasalt	olivine trachybasalt	dark leucite basanite	rhyolite	rhyolite	rhyolite
Felsic-mafic index	2.10	1.68	1.78	1.55	61.4	70.5	29.8
Rock name according to felsic-mafic index	andesite or basalt	basalt	basalt	basalt	extreme alkali rhyolite	extreme alkali rhyolite	alkali rhyolite
Specific gravity	-	-	-	-	-	-	-
Reference	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	33	34	35	36	37	38	39
Original author's identifying number	5	7	8	9	10	14	15
Location and rock form (dike, etc.)	SE 1/4 sec. 26, T. 5 N., R. 82 W., dike?	SE 1/4 sec. 23 T. 4 N.,R. 81 W., dike.	SW 1/4 sec. 8, T. 4 N.,R. 81 W., plug.	SE 1/4 sec. 8, T. 4 N., R. 81 W., plug.	NW 1/4 sec. 17, T. 4 N., R. 81 W., plug.	NE 1/4 sec. 30, T. 5 N., R. 81 W., sill.	SW 1/4 sec. 26, T. 5 N., R. 82 W., dike.
Analyst	7/	7/	7/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 7.8	NQ - 19.2	NQ - 13.3	NQ - 13.1	NQ - 11.4	NQ - 11.6	NQ - 15
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	P	P	P	F	F
Original author's rock name	dark rhyolite	quartz latite	dark quartz latite	rhyodacite	dark quartz latite	rhyodacite	dark rhyodacite
Felsic-mafic index	3.76	12.2	5.60	5.78	5.17	5.01	4.47
Rock name according to felsic-mafic index	latite	quartz latite	quartz andesite	quartz andesite	quartz andesite	quartz andesite	latite
Specific gravity	-	-	-	-	-	-	-
Reference	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

1-degree quadrangle No.5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	40	41	42	43	44	45	46
Original author's identifying number	16	18	20	21	22	24	26
Location and rock form (dike, etc.)	NE 1/4 sec. 30, T. 5 N.,R.81 W., sill.	SE 1/4 sec. 21, T. 5 N., R. 82 W. sill.	SE 1/4 sec. 21, T. 5 N.,R. 82 W., sill.	NE 1/4 sec. 7, T. 4 N., R. 81 W., sill.	NW 1/4 sec. 28, T. 5 N., R. 80 W., plug?	SE 1/4 sec. 4, T. 3 N., R. 81 W., sill?	NE 1/4 sec. 4, T. 4 N.,R. 82 W., sill.
Analyst	7/	7/	7/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 8.5	NQ - 9.6	NQ - 3.6	N Ol - 4.0	NQ - 12.7	NQ - 3.5	N Ne - 2.3 N Ol - 17.3
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	P	P	P	F
Original author's rock name	dark rhyodacite	dark rhyodacite	olivine latite	olivine trachyte	light latite	latite	olivine latite
Felsic-mafic index	4.68	4.36	3.50	3.19	10.8	3.44	2.20
Rock name according to felsic-mafic index	latite	latite	latite	latite	quartz latite	latite	andesite
Specific gravity	-	-	-	-	-	-	-
Reference	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	47	48	49	50	51	52	53
Original author's identifying number	29	32	35	36	40	43	48
Location and rock form (dike, etc.)	SE 1/4 sec. 36, T. 5 N., R. 82 W., sill.	SE 1/4 sec. 30, T. 5 N.,R. 81 W., stock?	NE 1/4 sec. 30, T. 5 N.,R. 81 W., stock?	SE 1/4 sec. 30, T. 4 N., R. 81 W. dike?	SW 1/4 sec. 5, T. 3 N.,R. 81 W., sill.	NW 1/4 sec. 25, T. 5 N.,R. 82 W., sill.	NW 1/4 sec. 7, T. 4 N.,R. 80 W. plug?
Analyst	7/	7/	7/	7/	7/	7/	7/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 7.7	NQ - 2.7	NQ - 3.2	NQ - 5.9	NQ - 4.1	N Ol - 7	N Ol - 9.8
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	-	F	F	F
Original author's rock name	trachyandesite	trachyandesite	trachyandesite	olivine trachyandesite	andesine trachybasalt	olivine andesine trachybasalt	olivine andesine trachybasalt
Felsic-mafic index	3.56	3.56	3.75	2.64	2.50	2.15	1.82
Rock name according to felsic-mafic index	latite	latite	latite	andesite	andesite	andesite	basalt
Specific gravity	-	-	-	-	-	-	-
Reference	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)	Hail (1968)

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	54	55	56	57	58	59	60
Original author's identifying number	668	665	666	667	664	663	663A
Location and rock form (dike, etc.)	NE 1/4 sec. 11, T.10 N.,R.86 W., stock.	SW 1/4 sec. 12, T.10 N.,R.86 W., stock.	SW 1/4 sec. 12, T.10 N.,R.86 W., stock.	SW 1/4 sec. 12, T.10 N.,R.86 W., stock.	NE 1/4 sec. 13, T.10 N.,R. 86 W., stock.	SE 1/4 sec. 13, T.10 N.,R.86 W., stock.	SE 1/4 sec. 13 T.10 N.,R.85 W., stock.
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	labradorite rhyodacite	quartz latite	rhyodacite	rhyodacite	quartz latite	labradorite rhyodacite	quartz latite
Felsic-mafic index	20.2	19.6	19.3	15.8	22.3	18.2	10.0
Rock name according to felsic-mafic index	rhyolite	rhyolite	rhyolite	rhyolite	rhyolite	rhyolite	quartz latite
Specific gravity	2.578 powder density	2.667 powder density	2.632 powder density	2.488 powder density	2.640 powder density	2.568 powder density	2.633 powder density
Reference	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data

8/ Rapid rock analyses by P. Elmore, L. Artis, G. Chloe, J. Kelsey, S. Botts, J. Glenn, and H. Smith.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	61	62	63	64	65	66	67
Original author's identifying number	662	661	671	672	297A	669	670
Location and rock form (dike, etc.)	SE 1/4 sec. 23, T. 10 N.,R.86 W. stock.	SW 1/4 sec. 25, T. 10 N.,R.86 W. dike.	NE 1/4 sec. 29, T. 10 N.,R.85 W. stock.	SE 1/4 sec. 20, T. 10 N.,R.85 W. stock.	SE 1/4 sec. 9, T. 10 N.,R.85 W. stock.	NE 1/4 sec. 16, T. 10 N.,R. 85 W. stock.	Center sec. 16, T. 10 N.,R.85 W. stock.
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	P	P	P	P	P
Original author's rock name	rhyodacite	olivine andesine trachybasalt	quartz latite	quartz latite	rhyodacite	rhyodacite	rhyodacite
Felsic-mafic index	18.1	2.10	6.23	5.94	16.2	5.39	18.9
Rock name according to felsic-mafic index	rhyolite	basalt	quartz andesite	quartz andesite	rhyolite	quartz andesite	rhyolite
Specific gravity	2.580 powder density	2.775 powder density	2.701 powder density	2.711 powder density	2.662 powder density	2.685 powder density	2.653 powder density
Reference	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	68	69	70	71	72	73	74
Original author's identifying number	676	675	673	221	245	247	182
Location and rock form (dike, etc.)	NW 1/4 sec. 11, T.10 N.,R.85 W., dike.	SE 1/4 sec. 10, T.10 N.,R.85 W., dike.	SW 1/4 sec. 11, T.10 N.,R.85 W., dike.	NW 1/4 sec. 11, T.10 N.,R.85 W., dike.	SW 1/4 sec. 11, T.10 N.,R.85 W., dike.	SW 1/4 sec. 11, T.10 N.,R.85 W., dike.	NE 1/4 sec. 23, T.10 N.,R.85 W., stock.
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	quartz latite	labradorite rhyodacite	quartz latite	quartz latite	quartz latite	quartz latite	rhyolite
Felsic-mafic index	10.9	15.2	16.4	14.4	12.0	12.3	18.6
Rock name according to felsic-mafic index	quartz latite	rhyolite	rhyolite	quartz latite	quartz latite	quartz latite	rhyolite
Specific gravity	2.682 powder density	2.662 powder density	2.651 powder density	2.651 powder density	2.671 powder density	2.669 powder density	2.617 powder density
Reference	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	75	76	77	78	79	80	81
Original author's identifying number	183	79	80	159	219	13B	132
Location and rock form (dike, etc.)	NW 1/4 sec. 23, T. 10 N., R. 85 W. stock.	SE 1/4 sec. 35, T. 10 N., R. 85 W. dike?	NW 1/4 sec. 2, T. 9 N., R. 85 W. dike?	SE 1/4 sec. 2, T. 9 N.,R.85 W. dike?	SE 1/4 sec. 2, T. 9 N.,R. 85 W. dike?	SW 1/4 sec. 7, T. 9 N.,R. 84 W. dike.	NW 1/4 sec. 2, T. 9 N.,R. 84 W. dike.
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	Quartz latite	Dark quartz latite	Dark quartz latite	Dark quartz latite	Rhyodacite	Rhyodacite	Trachyandesite
Felsic-mafic index	25.8	6.88	5.48	5.64	5.22	4.65	3.80
Rock name according to felsic-mafic index	Alkali rhyolite	Quartz andesite	Quartz andesite	Quartz andesite	Quartz andesite	Latite	Latite
Specific gravity	2.649 powder density	2.874 powder density	2.801 powder density	2.817 powder density	2.828 powder density	2.795 powder density	2.823 powder density
Reference	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.	Segerstrom and Young, 1967, unpubl. data.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	82	83	84	85	86	87	88
Original author's identifying number	1C	1S	2S	4C	7C	33C	38C
Location and rock form (dike, etc.)	Drill core from sec. 9, T.10 N., R. 85 W., dike.	Sec. 9, T.10 N., R. 85 W., stock.	Sec. 9,T. 10 N., R. 85 W., stock.	Drill core, sec. 9,T. 10 N., R. 85 W., stock.	Drill core, sec. 9,T. 10 N., R. 85 W., stock.	Drill core, sec. 9,T. 10 N., R. 85 W., stock.	Drill core, sec. 9,T. 10 N., R. 85 W., stock.
Analyst	E. E. Engleman	C. L. Parker	C. L. Parker	C. L. Parker	C. L. Parker	V. C. Smith	V. C. Smith
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 13.41	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	Dark alkali trachyte	Rhyolite	Rhyolite	Rhyolite	Rhyolite	Rhyolite	Rhyolite
Felsic-mafic index	6.58	24.1	87.4	29.6	23.7	34.3	32.3
Rock name according to felsic-mafic index	Quartz andesite	Rhyolite	Extreme alkali rhyolite	Alkali rhyolite	Rhyolite	Alkali rhyolite	Alkali rhyolite
Specific gravity	2.694 powder density	-	-	-	-	-	-
Reference	Segerstrom and Young (in press)	Segerstrom and Young (in press)	Segerstrom and Young (in press)	Young and Segerstrom, 1972, unpubl. data.	Young and Segerstrom, 1972, unpubl. data.	Young and Segerstrom, 1972, unpubl. data.	Young and Segerstrom, 1972, unpubl. data.

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	89						
Original author's identifying number	41C						
Location and rock form (dike, etc.)	Drill core, sec. 9 T.10 N., R.85 W., stock.						
Analyst	G. O. Riddle						
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-						
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P						
Original author's rock name	Rhyolite						
Felsic-mafic index	25.6						
Rock name according to felsic-mafic index	Alkali rhyolite						
Specific gravity	-						
Reference	Young and Segerstrom, 1972, unpubl. data.						

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	14A	14B	14C	15	16	17	18
SiO_2	56.2	50.2	50.2	51.3	49.2	48.9	71.3
Al_2O_3	16.1	15.2	15.0	17.0	15.1	15.4	15.0
Fe_2O_3	4.9	2.8	5.1	6.5	6.0	5.1	1.8
FeO	1.2	8.4	3.0	1.7	3.6	4.6	0.06
MgO	3.0	7.0	4.7	2.5	4.2	4.5	0.31
CaO	5.4	8.5	9.0	3.8	10.0	8.9	1.1
Na_2O	4.3	3.0	3.2	5.5	3.0	2.6	4.1
K_2O	3.2	1.2	2.2	3.6	1.8	1.3	5.1
H_2O^-	1.6	0.92	2.4	(	(	(	(
H_2O^+	1.0	0.68	1.7	(5.4 (	(4.0 (	(6.5 (	(0.53 (
TiO_2	1.2	1.6	1.6	1.4	1.7	1.6	0.29
P_2O_5	0.55	0.40	0.88	0.96	0.47	0.47	0.11
MnO	0.14	0.13	0.12	0.13	0.16	0.14	0.09
CO_2	0.92	<0.05	0.98	0.15	0.86	<0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	19	20	21	22	23	24	25
SiO_2	60.9	59.5	56.6	53.6	53.0	51.3	51.2
Al_2O_3	15.8	14.8	14.2	17.1	16.5	15.3	14.5
Fe_2O_3	3.3	3.8	4.4	5.8	5.3	2.7	7.1
FeO	1.6	1.6	2.4	1.6	2.3	7.5	2.8
MgO	3.0	4.3	3.7	3.2	4.1	6.6	5.9
CaO	4.3	4.5	4.7	5.5	6.2	8.9	7.9
Na_2O	4.3	4.0	3.3	4.1	4.1	3.1	3.3
K_2O	3.0	2.9	4.6	3.2	3.1	1.3	2.3
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(2.2	(3.2	(2.4	(2.9	(3.2	(1.5	(3.0
TiO_2	0.76	0.84	1.7	1.5	1.7	1.6	1.4
P_2O_5	0.36	0.38	0.80	0.59	0.47	0.42	0.56
MnO	0.08	0.08	0.09	0.11	0.10	0.14	0.12
CO_2	<0.05	0.17	0.07	<0.05	<0.05	<0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	100.0	99.0	99.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	26	27	28	29	30	31	32
SiO_2	49.9	45.7	42.0	42.3	75.2	74.6	72.3
Al_2O_3	14.1	14.9	15.3	13.1	13.7	14.0	14.2
Fe_2O_3	6.0	4.2	4.7	5.1	0.71	0.27	1.8
FeO	4.5	6.0	7.0	4.6	0.02	0.28	0.06
MgO	6.9	8.7	7.4	8.8	0.19	0.10	0.13
CaO	8.9	11.0	7.2	11.4	0.44	0.53	0.73
Na_2O	3.1	3.1	2.7	1.4	3.9	4.4	4.0
K_2O	2.3	1.5	2.2	2.7	4.4	4.2	4.6
H_2O^- / H_2O^+	0.92	0.78	6.4	4.9	1.3	1.2	1.8
TiO_2	1.6	2.5	2.9	2.2	0.03	0.02	0.34
P_2O_5	0.47	0.66	0.76	0.73	0.01	0.01	0.02
MnO	0.17	0.13	0.18	0.14	0.07	0.09	0.04
CO_2	1.1	<0.05	0.06	2.9	0.05	<0.05	< 0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	100.0	99.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	33	34	35	36	37	38	39
SiO_2	54.8	65.2	61.3	60.9	60.4	55.5	55.0
Al_2O_3	11.9	17.7	15.4	16.2	15.3	16.3	14.9
Fe_2O_3	2.6	3.0	3.5	3.6	3.0	3.0	5.5
FeO	2.7	0.20	1.4	1.6	2.0	2.8	1.9
MgO	4.6	0.36	3.0	2.7	3.7	2.1	2.4
CaO	6.6	2.5	4.4	3.9	4.4	4.5	3.9
Na_2O	2.6	4.3	4.0	4.4	4.2	3.7	3.6
K_2O	4.6	4.2	3.5	3.0	3.2	3.0	2.6
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(1.5	(1.6	(2.4	(2.7	(2.8	(2.9	(5.5
	(	(	(	(	(	(	(
TiO_2	0.91	0.61	0.72	0.85	0.82	1.2	1.2
P_2O_5	0.91	0.23	0.37	0.36	0.38	0.48	0.57
MnO	0.12	0.07	0.06	0.08	0.10	0.11	0.10
CO_2	4.4	<0.05	<0.05	<0.05	<0.05	4.7	3.0
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	98.0	100.0	100.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	40	41	42	43	44	45	46
SiO_2	54.4	58.3	54.8	53.2	63.4	54.7	50.0
Al_2O_3	15.9	14.7	14.1	13.8	17.9	15.0	14.1
Fe_2O_3	1.2	2.1	3.5	4.1	3.5	5.1	2.5
FeO	4.4	3.5	3.2	2.9	0.46	2.7	6.7
MgO	2.9	3.8	5.6	6.6	0.46	4.5	9.1
CaO	4.5	3.5	5.5	5.7	2.3	5.8	7.3
Na_2O	3.6	3.9	3.2	3.2	4.9	3.8	3.5
K_2O	2.8	2.8	4.4	5.2	4.6	3.8	2.9
H_2O^- / H_2O^+	1.9	0.95	2.3	2.3	1.3	1.7	1.7
TiO_2	1.2	0.96	1.6	1.5	0.68	1.6	1.6
P_2O_5	0.47	0.36	0.74	0.94	0.31	0.71	0.65
MnO	0.08	0.10	0.11	0.11	0.13	0.13	0.17
CO_2	6.0	2.5	0.15	0.15	< 0.05	0.05	< 0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.0	99.0	99.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	47	48	49	50	51	52	53
SiO_2	55.1	53.4	52.8	52.2	53.1	50.0	47.1
Al_2O_3	15.7	16.3	16.5	15.4	15.0	14.3	14.5
Fe_2O_3	1.8	2.8	4.0	4.9	4.4	3.6	6.1
FeO	4.3	4.1	2.9	4.1	4.8	5.9	6.6
MgO	2.8	4.2	3.3	4.7	6.5	8.3	7.5
CaO	5.0	5.8	5.8	8.1	7.6	7.8	8.5
Na_2O	4.0	4.0	4.0	3.2	3.2	3.0	3.3
K_2O	2.6	2.7	3.2	2.0	1.9	2.1	1.7
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(2.0	(2.5	(2.8	(3.2	(1.6	(3.0	(2.0
	(	(	(	(	(	(	(
TiO_2	1.2	1.4	1.5	1.5	1.3	0.73	2.2
P_2O_5	0.45	0.48	0.47	0.48	0.43	0.64	0.69
MnO	0.10	0.12	0.09	0.09	0.12	0.14	0.18
CO_2	5.3	2.6	2.0	<0.05	<0.05	<0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	100.0	99.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	54	55	56	57	58	59	60
SiO_2	70.8	69.1	69.2	67.6	70.0	68.7	65.2
Al_2O_3	15.6	15.7	16.3	15.9	15.6	17.1	15.6
Fe_2O_3	2.0	2.0	1.4	1.4	0.84	1.8	3.1
FeO	0.48	0.36	0.40	0.60	0.60	0.40	0.84
MgO	0.73	1.0	0.65	0.92	0.80	1.0	1.6
CaO	0.52	1.5	1.5	1.7	1.2	0.74	1.8
Na_2O	1.5	3.2	3.6	3.0	3.1	0.88	4.3
K_2O	2.9	3.3	3.3	2.8	3.7	2.1	4.1
H_2O^-	0.67	0.66	1.0	2.4	0.72	0.86	0.49
H_2O^+	3.5	2.1	1.8	2.2	2.1	5.2	0.91
TiO_2	0.45	0.42	0.38	0.46	0.57	0.57	0.67
P_2O_5	0.22	0.26	0.20	0.20	0.33	0.52	0.54
MnO	0.04	0.07	0.03	0.05	0.03	0.04	0.05
CO_2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.0	100.0	100.0	99.0	100.0	100.0	99.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	61	62	63	64	65	66	67
SiO_2	69.0	46.4	63.3	62.3	69.9	60.0	70.4
Al_2O_3	15.9	11.6	15.6	15.8	15.4	14.2	15.2
Fe_2O_3	1.5	3.2	3.8	3.8	1.7	1.8	2.0
FeO	0.60	4.7	0.92	0.92	0.72	2.5	0.48
MgO	0.65	8.5	2.6	2.7	0.70	3.9	0.80
CaO	1.4	8.0	4.0	4.3	1.6	4.2	0.79
Na_2O	3.2	2.7	4.1	4.1	3.8	4.2	3.8
K_2O	3.0	2.1	3.2	3.3	3.0	2.6	3.0
H_2O^-	1.5	0.61	0.43	0.39	1.3	0.73	0.51
H_2O^+	2.1	1.3	0.77	0.91	1.3	1.9	1.8
TiO_2	0.34	1.1	0.81	0.86	0.39	0.72	0.43
P_2O_5	0.15	0.57	0.38	0.36	0.20	0.40	0.20
MnO	0.09	0.16	0.11	0.10	0.03	0.10	0.05
CO_2	<0.05	8.5	<0.05	<0.05	<0.05	2.6	0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.0	99.0	100.0	100.0	100.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	68	69	70	71	72	73	74
SiO_2	67.8	68.9	69.5	68.7	67.9	67.7	69.1
Al_2O_3	14.1	16.2	15.9	15.0	15.0	15.6	15.4
Fe_2O_3	1.5	2.1	2.3	1.8	1.8	1.5	1.7
FeO	1.2	0.52	0.68	.76	0.84	1.3	0.56
MgO	1.6	0.65	0.72	1.1	0.65	1.3	0.80
CaO	2.5	1.7	0.87	1.6	2.9	2.1	1.1
Na_2O	3.3	3.8	1.7	3.6	2.1	4.8	2.4
K_2O	3.2	3.0	3.9	3.7	4.2	3.8	6.0
H_2O^-	0.53	0.44	0.50	1.6	0.53	0.27	1.5
H_2O^+	1.2	1.5	2.4	1.2	1.9	0.68	0.90
TiO_2	0.43	0.43	0.46	0.45	0.39	0.43	0.33
P_2O_5	0.22	0.27	0.25	0.28	0.23	0.29	0.17
MnO	0.07	0.06	0.10	0.03	0.06	0.05	0.02
CO_2	2.0	0.05	<0.05	<0.05	<0.93	<0.05	< 0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	100.0	99.0	100.0	99.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	75	76	77	78	79	80	81
SiO_2	72.4	63.0	61.6	61.2	60.8	59.1	55.2
Al_2O_3	14.8	15.7	15.2	15.0	15.4	16.0	15.2
Fe_2O_3	0.91	4.9	5.2	4.3	4.4	6.5	4.9
FeO	0.72	1.6	1.5	2.2	2.2	1.2	3.9
MgO	0.38	2.5	2.4	2.4	2.4	2.5	2.8
CaO	1.1	1.2	3.5	3.2	3.8	3.9	4.7
Na_2O	3.7	3.4	3.6	3.4	3.9	3.2	4.2
K_2O	4.0	3.7	3.8	3.6	3.1	3.3	2.6
H_2O^-	0.39	0.18	0,23	.12	0.09	0.26	0.22
H_2O^+	0.91	1.2	1.0	1.0	1.0	1.1	1.1
TiO_2	0.19	1.2	1.3	1.2	1.2	1.5	1.7
P_2O_5	0.10	0.43	0.58	0.56	0.55	0.71	0.83
MnO	0.03	0.06	0.07	0.09	0.07	0.08	.22
CO_2	<0.05	<0.05	0.10	1.1	0.56	0.52	2.4
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.0	99.0	100.0	99.0	99.0	100.0	100.0

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	82[9]	83[10]	84[11]	85[12]	86[13]	87[14]	88[15]
SiO_2	61.64	69.19	68.16	68.00	68.32	68.63	68.26
Al_2O_3	13.96	15.57	16.36	15.73	15.51	16.52	16.69
Fe_2O_3	2.15	2.43	0.43	2.17	2.71	0.77	0.71
FeO	3.06	0.18	0.09	0.07	0.11	0.56	0.72
MgO	2.86	0.32	0.17	0.38	0.42	0.63	0.67
CaO	2.65	0.32	0.21	0.00	0.00	0.28	0.26
Na_2O	4.10	2.90	1.94	0.17	0.18	1.89	2.07
K_2O	4.88	6.24	8.63	9.27	8.10	6.34	5.96
H_2O^-	0.31	0.37	0.76	0.69	0.44	0.94	0.87
H_2O^+	0.65	1.34	1.64	1.54	1.86	1.91	2.12
TiO_2	0.92	0.46	0.37	0.38	0.35	0.56	0.56
P_2O_5	0.63	0.21	0.13	0.02	0.03	0.30	0.27
MnO	0.14	0.02	0.01	0.01	0.01	0.01	0.01
CO_2	1.21	0.00	0.00	0.00	0.00	0.01	0.01
BaO	0.37	0.18	0.19	0.19	0.16	0.17	0.17
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	0.05	0.02	0.13	1.50	2.05	0.05	0.05
Cl	0.00	0.00	0.01	0.00	0.00	0.01	0.01
F	0.21	0.11	0.07	0.09	0.10	0.12	0.12
	99.68	99.80	99.17	99.42	99.29	99.63	99.47

1/ See next page for footnotes.

1-degree quadrangle No. 5

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	89[16]						
SiO_2	67.50						
Al_2O_3	15.83						
Fe_2O_3	2.55						
FeO	0.09						
MgO	0.32						
CaO	0.05						
Na_2O	1.59						
K_2O	7.79						
H_2O^-	0.50						
H_2O^+	1.23						
TiO_2	0.37						
P_2O_5	0.39						
MnO	0.01						
CO_2	0.00						
BaO	0.20						
SrO	-						
SO_3	-						
S	1.83						
Cl	0.00						
F	0.11						
	99.40						

[9] Less O_2 for F&S = 0.11

[10] Less O_2 for F&S = 0.06

[11] Less O_2 for F&S = 0.13

[12] Less O_2 for F&S = 0.79

[13] Less O_2 for F&S = 1.06

[14] Less O_2 for F&S = 0.07

[15] Less O_2 for F&S = 0.07

[16] Less O_2 for F&S = 0.96

1-degree quadrangle No. 6

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
11	About 1.5 mi N of Bible Back Mtn., sec. 23, T. 12 N., R. 89 W., at 7500'. Vesicular basalt flow.	K-Ar	Biotite	9.5±0.5	Buffler (1967), extrusive rocks.
12	Brush Mtn., Elkhead Mtns., sec. 34, T. 11 N., R. 88 W. Lamprophyre dike intruding a diatreme.	K-Ar	Biotite	11.1±0.5	Buffler (1967)
13	City Mtn., Elkhead Mtns., sec. 26, T. 11 N., R. 86 W. Latite porphyry intrusive rock.	K-Ar	Biotite	7.6±0.4	Buffler (1967)

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Fourmile Creek (and Timberlake Creek)	6	Au	Placer
Lay	6	Au	Placer

1-degree quadrangle No. 6

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	90	91	92	93	93A		
Original author's identifying number	A	B	F	-	-		
Location and rock form (dike, etc.)	SE 1/4 T. 10 N., R. 91 W. Fortification Dike	SE 1/4 T. 10 N., R. 91 W. Fortification Dike	NE 1/4 T. 6 N., R. 90 W. Breeze Mtn. Sill?	Ridge between Slater's and Steves Forks. Stock?	Elkhead Mtn., Elk Mtn. ?		
Analyst	George Steiger	George Steiger	George Steiger	R. W. Woodward	L. G. Eakins		
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	M Ol - 6% N Q - 0.42%	M Ol - 6% N Ol - 1.26%	M Ol - 9% N Ol - 13.90%	M Ne - present	-		
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P glassy	F	F	F	-		
Original author's rock name	verdite	verdite	analcite basalt	trachyte	nepheline tephrite		
Felsic-mafic index	3.04	2.81	2.02	3.54	1.76		
Rock name according to felsic-mafic index	latite	andesite	basalt	latite	basalt		
Specific gravity	-	-	-	2.7	2.888 (12.2°)		
Reference	Ross (1926)	Ross (1926)	Ross (1926)	Hague and Emmons (1877), p. 176	Clarke (1904), p. 187		

1-degree quadrangle No. 6

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	90[17]	91	92	93[18]	93A		
SiO_2	53.48	52.83	48.31	53.19	46.67		
Al_2O_3	11.54	11.87	14.32	14.48	15.90		
Fe_2O_3	2.84	3.44	3.48	-	3.20		
FeO	3.50	3.03	6.13	6.01	7.04		
MgO	8.14	8.38	7.72	5.13	10.17		
CaO	5.45	6.64	9.12	6.01	9.15		
Na_2O	3.38	2.68	3.19	3.08	3.20		
K_2O	3,82	4.95	2.10	4.56	2.54		
H_2O^-	3.68	1.43	2.75	(7.61	(1.64		
H_2O^+	0.47	1.35	0.79	(	(		
TiO_2	1.47	1.42	1.38	-	-		
P_2O_5	0.95	0.87	0.64	-	0.64		
MnO	0.08	0.06	0.11	tr	tr		
CO_2	0.00	0.88	0.00	-	-		
BaO	0.43	-	-	-	-		
SrO	0.23	-	-	-	-		
SO_3	-	-	-	-	tr		
S	0.09	-	-	-	-		
Cl	-	-	-	-	0.11		
F	-	-	-	-	-		
	99.60	99.83	100.04	100.07	100.26		

17/ Also includes Cr_2O_3 = 0.05

18/ Average of 2 analyses

1-degree quadrangle No. 9

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
14	Snowmass Creek sill.	K-Ar	Biotite	31.2±1.1	Obradovich and others (1969), Sample 99.
15	Snowmass pluton, northeast end of Snowmass Lake.	K-Ar	Biotite	34.1±1.4	Obradovich and others (1969), Sample 103.
16	Treasure Mtn. stock.	K-Ar	Biotite	12.5±0.6	Obradovich and others (1969), Sample 126
17	Treasure Mtn. stock.	K-Ar	Biotite	12.3±0.6	Obradovich and others (1969)

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Rock Creek (Marble) (Crystal River)	5	Pb, Ag, Zn, Cu, Au	Veins, replacement and blanket deposits in Paleozoic to Mesozoic sedimentary rocks.
Rifle Creek	6	Zn, V, Pb	Vein fissures in Leadville Ls. V as impregnations in Jurassic sandstones.
Elk Creek	6	Au, Ag, Cu	Vein fissures in Precambrian

1-degree quadrangle No. 9

Rock types of two large stocks characterized by felsic-mafic index

Treasure Mountain granite stock

Sample	Felsic/Mafic index	
94	48.7	
102	63.8	
123	159.0	
124	22.4	
125	12.0	
126	18.5	
127	45.5	
128	18.9	
Average	48.6	alkali granite (almost extreme)

Snowmass stock

95	3.40	
96	6.72	
97	8.85	
98	3.82	
100	4.26	
101	5.80	
103	8.11	
116	5.25	
117	5.74	
118	8.06	
Average	6.00	quartz diorite

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	94	95	96	97	98	99	100
Original author's identifying number	-	325A	331B	331L	328D	389	366
Location and rock form (dike, etc.)	Bear Basin Treasure Mtn. Stock	Northeast of Little Snowmass Lake, Snowmass Mtn. Stock	West of Little Snowmass Lake, Snowmass Mtn. Stock	Near 96 stock	Near 96 stock	Snowmass Creek, Dill, Snowmass Creek Trail	Snowmass stock, South of Meadow Mtn.
Analyst	J. G. Fairchild	J. G. Fairchild	J. G. Fairchild	J. G. Fairchild	J. G. Fairchild	19/	19/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 32.5%	NQ - 14.0%	NQ - 13.1%	NQ - 28.26%	NQ - 16.2%	NQ - 29.70%	NQ - 15.63%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M	M	F	M	M	P	-
Original author's rock name	pink granite	quartz diorite	albite granite	granodiorite	granodiorite	granodiorite	granodiorite, dark border phase
Felsic-mafic index	48.7	3.40	6.72	8.85	3.82	11.4	4.26
Rock name according to felsic-mafic index	alkali granite	monzonite	quartz diorite	granodiorite	monzonite	quartz monzonite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Vanderwilt (1937)	Vanderwilt(1937)	Vanderwilt(1937)	Vanderwilt(1937)	Vanderwilt(1937)	Bryant, 1970, unpubl. data.	Bryant, 1970, unpubl. data.

19/ Rapid rock analyses by P. Elmore, L. Artis, S. Botts, G. Chloe, J. Glenn, J. Kelsey, H. Smith, and D. Taylor

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	101	102	103	108	109	110	111
Original author's identifying number	414	5	386	387	382	383	352
Location and rock form (dike, etc.)	Snowmass stock, west of Meadow Mtn.	Treasure Mtn. stock, Bear Basin	Snowmass stock, head of Snowmass Lake	Head of Snowmass Lake, dike in Snowmass stock	Schofield stock, northwest of Mount Bellview	Near 109 Schofield stock	North fork of Lost Trail Creek dike
Analyst	19/	19/	19/	19/	19/	19/	19/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 18.14%	NQ - 31.40%	NQ - 22.01%	NQ - 43.08%	NQ - 13.39%	NQ - 21.98%	NQ - 18.22%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	F?	-	-	P
Original author's rock name	granodiorite dark border phase	granite, core facies	granodiorite	aplite	granodiorite	granodiorite	gabbro, intensely altered
Felsic-mafic index	5.80	63.8	8.11	68.0	4.55	9.95	1.70
Rock name according to felsic-mafic index	quartz diorite	extreme alkali granite	granodiorite	extreme alkali granite	monzonite	granodiorite	gabbro
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970 unpub. data.

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	112	113	114	115	116	117	118
Original author's identifying number	370	410	351	394	M75	M593	M604
Location and rock form (dike, etc.)	East of Geneva Lake dike	Northeast of Mineral Point dike	North Fork of Lost Trail Creek dike	Southeast of Emerald Lake sill	East northeast of Elk Mtn., Snowmass stock	Southeast of Avalanche Pass, Snowmass stock	East of West Avalanche Creek Snowmass stock
Analyst	19/	19/	19/	19/	19/	19/	19/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 1.91%	NQ - 12.85%	NQ - 28.93%	NQ - 42.76%	NQ - 21.98%	NQ - 21.86%	NQ - 24.89%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	F	F	-	-	-
Original author's rock name	gabbro	gabbro, intensely altered	felsite	felsite	granodiorite	granodiorite	granodiorite
Felsic-mafic index	2.30	2.42	18.7	34.4	5.25	5.74	8.06
Rock name according to felsic-mafic index	diorite	diorite	rhyolite	alkali rhyolite	quartz diorite	quartz diorite	granodiorite
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No.9

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	119	120	121	122	123	124	125
Original author's identifying number	M53	959	C1044	C3	4	7	296
Location and rock form (dike, etc.)	North Fork of Lost Creek Trail dike	South of Marble, dike	Summit of Chair Mtn., Ragged Mtn. laccolith	West of Narrows of Muddy Creek dike	Head of Bear Basin, Treasure Mtn. stock	East of First Yule Lake, Treasure Mtn. stock	Crystal River southeast of Crystal, Treasure Mtn. stock
Analyst	19/	19/	19/	19/	19/	19/	19/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 15.00	NQ - 13.82?	NQ - 22.58	NQ - 1.78	NQ - 40.97	NQ - 32.56	NQ - 39.05
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	-	P	-	-	-	-
Original author's rock name	gabbro	lamprophyre, intensely altered	granodiorite	basalt	granite, border facies	granite, border facies	granite, border facies
Felsic-mafic index	2.74	0.82	8.41	2.32	15.9	22.4	12.0
Rock name according to felsic-mafic index	diorite	ultramafic	granodiorite	diorite	extreme alkali granite	granite	quartz monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	126	127	128				
Original author's identifying number	348	1067	M270				
Location and rock form (dike, etc.)	Crystal River Valley, north of Little Bear Mtn., Treasure Mtn. stock	Yule Creek, Treasure Mtn. stock	Yule Creek Treasure Mtn. stock				
Analyst	19/	19/	19/				
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 26.73	NQ - 33.73	NQ - 24.84				
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P				
Original author's rock name	granite Twin Bridges facies	granite Twin Bridges facies?	granite Twin Bridges facies?				
Felsic-mafic index	18.5	45.5	18.9				
Rock name according to felsic-mafic index	granite	alkali granite	granite				
Specific gravity	-	-	-				
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970. unpub. data.				

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	94	95	96	97	98	99	100
SiO_2	76.46	56.83	60.67	66.19	59.68	69.5	57.6
Al_2O_3	12.58	16.67	16.76	15.72	16.31	15.7	16.5
Fe_2O_3	0.52	4.62	1.52	2.36	4.11	1.5	4.5
FeO	0.59	4.48	3.64	2.13	4.11	1.2	3.4
MgO	0.13	2.75	1.98	1.26	2.51	0.65	2.6
CaO	0.52	6.45	2.96	2.58	6.36	3.3	4.5
Na_2O	3.78	3.56	6.48	3.87	3.42	3.8	3.7
K_2O	5.45	1.82	0.60	3.60	2.12	2.7	2.6
H_2O^-	none	(	(	0.93	0.05	0.07	0.54
H_2O^+	0.48	(0.88	(1.98	-	0.65	0.43	1.5
TiO_2	0.05	0.58	0.50	0.49	0.60	0.37	0.76
P_2O_5	0.06	0.59	0.40	0.40	0.42	0.27	0.37
MnO	0.04	0.21	0.04	0.02	0.17	0	0.07
CO_2	tr	0.07	2.03	0.20	0.00	<0.05	0.95
BaO	-	0.09	0.06	0.21	0.18	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.66	99.60	99.62	99.96	100.69	99.51	99.59

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	101	102	103	108	109	110	111
SiO_2	62.4	75.3	66.3	79.6	59.9	66.8	41.7
Al_2O_3	16.3	13.4	16.6	11.4	15.4	15.6	14.5
Fe_2O_3	3.4	0.25	2.1	0.18	3.6	1.6	4.2
FeO	2.6	0.16	1.6	0.28	3.2	1.6	7.8
MgO	1.7	0.08	1.1	0.17	2.6	1.4	4.3
CaO	4.2	0.83	4.2	0.65	5.3	2.9	10.1
Na_2O	4.0	4.1	4.3	3.3	3.7	3.8	2.1
K_2O	2.7	4.8	2.4	4.1	3.3	4.0	0.98
H_2O^-	0.23	0.08	0.08	0.05	0.16	0.09	0.41
H_2O^+	1.3	0.43	0.44	0.24	0.68	0.68	2.40
TiO_2	0.54	0.14	0.40	0.06	1.20	1.10	1.3
P_2O_5	0.39	0.02	0.23	0.02	0.58	0.29	0.38
MnO	0.07	0	0	0	0.07	0	0.13
CO_2	0.11	<0.05	<0.05	<0.05	0.16	<0.05	9.7
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.94	99.64	99.77	100.07	99.85	99.88	100.0

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	112	113	114	115	116	117	118
SiO_2	48.8	47.6	71.1	74.4	61.6	62.4	66.4
Al_2O_3	15.9	16.0	14.0	14.6	17.3	17.3	15.7
Fe_2O_3	4.8	5.3	1.3	0.90	3.3	3.5	3.1
FeO	5.7	5.6	1.0	0.64	2.9	2.2	2.1
MgO	5.4	4.5	0.64	0.44	1.4	1.2	0.4
CaO	7.5	6.3	1.3	0.35	5.2	5.0	3.5
Na_2O	3.8	3.0	3.8	4.2	3.3	3.4	3.6
K_2O	1.3	2.0	4.5	1.6	2.4	2.6	3.4
H_2O^-	0.77	0.60	0.13	0.24	0.08	0.16	0.10
H_2O^+	2.00	3.20	0.41	1.7	0.79	0.84	0.81
TiO_2	1.4	1.2	0.46	0.13	0.58	0.50	0.36
P_2O_5	0.49	0.52	0.18	0.07	0.80	0.57	0.22
MnO	0.16	0.07	0.05	0.02	0.10	0.05	0
CO_2	1.8	4.0	0.15	0.08	0.20	0.09	0.08
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.82	99.89	99.02	99.37	99.95	99.81	99.77

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	119	120	121	122	123	124	125
SiO_2	51.4	28.8	66.1	51.7	78.0	72.6	75.5
Al_2O_3	16.7	8.5	15.9	15.8	12.1	13.5	12.1
Fe_2O_3	2.1	1.4	2.2	1.9	0	1.4	5.4
FeO	6.5	8.4	1.6	8.0	0.14	1.1	0.40
MgO	5.0	4.7	1.1	6.2	0.1	0.58	0.45
CaO	6.5	22.1	3.8	8.0	0.30	0.56	0.66
Na_2O	2.5	0.45	3.6	3.0	2.7	2.4	2.4
K_2O	1.2	0.59	3.5	1.3	5.4	6.4	5.4
H_2O^-	0.27	0.35	0.48	0.78	0.13	0.07	0.73
H_2O^+	3.0	3.5	0.72	0.42	0.55	0.80	0.67
TiO_2	2.0	1.4	0.48	1.80	0.12	0.42	0.09
P_2O_5	0.57	1.2	0.27	0.41	0	0.15	0
MnO	0.12	0.14	0.12	0.14	0	0.03	0.04
CO_2	2.1	17.9	<0.05	<0.05	<0.05	<0.05	0.09
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.96	99.43	99.89	99.47	99.60	100.06	103.93

1-degree quadrangle No. 9

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	126	127	128				
SiO_2	71.0	75.1	70.2				
Al_2O_3	14.0	12.9	14.8				
Fe_2O_3	2.1	0	1.4				
FeO	0.32	0.88	1.2				
MgO	0.50	0.4	0.2				
CaO	1.4	0.55	1.4				
Na_2O	4.0	3.8	3.8				
K_2O	4.8	4.5	5.4				
H_2O^-	0.17	0.11	0.11				
H_2O^+	0.52	0.72	0.53				
TiO_2	0.50	0.17	0.46				
P_2O_5	0.27	0.02	0.16				
MnO	0.02	0.02	0.02				
CO_2	0.12	0.10	0.14				
BaO	-	-	-				
SrO	-	-	-				
SO_3	-	-	-				
S	-	-	-				
Cl	-	-	-				
F	-	-	-				
	99.72	99.28	99.82				

1-degree quadrangle No. 10

Geologic age

No.		Type	Mineral	Age m.y.	Reference, remarks
18	Little Annie sill? Approximately 4.5 mi S of Aspen.	K-Ar	Muscovite	72.2±2.2	Obradovich and others (1969), Sample 150
19	Unnamed pluton, approximately 5.5 mi S of Aspen.	K-Ar	Biotite	70.0±2.3	Obradovich and others (1969), Sample 153.
20	do.	K-Ar	Separate biotite concentrate from same rock as 19	67.4±2.2	do.
21	Twin Lakes stock, approximately 5 mi W of Twin Lakes.	K-Ar	Biotite	41.7±1.2	Obradovich and others (1969)
22	Whiterock pluton, approximately 4.5 mi SW of Ashcroft.	K-Ar	Biotite	33.9±1.0	Obradovich and others (1969), Sample 140
23	Lincoln Creek stock, 9 mi ENE of Ashcroft.	K-Ar	Biotite	33.9±1.0	Obradovich and others (1969), Sample 146
24	Granodiorite, approximately 14 mi NW of Leadville.	K-Ar	Biotite	70	Pearson and others (1962)
25	do.	K-Ar replicate Ar determ.	Biotite	69	Pearson and others (1962)
26	Lincoln Porphyry, approximately 2.5 mi SW of Climax.	K-Ar	Biotite	64	do.
27	Pando Porphyry, approximate- 3.3 mi NNE of Leadville.	do.	do.	70	do.
28	Johnson Gulch Porphyry, approximately 1 mi N of Leadville.	do.	do.	41	do.
29	Twin Lakes stock, approximately 6.5 mi WSW of Twin Lakes.	Rb-Sr	do.	56±10	Moorbath and others (1967)
30	Twin Lakes stock.	do.	do.	51	Moorbath (1962)
31	Climax, ore body.	do.	Sericite	73±8	Moorbath and others (1967)

32	Leadville, hydrothermal alteration product in porphyry.	Rb-Sr	Muscovite $2M_1$	100±11	Moorbath and others (1967)
33	Humbug stock, 4 mi WSW of Breckenridge.	K-Ar	?	(Range) ( ) (from) ( )	Case and Tweto, 1972, unpub. data.
34	do.	do.	?	(35) ( )	do.
35	do.	do.	?	(to) ( )	do.
36	do.	do.	?	(47)	do.
37	Climax stock.	do.	?	~ 30	do.
38	do.	do.	?	~ 30	do.
39	Chalk Mtn. stock, 1 mi W of Climax.	do.	?	27±1.9	do.
40	Rhyolite porphyry plug, a few miles N of Climax.	K-Ar	?	35.2±1.4	Case and Tweto, 1972, unpub. data.
41	Lincoln Porphyry, Leadville.	do.	Biotite	64.7±1.9	Gast and others (1966)
42	Pando (White)Porphyry, no location.	do.	Sericite (probably deuteric)	60	Linn (1963)
43	Upper buckskin Gulch stock, approximately 4 mi WNW of Alma.	do.	Biotite	64	Hedge, 1970, pers. comm.
44	do.	do.	Biotite	64	do.

1-degree quadrangle No. 10

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Leadville	1	Ag, Zn, Pb, Au, Cu	Blanket or manto replacement deposits in dolomites and quartzites; some veins.
Climax	1	Mo, W	Stockwork ore bodies of numerous small veinlets in shattered and altered rock.
Gilman	2	Zn, Ag, Cu, Pb, Au	Massive sulfide replacements in carbonate rocks.
Aspen	2	Ag, Pb, Zn	Replacement and vein deposits in carbonate rocks.
Breckenridge	3	Au, Ag, Pb, Zn	Stockworks, veins, minor blanket and contact metamorphic deposits.
Kokomo	3	Zn, Pb, Ag, Au	Sulfide replacement deposits in carbonate rocks and veins in siliceous rock.
Sugar Loaf-St. Kevin	3	Ag, Au, Zn, Pb	Veins in altered Precambrian rock.
Alma-Horseshoe (includes Buckskin, Consolidated Montgomery, Sacramento, and Mosquito Districts)	3	Au, Ag, Pb, Zn,	Placer; veins in siliceous rock and replacement deposits in carbonate rock.

1-degree quadrangle No. 10

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Upper Blue River	4	Au, Ag, Pb, Zn	Veins in Precambrian rock and replacement bodies and veins in carbonate rock.
Granite (and Lost Canyon)	5	Au, Ag, Pb, Cu	Placer; veins in Precambrian granite cut by Tertiary dikes.
Green Mountain (Wilkinson)	5	Pb, Zn, Ag, Au	Veins at contact of intrusive igneous rock and sedimentary rock.
Brush Creek	5	Ag, Cu	Veins in sandstone.
Fulford	6	Au, Cu	Veins.
Twin Lakes	6	Au, Ag	Placer; veins in Tertiary igneous rock.
Ashcroft	6	Au, Pb, Ag, Zn	Veins in Tertiary igneous rock and carbonate rock.
Independence	6	Au, Ag	Veins.
Lincoln Gulch	6	Ag, Pb, Au	Veins.
Beaver Creek	6	Au	Placer; veins and replacement bodies in carbonate rocks.
Weston Pass	6	Pb, Ag, Zn	Replacement deposits in carbonate rock.
Box Creek	6	Au	Placer.
Homestake, Lake Co.	6	Pb, Ag, Au, Ni	Veins in Precambrian rock.

1-degree quadrangle No. 10

Rock types of two large stocks characterized by felsic-mafic index

Sample	Felsic/Mafic index	
	Whiterock stock	
129	9.85	
130	8.87	
131	8.80	
132	8.95	
133	5.92	
134	3.18	
137	3.72	
139	5.93	
140	6.33	
141	8.82	
142	8.80	
143	9.84	
145	8.96	
284	15.7	
285	21.1	
Average	9.62	granodiorite
		Ranges from
		3.18 to 21.1
		monzonite granite
	Twin Lakes stock	
161	19.8	
162	8.90	
163	13.2	
164	17.2	
165	9.64	
Average	13.8	quartz monzonite
		Ranges from
		8.90 to 19.8
		granodiorite granite

1-degree quadrangle No. 10

Two common rock types in the Leadville area characterized by felsic-mafic index

Sample	Felsic/Mafic index	
Pando Porphyry (White)		
154	25.6	
155	20.9	
156	34.4	
157	152.	
Average	58.2	extreme alkali granite
	Ranges from	
	20.9 to granite	152. extreme alkali granite
Lincoln Porphyry (Gray)		
158	9.02	
159	9.29	
160	7.26	
Average	8.52	granodiorite
	Ranges from	
	7.26 granodiorite	to 9.29 granodiorite

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	129	130	131	132	133	134	135
Original author's identifying number	461	462	463	501	DAI	735	1970
Location and rock form (dike, etc.)	Whiterock Stock Copper Lake	Whiterock Stock Copper Lake	Whiterock Stock Copper Lake	Whiterock Stock	Whiterock Stock	Whiterock Stock	Approx. 9 mi. S of Aspen dike
Analyst	19/	19/	19/	19/	19/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 26.45	NQ - 22.36	NQ - 24.27	NQ - 27.03	NQ - 20.91	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	-	-	-	-
Original author's rock name	granodiorite	granodiorite	granodiorite	granodiorite	granodiorite	-	-
Felsic-mafic index	9.85	8.87	8.80	8.95	5.92	3.18	5.04
Rock name according to felsic-mafic index	granodiorite	granodiorite	granodiorite	granodiorite	quartz diorite	monzonite	quartz diorite
Specific gravity	-	-	-	-	-	2.76	2.63
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	136	137	138	139	140	141	142
Original author's identifying number	B7	WR-1	75a	DA-1	WR-2	462	463
Location and rock form (dike, etc.)	Approx.10 mi N. of Crested Butte sill	Whiterock Stock	Approx. 14 mi N. of Crested Butte dike	Whiterock Stock	Whiterock Stock	Whiterock Stock	Whiterock Stock
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	-	-	-	-
Original author's rock name	-	-	-	-	-	-	-
Felsic-mafic index	3.93	3.72	4.98	5.93	6.33	8.82	8.80
Rock name according to felsic-mafic index	monzonite	monzonite	monzonite	quartz diorite	quartz diorite	granodiorite	granodiorite
Specific gravity	2.69	2.72	2.70	2.71	2.61	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	143	144	145	146	147	148	149
Original author's identifying number	461	280	501	NY-5	2060	1184	1560
Location and rock form (dike, etc.)	Whiterock Stock	Approx. 9 mi SW of Aspen sill	Whiterock Stock	Lincoln Creek Stock	Approx. 3 mi E. of Aspen dike?	Approx. 5 mi S. of Aspen dike?	Approx. 2 mi S. of Aspen stock?
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	P	-	-	P
Original author's rock name	-	-	-	granodiorite	-	-	-
Felsic-mafic index	9.84	10.8	8.96	6.43	2.83	3.50	13.6
Rock name according to felsic-mafic index	granodiorite	quartz monzonite	granodiorite	quartz diorite	diorite	monzonite	quartz monzonite
Specific gravity	-	2.66	2.67	2.63	2.76	2.77	2.68
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	150	151	152	153	154	155	156
Original author's identifying number	HNMP	1175	2059	1045	II	1	2
Location and rock form (dike, etc.)	Approx. 4.5 mi S. of Aspen Little Annie sill	Approx. 6 mi S. of Aspen ?Little Annie sill	3 mi slightly S.of E. of Aspen ? dike?	Approx. 5.5 mi slightly E of S of Aspen. stock?	Calif.Gulch, Leadville sill?	Little Harry Shaft,Prospect Mtn,Leadville. sill?	Carbonate Hill, Leadville. sill?
Analyst	8/	8/	8/	8/	W. F. Hillebrand	L. G. Eakins	L. D. Ricketts?
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	-	F	P	P	P
Original author's rock name	quartz muscovite porphyry	-	-	aplite	White porphyry	Mt. Zion porphyry (White porphyry)	White porphyry
Felsic-mafic index	17.7	21.6	30.9	23.4	25.6	20.9	34.4
Rock name according to felsic-mafic index	granite	granite	alkali granite	granite	alkali granite	granite	alkali granite
Specific gravity	2.62	2.62	2.58	2.61	2.680	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970. unpub. data.	Emmons (1886, p. 326)	Emmons (1886, p. 326)	Emmons et al (1927, p. 45)

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	157	158	159	160	161	162	163
Original author's identifying number	3	I	II	I	1	2	3
Location and rock form (dike, etc.)	Yak tunnel Leadville. sill?	Summit of Mt. Lincoln.stock?	Onota shaft, Johnson Gulch, Leadville. sill?	Evans Gulch porphyry from tunnel 200 ft E.of Silver Spoon shaft. sill?	Twin Lakes stock	Twin Lakes stock	Twin Lakes stock
Analyst	R. C. Wells	W. F. Hillebrand	W. F. Hillebrand	J. G. Fairchild	G. O. Riddle	G. O. Riddle	G. O. Riddle
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	NQ - 29.10 MQ - 29.8	-	NQ - 23.64 MQ - 25.0	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	M	M	C
Original author's rock name	White porphyry? pyritiferous	Lincoln porphyry (Gray porphyry)	Gray porphyry	Evans Gulch porphyry (Gray porphyry)	granodiorite (contact phase)	granodiorite (interior)	granodiorite
Felsic-mafic index	152.	9.02	9.29	7.26	19.8	8.90	13.2
Rock name according to felsic-mafic index	extreme alkali granite	granodiorite	granodiorite	granodiorite	granite	granodiorite	quartz monzonite
Specific gravity	2.652 2.736(powder dens.)	2.670	2.636	-	-	-	-
Reference	Emmons et al (1927,p.45)	Emmons (1886, p.332)	Emmons (1886 p.332)	Emmons et al (1927,p. 51)	Wilshire (1969)	Wilshire (1969)	Wilshire (1969)

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	164	165	166	167	168	169	170
Original author's identifying number	4	5	-	17	18	20	21
Location and rock form (dike, etc.)	Twin Lakes stock	Twin Lakes stock	NE part of Chalk Mtn. stock	Copper Mtn. Ten Mile District stock?	Jefferson tunnel Ten Mile District stock?	McNulty Gulch Tenmile Distr. stock?	Jefferson tunnel Ten Mile Distr. stock?
Analyst	G. O. Riddle	G. O. Riddle	W. F. Hillebrand	L. G. Eakins	W. F. Hillebrand	W. F. Hillebrand	L. G. Eakins
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	C	C P	P	P	P	P	P
Original author's rock name	granodiorite	granodiorite	rhyolite porphyry (Nevadite)	diorite	granite	granite	granite
Felsic-mafic index	17.2	9.64	47.1	12.1	11.6	11.0	10.8
Rock name according to felsic-mafic index	granite	granodiorite	alkali rhyolite	quartz monzonite	quartz monzonite	quartz monzonite	quartz monzonite
Specific gravity	-	-	-	-	2.672	2.640	2.666
Reference	Wilshire (1969)	Wilshire (1969)	Emmons (1886, p. 349)	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Lovering (1935, p. 37)

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	171	172	173	174	175	175A	175B
Original author's identifying number	29	36	37	38	39	XII	XIV
Location and rock form (dike, etc.)	Sugar Loaf Mtn. Ten Mile Distr. stock?	Wellington Mine Breckenridge, stock?	Wellington Mine Breckenridge, stock?	Near Northern Light Mine, Lower Buckskin Gulch, Park Co. sill?	N. Mosquito Ampitheater Mosquito Range dike	Gold Hill Ten Mile Distr. laccolith?	Chicago Mtn. Ten Mile Distr. laccolith
Analyst	L. G. Eakins	W. T. Schaller	W. T. Schaller	-	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	NQ - 4.50	NQ - 3.00	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	quartz porphyrite	diorite	diorite	porphyrite	biotite porphyrite	quartz-hornblende-mica porphyrite	quartz porphyrite
Felsic-mafic index	10.8	4.19	3.26	3.99	6.03	6.77	10.7
Rock name according to felsic-mafic index	quartz monzonite	monzonite	monzonite	monzonite	quartz diorite	quartz diorite	quartz monzonite
Specific gravity	-	(powd. dens.) 2.763 2.799	(powd. dens.) 2.827 2.863	2.768	2.740	-	-
Reference	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Lovering (1935, p. 37)	Cross (1894, p. 227)	Cross (1894, p. 227)

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample number	129	130	131	132	133	134	135
SiO_2	67.6	66.1	66.7	68.1	62.6	54.6	57.0
Al_2O_3	15.6	16.2	16.1	15.2	15.8	16.7	16.8
Fe_2O_3	2.0	2.2	2.2	2.6	3.6	2.5	3.6
FeO	1.7	1.8	1.8	1.5	2.4	5.7	3.2
MgO	0.9	1.2	1.2	0.68	1.3	3.9	2.9
CaO	3.0	3.1	3.2	3.6	4.4	6.9	3.1
Na_2O	3.4	3.8	3.6	3.1	3.7	2.8	5.7
K_2O	3.8	3.7	3.6	3.9	3.0	3.0	1.8
H_2O^-	0.15	0.20	0.10	0.10	0.29	0.12	0.34
H_2O^+	0.85	0.69	0.39	0.49	1.0	1.4	2.5
TiO_2	0.41	0.51	0.53	0.42	0.52	1.1	0.71
P_2O_5	0.29	0.26	0.26	0.14	0.24	0.38	0.55
MnO	0.03	0.03	0.04	0.07	0.06	0.14	0.20
CO_2	0.18	0.19	0.18	<0.05	0.84	0.59	1.6
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.91	99.98	99.90	99.92	99.75	99.83	100.00

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	136	137	138	139	140	141	142
SiO_2	57.4	59.4	59.5	62.6	64.1	66.1	66.7
Al_2O_3	15.8	15.3	16.5	15.8	16.8	16.2	16.1
Fe_2O_3	3.8	4.9	3.4	3.6	3.5	2.2	2.2
FeO	3.7	4.0	3.2	2.4	2.0	1.8	1.8
MgO	4.2	2.7	2.3	1.3	0.90	1.2	1.2
CaO	4.7	5.8	4.3	4.4	4.7	3.1	3.2
Na_2O	4.3	2.9	3.5	3.7	3.4	3.8	3.6
K_2O	2.8	2.4	2.8	3.0	2.7	3.7	3.6
H_2O^-	0.32	0.03	0.32	0.29	0.10	0.20	0.10
H_2O^+	1.2	0.71	1.9	1.0	0.70	0.69	0.39
TiO_2	0.88	1.0	0.76	0.52	0.48	0.51	0.53
P_2O_5	0.00	0.57	0.00	0.24	0.43	0.26	0.26
MnO	0.05	0.11	0.03	0.06	0.02	0.03	0.04
CO_2	0.38	<0.05	1.2	0.84	0.09	0.19	0.18
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F							
	99.53	99.87	99.71	99.75	99.92	99.98	99.90

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	143	144	145	146	147	148	149
SiO_2	67.6	67.9	68.1	61.2	51.9	54.1	67.7
Al_2O_3	15.6	14.4	15.2	16.8	16.4	15.6	15.9
Fe_2O_3	2.0	2.0	2.6	3.2	5.2	3.1	2.3
FeO	1.7	1.6	1.5	1.7	5.7	5.0	0.40
MgO	.90	0.68	0.68	0.96	4.1	2.8	0.35
CaO	3.0	2.7	3.6	4.6	5.1	5.9	2.4
Na_2O	3.4	3.7	3.1	3.0	3.0	2.9	4.1
K_2O	3.8	3.6	3.9	3.0	2.0	1.9	2.5
H_2O^-	0.15	0.35	0.10	0.63	0.20	0.19	0.15
H_2O^+	0.85	0.85	0.49	1.5	3.3	2.7	1.1
TiO_2	0.41	0.44	0.42	0.62	1.5	1.0	0.15
P_2O_5	0.29	0.00	0.14	0.32	0.58	0.56	0.07
MnO	0.03	0.03	0.07	0.08	0.21	0.17	0.09
CO_2	0.18	0.93	<0.05	2.0	0.09	3.1	2.0
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.91	99.18	99.95	99.61	99.28	99.02	99.21

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	150	151	152	153	154	155	156
SiO_2	69.2	72.4	72.4	73.4	70.74	73.50	7498
Al_2O_3	16.2	14.8	15.4	14.7	14.68	14.87	15.27
Fe_2O_3	1.3	0.55	0.67	0.87	0.69	0.95	(
FeO	0.20	0.78	0.48	0.48	0.58	0.42	(1.27 (
MgO	0.25	0.23	0.14	0.15	0.28	0.29	tr
CaO	2.5	2.1	1.3	1.9	4.12	2.14	1.03
Na_2O	3.4	3.2	3.4	2.9	2.29	3.46	1.89
K_2O	2.7	3.7	4.2	3.4	2.59	3.56	2.10
H_2O^-	0.43	0.33	0.11	0.44	(	(	(
H_2O^+	1.3	0.65	1.0	0.56	(2.09 (	(0.90 (	(2.00 (
TiO_2	0.03	0.12	0.10	0.12	-	0	-
P_2O_5	0.04	0.18	0.03	0.18	-	0	tr
MnO	0.03	0.03	0.14	0.12	0.06	0.03	1.07
CO_2	1.6	0.05	0.56	<0.05	2.14	-	-
BaO	-	-	-	-	0.03	0	-
SrO	-	-	-	-	tr	tr	-
SO_3	-	-	-	-	-	-	tr
S	-	-	-	-	-	-	-
Cl	-	-	-	-	tr	-	-
F	-	-	-	-	-	-	
	99.18	99.12	99.93	99.27	100.29	100.12	99.61

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	157 [20]	158 [21]	159	160	161 [22]	162 [23]	163 [24]
SiO_2	66.37	66.45	68.10	63.25	72.87	70.78	68.37
Al_2O_3	11.15	15.84	14.97	16.16	14.54	14.55	16.38
Fe_2O_3	0	2.59	2.78	2.60	0.80	1.35	1.14
FeO	0.32	1.43	1.10	2.44	0.84	1.31	0.95
MgO	tr	1.21	1.10	1.62	0.42	0.83	0.67
CaO	0.18	2.90	3.04	2.99	2.00	2.29	2.99
Na_2O	0.56	3.92	3.46	3.54	4.02	3.87	4.48
K_2O	9.03	2.89	2.93	3.26	3.55	3.81	3.31
H_2O^-	0.14	-	(	0.63	0.07	0.03	0.13
H_2O^+	0.44	0.84	(1.28 (	1.85	0.36	0.24	0.47
TiO_2	0.23	0.10	0.07	0.50	0.17	0.34	0.27
P_2O_5	none	0.36	0.16	0.30	0.07	0.15	0.15
MnO	-	0.09	0.09	-	0.04	0.04	0.08
CO_2	0	1.35	0.92	0.88	0.01	0.02	0.03
BaO	0.10	-	-	-	-	-	-
SrO	-	0.07	0.08	-	-	-	-
SO_3	0.35	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	0.05	0.03	-	0.02	0.03	0.01
F	-	-	-	-	0.05	0.06	0.05
	97.38	100.09	100.11	100.02	99.81	99.66	99.46

_/ See page 93 for footnotes

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	164[25/]	165[26/]	166[27/]	167	168	169	170
SiO_2	72.47	67.66	74.45	67.01	65.94	68.60	65.51
Al_2O_3	14.43	16.21	17.42	18.03	16.00	16.21	17.01
Fe_2O_3	0.91	1.73	none	0.66	.60	1.67	-
FeO	0.99	1.53	0.56	0.72	1.74	1.57	2.79
MgO	0.54	0.96	0.37	0.84	1.02	1.05	0.90
CaO	2.19	3.55	0.83	3.99	2.87	2.61	3.16
Na_2O	3.78	4.30	3.97	4.42	3.85	3.29	3.82
K_2O	3.36	2.87	4.53	3.53	4.56	3.88	4.67
H_2O^-	0.11	0.14	(	-	-	(	(
H_2O^+	0.49	0.36	(0.66 (	0.91	1.13	(0.92 (	(1.78 (
TiO_2	0.20	0.33	-	-	-	-	-
P_2O_5	0.09	0.15	0.01	0.10	0.23	0.21	0.13
MnO	0.05	0.11	0.28	0.09	-	0.09	-
CO_2	0.01	0.01	-	-	-	-	-
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	0.02	0.01	-	-	-	-	-
F	0.04	0.07					
	99.66	99.96	100.38	100.40	100.26	100.32	99.77

_/ See page 93 for footnotes

1-degree quadrangle No. 10

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	171	172[28/]	173[29/]	174	175	175A	175B
SiO_2	67.29	57.35	55.44	56.62	64.81	63.66	68.30
Al_2O_3	15.78	16.29	14.95	16.74	15.73	17.05	16.24
Fe_2O_3	1.86	3.15	4.37	4.94	1.68	1.97	1.60
FeO	1.97	4.36	5.18	3.27	2.91	2.62	1.63
MgO	0.72	2.41	3.58	4.08	2.82	1.99	1.05
CaO	2.36	5.66	6.12	7.39	4.22	3.89	2.79
Na_2O	3.77	4.50	4.44	3.50	3.98	4.13	3.90
K_2O	3.55	3.39	2.83	1.97	1.43	3.09	3.52
H_2O^-	2.10	0.15	0.12	0.92	-	1.19	0.71
H_2O^+		0.70	0.84		0.62		
TiO_2	not deter.	1.07	1.22	-	0.08	undeterm.	undeterm.
P_2O_5	0.28	0.70	0.49	tr	0.23	0.27	0.13
MnO	0.21	0.12	0.22	0.15	0.08	0.14	0.12
CO_2	0.27	0.46	0.35	1.15	1.08	-	-
BaO	-	0.10	0.16	-	-	-	tr
SrO	-	0.05	0.04	-	-	0.08	0.04
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.16	100.55	100.44	100.73	100.61	100.08	100.03

_/ See page 93 for footnotes

20/ Also contains ZrO_2 - 0.02 and FeS_2 - 10.75.

21/ Also contains Li_2O - tr.

22/ Less O for F and Cl - 0.02.

23/ Less O for F and Cl - 0.04.

24/ Less O for F and Cl - 0.02.

25/ Less O for F and Cl - 0.02.

26/ Less O for F and Cl - 0.03.

27/ Also contains Li_2O - tr. MnO is listed as MnO_2.

28/ Also contains FeS_2 - 0.09.

29/ Also contains FeS_2 - 0.09.

1-degree quadrangle No. 11

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
45	Intrusive spur on NE side of Eldora stock.	K-Ar	coarse biotite	54.8	Hart (1964)
46	do.	do.	fine biotite	53.7	do.
47	do.	Rb-Sr	coarse biotite	63±9	do. Rb-Sr age is too high.
48	South Table Mtn. SW1/4 NW1/4 sec. 31,T.3 S., R.69W.,235 ft stratigraphically above 49.	K-Ar	Whole rock (basalt)	58.7	Evernden et al (1964). Extrusive rock.
49	Same location. 35 ft stratigraphically above Cretaceous-Tertiary boundary.	do.	Plagioclase from pumice bed in Denver Fm.	64.8	do.
50	2 mi W of Empire--stock of hornblende pyroxene monzonite.	do.	Hornblende	53	Hedge, 1970, pers. comm.
51	Red Mtn. rhyolite plug; NE side of peak.	K-Ar	Sanidine	27±3	Taylor et al (1968)
52	Hideway Park.	do.	Sanidine from rhyolitic tuff breccia.	29±3	do. Extrusive rock.
53	Eldora stock; contact zone, 58 ft from stock.	do.	Biotite	68±2	Hart (1960); more correct age than No. 54 according to Hart
54	Eldora stock; contact zone, 248 ft from stock.	K-Ar	Biotite	80±2	Hart (1960)
55	Wood mine, Gilpin Co.	$\frac{Pb^{207}}{U^{235}}$	Uraninite	42±2	Eckelman and Kulp (1957)
56	do.	do.	do.	56±2	do.
57	do.	do.	do.	64±2	do.
58	Iron mine, Gilpin Co.	do.	do.	70±3	do.
59	Richards mine, Gilpin Co.	$\frac{Pb^{207}}{U^{235}}$	do.	62±6	Eckelman and Kulp (1957)

1-degree quadrangle No. 11

Geologic age

No.	Location	Type	Mineral	Age	Reference, remarks
60	German mine, Gilpin Co.	$\frac{Pb^{207}}{U^{235}}$	Uraninite	54±2	Eckelman and Kulp (1957)
61	Gilpin Co.	do.	do.	61±2	do.
62	Copper King mine, Larimer Co.	do.	do.	56±2	do. Located on quad. 4)
63	do.	do.	do.	75±5	do. The average of the 9 $\frac{Pb^{207}}{U^{235}}$ ages is 60 m.y.
64	Wood mine, Gilpin Co.	$\frac{Pb^{206}}{U^{238}}$	do.	57	Faul (1954)
65	do.	do.	do.	60±6	do.
66	Iron mine, Gilpin Co.	do.	do.	70±7	do.
67	Copper King mine, Larimer Co.	do.	do.	68±7	do. (Located on quad. 4)
68	do.	do.	do.	55±6	do.
69	Gilpin Co.	do.	do.	59	Faul (1954)
70	German mine, Gilpin Co.	Pb^{210}	do.	58±3	do.
71	Richards mine, Gilpin Co.	do.	do.	61±3	do.
72	Mena mine, Ralston mining district	$\frac{Pb^{206}}{U^{238}}$	do.	73±0.2	Sheridan and others (1967)
73	do. (same sample)	$\frac{Pb^{207}}{U^{235}}$	do.	73±1.7	do.
74	do. (same sample)	$\frac{Pb^{207}}{U^{206}}$	do.	66±57	do. Stieff and Stern in Sheridan and others (1967) conclude that 73±5 m.y. is the preferred age.
75	Montezuma stock	K-Ar	Biotite	38.6+ 1.2	Gast and others (1966)
76	Eldora; monzonite porphyry stock	do.	do.	59.1+ 1.8	do.

1-degree quadrangle No. 11

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Central City-Blackhawk [including Northern districts of Perigo, Independence, Pine-Kingston-Apex and Southern districts of Nevada, Gregory, Russel, and Quartz Mountain]	2	Au, Ag, Cu, Pb, Zn, U	Laramide veins and stockworks of: 1. pyrite, chalcopyrite, quartz; 2. galena, sphalerite, chalcopyrite; 3. uranium ore; 4. telluride ore.
Nederland	3	W	Laramide veins in Precambrian rock.
Montezuma [includes Argentine district]	3	Pb, Ag, Cu, Zn	Laramide veins and stockworks; contact metamorphic deposits.
Idaho Springs	3	Au, Ag, Pb, Zn, Cu	Laramide fault-fissure veins in Precambrian rocks.
Georgetown-Silver Plume	3	Ag, Pb, Zn	Laramide fissure veins in Precambrian rocks.
Ralston Creek (including Golden Gate Canyon area)	3	U	Laramide fault-fissure veins in Precambrian rock.
Freeland-Lamartine	3	Ag, Au, Pb, Zn, Cu Zn	Laramide fissure-filling veins in Precambrian rock.
Lawson-Dumont	4	Ag, Pb, Cu, Au, Zn	Laramide fissure-filling veins in Precambrian rock.
Empire	4	Au, Ag	Laramide fissure-filling veins in Precambrian rock.
Urad	4	Mo	Stockwork--myriad veinlets in Oligocene stock of rhyolite porphyry.
Magnolia	4	Au, Ag	Laramide fissure-filling veins of Au Telluride
Caribou	4	Ag, Pb, U	Laramide fissure-filling veins in Tertiary intrusive rock.
Fairplay	4	Au	Placer.
Tarryall Creek	5	Au	Placer.
Halls Gulch	5	Pb, Ag. Cu, Au	Veins in Precambrian rock.
Golden Placers	5	Au	Placer.
Malachite	5	Cu, Ag	Vein-like lenticular masses in Precambrian rock.
Clear Creek (Adams Co.)	6	Au	Placer.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	176	177	178	179	180	181	182
Original author's identifying number	1	I	II	III	IV	V	VI
Location and rock form (dike, etc.)	Chalmers quartz monzonite T.11S.,R.76 W. stock?	Eshe porphyry, near Halfway, Tarryall distr. stock?	Eshe porphyry, north of Halfway stock?	Boreas Pass sill?	Near Boreas Pass sill?	Little French Creek dike?	Mineral Ranch Hill, Tarryall district
Analyst	A. Willman	H. W. Mundt and A. L. Cairns	H. W. Mundt and A. L. Cairns	H. W. Mundt and A. L. Cairns	H. W. Mundt and A. L. Cairns	H. W. Mundt and A. L. Cairns	H. W. Mundt and A. L. Cairns
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 20.6% MQ - 15%	-	-	-	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	P	P	P	P
Original author's rock name	quartz monzonite	quartz monzonite	quartz monzonite	diorite	diorite	quartz monzonite	quartz monzonite
Felsic-mafic index	6.04	8.47	8.21	3.26	9.45	10.4	5.35
Rock name according to felsic-mafic index	quartz diorite	granodiorite	granodiorite	monzonite	granodiorite	quartz monzonite	quartz diorite
Specific gravity	-	-	-	-	-	-	-
Reference	Stark et al (1949, p. 86)	Stark et al (1949, p. 84)	Stark et al (1949, p. 84)	Stark et al (1949, p. 84)	Stark et al (1949, p. 84)	Stark et al (1949, p. 84)	Stark et al (1949, p. 84)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	183	184	185	186	187	188	189
Original author's identifying number	1	-	2	1	4	1	6
Location and rock form (dike, etc.)	Oil well intrusion dike?	Mount Guyot Summit Breckenridge stock	Browns Gulch 900 ft S. of Swan City stock	Brewery Hill, 1000 ft NE of summit stock	Chicago Creek, dike	S.side of Clear Creek,E. of mouth of Soda Creek stock	Red Lyon Lode; on Chicago Crk. 0.2 mi NE mouth of King Solomon Gulch stock
Analyst	A. Willman	R. C. Wells	R. C. Wells	R. C. Wells	W. T. Schaller	-	W. T. Schaller
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ne - 8.5%	NQ - 18.31%	NQ - 24.42%	NQ - 25.56%	-	quartz present	quartz present
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	C	P	P	P	F	P	P
Original author's rock name	Transitional facies between analcite syenite and analcite diabase	quartz monzonite	quartz monzonite	quartz monzonite	biotite latite	alkali syenite	bostonite
Felsic-mafic index	3.94	6.94	14.3	9.33	15.2	9.04	34.5
Rock name according to felsic-mafic index	monzonite	quartz diorite	quartz monzonite	granodiorite	rhyolite	granodiorite	alkali rhyolite
Specific gravity	-	-	-	-	-	-	-
Reference	Stark and others (1949, p. 91)	Ransome (1911, p. 58)	Ransome (1911, p. 45)	Ransome (1911, p. 45)	Spurr and others (1908, p. 134)	Spurr and others (1908, p. 134)	Spurr and others (1908, p. 134)

1-degree quadrangle No.11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	190	191	192	193	194	195	196
Original author's identifying number	-	-	-	A	B	-	1
Location and rock form (dike, etc.)	Near the head of the N fork of Turkey Creek stock?	Alum Hill SE 1/4 sec. 2, T. 1 S.,R.70 W. dike	Same as 191	Magnolia distr. dike	Same as 193	Mt. Falcon; NE corner sec.8, T. 5 S.,R.70 W. plug	1 mi S of Caribou stock
Analyst	L. G. Eakins	C. I. Andrews	C. I. Andrews	M. C. Whitaker	M. C. Whitaker	G. O. Riddle	George Steiger
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	no quartz	no quartz	haüyne - 1% tridynite - 1%	contains olivine	contains olivine	M Ne - 1%	NQ - 7.62%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M - C	F	C	P?	P?	M	F
Original author's rock name	augite-mica-syenite	-	-	olivine	olivine	shonkinite	quartz monzonite
Felsic-mafic index	3.99	0.90	1.50	0.67	0.65	2.64	3.68
Rock name according to felsic-mafic index	monzonite	ultrabasic	gabbro	ultramafic	ultramafic	diorite	monzonite
Specific gravity	2.857	-	-	2.73	2.73	2.91 powder density	2.837 powder density
Reference	Emmons and others (1896, p. 310)	Andrews (1895)	Andrews (1895)	Whitaker (1898)	Whitaker (1898)	Gable (1968)	Bastin and Hill (1917, p. 43)

1-degree quadrangle No. 39

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	197	198	199	200	201	202	203
Original author's identifying number	2	3	4	5	6	7	8
Location and rock form (dike, etc.)	1/2 mi S of Caribou stock	Caribou stock	Caribou stock	1 mi S of Caribou;border differentiate of 196. stock	From dump of Up to Date tunnel, 1 mi NW of Caribou stock	From dump of Caribou mine stock	1/2 mi S of Caribou stock
Analyst	George Steiger	E. P. Jennings	E. P. Jennings	George Steiger	George Steiger	George Steiger	George Steiger
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	contains olivine	contains olivine	N Ol - 4.71	N Ne - 4.31 N Ol - 15.30	N Ne - 3.41 N Ol - 17.70 N leucite - 2.83	N Ol - 29.69
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F - M	F - M	F - M	F - M	C	M	F - M
Original author's rock name	monzonite	monzonite	monzonite	gabbro	hornblendite	magnetite-rich gabbro	magnetite peridotite
Felsic-mafic index	3.59	3.10	2.90	1.42	0.89	0.71	0.45
Rock name according to felsic-mafic index	monzonite	monzonite	diorite	gabbro	ultramafic	ultramafic	ultramafic
Specific gravity	2.783 powder dens.	-	-	3.074 powder dens.	3.288 powder dens.	3.374 powder dens.	3.564 powder dens.
Reference	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)	Bastin and Hill (1917, p. 43)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	204	205	206	207	208	209	210
Original author's identifying number	A	-	1-107	4-165B	4-165B	5-2	4-164B
Location and rock form (dike, etc.)	Mt. Morrison dike?	1700 ft W of Silver Queen mine near Tungsten dike	7 1/2 mi NNE of Empire dike	4 mi NNE of Empire stock	4 mi NNE of Empire stock	4 mi NNE of Empire dike	4 mi NNE of Empire stock
Analyst	L. G. Eakins	J. G. Fairchild	39/	39/	C. L. Parker	39/	39/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	NQ - 16.6%	NQ - 19.3%	NQ - 14.2%	NQ - 23.8%	NQ - 24.8%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	Enstatite-diabase-porphyry	Hornblende monzonite porphyry	Hornblende granodiorite porphyry	Hornblende granodiorite porphyry	Hornblende granodiorite porphyry	Hornblende granodiorite porphyry	Biotite granodiorite porphyry
Felsic-mafic index	3.00	7.40	4.66	6.08	6.08	6.28	9.11
Rock name according to felsic-mafic index	andesite-latite	granodiorite	monzonite	quartz diorite	quartz diorite	quartz diorite	granodiorite
Specific gravity	2.876	-	-	-	-	-	-
Reference	Clarke (1904, p. 160)	Lovering and Tweto (1953,p.19)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969. p. 21)

39/ Rapid rock analyses by P. L. D. Elmore, I. H. Barbour, S. D. Botts, G. W. Chloe; F, Cl, S are separate analyses by V. C. Smith.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	211	212	213	214	215	216	217
Original author's identifying number	4-196	10-1	10-31B	8-133	4-165A	E-10	P-915
Location and rock form (dike, etc.)	2 mi NNE of Empire stock	About 1 mi NE of Empire stock	About 1 mi ENE of Empire stock	1 mi WNW of Empire stock	4 mi NNE of Empire dike	About 2 mi WNW of Empire stock	About 2 mi WNW of Empire stock
Analyst	C. L. Parker	C. L. Parker	39/	6/	39/	C. L. Parker	43/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 23.7	NQ - 26.5	NQ - 24.5	-	NQ - 39.0	N Ne - 14.0% N Ol - 2.1%	N Ne - 15.0% N Ol - 1.6%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	F	F	F
Original author's rock name	Biotite granodiorite porphyry	Biotite granodiorite porphyry	Biotite granodiorite porphyry	Biotite quartz monzonite porphyry	Granite aplite	Feldspathoidal hornblende-pyroxene monzonite	Feldspathoidal hornblende-pyroxene monzonite
Felsic-mafic index	9.69	12.3	16.9	11.7	28.8	2.87	3.25
Rock name according to felsic-mafic index	granodiorite	quartz monzonite	granite	quartz monzonite	alkali granite	diorite (equivalent)	monzonite (equivalent)
Specific gravity	-	-	-	-	-	-	-
Reference	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 21)	Braddock (1969, p. 26)	Braddock (1969, p. 26)

43/ Rapid rock analyses by P. L. D. Elmore, K. E. White, and S. D. Botts

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	218	219	220	221	222	223	224
Original author's identifying number	P-917	P-570	E-33	E-39	E-48	E-53	E-78
Location and rock form (dike, etc.)	About 2 mi WNW of Empire stock	not known stock?	About 2 mi WNW of Empire stock	About 2 mi W of Empire stock	About 2 mi W of Empire stock	About 2 mi W of Empire stock	2 1/2 mi NW of Empire stock
Analyst	43/	43/	39/	C. L. Parker	39/	39/	C. L. Parker
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ne - 15.6% N Ol - 0.6%	N Ne - 7.8% N Ol - 2.0%	N Ne - 1.2% N Ol - 2.5%	N Ne - 1.7% N Ol - 3.2%	N Ne - 3.3% N Ol - 2.6	NQ - 1.3%	N Ne - 0.3% N Ol - o.1%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	F	F	F	F
Original author's rock name	Feldspathoidal hornblende-pyroxene monzonite	Feldspathoidal hornblende-pyroxene monzonite	Hornblende-pyroxene monzonite	Hornblende-pyroxene monzonite	Hornblende-pyroxene monzonite	Hornblende-pyroxene monzonite	Hornblende-pyroxene monzonite
Felsic-mafic index	3.76	2.45	3.92	1.85	3.78	4.77	6.29
Rock name according to felsic-mafic index	monzonite (equivalent)	diorite (equivalent)	monzonite	gabbro	monzonite	monzonite	quartz diorite
Specific gravity	-	-	-	-	-	-	-
Reference	Braddock (1969, p. 26)	Braddock (1969, p. 26)	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 27)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	225	226	227	228	229	230	231
Original author's identifying number	P-913	P-914	E-60	5-51	P-912	9-33A	E-83
Location and rock form (dike, etc.)	About 2 mi WNW of Empire stock	About 2 mi WNW of Empire stock	About 2 1/2 mi NW of Empire stock	About 3 mi NNE of Empire dike	About 3 mi WSW of Empire.Lincoln Mtn. stock	About 3 mi WSW of Empire.Lincoln Mtn. stock	About 1 1/2 mi NW of Empire stock
Analyst	43/	43/	C. L. Parker	39/	43/	6/	39/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ne - 0.5% N Ol - 2.3%	N Ne - 4.6% N Ol - 1.8%	NQ - 0.4%	NQ - 7.8%	NQ - 14.3	NQ - 12.6	NQ - 11.0
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	P	P	P	P	-
Original author's rock name	hornblende-pyroxene monzonite	hornblende-pyroxene monzonite	hornblende-pyroxene monzonite	monzonite porphyry	quartz-bearing monzonite porphyry	quartz-bearing monzonite porphyry	leucocratic monzonite
Felsic-mafic index	4.06	4.15	6.44	4.61	8.35	7.67	14.5
Rock name according to felsic-mafic index	monzonite	monzonite	quartz diorite	monzonite	granodiorite	granodiorite	quartz monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 27)	Braddock (1969, p. 32)	Braddock (1969, p. 32)	Braddock (1969, p. 32)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	232	233	234	235	236	237	238
Original author's identifying number	E-84	8-127A	8-141	1-51	1-111	1-134	4-32
Location and rock form (dike, etc.)	About 1 1/2 mi NW of Empire stock	About 1 1/2 mi NW of Empire stock	About 2 mi WNW of Empire stock	7 mi NNE of Empire dike	8 1/2 mi NNE of Empire dike	5 1/2 mi NNE of Empire dike	3 1/2 mi NE of Empire dike
Analyst	C. L. Parker	6/	6/	39/	39/	39/	39/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 3.7	NQ - 14.2	NQ - 4.8	NQ - 20.3	NQ - 19.9	NQ -5.5	NQ - 14.1
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	P	P	P	P
Original author's rock name	leucocratic monzonite	leucocratic monzonite	leucocratic monzonite	bostonite porphyry	bostonite porphyry	bostonite porphyry	bostonite porphyry
Felsic-mafic index	29.2	18.4	9.63	16.2	58.0	13.7	11.2
Rock name according to felsic-mafic index	alkali granite	granite	granodiorite	rhyolite porphyry	extreme alkali rhyolite	quartz latite	quartz latite
Specific gravity	-	-	-	-	-	-	-
Reference	Braddock (1969, p. 32)	Braddock (1969, p. 32)	Braddock (1969, p. 32)	Braddock (1969, p. 36)	Braddock (1969, p. 36)	Braddock (1969, p. 36)	Braddock (1969, p. 36)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	239	240	241	242	243	244	245
Original author's identifying number	4-108	8-2	10-21	4-83	P-42	P-108	P-118
Location and rock form (dike, etc.)	5 1/2 mi NE of Empire dike	2 1/2 mi NE of Empire dike	About 2 mi ENE of Empire dike	4 1/2 mi NE of Empire dike	Gilson gulch; 3 mi S of Central dike	About 1 1/2 mi NW of Central City Nigger Hill dike	1 1/2 mi SW of Central City Main Wood dike
Analyst	39/	39/	39/	39/	W. J. Blake	W. J. Blake	W. J. Blake
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 17.5%	NQ - 5.6%	NQ - 14.6%	NQ - 8.5%	NQ - 12.5%	NQ - 19.7%	NQ - 16.1%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	F	P
Original author's rock name	bostonite porphyry	bostonite porphyry	bostonite porphyry	sanidinite porphyry	monzonite	quartz bostonite	quartz bostonite
Felsic-mafic index	18.4	11.3	8.60	23.0	13.1	18.1	18.6
Rock name according to felsic-mafic index	rhyolite	quartz latite	dacite	rhyolite	quartz monzonite	rhyolite	rhyolite
Specific gravity	-	-	-	-	-	-	-
Reference	Braddock (1969, p. 36)	Braddock (1969, p. 36)	Braddock (1969, p. 36)	Braddock (1969, p. 36)	Phair (1952, p. 13)	Phair (1952, p. 13)	Phair (1952, p. 13)

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	176	177	178	179	180	181	182
SiO_2	62.94	65.38	64.44	53.60	66.67	68.34	62.51
Al_2O_3	16.90	17.54	16.97	17.01	16.72	16.96	17.49
Fe_2O_3	2.82	2.14	2.79	4.06	2.54	0.44	2.52
FeO	2.43	1.72	1.31	4.81	0.72	1.62	2.80
MgO	1.74	1.51	1.70	3.54	1.47	1.94	2.27
CaO	4.45	2.90	2.88	5.73	3.03	3.12	5.08
Na_2O	3.12	3.82	3.77	3.42	3.67	3.25	3.31
K_2O	3.01	2.98	3.04	2.08	3.10	2.49	1.80
H_2O^-	0.19	0.20	0.28	0.11	0.13	0.05	0.08
H_2O^+	0.88	0.89	1.32	2.58	1.05	1.12	0.66
TiO_2	0.55	0.50	0.40	1.40	0.30	0.40	0.70
P_2O_5	0.37	-	-	-	-	-	-
MnO	0.05	-	-	0.87	-	0.26	0.36
CO_2	0.36	-	1.75	0.84	-	-	-
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.81	99.58	100.65	100.05	99.40	99.99	99.58

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	183	184[30/]	185[31/]	186[32/]	187[33/]	188[34/]	189[35/]
SiO_2	50.68	64.28	68.14	67.53	66.44	60.30	67.41
Al_2O_3	17.35	16.99	15.29	15.46	14.98	18.12	16.23
Fe_2O_3	4.16	2.59	0.35	2.18	1.57	2.45	0.85
FeO	3.07	2.64	1.66	2.42	0.43	1.25	1.14
MgO	3.31	1.13	0.26	0.16	0.18	0.28	0.15
CaO	4.70	3.95	3.03	3.24	2.47	3.89	0.14
Na_2O	5.90	3.78	3.59	3.24	1.12	5.83	3.95
K_2O	3.76	3.51	4.07	3.86	3.32	5.01	7.19
H_2O^-	0.32	0.07	0.40	0.23	4.60	0.75	0.67
H_2O^+	3.50	0.25	0.39	0.55	4.06	0.77	0.88
TiO_2	1.77	0.49	0.36	0.41	0.20	0.55	0.16
P_2O_5	0.89	0.32	0.17	0.01	0.11	0.25	0.05
MnO	0.19	0.14	0.12	0.10	0.13	0.12	0.16
CO_2	0.04	-	0.22	0.03	0.67	-	0.56
BaO	0.28	0.10	0.03	0.07	0.11	0.26	tr
SrO	-	0.04	0.03	-	-	-	-
SO_3	-	-	-	-	-	0.06	-
S	-	-	-	-	0.02	-	-
Cl	-	-	-	-	-	-	-
F	-	0.06	-	0.03	-	-	-
	99.92	100.38	99.65	99.63	100.42	99.90	99.65

/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	190	191	192	193	194	195[36/]	196
SiO_2	56.90	39.22	44.93	22.24	21.90	50.60	56.64
Al_2O_3	18.50	4.93	18.32	11.78	11.95	13.61	17.00
Fe_2O_3	0.17	18.12	8.70	4.74	4.60	3.20	3.11
FeO	4.61	5.90	21.09	3.35	3.35	4.41	5.06
MgO	5.10	3.61	0.47	25.00	25.78	6.96	2.79
CaO	6.17	19.29	1.41	10.19	10.77	7.84	6.20
Na_2O	2.99	2.51	2.12	3.29	3.29	2.05	3.16
K_2O	4.14	0.68	0.58	3.64	3.64	6.64	3.40
H_2O^-	(	(	(	(	(	0.09	0.31
H_2O^+	(0.51 (	(0.21 (	(tr (	(5.63 (	(5.59 (	0.59	0.70
TiO_2	0.19	3.49	2.92	0.36	0.32	1.18	0.81
P_2O_5	0.79	-	-	0.61	0.58	1.20	0.44
MnO	tr	-	-	-	-	0.13	0.20
CO_2	-	1.24	tr	8.79	8.75	0.14	none
BaO	-	-	-	-	-	-	0.06
SrO	-	-	-	-	-	-	tr
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	0.03
Cl	tr	-	-	-	-	.05	-
F	-	-	-	-	-	0.54	none
	100.07	99.20	100.54	99.62	100.52	98.99	99.91

_/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	197	198	199	200	201	202[37/]	203[38/]
SiO_2	53.95	52.10	51.43	44.26	36.77	30.47	27.71
Al_2O_3	18.56	19.35	19.35	13.95	10.29	9.04	2.92
Fe_2O_3	3.86	4.63	5.32	7.84	10.54	16.37	21.80
FeO	4.23	4.16	4.70	8.87	12.11	14.91	15.70
MgO	2.35	3.19	3.05	6.59	9.34	7.86	17.98
CaO	6.58	7.15	7.09	10.41	12.26	9.33	6.83
Na_2O	3.36	3.39	3.54	1.81	1.16	0.77	0.19
K_2O	3.88	3.77	3.52	1.75	1.38	2.89	none
H_2O^-	0.30	0.06	0.08	.33	0.36	0.32	0.54
H_2O^+	0.68	0.13	0.35	1.54	1.70	1.32	3.51
TiO_2	0.76	0.94	0.85	1.41	2.49	2.52	2.69
P_2O_5	0.60	0.71	0.60	0.85	1.40	2.87	none
MnO	0.17	0.10	tr	0.19	0.23	.39	0.22
CO_2	0.85	-	-	0.33	0.18	.21	0.22
BaO	0.13	-	-	0.03	-	0.09	tr
SrO	0.07	-	-	0.03	-	0.04	tr
SO_3	-	-	-	-	-	-	-
S	0.06	-	-	0.13	0.33	0.69	0.04
Cl	-	-	-	-	-	-	-
F	none	-	-	none	-	-	-
	100.39	99.68	99.88	100.32	100.63	100.12	100.40

_/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	204	205	206	207	208[40/]	209	210
SiO_2	56.74	63.39	58.1	63.8	62.09	63.6	65.4
Al_2O_3	18.80	16.75	18.4	16.2	17.62	16.6	16.8
Fe_2O_3	0.15	1.83	4.3	2.7	2.66	2.7	2.6
FeO	6.91	3.05	2.8	2.4	2.09	3.0	2.0
MgO	5.57	0.90	2.0	1.5	1.35	1.6	1.08
CaO	7.34	3.85	4.6	5.0	5.29	3.8	3.23
Na_2O	2.32	4.26	4.1	3.5	4.34	3.0	3.3
K_2O	0.77	3.61	1.7	3.2	2.81	3.1	3.6
H_2O^-	(	0.13	(	(	0.12	(	(
H_2O^+	(1.09 (	0.93	(2.4 (	(0.44 (	0.35	(1.2 (	(0.94 (
TiO_2	-	0.35	0.79	0.58	0.51	0.50	0.39
P_2O_5	0.20	0.39	0.48	0.44	0.29	0.32	0.29
MnO	0.07	0.14	0.08	0.10	0.14	0.02	0.02
CO_2	-	0.09	0.05	0.01	0.02	0.00	0.00
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	0.00	0.00	0.07	0.00	0.10
Cl	-	-	0.02	0.03	0.02	0.03	0.03
F	-	-	0.12	0.08	0.07	0.06	0.08
	99.96	99.67	100	100	99.77	99	100

_/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	211[41]/	212[42]/	213	214	215	216[44]/	217
SiO_2	66.32	68.62	69.4	65.7	76.4	50.04	50.7
Al_2O_3	16.22	15.82	16.2	15.4	12.4	17.36	17.3
Fe_2O_3	2.23	1.20	1.5	1.5	1.4	4.07	4.2
FeO	1.99	1.34	0.93	1.2	0.72	4.63	4.2
MgO	1.05	0.67	0.57	0.76	0.18	3.19	3.0
CaO	2.35	2.98	1.6	2.8	0.64	8.19	7.3
Na_2O	3.76	3.95	4.6	4.0	2.3	4.99	5.5
K_2O	3.76	3.66	3.8	3.6	5.9	4.65	4.6
H_2O^-	0.29	0.11	(	1.0	(	0.05	(
H_2O^+	1.10	0.45	(0.98 (	0.45	(.50 (	0.52	(0.46 (
TiO_2	0.38	0.27	0.30	0.29	.08	0.93	0.90
P_2O_5	0.23	0.14	0.18	0.18	.02	0.69	0.68
MnO	0.05	0.03	0.02	0.16	0.00	0.22	0.22
CO_2	0.01	0.31	0.01	2.6	0.00	0.11	0.20
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	0.00	0.03	0.00	-	0.00	0.03	-
Cl	0.01	0.02	0.00	-	0.02	0.14	-
F	0.04	0.06	0.04	-	0.01	0.11	-
	99.77	99.41	100	100	100	99.82	99

/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	218	219	220	221 [45/]	222	223	224 [46/]
SiO_2	52.0	49.4	54.7	47.00	53.9	57.0	58.13
Al_2O_3	17.8	15.6	18.5	16.56	17.6	17.6	19.09
Fe_2O_3	4.0	6.1	4.1	6.19	3.2	4.0	3.17
FeO	3.9	5.1	3.4	5.36	3.8	2.8	1.79
MgO	2.3	3.7	2.3	4.54	2.6	1.8	1.11
CaO	6.5	8.6	6.4	11.93	7.0	5.3	4.79
Na_2O	6.0	4.1	4.6	3.29	4.4	4.6	5.14
K_2O	4.8	4.0	4.2	1.50	4.5	4.8	5.02
H_2O^-	(		(	0.15	(	(	0.17
H_2O^+	(0.54	0.80 (LOI)	(0.69	0.65	(0.90	(0.58	0.27
	(		(		(	(	
TiO_2	0.84	1.00	0.89	1.31	0.90	0.86	0.68
P_2O_5	0.56	0.83	0.49	0.87	0.49	0.45	0.21
MnO	0.22	0.24	0.19	0.24	0.20	0.16	0.19
CO_2	0.22	-	0.01	0.19	0.02	0.01	0.01
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	0.00	0.02	0.00	0.00	0.01
Cl	-	-	0.03	0.02	0.08	0.04	0.02
F	-	-	0.08	0.10	0.11	0.10	0.09
	100	100	100	99.87	100	100	99.84

/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	225	226	227[47/]	228	229	230	231
SiO_2	54.4	54.2	57.73	58.2	62.3	62.4	65.9
Al_2O_3	18.5	18.5	20.31	17.4	16.4	16.8	17.5
Fe_2O_3	3.6	3.7	3.05	4.2	2.6	3.6	2.2
FeO	3.3	3.4	1.35	2.8	1.7	2.0	0.78
MgO	2.1	1.9	0.75	2.0	1.2	1.2	1.0
CaO	6.5	6.4	5.30	5.3	3.0	2.5	1.3
Na_2O	4.3	5.2	5.28	4.5	4.9	5.1	5.7
K_2O	4.3	4.1	4.22	3.3	3.8	3.8	4.7
H_2O^-	(	(	0.27	(	(	0.35	(
H_2O^+	(0.80 (L.O.L.)	(0.76	0.33	(0.57	(1.2	0.80	(0.59
TiO_2	0.81	0.70	0.73	0.84	0.52	0.64	0.30
P_2O_5	0.50	0.40	0.16	0.50	0.30	0.44	0.10
MnO	0.16	0.18	0.16	0.13	0.10	0.14	0.06
CO_2	-	0.40	0.03	0.01	0.94	0.11	0.02
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	0.01	0.00	-	-	-
Cl	-	-	0.02	0.05	-	-	0.01
F	-	-	0.07	0.11	-	-	0.05
	100	100	99.73	100	99	100	100

_/ See page 117 for footnotes.

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	232	233	234	235	236	237	238
SiO_2	65.44	66.6	61.5	65.4	70.8	63.2	61.1
Al_2O_3	18.06	17.4	18.2	17.8	16.5	18.4	17.3
Fe_2O_3	1.62	1.7	3.0	3.3	0.85	3.1	2.8
FeO	0.52	0.42	1.5	0.58	0.14	1.1	0.32
MgO	0.08	0.14	0.65	0.58	0.14	0.62	0.33
CaO	0.46	1.9	2.4	0.14	0.28	0.59	2.9
Na_2O	5.57	5.6	4.5	4.9	4.6	6.9	4.3
K_2O	7.43	4.4	6.6	4.3	6.2	4.2	6.0
H_2O^-	0.13	0.26	0.14	(	(	(	(
H_2O^+	0.30	0.52	0.48	(2.6 (	(0.78 (	(1.4 (	(1.5 (
TiO_2	0.16	0.24	0.60	0.43	0.10	0.44	0.32
P_2O_5	0.01	0.06	0.28	0.15	0.02	0.17	0.11
MnO	0.03	0.03	0.12	0.02	0.01	0.10	0.14
CO_2	0.01	0.39	<0.05	0.01	0	0.01	2.2
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	0.27
S	-	-	-	0.02	-	-	-
Cl	0.02	-	-	0.01	0.01	0.01	-
F	0.01	-	-	0.16	0.09	0.04	0.10
	99.85	100	100	100	100	100	99

1-degree quadrangle No. 11

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	239[48/]	240	241	242	243	244	245
SiO_2	65.99	60.2	61.2	62.4	66.78	68.56	68.10
Al_2O_3	17.42	19.0	17.2	18.5	16.05	15.88	15.89
Fe_2O_3	2.96	2.1	2.5	2.9	1.69	3.06	1.43
FeO	0.13	0.97	2.1	0.10	2.09	1.19	2.49
MgO	0.26	0.52	1.0	0.21	0.46	0.10	0.08
CaO	0.75	2.7	2.6	0.10	1.65	.00	0.22
Na_2O	5.86	6.0	4.4	0.30	5.49	4.80	4.95
K_2O	3.68	4.6	4.9	13.5	4.74	5.44	5.65
H_2O^-	0.45	(	(	(	0.10	0.20	0.18
H_2O^+	1.04	(1.2 (	(1.4 (	(1.4 (	0.32	0.64	0.70
TiO_2	0.34	0.40	0.52	0.31	0.32	0.14	0.10
P_2O_5	0.14	0.10	0.24	0.10	0.13	0.04	0.14
MnO	0.15	0.14	0.16	0.08	0.09	0.03	0.12
CO_2	0.36	1.4	1.6	0	0.04	0.01	0.21
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	0.02	-	-	-	-	-	-
Cl	-	.01	0.01	0.01	-	-	-
F	0.08	.09	0.08	0.06	-	-	-
	99.59	99	100	100	99.95	100.09	100.26

_/ See Page 117 for footnotes.

30/ Also contains ZrO_2 - 0.01 and V_2O_3 - 0.03.

31/ Also contains ZrO_2 - 0.01, FeS_2 - 1.52, and NiO_2(sic) - 0.01.

32/ Also contains ZrO_2 - 0.02 and FeS_2 - 0.09.

33/ Also contains ZrO_2 - 0.01.

34/ Also contains ZrO_2 - 0.01.

35/ Also contains ZrO_2 - 0.11.

36/ Less O for F and Cl = 0.24.

37/ Also includes CoO - 0.03.

38/ Also includes CoO - 0.05.

40/ Less O for F and Cl = 0.07.

41/ Less O for F and Cl = 0.02.

42/ Less O for F and Cl = 0.05.

44/ Less O for F and Cl = 0.10.

45/ Less O for F, Cl and S = 0.05.

46/ Less O for F, Cl and S = 0.05.

47/ Less O for F, Cl and S - 0.04

48/ Less O for F and S = 0.04.

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference remarks
77	Cripple Creek; syenite	K-Ar	Hornblende	33.4±10	Gast and others (1966)
78	do. (same sample as 77)	do.	do.	33.8±1.3	do.
79	Salida; Cameron Mtn. stock.	do.	Biotite	70.4±2.1	do.
80	do.	do.	Hornblende	69.4±2.1	do.
81	Devils Hole; Rosita Fm. at Rosita Hills.	do.	Whole rock?	38.2±1.5	Siems (1968) (extrusive rock)
82	Game Ridge; Rosita Hills.	do.	Whole rock?	33.2±0.9	do.
83	Silver Cliff; rhyolite lava flow.	$\frac{Rb^{87}}{Sr^{87}}$	Obsidian	40±13	do.

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Cripple Creek	2	Au, Ag	Au tellurides in: 1. single and multiple fissure veins. 2. irregular deposits in shattered rock. 3. mineralized "collapse breccias."
Westcliff-Silver Cliff	4	Ag, Au, Pb, Zn, Cu	Tertiary veins in Precambrian granite and Tertiary rhyolite.
Rosita Hills	4	Ag, Pb, Cu, Au	Tertiary veins and pipes in volcanic rock.
Oak Creek	4?	Pb	Cerrussite in lenses, stringers, and small pockets in Precambrian.
Tallahassee Creek	4	U	Sedimentary deposit in Eocene? arkose.
Cotopaxi	5	Zn, Cu, Pb, Au, Ag	Veins in Precambrian granite.
Grape Creek (Greenhorn)	6	Zn, Pb, Cu, Au, Ag	?

1-degree quadrangle No. 18

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	246	247	248	249	250	251	252
Original author's identifying number	-	-	-	-	-	-	III
Location and rock form (dike, etc.)	About 2 mi W of Rosita dike?	About 2 mi W of Rosita dike?	About 2 mi WSW of Rosita dike	near Rosita dike	near Rosita dike	The Basin dike	Mitre Peak Cripple Creek area cone
Analyst	L. G. Eakins	L. G. Eakins	L. G. Eakins	L. G. Eakins	L. G. Eakins	W. F. Hillebrand	W. F. Hillebrand
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	-	-	-	contains nepheline and sodalite
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	-	-	-	F
Original author's rock name	augite diorite (olivine facies)	augite diorite (orthoclase facies)	Pringle andesite	trachyte	mica dacite	analcite basalt	phonolite
Felsic-mafic index	2.74	4.51	11.4	22.6	16.6	1.76	25.5
Rock name according to felsic-mafic index	diorite	monzonite	quartz latite	rhyolite	rhyolite	basalt	alkali trachyte
Specific gravity	2.870	2.768	2.690	2.621	2.563	-	-
Reference	Cross (1896, p. 324)	Cross (1896, p. 324)	Cross (1896, p. 324)	Cross (1896, p. 324)	Cross (1896, p. 324)	Cross (1897)	Cross and Penrose (1895, p. 39)

1-degree quadrangle No.18

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	253	254	255	256	257	258	259
Original author's identifying number	II	IV	I	-	I	II	III
Location and rock form (dike, etc.)	1 mi S of Straub Mtn. cone?	NE slope of Big Bull Mtn. dike	SW slope of Rhyolite Mtn. dike	W slope of Bull Cliff dike	Portland mine Level 6 -	Anaconda mine adit level -	Portland mine adit level -
Analyst	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand	George Steiger	George Steiger	W. F. Hillebrand
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	contains nepheline	contains nepheline and sodalite	contains nepheline	contains nepheline	-	-	contains feldspathoids
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	P	F	F	F	P
Original author's rock name	phonolite	phonolite	phonolite	trachytic phonolite	latite phonolite	latite phonolite	latite phonolite
Felsic-mafic index	22.0	21.6	17.2	14.3	4.80	6.01	6.47
Rock name according to felsic-mafic index	trachyte	trachyte	trachyte	quartz latite (equivalent)	latite (equivalent)	quartz andesite (equivalent)	quartz andesite (equivalent)
Specific gravity	-	-	2.52	-	-	-	-
Reference	Cross and Penrose (1895, p. 39)	Cross and Penrose (1895, p. 39)	Cross and Penrose (1895, p. 39)	Cross and Penrose (1895, p. 43)	Lindgren and Ransome (1906, p. 79)	Lindgren and Ransome (1906, p. 79)	Lindgren and Ransome (1906, p. 79)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	260	261	262	263	264	265	266
Original author's identifying number	IV	V	-	-	-	-	-
Location and rock form (dike, etc.)	3300 ft S 10E from Bull Cliff -	Portland mine, 500-600 ft level -	near Longfellow mine -	Portland mine, 600 ft level -	Bull Cliff -	Isabella mine dike	Appie Ellen, shaft, Cripple Creek dike
Analyst	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand	W. F. Hillebrand	W. T. Schaller	W. F. Hillebrand
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	contains feldspathoids	contains feldspathoids	contains nepheline	contains feldspathoids	-	-	contains nepheline
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	M	F	F	F	F
Original author's rock name	latite phonolite	biotite trachyte	nepheline syenite	syenite	trachydolerite (local facies of a phonolitic mass)	trachydolerite	nepheline basalt
Felsic-mafic index	6.57	19.0	5.92	3.88	3.08	2.60	1.11
Rock name according to felsic-mafic index	quartz andesite (equivalent)	trachyte	quartz andesite (equivalent)	latite (equivalent)	monzonite	andesite	ultramafic
Specific gravity	-	-	2.68	-	-	-	2.99
Reference	Lindgren and Ransome (1906, p. 79)	Lindgren and Ransome (1906, p. 79)	Cross and Penrose (1895, p. 34)	Lindgren and Ransome (1906)	Lindgren and Ransome (1906)	Lindgren and Ransome (1906)	Cross and Penrose (1895, p. 50)

1-degree quadrangle No.18

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	267	268	269	270	271	272	
Original author's identifying number	-	-	-	-	-	-	
Location and rock form (dike, etc.)	Jennie Sample mine -	Block 8 mine	Game Ridge stock	Same location as 269 dike	South slope of the Blue Mtns. dike	N.bank of Cottonwood Gulch, just above the Mtn.Boy mine dole?	
Analyst	W. T. Schaller	W. T. Schaller	L. G. Eakins	L. G. Eakins	L. G. Eakins	L. G. Eakins	
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	contains olivine	contains quartz	contains quartz	contains quartz	-	
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	-	-	-	-	
Original author's rock name	vogesite	monchiquite	trachyte	trachyte	syenite	peridotite	
Felsic-mafic index	3.02	1.88	20.6	22.6	6.71	1.17	
Rock name according to felsic-mafic index	latite	basalt	rhyolite	rhyolite	quartz diorite	ultramafic	
Specific gravity	-	-	2.592	2.621	2.689	3.228	
Reference	Lindgren and Ransome (1906)	Lindgren and Ransome (1906)	Cross (1896)	Cross (1896)	Cross (1887)	Cross (1887)	

1-degree quadrangle No. 18

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	246	247	248	249	250	251[49/]	252[50/]
SiO_2	50.47	53.80	63.49	65.41	67.49	45.59	58.98
Al_2O_3	18.73	20.13	18.40	18.78	17.76	12.98	20.54
Fe_2O_3	4.19	3.57	2.44	0.94	2.54	4.97	1.65
FeO	4.92	2.63	1.09	0.72	0.08	4.70	0.48
MgO	3.48	2.26	0.66	0.16	0.35	8.36	0.11
CaO	8.82	5.60	2.30	1.58	1.67	11.09	0.67
Na_2O	4.62	5.20	5.70	5.91	5.03	4.53	9.95
K_2O	3.56	4.49	4.62	5.41	4.40	1.04	5.31
H_2O^-	(	(	(	(	(	(	0.19
H_2O^+	(0.58	(0.90	(1.04	(1.38	(0.52	(0.51	
	(	(	(	(	(	(	0.97
TiO_2	0.51	0.43	tr	-	-	1.32	0.24
P_2O_5	0.10	0.56	tr	tr	tr	-	0.04
MnO	0.11	0.29	0.16	tr	tr	0.14	0.26
CO_2	tr	-	tr	-	-	0.91	-
BaO	-	-	-	-	-	0.13	none
SrO	-	-	-	-	-	0.12	none
SO_3	-	-	-	-	-	-	0.20
S	-	-	-	-	-	-	-
Cl	tr	-	-	-	-	0.05	0.288
F	-	-	-	-	-	-	-
	100.09	99.86	99.90	100.27	99.84	99.87	100.07

/ See page 127 for footnotes.

1-degree quadrangle No. 18

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	253[51/]	254[52/]	255[53/]	256[54/]	257[55/]	258[56/]	259[57/]
SiO_2	58.78	59.00	58.64	59.38	56.01	58.05	54.88
Al_2O_3	20.03	20.07	19.62	19.47	17.92	17.66	18.53
Fe_2O_3	1.87	1.58	2.17	1.60	4.20	3.51	2.93
FeO	0.49	0.65	0.42	1.19	2.52	1.65	1.92
MgO	0.16	0.10	0.37	0.36	2.04	1.55	1.26
CaO	0.83	1.05	1.24	1.96	4.80	4.58	4.15
Na_2O	9.36	8.34	8.39	7.80	4.92	5.80	6.65
K_2O	5.50	5.63	5.26	5.83	4.21	4.06	4.90
H_2O^-	0.31	0.24	0.34	0.11	0.31	0.35	0.38
H_2O^+	1.57	2.03	2.40	0.69	1.10	0.87	1.75
TiO_2	0.29	0.29	0.20	0.58	1.20	0.91	0.93
P_2O_5	0.03	0.05	0.03	0.08	0.55	0.40	0.27
MnO	0.15	0.12	0.20	0.15	0.13	0.13	0.25
CO_2	-	0.26	0.23	-	none	none	0.13
BaO	none	tr	tr	0.13	0.16	0.19	0.18
SrO	none	none	tr	0.03	0.06	0.08	0.11
SO_3	0.12	0.07	tr	0.37	none	0.04	0.36
S	-	-	-	-	-	-	-
Cl	0.58	0.24	0.14	0.22	tr	tr	0.14
F	-	-	-	-	-	-	-
	100.24	99.92	99.74	100.05	100.19	99.75	99.82

/ See page 127 for footnotes.

1-degree quadrangle No. 18

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	260[58]/	261[59]/	262[60]/	263[61]/	264[62]/	265[63]/	266[64]/
SiO_2	54.43	62.79	54.34	51.89	49.84	48.76	35.03
Al_2O_3	19.01	19.10	19.23	17.94	17.78	17.04	9.80
Fe_2O_3	2.85	2.29	3.19	3.85	5.86	5.04	5.55
FeO	1.93	0.36	2.11	3.37	2.62	3.47	4.98
MgO	0.99	0.40	1.28	2.88	3.02	4.57	9.78
CaO	4.33	0.87	4.53	5.62	7.35	8.64	15.09
Na_2O	6.92	6.23	6.38	4.63	5.20	4.27	2.04
K_2O	5.07	5.58	5.14	4.50	3.04	3.39	2.16
H_2O^-	0.31	0.25	0.14	0.72	0.34	0.69	0.41
H_2O^+	1.68	0.84	1.17	2.09	2.02	1.84	2.05
TiO_2	0.96	0.71	1.09	1.34	1.43	1.34	2.20
P_2O_5	0.25	0.12	0.27	0.67	0.76	0.79	1.99
MnO	0.08	0.07	0.08	0.08	0.21	0.08	0.06
CO_2	0.14	tr	-	tr	0.52	0.22	7.83
BaO	0.21	0.14	0.24	0.19	0.22	-	0.14
SrO	0.21	0.03	0.16	0.11	0.18	0.07	0.17
SO_3	0.42	none	0.07	none	none	tr	-
S	-	-	-	-	-	-	-
Cl	0.22	tr	0.28	tr	tr	0.01	tr
F	-	-	-	-	-	-	-
	100.07	99.90	99.77	100.32	100.42	100.48	99.66

/ See page 127 for footnotes.

1-degree quadrangle No. 18

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	267[65/]	268[66/]	269	270	271	272	
SiO_2	47.31	44.08	66.03	65.41	59.78	46.03	
Al_2O_3	16.21	12.80	18.49	18.78	16.86	9.27	
Fe_2O_3	5.05	4.58	2.18	0.94	3.08	2.72	
FeO	2.90	3.72	0.22	0.72	3.72	9.94	
MgO	3.08	7.22	0.39	0.16	0.69	25.04	
CaO	7.11	11.21	0.96	1.58	].96	3.53	
Na_2O	3.92	2.97	5.22	5.91	5.39	1.48	
K_2O	3.73	3.31	5.86	5.41	5.01	0.87	
H_2O^-	0.87	0.77	(	(	(	(	
H_2O^+	2.17	2.35	(0.85 (	(1.38 (	(1.58 (	(0.64 (	
TiO_2	1.64	1.43	-	-	-	-	
P_2O_5	0.90	0.70	0.04	tr	-	0.17	
MnO	tr	0.14	tr	tr	0.14	0.40	
CO_2	4.98	4.14	tr	-	0.75	-	
BaO	0.17	0.13	-	-	-	-	
SrO	0.02	0.06	-	-	-	-	
SO_3	0.05	0.01	-	-	-	-	
S	-	-	-	-	-	0.01	
Cl	0.05	0.04	-	-	-	-	
F	-	-	-	-	-	-	
	100.28	99.96	100.24	100.29	99.96	100.10	

--/ See next page for footnotes.

49/ Also contains ZrO_2 - 0.03 and Li_2O - tr.

50/ Also contains ZrO_2 - 0.20 and Li_2O - tr.

51/ Also contains ZrO_2 - 0.17 and Li_2O - tr.

52/ Also contains ZrO_2 - 0.20 and Li_2O - tr.

53/ Also contains ZrO_2 - 0.09 and Li_2O - tr.

54/ Also contains ZrO_2 - 0.10, and Li_2O - tr.

55/ Also contains ZrO_2 - 0.02 and FeS_2 - 0.4

56/ Also contains ZrO_2 - 0.02.

57/ Also contains ZrO_2 - 0.3, FeS_2 - 0.10, and Li_2O - tr.

58/ Also contains ZrO_2 - 0.04_2 - 0.07, and Li_2O - tr.

59/ Also contains ZrO_2 - 0.02, FeS_2 - 0.10, and Li_2O - tr.

60/ Also contains ZrO_2 - 0.07 and Li_2O - tr.

61/ Also contains ZrO_2 - 0.03, FeS_2 - 0.41, and Li_2O - tr.

62/ Also contains ZrO_2 - 0.03, and Li_2O - tr.

63/ Also contains ZrO_2 - tr, FeS_2 - 0.11, and Li_2O - tr.

64/ Also contains FeS_2 - 0.38 and Li_2O - tr.

65/ Also contains ZrO_2 - 0.01, FeS_2 - 0.12, Cr_2O_3 - tr, Li_2O - tr, and includes less O for Cl - 0.01.

66/ Also contains FeS_2 - 0.26, Li_2O - tr, Cr_2O_3 - 0.05, and includes less O for Cl - 0.1

1-degree quadrangle No. 19

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
84	Crested Butte ski area; 100 ft S of top of gondola lift. Rock chemical analysis No. 286. Crested Butte laccolith.	K-Ar	Biotite	29.1±1.0	Obradovich and others (1969)
85	Near corner of secs. 27, 28, 33, and 34, T. 51 N., R. 8 E., vitrophyric welded tuff.	K-Ar	Biotite	34±3	Van Alstine (1965); extrusive rock
86	do. (Same sample)	K-Ar	Glassy matrix	34±3	do.
87	Ruby Mtn.; NE1/4NW1/4 sec. 13, T. 15 N., R. 78 W. Obsidian pellets.	K-Ar	Glass	29.3±1.5	Van Alstine (1969); extrusive rock
88	NW end of Sugarloaf Mtn., SE1/4NE1/4 sec. 11, T. 15 S., R. 78 W. Porphyritic rhyolite.	K-Ar	Feldspar	29.1±0.9	do.
89	Quarry; SW1/4SE1/4 sec. 11, T. 15 S., R. 78 W., porphyritic rhyolite.	K-Ar	Feldspar	28±0.8	do.
90	Sec. 32, T. 49 N., R. 8 E., andesite porphyry.	K-Ar	Biotite	33.2±1.0	Marvin, 1970, pers. commun. extrusive rock
91	Sec. 32, T. 49 N.,R. 8 E., andesite porphyry	K-Ar	Plagioclase (andesine)	33.7±3.4	Marvin, 1970, pers. commun. extrusive rock
92	Sec. 6, T. 48 N., R. 8 E., vesicular basalt.	K-Ar	Plagioclase (labradorite)	34.2±3.4	do.
93	Browns Canyon volcanics; Lat 38°39'19" N, Long 106° 03'34" W. Porphyritic quartz latite vitrophyre.	K-Ar	Biotite	37.3±1.9	do.
94	do. (Same rock)	K-Ar	Sanidine	35.4±1.1	do.
95	Tertiary volcanic sequence near Salida; quartz latite with vitrophyre.	K-Ar	Biotite	34	do.
96	do. (same rock)	K-Ar	Sanidine	39	do.
97	do. (same rock)	K-Ar	Glass	34	do.

1-degree quadrangle No. 19

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Garfield-Monarch	3	Ag, Pb, Zn, Au, Cu	Replacement deposits in limestone and dolomite, and veins in Tertiary igneous and other rocks.
Tomichi (Whitepine)	3	Zn, Pb, Ag	1. Replacement deposits in limestone and dolomite 2. Contact deposits 3. Fissure veins
Bonanza (Kerber Creek)	3	Ag, Pb, Cu	Veins of 2 types, mostly in volcanic rock - 1. Base metal sulfides 2. High silver-low sulfide.
Chalk Creek (Alpine, Romley, St. Elmo)	3	Au, Pb, Zn,	Pyritic quartz veins and base metal sulfide veins in Tertiary igneous rock.
Tincup	4	Ag, Au, Pb (Mo, W)	Manto deposits and veins
Gold Brick - Pitkin	4	Au, Ag, Pb	Veins in Precambrian granite and schist.
Spring Creek (Spring Gulch)	4	Zn, Pb, Ag	Zinc and lead carbonate replacement bodies in Leadville dolomite.
Sedalia	4	Cu, Au, Ag, Zn	Chalcopyrite disseminated through schist.
Browns Canyon	4	Fluorspar	Epithermal fissure veins in Precambrian rocks and Tertiary rhyolite porphyry.
Cochetopa	4?	U	Pitchblende veins in Morrison Fm. and Precambrian schist.
Marshall Pass	4?	U	Pitchblende in limestone, sandstone, and shale of Belden Fm.
Quartz Creek	5	Ag, Pb, Au	Replacement bodies in dolomite.
Elk Mountain	6	Ag, Au, Cu, Pb, Zn	Base metal sulfide veins containing Au and Ag in Tertiary igneous rock.
Taylor Park	6	Pb, Ag, Zn	Replacement bodies in dolomite and veins in granite.
Box Canyon	6?	Au	Au-quartz veins in schist.
Mt. Harvard (Riverside)	6	Au, Ag, Pb,	Veins in Precambrian granite cut by Tertiary dikes.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	273	274	275	276	277	278	279
Original author's identifying number	1	2	-	1	-	1	1
Location and rock form (dike, etc.)	Lost Mtn.;about 2 mi NE of Garfield stock	Monarch stock	Jennings Gulch stock	Dump of Pride of the West tunnel, Pomeroy Mtn. stock	Near the head of Jennings Gulch chonolith	Taylor Mtn. stock	Gulch S of Williams Pass, Quartz Creek distr stock
Analyst	R. M. Butters	R. M. Butters	R. M. Butters	R. M. Butters	R. M. Butters	R. M. Butters	Leonard Shapiro
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 5.82% MQ - 13.7%	NQ - 5.16%	NQ - 20.94% MQ - 22.86%	NQ - 15.60% MQ - 17.46%	NQ - 9.66%	NQ - 23.16% MQ - 18.8%	MQ - 18.8%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	C	-	F	M	M?
Original author's rock name	quartz diorite	quartz diorite (monzonitic)	quartz monzonite gneiss	Pomeroy quartz monzonite	andesite	Mt.Princeton quartz monzonite	Mt.Princeton quartz monzonite
Felsic-mafic index	4.40	4.55	11.8	7.05	4.59	9.78	8.65
Rock name according to felsic-mafic index	monzonite	monzonite	quartz monzonite	granodiorite	andesite	granodiorite	granodiorite
Specific gravity	-	-	-	-	-	-	-
Reference	Crawford (1913, p. 133)	Crawford (1913, p. 133)	Crawford (1913, p. 150)	Crawford (1913, p. 137)	Crawford (1913, p. 162)	Crawford (1913, p. 144)	Dings and Robinson (1957, p. 26)

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	280	281	282	283	284	285	286
Original author's identifying number	1	1	1	-	423	424	472
Location and rock form (dike, etc.)	Browns Gulch stock	Mohammed tunnel, Monarch District stock?	Clover Mtn. stock	Eagle Gulch, Bonanza district stock?	Whiterock stock, W. of Twin Lake	Same location and rocks as 284	Crested Butte laccolith
Analyst	R. M. Butters	R. M. Butters	R. M. Butters	George Rohwer and E. Y. Titus	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 29.82%	NQ - 12.96%	NQ - 20.10%	-	NQ - 20.76%	NQ - 26.09%	NQ - 22.35%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	C	P	P	-	-	-	P
Original author's rock name	Mt. Antero granite	quartz latite porphyry	Mt. Etna quartz monzonite porphyry	quartz latite	granodiorite (altered)	granodiorite (altered)	granodiorite
Felsic-mafic index	49.3	11.3	10.6	14.2	15.7	21.1	7.90
Rock name according to felsic-mafic index	alkali granite, almost extreme	quartz latite	quartz monzonite	quartz latite	granite	granite	granodiorite
Specific gravity	-	-	-	-	-	-	-
Reference	Crawford (1913, p. 154)	Crawford (1913, p. 166)	Crawford (1913, p. 158)	Patton (1915)	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 19

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	287	288	289	290	291		
Original author's identifying number	XI(c)	417	A	C	E		
Location and rock form (dike, etc.)	Crested Butte laccolith	Round Mtn. laccolith	East Mtn. Crested Butte Distr. stock	Brush Creek Gunnison Co. -	Crested Butte stock		
Analyst	L. G. Eakins	8/	L. G. Eakins	L. G. Eakins	L. G. Eakins		
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 14.58%	NQ - 29.97%	-	-	-		
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	F	-	P		
Original author's rock name	granodiorite (~~altered~~)	granodiorite	rhyolite	diorite	quartz porphyrite		
Felsic-mafic index	12.7	19.9	39.8	5.00+	12.7		
Rock name according to felsic-mafic index	quartz monzonite	granite	alkali rhyolite	quartz diorite	quartz monzonite		
Specific gravity	-	-	2.38	2.791	-		
Reference	Cross (1894)	Bryant, 1970, unpub. data.	Clarke (1904, p.178)	Clarke (1904, p. 178)	Clarke (1904, p. 179)		

1-degree quadrangle No. 19

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	273 [67]	274 [68]	275	276	277 [69]	278	279
SiO_2	57.39	57.67	67.90	62.60	57.51	67.64	65.37
Al_2O_3	18.26	18.07	16.08	18.16	19.18	14.75	17.04
Fe_2O_3	1.58	1.09	0.83	0.91	1.76	0.81	2.30
FeO	5.10	4.23	2.02	2.72	3.39	1.95	2.16
MgO	1.51	2.69	0.73	0.96	2.44	0.94	0.63
CaO	6.52	6.24	2.86	5.30	6.32	3.98	3.37
Na_2O	2.78	3.14	4.08	3.02	3.28	3.40	3.76
K_2O	4.59	4.02	4.11	4.10	3.18	4.06	4.20
H_2O^-	0.20	0.22	0.14	0.28	0.09	0.13	0.06
H_2O^+	0.11	0.17	0.21	0.34	0.09	0.19	0.34
TiO_2	1.11	1.04	1.15	1.02	2.02	1.36	0.48
P_2O_5	0.11	0.11	0.12	0.06	0.41	0.20	0.21
MnO	0.88	0.80	none	0.50	none	0.27	0.08
CO_2	-	-	-	-	-	-	0.08
BaO	-	-	-	-	-	-	0.16
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	0.05	0.04	0.01	0.04	0.07	0.08	-
F	-	-	-	-	-	-	-
	100.22	99.85	100.24	100.01	99.97	99.76	100.24

[67] / [68] / [69] / See page 135 for footnotes.

1-degree quadrangle No. 19

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	280[70/]	281	282	283	284	285	286
SiO_2	74.27	64.56	66.71	67.16	66.0	68.5	64.4
Al_2O_3	13.67	17.36	15.04	16.03	16.6	16.5	15.7
Fe_2O_3	0.48	0.76	0.92	1.67	1.6	0.37	1.7
FeO	0.45	1.81	1.74	1.38	0.78	0.43	2.1
MgO	0.12	0.73	1.53	0.77	0.62	0.49	1.7
CaO	0.65	3.25	2.92	1.62	1.8	2.3	3.5
Na_2O	3.48	3.56	3.37	4.23	4.4	6.9	3.1
K_2O	5.90	5.94	5.04	5.78	4.9	0.45	3.7
H_2O^-	0.10	0.41	0.34	0.11	0.27	0.46	1.4
H_2O^+	0.04	0.45	0.43	0.64	0.83	1.1	1.4
TiO_2	0.49	0.61	1.29	0.56	0.40	0.44	0.50
P_2O_5	0.04	0.08	0.20	0.05	0.21	0.21	0.26
MnO	none	0.33	0.46	0.12	0.02	0.02	0.10
CO_2	-	-	-	0.06	1.2	1.7	0.09
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	0.03	-	-	-
S	-	-	-	none	-	-	-
Cl	0.02	0.01	0.04	none	-	-	-
F	-	-	-	-	-	-	-
	99.72	99.86	100.03	100.21	99.63	98.32	99.65

/ See page 135 for footnotes.

1-degree quadrangle No. 19

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	287	288	289	290	291		
SiO_2	65.61	70.6	74.84	62.71	65.71		
Al_2O_3	18.30	14.6	14.05	17.06	18.30		
Fe_2O_3	1.19	1.6	0.17	3.79	1.19		
FeO	1.53	0.52	0.31	2.74	1.53		
MgO	0.98	0.33	tr	1.78	0.98		
CaO	2.17	1.5	1.57	5.51	2.17	67/	Also contains ZrO_2 - 0.03.
Na_2O	5.00	3.2	3.66	3.54	5.00	68/	Also contains ZrO_2 - 0.32.
K_2O	3.95	4.9	3.14	2.96	3.95	69/	Also contains FeS_2 - 0.23.
H_2O^-	(	0.41	(	(	(		
H_2O^+	(1.39	1.0	(2.33	(0.24	(1.39	70/	Also contains ZrO_2 - 0.01.
TiO_2	0	0.27	-	-	-		
P_2O_5	0	0.10	-	none	-		
MnO	0.02	0.03	-	tr	0.02		
CO_2	0	0.05	-	-	-		
BaO	-	-	-	-	-		
SrO	-	-	-	-	-		
SO_3	-	-	-	-	-		
S	-	-	-	-	-		
Cl	-	-	-	-	-		
F	-	-	-	-	-		
	100.24	99.11	100.07	100.33	100.24		

1-degree quadrangle No. 20

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
98	Paradise stock. Rock chemical analysis no. 301.	K-Ar	Biotite	29.0±1.1	Obradovich and others (1969)
99	Spruce Ridge dike; about 11 mi NNE of Ouray. Rock chemical analysis no. 324C.	K-Ar	Biotite	66.9±4	Dickinson and others (1968)
100	Sapinero Mesa. Tuff of Fish Canyon.	K-Ar	Biotite	26.8±2.7	Steven and others (1967). Extrusive rock.

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Ouray (includes districts of Red Mtn., Sneffels, and Uncompahgre)	2	Au, Ag, Pb, Cu	Veins and mineralized pipes
Lake City (includes districts of Galena and Lake Fork)	3	Ag, Pb, Au	Fissure filling and replacement veins.
Ruby	4	Ag	Veins in Mesaverde shale.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	292	293	294	295	296	297	298
Original author's identifying number	M450(S)	1X	M451(S)	X	C12005	M452(S)	M453(S)
Location and rock form (dike, etc.)	Ruby Anthracite Canyon laccolith, Ruby Anthracite Creek	Marcellina Mtn. laccolith	Marcellina Mtn. laccolith, Anthracite Creek	Mount Carbon laccolith	Gothic Mtn. laccolith, W. of Gothic	Head of Gold Creek dike	The Dyke Horse Ranch Park dike
Analyst	8/	T. M. Chatard	8/	T. M. Chatard	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 29.85	NQ - 19.90	NQ - 23.81	NQ - 21.63	NQ - 22.43	NQ - 23.18	NQ - 24.76
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	granodiorite	porphyritic diorite	granodiorite	quartz-porphyrite	genodiorite	granodiorite	granodiorite
Felsic-mafic index	7.10	6.46	6.92	7.25	9.66	7.75	8.22
Rock name according to felsic-mafic index	granodiorite	quartz diorite	quartz diorite	granodiorite	granodiorite	granodiorite	granodiorite
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Cross (1894, p. 227)	Bryant, 1970, unpub. data.	Cross (1894, p. 227)	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	299	300	301	302	303	304	305
Original author's identifying number	VIII	121	390	143	3	497	G99
Location and rock form (dike, etc.)	Storm Ridge laccolith	Paradise stock, W. of Paradise mine	Paradise stock, W. of Paradise mine	Paradise stock, NW quadrant of Paradise stock	E of Paradise mine dike	Augusta stock	Augusta stock
Analyst	L. G. Eakins	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 17.37	NQ - 27.72	NQ - 27.05	NQ - 61.24	NQ - 39.47	NQ - 15.59	NQ - 8.89
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	-	-	-	-	-	-
Original author's rock name	granodiorite	granodiorite	granodiorite	granodiorite (altered)	aplite	granodiorite, border phase	granodiorite, border phase
Felsic-mafic index	5.18	9.00	9.46	14.7	10.5	3.30	2.98
Rock name according to felsic-mafic index	quartz diorite	granodiorite	granodiorite	quartz monzonite	extreme alkali granite	monzonite	diorite
Specific gravity	-	-	-	-	-	-	-
Reference	Cross (1894, p. 227)	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	306	307	308	309	310	311	312
Original author's identifying number	G796	733	I-358	M455	M454	M424	DLG
Location and rock form (dike, etc.)	E. of Augusta stock sill	August stock	Owens stock	Ruby Peak stock	Horse Ranch Park dike	1 mi S of Castle Pass dike	2 mi SW of Castle Pass dike
Analyst	8/	8/	8/	8/	8/	8/	8/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 12.15	NQ - 27.93	NQ - 16.53	NQ - 27.12	NQ - 17.45	NQ - 14.73	NQ - 13.78
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	-	-	P	P	P
Original author's rock name	granodiorite, border phase	granodiorite core phase	granodiorite, border phase	granodiorite core phase	dacite	dacite	dacite
Felsic-mafic index	3.76	10.1	4.90	7.90	5.56	5.40	3.84
Rock name according to felsic-mafic index	monzonite	quartz monzonite	monzonite	granodiorite	quartz andesite	quartz andesite	latite
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	313	314	315	316	317	318	319
Original author's identifying number	872	2	I754	L48	-	-	-
Location and rock form (dike, etc.)	NE of Paradise stock dike	W side of Mt. Baldy dike	Redwall Basin plug	Middle Anthracite Creek dike	Above American Nettie mine SW 1/4 sec.19 T.44 N.,R.7 W. sill	Dexter Creek laccolith NE 1/4 sec.20,T.44 N., R. 7 W.	Dexter Creek laccolith NW 1/4 sec.20,T.44 N., R. 7 W.
Analyst	8/	8/	8/	8/	Charles Milton	J. G. Fairchild	J. J. Fahey
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 2.02	NQ - 5.28	NQ - 59.02	NQ - 38.73	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	-	F	F	P.	P	P
Original author's rock name	lamprophyre	lamprophyre	felsite	felsite	sodic granodiorite	sodic granodiorite	sodic granodiorite
Felsic-mafic index	1.46	1.90	27.4	79.3	8.61	8.88	9.22
Rock name according to felsic-mafic index	basalt	basalt	alkali rhyolite	extreme alkali rhyolite	granodiorite	granodiorite	granodiorite
Specific gravity	-	-	-	-	-	-	-
Reference	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Bryant, 1970, unpub. data.	Burbank (1936)	Burbank (1936)	Burbank (1936)

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	320	321	322	323	324	324A	324B
Original author's identifying number	2	3	4	5	9	1	2
Location and rock form (dike, etc.)	Bwtn W and Middle Forks Trout Crk., E side of saddle at 10,500 alt. plug?	NE slope Trout Creek on shoulder 1 mi S of pt 10710 at 9900' alt. plug?	E slope of most easterly fork of Trout Crk and 1 mi S of pt 10710. Top of knoll at 10,100' alt. plug?	Ridge between branches of E fork of Trout Crk and 1 mi S of pt 10710 at alt 10,100+ plug?	E border Ouray quad. on E side of porphyry basin dike	Difficulty Creek laccolith	Pinnacle Ridge sill?
Analyst	F. A. Gonyer	F. A. Gonyer	F. A. Gonyer	F. A. Gonyer	George Steiger	George Steiger	George Steiger
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 28.50	NQ - 15.12	NQ - 15.30	NQ - 12.30	NQ - 16.98	NQ - 24.60	NQ - 16.38
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	F	P	F	F
Original author's rock name	Lake Fork quartz latite	Lake Fork quartz latite	Lake Fork quartz latite	Lake Fork quartz latite	granodiorite	Difficulty Creek latite	Cimmarron Creek
Felsic-mafic index	15.3	6.46	5.39	4.13	6.67	13.9	4.81
Rock name according to felsic-mafic index	rhyolite	quartz andesite	quartz andesite	latite	quartz diorite	quartz latite	latite
Specific gravity	-	-	-	-	-	-	-
Reference	Larsen and Cross (1956, p. 68)	Larsen and Cross (1956, p. 68)	Larsen and Cross (1956, p. 68)	Larsen and Cross (1956, p. 68)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 216)	Larsen and Cross (1956, p. 216)

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	324C						
Original author's identifying number	-						
Location and rock form (dike, etc.)	Upper Cret. Spruce Ridge dike. Lat 38°10'45"N., Long 107°36'43" W.						
Analyst	72/						
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-						
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-						
Original author's rock name	rhyodacite						
Felsic-mafic index	4.49						
Rock name according to felsic-mafic index	latite						
Specific gravity	-						
Reference	Dickinson et al (1968)						

72/ Rapid rock analysis by P. Elmore, S. Botts, L. Artis, H. Smith, G. Chloe, and J. Glenn

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample number	292	293	294	295	296	297	298
SiO_2	62.2	62.85	64.3	65.36	66.6	65.2	65.4
Al_2O_3	15.5	16.21	16.2	15.48	15.0	16.5	15.7
Fe_2O_3	2.0	3.08	2.8	3.09	1.7	2.7	2.6
FeO	2.2	1.46	1.9	1.21	1.9	2.1	1.8
MgO	1.3	1.47	1.3	1.53	1.0	1.1	1.1
CaO	4.1	4.72	4.2	4.14	3.1	3.4	3.3
Na_2O	3.1	3.49	3.1	3.58	4.0	3.7	3.8
K_2O	2.8	3.10	3.2	3.41	3.8	3.2	3.2
H_2O^-	0.98	2.32	0.39	(	0.25	0.20	0.42
H_2O^+	2.3	-	1.4	(1.52 (	0.85	0.99	1.10
TiO_2	0.41	0.41	0.47	0.52	0.63	0.48	0.52
P_2O_5	0.30	0.48	0.33	0.25	0.30	0.32	0.31
MnO	0.08	0.15	0.11	0.19	0.14	0.11	0.10
CO_2	2.60	0	<0.05	0	0.55	0.08	0.64
BaO	-	0.11	-	0.08	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.87	99.85	99.72	100.36	99.82	100.08	99.99

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	299	300	301	302	303	304	305
SiO_2	61.42	67.4	68.0	78.9	77.2	57.4	54.6
Al_2O_3	17.69	16.1	15.5	7.7	12.4	16.3	17.0
Fe_2O_3	4.24	1.8	1.9	2.2	0.37	4.1	3.9
FeO	1.74	1.7	1.6	0.40	0.12	4.4	5.3
MgO	1.81	1.6	1.1	0.62	0.14	3.0	4.0
CaO	5.29	3.1	3.3	2.4	0.19	7.3	6.9
Na_2O	3.19	3.4	3.4	0.28	1.6	2.5	2.4
K_2O	3.14	3.0	3.4	3.3	7.3	2.2	2.9
H_2O^-	0.97	0.10	0.17	0.31	0.06	0.10	0.10
H_2O^+	-	0.85	0.80	1.7	0.45	1.1	0.90
TiO_2	0.37	0.39	0.40	0.16	0.10	0.89	1.3
P_2O_5	0.14	0.34	0.29	0.15	0.02	0.52	0.46
MnO	0.19	0.07	0.02	0.30	0	0.16	0.19
CO_2	0	0.05	<0.05	0.82	<0.05	0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.19	99.90	99.90	99.24	99.97	100.02	99.77

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	306	307	308	309	310	311	312
SiO_2	57.6	68.8	60.1	66.3	60.7	60.3	57.5
Al_2O_3	17.5	15.2	17.6	16.3	17.1	17.9	17.8
Fe_2O_3	0.87	2.1	2.6	2.8	3.9	3.9	6.4
FeO	6.3	1.6	3.4	1.9	2.0	1.5	1.2
MgO	3.0	1.3	1.9	1.1	1.7	1.4	2.2
CaO	6.5	2.5	5.6	3.4	4.5	5.6	6.6
Na_2O	2.4	3.3	3.3	3.4	3.6	3.7	3.6
K_2O	2.7	3.9	2.7	3.0	3.0	3.0	2.0
H_2O^-	0.12	0.03	0.13	0.18	1.10	0.29	0.33
H_2O^+	1.4	0.19	0.87	0.96	1.10	1.00	0.77
TiO_2	0.94	0.37	0.64	0.46	0.71	0.76	0.84
P_2O_5	0.55	0.28	0.75	0.32	0.45	0.31	0.57
MnO	0.18	0.06	0.15	0.10	0.16	0.14	0.23
CO_2	<0.05	<0.05	0.06	0.13	<0.05	0.08	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.08	99.65	99.80	100.35	100.04	99.88	100.06

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	313	314	315	316	317	318	319 71/
SiO_2	42.7	44.7	77.0	77.1	65.38	65.02	65.35
Al_2O_3	11.8	14.1	13.2	12.8	15.41	15.83	16.09
Fe_2O_3	1.8	3.2	1.5	0.36	1.97	2.13	2.69
FeO	8.0	6.7	0.24	0.12	2.19	1.56	1.40
MgO	7.6	7.2	1.1	0.10	1.43	1.14	1.33
CaO	13.8	8.6	0.12	0.49	2.87	3.32	2.52
Na_2O	1.0	1.9	0.38	3.8	4.13	4.03	4.44
K_2O	1.8	2.3	3.7	4.0	3.42	3.42	3.34
H_2O^-	0.40	0.57	0.23	0.11	0.09	0.44	0.14
H_2O^+	3.5	3.4	1.8	0.59	1.29	1.24	1.26
TiO_2	1.5	1.60	0.21	0.20	0.88	0.40	0.39
P_2O_5	1.00	1.10	0.09	0	0.27	0.15	0.19
MnO	0.14	0.18	0.29	0.03	0.09	0.12	0.06
CO_2	4.8	3.5	<0.05	0.03	0.23	1.23	0.58
BaO	-	-	-	-	0.09	0.03	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	0.04
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.84	99.33	99.88	99.78	99.74	100.06	99.85

71/ Also includes Cr_2O_3 - 0.03.

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	320	321	322	323	324	324A	324B
SiO_2	69.06	61.54	60.22	57.44	61.36	68.81	60.69
Al_2O_3	15.42	17.81	16.30	17.70	16.36	15.54	15.90
Fe_2O_3	2.08	4.48	5.28	3.84	3.59	1.78	4.52
FeO	0.43	0.58	0.43	2.74	1.45	0.80	1.72
MgO	0.73	1.70	2.46	3.12	1.75	0.52	1.93
CaO	1.76	3.94	4.30	5.72	3.59	2.43	5.23
Na_2O	3.79	3.81	3.68	3.56	4.04	4.24	3.55
K_2O	3.70	3.70	3.27	2.66	3.64	4.07	3.22
H_2O^-	-	-	-	-	1.56	0.50	0.93
H_2O^+	1.83	0.87	2.18	0.75	1.34	0.78	0.96
TiO_2	0.37	0.66	0.65	0.92	0.51	0.28	0.73
P_2O_5	0.18	0.36	0.82	1.05	0.36	0.13	0.31
MnO	0.06	0.06	0.08	0.07	0.07	0.12	0.13
CO_2	0.03	none	0.38	none	0.64	0.48	0.27
BaO	0.11	0.12	0.11	0.11	0.12	0.13	0.10
SrO	0.02	0.03	0.03	0.04	0.12	0.04	0.03
SO_3	0.06	0.06	0.05	0.03	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.63	99.72	100.25	99.79	100.51	100.65	100.22

1-degree quadrangle No. 20

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	324C						
SiO_2	58.6						
Al_2O_3	16.3						
Fe_2O_3	6.3						
FeO	0.56						
MgO	2.3						
CaO	5.3						
Na_2O	3.9						
K_2O	2.5						
H_2O^-	0.87						
H_2O^+	1.6						
TiO_2	0.70						
P_2O_5	0.46						
MnO	0.18						
CO_2	<0.05						
BaO	-						
SrO	-						
SO_3	-						
S	-						
Cl	-						
F	-						
	100						

1-degree quadrangle No. 21

Mining Districts

Mining district	Class	Metals	Type of Ore Deposit
La Sal Creek	5	Cu, Ag, Au	Sandstone of the Dolores Formation impregnated with chalcocite. Native Cu and Ag in fault breccia zones.
Gateway	6	Cu, Ag	Fissure and fault fillings in sandstone.
Unaweep	6	Cu, Ag	Fissure fillings in Precambrian rock and sedimentary rock.
Naturita	6	Au, Ag	Placer.

1-degree quadrangle No. 22

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference remarks
101	Augite-biotite monzonite facies of Rico dome. Lat 37°41'34" N, Long 108° 02'42" W.	K-Ar	Biotite	64	Pratt, 1971, pers. commun.
102	Same as 101. Same rock	Fission track	Zircon	57±4	do.
103	Same as 101. Same rock.	do.	Sphene	56±6	do.
104	Hornblende monzonite facies of Rico dome, Lat 37°41'47" N, Long 108°02'21" W.	K-Ar	Hornblende	Pending	do.
105	Same as 104. Same rock.	Fission track	Zircon	44±3	do. (younger ages suggest reheating)
106	Same as 104. Same rock.	do.	Sphene	49.8±?	do.
107	Dike of altered hornblende diorite porphyry 4 mi S of Rico. Lat 37°38'20" N, Long 108°3'35" W.	K-Ar	Pyroxene (contains 25% chlorite and 10% rock)	179	Armstrong (1969) Age is too great
108	Same location as 107. Same rock.	do.	Whole rock (less heavy fraction)	61.3	Armstrong (1969)

109	Laccolith of hornblende-diorite porphyry in Sun Dance cluster of laccoliths, Ute Mountains. Lat 37°14'22" N, Long 108°46'32" W.	K-Ar	Hornblende (contains 5% chlorite and 3% rock)	481	Armstrong (1969), Age is too great
110	Same location as 109. Same rock.	K-Ar	Whole rock (less heavy fraction).	83.7	Armstrong (1969)
111	Augite monzonite from Madden Creek, La Plata Mtns. Lat 37°23'20" N, Long 108°4'40".	K-Ar	Augite (contains 5% hornblende and 6% rock).	85.5	Armstrong (1969)
112	Same location as 111. Same rock.	K-Ar	Biotite (contains 4% chlorite, 6% hornblende).	65.0	Armstrong (1969)

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Rico	3	Ag, Zn, Pb, Au, Cu	Veins and blanket deposits.
La Plata	4	Au, Ag, Pb, Cu	Veins and replacement deposits of Au-bearing and Ag-bearing telluride ores.
Dunton (Lone Cone)	6	Ag, Au, Pb	-

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	325	326	327	328	329	330	331
Original author's identifying number	1	2	3	4	5	6	7
Location and rock form (dike, etc.)	Vicinity of Yucca cluster. Ute Mtns. laccolith?	The Tongue laccolith	Yucca cluster laccolith?	Yucca cluster laccolith?	Yucca cluster laccolith?	Pa k Trail laccolith	Flat laccolith
Analyst	43/	43/	73/	73/	43/	43/	74/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 9.2%	NQ - 7.6%	NQ - 11.2%	NQ - 9.7%	NQ - 11.1%	NQ - 9.2 %	NQ - 8.0 %
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	spessarite lamprophyre	microgabbro	diorite	diorite	diorite	diorite	diorite
Felsic-mafic index	2.24	2.58	4.00	3.56	3.79	4.40	4.42
Rock name according to felsic-mafic index	diorite	diorite	monzonite	monzonite	monzonite	monzonite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)

74/ Rapid rock analyses by H. F. Phillips, P. L. D. Elmore, and K. E. White

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	332	333	334	335	336	337	338
Original author's identifying number	-	9	-	11	12	13	14
Location and rock form (dike, etc.)	Ute Peak stock?	Ute Peak stock?	"The Knees" stock	Sentinel Peak bysmalith	Mushroom laccolith	Mushroom laccolith	Vicinity of Sentinel Peak stock?
Analyst	W. F. Hillebrand	75/	W. F. Hillebrand	74/	73/	43/	74/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 11.0%	NQ - 15.0%	NQ - 14.1 %	NQ - 17.7 %	NQ - 26.7 %	NQ - 27.0 %	NQ - 19.7 %
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	P
Original author's rock name	granodiorite	granodiorite	granodiorite	granodiorite	granodiorite (altered)	granodiorite	quartz monzonite
Felsic-mafic index	4.62	5.27	6.15	7.42	9.10	8.85	18.2
Rock name according to felsic-mafic index	monzonite	quartz diorite	quartz diorite	granodiorite	granodiorite	granodiorite	granite
Specific gravity	-	-	-	-	-	-	-
Reference	Cross (1894)	Ekren and Houser (1965, p. 36)	Cross (1894)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)

75/ Rapid analyses by P. L. D. Elmore and S. D. Botts

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	339	340	341	342	343	344	345
Original author's identifying number	15	16	4	5	6	11	2
Location and rock form (dike, etc.)	Vicinity of Black Mtn. stock	Banded laccolith	Monzonite facies of diorite mass of Diorite peak La Plata Mtns. stock	Babcock Peak La Plata Mtns. stock	W slope of Deadwood Gulch, La Plata Mtns. dike	Ridge between Tirbircio and Schurman Gulches, La Plata Mtns. stock	Indian Trail Ridge laccolith?
Analyst	43/	43/	W. F. Hillebrand	H. N. Stokes	W. F. Hillebrand	H. N. Stokes	W. F. Hillebrand
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 26.9%	NQ - 21.0%	NQ - 1.50%	NQ - 3.96%	NQ - 7.98%	NQ - 3.30%	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	-	F-M	P	P	F
Original author's rock name	quartz monzonite	quartz monzonite	monzonite	monzonite	granodiorite	syenite	camptonite (lamprophyre)
Felsic-mafic index	16.9	16.9	3.65	4.57	5.78	6.85	1.70
Rock name according to felsic-mafic index	granite	granite	monzonite	monzonite	quartz diorite	quartz diorite	basalt
Specific gravity	-	-	-	-	-	-	-
Reference	Ekren and Houser (1965, p. 36)	Ekren and Houser (1965, p. 36)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 236)

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	346						
Original author's identifying number	3						
Location and rock form (dike, etc.)	Just S of summit of Snowstorm Peak dike						
Analyst	W. F. Hillebrand						
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-						
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P						
Original author's rock name	camptonite (lamprophyre)						
Felsic-mafic index	1.94						
Rock name according to felsic-mafic index	basalt						
Specific gravity	-						
Reference	Larsen and Cross (1956, p. 236)						

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	325	326	327	328	329	330	331
SiO_2	48.8	50.0	55.3	55.9	56.8	58.6	57.4
Al_2O_3	15.5	17.3	16.7	17.2	16.7	17.4	16.7
Fe_2O_3	4.8	2.9	5.0	4.8	3.1	2.6	0.9
FeO	5.7	5.8	1.8	2.8	3.8	4.4	5.5
MgO	5.3	3.4	2.5	3.1	3.1	3.0	2.2
CaO	8.5	9.0	6.0	6.4	6.5	4.8	5.8
Na_2O	3.8	3.3	4.0	3.9	3.7	4.4	4.2
K_2O	1.9	1.1	1.9	2.0	2.1	2.1	2.1
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(3.7	(2.8	(4.1	(2.2	(2.6	(1.6	(4.0
	(	(	(	(	(	(	(
TiO_2	1.2	0.85	0.72	0.78	0.72	0.68	0.60
P_2O_5	0.42	0.49	0.36	0.37	0.29	0.30	0.34
MnO	0.17	0.16	0.15	0.16	0.12	0.12	0.14
CO_2	0.46	2.8	0.61	0.20	0.58	0.05	0.20
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.25	99.90	99.14	99.81	100.11	100.05	100.08

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	332	333	334	335	336	337	338
SiO_2	59.42	61.1	62.65	62.6	64.6	65.2	68.4
Al_2O_3	16.79	16.9	16.68	17.6	16.5	16.8	16.7
Fe_2O_3	3.23	3.8	2.35	1.9	1.3	2.3	1.3
FeO	3.29	2.3	2.63	2.1	1.8	1.1	0.78
MgO	2.24	2.1	1.43	1.1	1.0	1.0	0.36
CaO	5.57	4.7	4.96	4.3	3.7	3.7	1.8
Na_2O	4.15	4.0	4.45	5.1	3.7	4.0	6.0
K_2O	2.82	2.9	2.75	2.0	2.7	2.4	2.8
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(1.06	(1.4	(0.93	(1.5	(1.9	(1.6	(1.4
	(	(	(	(	(	(	(
TiO_2	0.68	0.66	0.42	0.24	0.30	0.32	0.17
P_2O_5	0.35	0.31	0.28	0.19	0.10	0.16	0.10
MnO	0.13	0.09	0.16	0.07	0.12	0.08	0.06
CO_2	0.44	0.10	-	1.3	1.5	1.2	0.34
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.17	100.36	99.69	100.11	99.22	99.86	100.21

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	339	340	341[76/]	342	343	344	345[77/]
SiO_2	68.7	68.9	55.53	57.42	60.44	59.79	43.98
Al_2O_3	17.1	17.4	16.78	18.48	16.65	17.25	13.30
Fe_2O_3	1.4	1.3	4.06	3.74	2.31	3.60	3.67
FeO	0.64	0.43	3.35	2.10	3.09	1.59	6.92
MgO	0.78	0.54	3.00	1.71	2.18	1.24	7.03
CaO	1.7	2.3	6.96	6.84	4.22	3.77	10.66
Na_2O	4.0	5.4	4.31	4.52	5.18	5.04	2.15
K_2O	3.6	3.0	3.57	3.71	2.71	5.05	1.64
H_2O^-	(	(	0.55	0.28	1.07	0.39	0.42
H_2O^+	(2.0 (	(1.0 (	0.09	0.08	0.36	0.19	1.52
TiO_2	0.20	0.18	0.95	0.86	0.60	0.67	1.18
P_2O_5	0.11	0.08	0.47	0.36	0.29	0.35	0.32
MnO	0.06	0.05	0.16	0.09	0.13	0.10	0.22
CO_2	0.12	0.13	0.09	-	0.48	0.72	6.46
BaO	-	-	0.13	0.15	0.12	0.14	0.06
SrO	-	-	0.11	0.08	0.11	0.11	0.05
SO_3	-	-	-	-	-	0.04	-
S	-	-	-	-	-	-	-
Cl	-	-	-	0.03	-	-	-
F	-	-	-	-	-	-	-
	100.41	100.71	100.17	100.45	99.96	100.34	100.15

-/ See next page for footnotes.

1-degree quadrangle No. 22

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	346[78]
SiO_2	47.25
Al_2O_3	15.14
Fe_2O_3	5.05
FeO	4.95
MgO	6.87
CaO	9.98
Na_2O	2.39
K_2O	2.60
H_2O^-	0.40
H_2O^+	2.12
TiO_2	1.22
P_2O_5	0.25
MnO	0.17
CO_2	1.87
BaO	0.08
SrO	0.05
SO_3	-
S	-
Cl	-
F	-
	100.46

[76] Also contains FeS_2 - 0.04, and V_2O_3 - 0.02.

[77] Also contains FeS_2 - 0.54, and NiO - 0.03.

[78] Also contains NiO - 0.02, and V_2O_3 - 0.05.

1-degree quadrangle No. 23

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
113	1.5 mi S of Silverton along U.S. Route 550. Quartz monzonite stock.	K-Ar	Biotite	26.9 ±0.8	McDowell (1966)
114	About 1 mi S of Silverton along U.S. Route 550. Same stock as 113.	K-Ar	Hornblende (includes some biotite and chlorite)	24.1 ±0.8	McDowell (1966)
115	About 0.5 mi E of Colorado Route 145 on Ophir Pass Road; monzonite stock.	K-Ar	Biotite (includes about 40% chlorite)	25.4 ±0.8	McDowell (1966)
116	Hornblende latite porphyry at Lat 37°42'28" N, Long 107°55'13" W.	K-Ar	Hornblende	80.1	Pratt, 1971, pers. commun. (probably too high) (See rock analysis no. 348)
117	Same location and rock as 116.	Fission track	Zircon	57±3	Pratt, 1971, pers. commun.
118	Same location and rock as 116.	Fission track	Sphene	63±10	Pratt, 1971, pers. commun.
119	Biotite trachyte at Lat 37°44'3" N, Long 107°56'26" W.	K-Ar	Biotite	16.2	Pratt, 1971, pers. commun. (See rock analysis no. 347

1-degree quadrangle No. 23

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Telluride (including Sneffels district)	2	Au,Ag,Pb, Cu, Zn	Fissure veins in Tertiary extrusives.
Silverton	2	Au, Ag, Pb, Zn, Cu, (W)	Fissure veins in Tertiary intrusives
Ophir	4	Ag, Au, Pb, Cu, Zn,(W)	Fissure veins in Tertiary intrusives and extrusives.
Eureka	4	Au, Ag, Pb, Zn, Cu,(W)	Fissure veins and chimney deposits in Tertiary intrusive and extrusive rocks.
Mt. Wilson	5	Au, Ag,Pb, Cu, Zn	Fissure veins in Mt. Wilson stock.
Carson	5	Ag, Cu, Au	Fissure veins in Tertiary extrusives and intrusives.
Burrows Park (Whitecross)	5	Au, Ag, Cu, Pb, Zn	Fissure fillings in Tertiary extrusives.
Bear Creek	5	Ag, Au, Cu	Fissure veins in Precambrian schist, slate, and quartzite.

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	347	348	349	350	351	352	353
Original author's identifying number	PH-7	PH-39	1	2	3	4	5
Location and rock form (dike, etc.)	Lat.37°44'3"N Long.107°56'26"W	Lat.37!42'28"N Long.107°55'13"W	West of Ames Ames Sill	Bilk Creek at 10,000 ft Mt.Wilson stock	Silver Pick Basin at 12,800 ft Mt. Wilson stock	Bilk Basin at 11,600 ft Mt. Wilson stock	Bilk Basin at 12,700 ft Mt. Wilson stock
Analyst	8/	8/	79/	79/	79/	79/	79/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	NQ - 12.8%	NQ - 13.6%	NQ - 10.4%	NQ - 11.9%	NQ - 13.7%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	F	F	F
Original author's rock name	biotite trachyte	hornblende latite	granodiorite	granodiorite	microgranogabbro	microgranogabbro	microgranogabbro
Felsic-mafic index	6.86	18.2	5.12	4.65	4.51	3.88	4.41
Rock name according to felsic-mafic index	quartz andesite	rhyolite	quartz diorite	monzonite	monzonite	monzonite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Pratt, 1971, pers. commun.	Pratt, 1971, pers. commun.	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)

79/ Rapid rock analyses by P. L. D. Elmore, I. H. Barlow, S. D. Botts, and G. W. Chloe.

1-degree quadrangle No.23

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	354	355	356	357	358	359	360
Original author's identifying number	6	7	8	9	10	11	12
Location and rock form (dike, etc.)	Silver Pick Basin at 11,040' Mt. Wilson stock	Bilk Basin at 12,080' Mt. Wilson stock	Bilk Basin at 13,080' Mt. Wilson stock	Navajo Basin at 13,200' Mt. Wilson stock	Bilk Basin at 12,600' Mt. Wilson stock	Navajo Basin at 11,870' Mt. Wilson stock	Saddle between Gladstone Peak and Mt. Wilson Mt. Wilson stock
Analyst	79/	79/	79/	79/	79/	79/	79/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 13.1%	NQ - 16.0%	NQ - 5.8%	NQ - 4.8%	NQ - 8.2%	NQ - 7.1%	NQ - 7.3%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	M	M	M	M	M
Original author's rock name	microgranogabbro	microgranogabbro	granodiorite	granodiorite	granodiorite	granodiorite	granodiorite
Felsic-mafic index	4.44	4.60	3.00+	3.80	3.45	4.12	4.40
Rock name according to felsic-mafic index	monzonite	monzonite	monzonite	monzonite	monzonite	monzonite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)

1-degree quadrangle No. 23

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	361	362	363	364	365	366	367
Original author's identifying number	13	14	15	1	-	-	-
Location and rock form (dike, etc.)	Elk Creek Basin at 13,000' Mt.Wilson stock (Sheet 22)	Navajo Basin at 12,000' Mt. Wilson stock (Sheet 22)	Bilk Basin at 12,800' Mt. Wilson stock	Black Face Telluride quad. plug	290'W of summit of Stony Mtn. at 12,510' Stony Mtn.stock	SW-trending ridge near summit of stony Mtn. stock	Summit of Stony Mtn. stock
Analyst	79/	79/	79/	W. F. Hillebrand	R. B. Ellestad	R. B. Ellestad	L. G. Eakins
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 23.3%	NQ - 20.5%	NQ - 20.0%	NQ - 7.92%	MQ - 7.9%	MQ - 8.1%	NQ - 0.96%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M	M	M	F	F	F-M	variable grain size
Original author's rock name	adamellite	adamellite	adamellite	camptonite	Governor diorite	Hornblende monzonite facies Governor diorite	gabbro
Felsic-mafic index	8.40	8.69	8.70	3.36	4.76	5.15	2.36
Rock name according to felsic-mafic index	granodiorite	granodiorite	granodiorite	latite	monzonite	quartz diorite	diorite
Specific gravity	-	-	-	-	-	-	-
Reference	Bromfield (1967)	Bromfield (1967)	Bromfield (1967)	Larsen and Cross (1956, p. 236)	Dings (1941)	Dings (1941)	Cross and Purington (1899)

1-degree quadrangle No. 23

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	368	369	370	371	372		
Original author's identifying number	1	3	10	12	13		
Location and rock form (dike, etc.)	From the pass S of Mt. Sneffels dike	From Ophir Needles stock	E base of Sultan Mtn. Silverton stock	Near the lake NW of San Miguel Pk, Telluride stock	SE slope of Grayrock Peak stock		
Analyst	H. N. Stokes	H. N. Stokes	L. G. Eakins	H. N. Stokes	George Steiger		
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 0.84%	NQ - 10.80%	NQ - 19.74%	NQ - 19.92 %	NQ - 19.56%		
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	P	F	F		
Original author's rock name	gabbro	granodiorite	granodiorite	quartz monzonite	rhyolite		
Felsic-mafic index	1.89	3.48	6.38	8.86	28.0		
Rock name according to felsic-mafic index	gabbro	monzonite	quartz diorite	granodiorite	alkali rhyolite		
Specific gravity	-	-	-	-	-		
Reference	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)	Larsen and Cross (1956, p. 232)		

1-degree quadrangle No. 23

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	347	348	349	350	351	352	353
SiO_2	62.5	68.6	59.3	60.6	57.5	58.7	59.4
Al_2O_3	16.6	16.0	15.9	16.2	17.3	17.2	17.8
Fe_2O_3	2.8	1.3	2.0	3.0	2.1	2.8	3.6
FeO	2.2	1.1	3.9	3.2	4.5	4.6	3.5
MgO	1.4	0.50	2.4	2.4	2.6	3.0	2.3
CaO	3.8	1.4	4.6	5.9	4.9	6.2	5.4
Na_2O	4.9	4.1	3.2	3.4	3.7	3.5	3.7
K_2O	2.7	5.4	3.6	3.5	2.4	2.2	2.3
H_2O^-	0.12	0.00	(	(	(	(	(
H_2O^+	1.8	0.56	(1.9 (	(1.0 (	(2.7 (	(1.0 (	(1.4 (
TiO_2	0.62	0.54	0.72	0.72	0.68	0.76	0.62
P_2O_5	0.27	0.13	0.25	0.26	0.30	0.27	0.36
MnO	0.14	0.08	0.11	0.12	0.21	0.14	0.22
CO_2	0.05	0.15	1.5	0.05	0.48	0.05	0.10
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	99	100	99	100	101

1-degree quadrangle No. 23

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	354	355	356	357	358	359	360
SiO_2	59.7	61.1	54.7	56.8	56.9	58.4	58.7
Al_2O_3	17.4	16.4	15.9	16.1	16.6	16.2	15.7
Fe_2O_3	2.7	3.3	3.9	3.6	3.4	3.0	2.9
FeO	3.8	3.5	5.6	4.4	5.2	4.7	4.2
MgO	2.4	2.4	4.2	3.3	3.3	2.9	3.0
CaO	5.9	5.4	6.5	5.6	6.4	5.4	5.0
Na_2O	3.6	3.6	3.2	3.6	3.4	3.6	3.6
K_2O	2.4	2.5	2.8	3.9	2.8	4.0	4.2
H_2O^-	(	(	(	(	(	(	(
H_2O^+	(0.64	(0.84	(1.4	(0.68	(0.95	(0.49	(0.65
	(	(	(	(	(	(	(
TiO_2	0.66	0.64	0.94	0.85	0.84	0.75	0.82
P_2O_5	0.32	0.35	0.65	0.39	0.52	0.51	0.33
MnO	0.16	0.15	0.18	0.16	0.16	0.14	0.13
CO_2	0.05	0.05	0.18	0.05	0.05	0.05	0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	99	100	100	99

1-degree quadrangle No.23

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	361	362	363	364	365	366	367
SiO_2	66.5	66.7	66.8	55.65	60.15	60.23	52.05
Al_2O_3	14.7	15.2	15.4	17.04	18.03	15.56	17.96
Fe_2O_3	2.8	2.6	2.2	2.81	2.73	3.20	4.09
FeO	1.8	2.0	2.1	5.17	3.27	3.08	6.33
MgO	1.4	1.2	1.3	3.42	2.18	2.73	5.03
CaO	2.9	2.8	3.0	6.82	5.78	4.21	8.64
Na_2O	3.5	4.0	4.0	3.27	3.53	4.43	2.99
K_2O	4.7	4.0	4.0	2.29	2.76	3.42	1.61
H_2O^-	(	(	(	0.46	0.09	0.10	(
H_2O^+	(0.52 (	(0.60 (	(0.66 (	1.49	0.53	1.10	(0.97
TiO_2	0.54	0.44	0.46	0.90	0.65	0.79	-
P_2O_5	0.29	0.28	0.30	0.37	-	0.34	0.31
MnO	0.10	0.08	0.10	0.20	-	0.14	0.43
CO_2	0.05	0.10	0.05	-	0.19	0.44	-
BaO	-	-	-	0.08	-	0.11	-
SrO	-	-	-	0.05	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	0.01	-
Cl	-	-	-	-	-	0.03	-
F	-	-	-	-	-	-	-
	100	100	100	100.02	99.89	99.92	100.41

1-degree quadrangle No. 23

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	368	369	370	371	372[80/]		
SiO_2	47.32	56.93	63.91	65.70	70.73		
Al_2O_3	16.71	17.03	17.07	15.31	14.22		
Fe_2O_3	6.92	3.67	4.39	2.54	1.59		
FeO	5.94	4.54	1.51	1.62	0.59		
MgO	5.69	3.30	0.81	1.62	none		
CaO	8.51	6.51	4.47	2.56	0.72		
Na_2O	2.70	3.19	3.48	3.62	4.96		
K_2O	2.02	2.58	3.74	4.62	5.57		
H_2O^-	1.04	0.45	0.33	0.42	0.32		
H_2O^+	0.24	0.13	-	0.17	1.16		
TiO_2	1.50	1.03	-	0.72	0.34		
P_2O_5	0.96	0.44	0.21	0.33	0.03		
MnO	0.08	0.10	-	-	0.11		
CO_2	-	-	-	-	-		
BaO	0.07	0.08	-	0.12	0.01		
SrO	0.06	0.06	-	0.03	-		
SO_3	0.19	-	-	0.12	-		
S	-	-	-	-	-		
Cl	-	-	-	0.03	-		
F	-	-	-	-	-		
	99.95	100.04	99.92	99.53	100.29		

80/ Also contains ZrO_2 - 0.04.

1-degree quadrangle No. 24

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
120	Rhyolite dike at Summer Coon volcanic center, Lat 37°49' N, Long 106°20' W.	K-Ar	Biotite	32.4 ±1.3	Lipman and others (1970)
121	Rhyodacite dike at Summer Coon volcanic center, Lat 37°47' N, Long 106°26' W.	K-Ar	Biotite	34.4 ±1.4	Lipman and others (1970)
122	Same location and rock as 121	K-Ar	Hornblende	35.0 ±2.4	Lipman and others (1970)
123	Alamosa River stock; monzonite from W slope of Telluride Mtn. Lat 37°23' N, Long 106°33' W.	K-Ar	Biotite	29.1 ±1.2	Lipman and others (1970)
124	Los Mogotes dike (diabase dike from Los Mogotes crater) in Hinsdale Fm. Lat 37°04' N, Long 106°11' W.	K-Ar	Plagioclase	5.3 ±0.7	Lipman and others (1970). See rock analysis no. 373.

Mining Districts

Mining District	Class	Metals	Type of Ore Deposit
Creede	3	Ag, Pb, Zn, Au, Cu	Fissure veins in Tertiary extrusive rock.
Summitville	4	Au, Ag, Cu	Veins and pipes in altered extrusive rocks and some intrusive dikes.
Wagon Wheel Gap	4	Fluorite	Fluorite veins in rhyolitic tuffs and breccias of Miocene age.
Platoro	6	Au, Ag, Cu, Pb	Veins in Tertiary volcanic volcanic rocks.

1-degree quadrangle No. 24

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	373	374	375	376	377	378	379
Original author's identifying number	3	2	3	5	26	7	9
Location and rock form (dike, etc.)	Crater of Los Mogotes plug?	Summer Coon volcanics dike	Summer Coon volcanics dike	Summer Coon volcanics dike	SW of stock of Summer Coon dike	Summer Coon volcanics dike	Summer Coon volcanics dike
Analyst	G. W. Brown	81/	81/	81/	George Steiger	81/	81/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 3.78%	-	-	NQ - 24.55%	NQ - 24.17%	NQ - 20.08%	NQ - 8.56%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	F	F	F	F
Original author's rock name	basalt	olivine basalt	trachyandesite	rhyolite	rhyolite	quartz latite	andesite
Felsic-mafic index	1.94	2.26	3.18	33.0	22.6	13.0	3.07
Rock name according to felsic-mafic index	basalt	andesite	latite	alkali rhyolite	rhyolite	quartz latite	latite
Specific gravity	-	2.89 powder density	2.76 powder density	2.57 powder density	-	2.59 powder density	2.77 powder density
Reference	Larsen and Cross (1956, p. 208)	Lipman (1968)	Lipman (1968)	Lipman (1968)	Larsen and Cross (1956)	Lipman (1968)	Lipman (1968)

81/ Rapid rock analyses by P. L. D. Elmore, L. Artis, S. Botts, G. Chloe, J. Glenn, H. Smith, and D. Taylor.

1-degree quadrangle No. 24

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	380	381	382				
Original author's identifying number	10	11	12				
Location and rock form (dike, etc.)	Summer Coon volcanics dike	Summer Coon volcanics dike	Summer Coon stock				
Analyst	81/	81/	81/				
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 16.73%	NQ - 16.22%	NQ - 28.14%				
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F				
Original author's rock name	rhyodacite	rhyodacite	quartz monzonite				
Felsic-mafic index	6.22	6.97	16.8				
Rock name according to felsic-mafic index	quartz andesite	quartz andesite	granite				
Specific gravity	2.62 powder density	2.60 powder density	2.62 powder density				
Reference	Lipman (1968)	Lipman (1968)	Lipman (1968)				

1-degree quadrangle No. 24

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	373	374	375	376	377	378	379
SiO_2	50.18	50.8	54.3	71.4	71.21	67.0	51.7
Al_2O_3	16.47	16.7	16.4	15.2	15.24	16.6	16.5
Fe_2O_3	8.92	4.4	4.5	1.3	1.46	2.1	4.2
FeO	2.60	6.1	2.7	0.06	0.33	0.42	2.3
MgO	6.98	5.6	4.2	0.18	0.20	0.79	2.0
CaO	9.30	8.6	7.5	1.4	1.56	2.5	10.3
Na_2O	2.74	3.1	3.8	4.6	4.41	4.3	3.5
K_2O	1.04	1.8	2.1	4.5	4.75	4.2	2.6
H_2O^-	0.08	0.71	1.8	0.26	0.44	0.76	1.1
H_2O^+	0.35	1.1	1.2	0.28	0.64	0.66	0.90
TiO_2	1.60	1.3	1.1	0.19	0.24	0.41	0.94
P_2O_5	0.29	0.47	0.47	0.04	0.10	0.13	0.38
MnO	none	0.18	0.15	0.11	-	0.03	0.35
CO_2	none	<0.05	0.11	<0.05	-	<0.05	3.3
BaO	-	-	-	-	-	-	-
SrO	0.03	-	-	-	0.03	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100.58	100	99	100	100.61	100	100

1-degree quadrangle No. 24

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	380	381	382				
SiO_2	63.3	63.7	69.3				
Al_2O_3	15.6	16.0	15.7				
Fe_2O_3	2.5	2.3	1.6				
FeO	2.0	1.9	0.34				
MgO	2.9	1.9	0.85				
CaO	3.9	4.1	1.8				
Na_2O	3.9	4.5	3.8				
K_2O	3.2	2.9	3.9				
H_2O^-	0.35	0.18	0.46				
H_2O^+	1.4	1.6	1.7				
TiO_2	0.61	0.56	0.38				
P_2O_5	0.19	0.20	0.13				
MnO	0.10	0.08	0.03				
CO_2	<0.05	<0.05	<0.05				
BaO	-	-	-				
SrO	-	-	-				
SO_3	-	-	-				
S	-	-	-				
Cl	-	-	-				
F	-	-	-				
	100	100	100				

1-degree quadrangle No. 25

Geologic age

Geologic age date of 32 m.y. (K-Ar) for partially unroofed granite batholith in the Blanca Peak massif in Sangre de Cristo Mountains (Goddard, Briggs, and Webb, 1964). Shown on 1° quadrangle; not shown on State map.

Mining Districts

Mining District	Class	Metals	Type of ore Deposit
Crestone	6	Au	Veins in shear zones in Precambrian rock.
Russell (Grayback)	6	Au	Veins in sandstone and limestone of Carboniferous age intruded by Tertiary? monzonite and diorite, and placer gold.

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	383	384	385	386	387	388	389
Original author's identifying number	-	78	82	7	88	86	115
Location and rock form (dike, etc.)	Mount Mestas, sole injection	About 6 mi NW of W Spanish Pk. radial dike	6 mi NNW of W. Spanish Pk. radial dike	2 mi W of Sheep Mtn. stock	5 mi WSW of W. Spanish Pk. radial dike	3 mi SW of W. Spanish Pk. radial dike	5 mi WNW of W. Spanish Pk. radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 30.16%	NQ - 24.68%	NQ - 22.77%	NQ - 28.61%	NQ - 15.82%	NQ - 14.14%	NQ = 10.34%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	P	P	P	P
Original author's rock name	microcrystalline granite	granite (Devils stairway dike)	granodiorite	syenite	syenite	syenite	syenodiorite
Felsic-mafic index	45.0	11.8	18.1	14.8	8.66	6.62	4.05
Rock name according to felsic-mafic index	alkali granite	quartz monzonite	granite	quartz monzonite	granodiorite	quartz diorite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968, p. 43)

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	390	391	392	393	394	395	396
Original author's identifying number	150	-	124	159	167	176	197
Location and rock form (dike, etc.)	5 mi WSW of W. Spanish Pk. subparallel dike	Gardner Butte plug	2 mi SW of Black Hills radial dike	7 mi WSW of W. Spanish Pk. independent dike	6 mi WSW of W. Spanish Pk. sill	7 mi W of W. Spanish Pk. independent dike	4 mi SSW of W. Spanish Pk. radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 6.48%	-	N Ne - 1.70% N Ol - 4.23%	NQ - 5.63%	NQ - 29.47%	NQ - 6.42%	NQ - 5.32%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	P	F	F	F	P
Original author's rock name	syenodiorite	syendiorite	syendiorite	diorite	syenogabbro	syenogabbro lamprophyre	gabbro lamprophyre
Felsic-mafic index	3.48	3.07	1.79	2.16	2.59	1.96	1.72
Rock name according to felsic-mafic index	monzonite	monzonite	basalt (equivalent)	diorite	diorite	gabbro	gabbro
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 46)

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	397	398	399	399A			
Original author's identifying number	200	-		176			
Location and rock form (dike, etc.)	4 mi SSW of Black Hills subparallel dike	Devil's Stairway dike. About 5 mi NW of W. Spanish Peak	Goemmer Butte plug	Same dike and locality as 395 independent dike			
Analyst	6/	R. B. Ellestad	R. B. Ellestad	6/			
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 16.40%	-	-	NQ - 10.30%			
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	F	-			
Original author's rock name	gabbro lamprophyre	granite	latite	gabbro			
Felsic-mafic index	1.52	14.8	5.42	1.97			
Rock name according to felsic-mafic index	gabbro	quartz monzonite	quartz andesite	gabbro			
Specific gravity	-	2.52	2.71	-			
Reference	Johnson (1968, p. 46)	Knopf (1936)	Knopf (1936)	Johnson (1968, p. 46)			

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	383	384	385	386	387	388	389
SiO_2	73.6	67.9	67.7	69.2	65.1	60.3	57.0
Al_2O_3	15.2	15.4	15.4	15.4	16.	17.0	15.6
Fe_2O_3	0.60	1.7	1.4	1.4	2.5	3.3	3.4
FeO	0.20	1.4	0.80	0.46	1.7	1.8	3.3
MgO	0.20	1.2	0.69	0.42	1.9	2.0	4.2
CaO	0.83	2.1	1.3	2.9	2.4	3.3	4.8
Na_2O	4.3	4.3	5.0	4.2	5.1	4.7	4.0
K_2O	4.4	3.5	3.1	3.3	3.4	3.8	2.7
H_2O^-	0.23	0.39	0.47	0.80	0.28	0.51	0.50
H_2O^+	0.74	1.1	1.8	0.95	0.84	1.5	2.2
TiO_2	0.06	0.49	0.32	0.15	0.65	0.86	1.2
P_2O_5	0.02	0.21	0.14	0.10	0.36	0.41	0.48
MnO	0.01	0.01	0.03	0.07	0.10	0.12	0.11
CO_2	<0.05	<0.05	<0.05	1.1	0.05	0.56	0.28
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100	100	100

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	390	391	392	393	394	395	396
SiO_2	54.2	51.4	46.7	46.6	49.2	45.7	45.2
Al_2O_3	16.4	17.4	13.8	16.7	13.5	15.9	13.3
Fe_2O_3	5.1	7.1	9.3	10.4	5.4	7.9	9.7
FeO	2.3	2.7	3.8	2.5	4.0	2.5	2.1
MgO	3.9	3.8	6.3	5.0	5.6	6.4	8.7
CaO	6.2	5.2	9.8	5.7	5.8	8.6	7.4
Na_2O	4.1	3.8	3.4	3.3	2.4	3.1	2.1
K_2O	2.6	2.6	2.1	1.1	2.3	1.0	0.61
H_2O^-	1.9	(	0.38	3.7	1.8	3.4	5.4
H_2O^+	1.3	(3.8 (	2.3	1.8	3.2	2.0	2.8
TiO_2	1.2	1.2	1.4	2.6	1.7	1.9	1.8
P_2O_5	0.64	0.70	0.87	0.59	0.98	0.68	0.44
MnO	0.11	0.20	0.20	0.16	0.14	0.17	0.13
CO_2	0.28	0.24	<0.05	<0.05	2.7	0.89	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	99	100	100

1-degree quadrangle No. 25

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	397	398	399	399A			
SiO_2	44.9	69.56	60.75	46.0			
Al_2O_3	11.8	15.06	16.55	15.7			
Fe_2O_3	4.5	0.96	3.63	7.5			
FeO	5.1	1.31	2.49	2.8			
MgO	12.5	0.85	1.68	6.3			
CaO	9.8	2.14	4.86	8.8			
Na_2O	2.1	4.24	4.29	3.1			
K_2O	1.5	3.97	3.54	1.0			
H_2O^-	2.0	0.10	0.10	3.0			
H_2O^+	3.3	0.81	0.72	1.8			
TiO_2	0.06	0.38	0.84	1.9			
P_2O_5	0.75	0.14	0.49	0.72			
MnO	0.24	0.03	0.11	0.19			
CO_2	0.86	0.36	-	1.4			
BaO	-	0.10	0.12	-			
SrO	-	0.04	0.06	-			
SO_3	-	-	-	-			
S	-	-	-	-			
Cl	-	-	-	-			
F	-	-	-	-			
	99	100.05	100.23	100			

1-degree quadrangle No. 26

Geologic age

No.	Location	Type	Mineral	Age m.y.	Reference, remarks
125	East Spanish Peak Lat 37°25'20" N, Long 104°58'29" W.	K-Ar	Whole rock (adamellite porphyry)	39.5	Armstrong (1969)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	400	401	402	403	404	405	406
Original author's identifying number	16	-	80	81	79	84	85
Location and rock form (dike, etc.)	5 mi S of Black Hills plug	East Spanish Peak stock	3 mi S of West Spanish Peak radial dike	10 mi SE of East Spanish Peak subparallel dike	About 4 mi SSW of West Spanish Peak radial dike	N end of East Spanish Peak radial dike	2 mi SSW of West Spanish Peak radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 26.79%	NQ - 31.16%	NQ - 29.83%	NQ - 41.55%	NQ - 27.09%	NQ - 26.13%	NQ - 21.50%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	F	P	F	F
Original author's rock name	granite	granite	granite	granite	granite	granodiorite	granodiorite
Felsic-mafic index	39.3	20.4	14.3	8.47	6.25	7.05	6.14
Rock name according to felsic-mafic index	alkali granite	granite	quartz monzonite	granodiorite	quartz diorite	granodiorite	quartz diorite
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)	Johnson (1968, p. 40)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	407	408	409	410	411	412	413
Original author's identifying number	87	28	28	96	97	99	98
Location and rock form (dike, etc.)	4 mi N of West Spanish Peak radial dike	About 2 mi W of Walsenburg subparallel dike	Near 408. Same dike	About 3 mi W of Walsenburg Same dike as 408.	1 mi NNW of Walsenburg Same dike as 408.	2 mi SW of Walsenburg Subparallel dike	1 mi N of Walsenburg Same dike as 408
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 15.16%	N Ol - 5.05%	N Ol - 7.04% N Ne - 3.16%	N Ol - 3.08% N Ne - 0.73%	N Ol - 3.19%	NQ - 7.65	N Ol - 7.83% N Ne - 3.54%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	F	F	F	F	F
Original author's rock name	syenite	lamprophyre (minette)	lamprophyre (minette)	lamprophyre (minette)	lamprophyre (minette)	lamprophyre (minette)	lamprophyre (minette)
Felsic-mafic index	8.67	2.09	1.96	1.92	2.00	2.60	1.74
Rock name according to felsic-mafic index	granodiorite	basalt	basalt	basalt	basalt	andesite	basalt
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968, p. 41)	Johnson (1968)	Johnson (1968)

1-degree quadrangle No.26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	414	415	416	417	418	419	420
Original author's identifying number	101	112	111	113	207	111	132
Location and rock form (dike, etc.)	4 mi N of West Spanish Peak subparallel dike	About 2 mi S of West Spanish Peak radial dike	3 mi SSW of West Spanish Peak. radial dike	About 1/4 mi W of 415. radial dike	About 2 mi SSW of West Spanish Peak radial dike	Near 416. Same dike	3 mi S of West Spanish Peak radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 5.35%	NQ - 14	NQ - 6.93%	NQ - 9.61%	NQ - 8.81%	NQ - 6.89	NQ - 6.31
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	P	-	P	F
Original author's rock name	lamprophyre (minette)	syenodiorite	syenodiorite	syenodiorite	syenodiorite	syenodiorite	syenodiorite
Felsic-mafic index	1.87	7.45	6.86	5.42	6.75	6.55	4.40
Rock name according to felsic-mafic index	basalt	granodiorite	quartz diorite	quartz diorite	quartz diorite	quartz diorite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968)	Johnson (1968)	Johnson (1968, p.43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	421						
Original author's identifying number	131						
Location and rock form (dike, etc.)	5 mi SE of East Spanish Pk. radial dike						
Analyst	6/						
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 12.06						
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F						
Original author's rock name	syenodiorite						
Felsic-mafic index	3.91						
Rock name according to felsic-mafic index	monzonite						
Specific gravity	-						
Reference	Johnson (1968), p. 43						

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	422	423	424	425	426	427	428
Original author's identifying number	108	106	138	120	138	52	148
Location and rock form (dike, etc.)	5 mi SSE of East Spanish Peak radial dike	About 4.5 mi. SSE of East Spanish Peak radial dike	About 9 mi SE of East Spanish Peak subparallel dike	About 10 mi ENE of East Spanish Peak radial dike	Same locality and dike as 424.	8 mi N of East Spanish Peak independent dike	About 9 mi E of East Spanish Peak subparallel dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 3.32%	NQ - 3.79%	NQ - 5.0%	NQ - 4.46%	NQ - 4.63%	NQ - 2.06%	NQ - 2.40%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	F	P	F	F	F
Original author's rock name	syenodiorite	syenodiorite	syenodorite	syenodiorite	syenodiorite	syenodiorite	lamprophyre (soda-vogesite)
Felsic-mafic index	4.91	3.44	3.04	3.32	3.00	3.41	3.26
Rock name according to felsic-mafic index	monzonite	monzonite	monzonite	monzonite	monzonite	monzonite	monzonite
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	429	430	431	432	433	434	435
Original author's identifying number	128	149	130	43	137	96	147
Location and rock form (dike, etc.)	13 mi SSE of East Spanish Peak subparallel dike	13 mi ESE of East Spanish Peak subparallel dike	9 mi NE of East Spanish Peak radial dike	About 11 mi ESE of East Spanish Peak Same dike as 403	About 9 mi SE of East Spanish Peak subparallel dike	About 3 mi W of Walsenburg. Same dike as 408. Same place as 410.	About 8 mi E of East Spanish Peak subparallel dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 6.94%	N Ol - 1.28%	NQ - 4.60%	N Ol - 9.05%	NQ - 2.45	N Ol - 5.34% N Ne - 2.64%	N Ol - 5.78
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	F	F	F	F	F	P
Original author's rock name	syenodiorite	lamprophyre (soda-vogesite)	syenodiorite	lamprophyre (soda-vogesite)	syenodiorite	lamprophyre (minette)	lamprophyre (soda-vogesite)
Felsic-mafic index	3.37	2.30	2.64	2.22	2.35	1.87	1.97
Rock name according to felsic-mafic index	monzonite	andesite	andesite	andesite	andesite	basalt	basalt
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	436	437	438	439	440	441	442
Original author's identifying number	136	28	97	133	146	152	155
Location and rock form (dike, etc.)	About 10 mi SE of East Spanish Peak subparallel dike	About 2 mi W of Walsenburg. Same dike as 408 and near 408.	1 mi NNW of Walsenburg Same dike as 408	About 6 mi NW of Walsenburg subparallel dike	About 2 mi SSE of Walsenburg subparallel dike	About 2 mi SSW of West Spanish Peak radial dike	About 8 mi SSE West Spanish Peak subparallel dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	NQ - 4.89%	N Ol - 5.76% N Ne - 1.95%	N Ol - 7.79% N Ne - 0.48%	NQ - 4.35%	N Ol - 11.57%	NQ - 14.65%	N Ol - 1.12%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	P	P	F	F	P	F
Original author's rock name	syenodiorite	lamprophyre (soda-minette)	lamprophyre (soda-minette)	syenodiorite	lamprophyre (soda-vogesite)	diorite	andesite
Felsic-mafic index	2.15	1.80	2.46	2.02	1.49	3.11	2.41
Rock name according to felsic-mafic index	andesite	basalt	andesite	basalt	basalt	monzonite	andesite
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 43)	Johnson (1968, p. 45)	Johnson (1968, p. 45)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	443	444	445	446	447	448	449
Original author's identifying number	163	164	43	157	156	172	166
Location and rock form (dike, etc.)	About 5 mi SSE of West Spanish Peak subparallel dike	About 13 mi SSE of West Spanish Peak subparallel dike	6 mi S of West Spanish Peak subparallel dike	About 15 mi SE of West Spanish Peak subparallel dike	About 15 mi SE of West Spanish Peak subparallel dike	About 8 mi WSW of Walsenburg independent dike	4 mi SE of East Spanish Peak radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 3.35%	N Ol - 11.58%	N Ol - 3.50%	N Ol - 1.84%	NQ - 4.97%	N Ol - 5.13%	NQ - 19.50%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	F	F	F	F	F	F	P
Original author's rock name	lamprophyre (spessartite)	lamprophyre (spessartite)	andesite	diorite	diorite	lamprophyre (monchiquite)	syenogabbro
Felsic-mafic index	2.42	1.83	2.26	1.90	1.95	1.81	2.09
Rock name according to felsic-mafic index	andesite	basalt	andesite	basalt	basalt	basalt	gabbro
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	450	451	452	453	454	455	456
Original author's identifying number	168	173	171	170	183	178	177
Location and rock form (dike, etc.)	5 mi SSE of East Spanish Peak radial dike	9 mi NE of East Spanish Peak subparallel dike	3 mi NW of Walsenburg subparallel dike	About 7 mi NNE of East Spanish Peak subparallel dike	About 13 mi SSE of East Spanish Peak subparallel dike	About 14 mi SSE of East Spanish Peak radial dike	About 8 mi ENE of East Spanish Peak radial dike
Analyst	6/	6/	6/	6/	6/	6/	6/
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 1.51%	N Ol - 15.59% N Ne - 2.28%	N Ol - 11.26% N Ne - 1.33%	N Ol - 18.38% N Ne - 0.75%	NQ - 0.67%	NQ - 0 N Ol - 0 N Ne - 0	NQ - 18.32%
Texture: P-porphyritic; C->1 cm; M-1--10 mm; F-<1 mm	P	P	P	F	F	P	F
Original author's rock name	lamprophyre (odinite)	lamprophyre (monchiquite)	lamprophyre (monchiquite)	lamprophyre (odinite)	basalt	gabbro	gabbro
Felsic-mafic index	1.83	1.56	1.56	1.49	1.70	1.56	1.95
Rock name according to felsic-mafic index	basalt	basalt	basalt	basalt	basalt	gabbro	gabbro
Specific gravity	-	-	-	-	-	-	-
Reference	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 45)	Johnson (1968, p. 47)	Johnson (1968, p. 47)	Johnson (1968, p. 46)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	457	458	459	460	461	462	463
Original author's identifying number	202	56	196	Locality I	Locality III	Locality IV	Locality V
Location and rock form (dike, etc.)	About 7 mi S of West Summit Peak subparallel dike	8 mi NW of Walsenburg independent dike	About 11 mi ESE of East Spanish Peak. radial dike	E flank of East Spanish Peak stock	Summit of West Spanish Peak stock	Bear Creek dike	Bear Creek dike
Analyst	6/	6/	6/	George Steiger	George Steiger	George Steiger	R. B. Ellestad
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	N Ol - 9.66% N Ne - 1.54%	N Ol - 11.93% N Ne - 3.11%	NQ - 2.91	NQ - 28.02%	NQ - 7.74%	-	NQ - 2.52%
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	P	P	P	P	P	P	F
Original author's rock name	lamprophyre (monchiquite)	monchiquite	lamprophyre (odinite)	granite	pyroxene syenodiorite	augite syenodiorite	microsyeno-diorite
Felsic-mafic index	1.50	1.45	1.43	23.9	4.68	3.90	3.50
Rock name according to felsic-mafic index	basalt	basalt	basalt	granite	monzonite	monzonite	monzonite
Specific gravity	-	-	-	2.58	2.74	-	2.67
Reference	Johnson (1968, p. 46)	Johnson (1968, p. 46)	Johnson (1968, p. 46)	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	464	465	466	467	468	469	470
Original author's identifying number	Locality VI	Locality VII	Locality VIII	Locality IX	Locality X	Locality XI	Locality XII
Location and rock form (dike, etc.)	Walsenburg-La Veta Road dike	S fork of Trujillo Canyon dike	Bear Creek dike	Huerfano Butte plug	Bear Creek dike	Walsen dike	Unfug dike
Analyst	George Steiger	R. B. Ellestad	R. B. Ellestad	George Steiger	R. B. Ellestad	George Steiger	George Steiger
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	-	-	N Ol - 15.08% N Ne - 4.26% M Ol - 6.5%	-	-	-
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	M	P	P	M	P	F-M	-
Original author's rock name	olivine-biotite shonkinite	augite minette	analcitic olivine trachydolerite	olivine-biotite-augite gabbro	analcite olivine trachydolerite	biotite-augite vogesite	olivine fourchite
Felsic-mafic index	2.53	2.22	1.70	1.68	1.68	1.92	1.66
Rock name according to felsic-mafic index	diorite	diorite	basalt	gabbro	basalt	basalt	basalt
Specific gravity	2.84	2.80	2.97	2.98	2.95	2.86	2.95
Reference	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	471	472	473	474			
Original author's identifying number	Locality XIII	Locality XIV	Locality XV	Locality XVI			
Location and rock form (dike, etc.)	Bear Creek dike	Picton dike	Upper Bear Creek dike	Bear Creek dike			
Analyst	R. B. Ellestad	R. B. Ellestad	R. B. Ellestad	R. B. Ellestad			
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	M Ol - 6.1%	-	-	M Ol - 9.3%			
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	P	F	P			
Original author's rock name	teschenite	olivine fourchite	olivine fourchite, border facies of dike	olivine fourchite			
Felsic-mafic index	1.63	1.65	1.70	1.50			
Rock name according to felsic-mafic index	basalt	basalt	basalt	basalt			
Specific gravity	2.89	2.92	2.90	2.90			
Reference	Knopf (1936)	Knopf (1936)	Knopf (1936)	Knopf (1936)			

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	400	401	402	403	404	405	406
SiO_2	72.5	71.2	69.1	67.2	58.3	63.1	61.3
Al_2O_3	14.6	14.6	15.1	14.9	16.6	15.0	16.0
Fe_2O_3	0.35	1.1	1.3	2.6	2.5	3.6	2.9
FeO	0.16	0.98	1.4	3.3	2.3	1.6	2.6
MgO	0.26	0.71	0.80	1.7	2.1	2.0	2.9
CaO	1.3	1.1	1.9	0.86	3.7	2.9	2.6
Na_2O	4.7	3.6	4.7	1.9	4.7	3.7	3.6
K_2O	4.2	4.6	3.4	2.6	3.3	4.4	2.6
H_2O^-	0.16	0.28	0.18	1.2	0.35	0.41	0.80
H_2O^+	0.64	0.98	1.1	2.7	2.2	1.5	2.9
TiO_2	1.2	0.33	0.44	0.66	1.0	0.67	0.98
P_2O_5	0.02	0.12	0.21	0.24	0.45	0.26	0.35
MnO	0.02	0.10	0.08	0.10	0.10	0.09	0.11
CO_2	0.29	0.22	0.75	<0.05	2.3	1.2	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	407	408	409	410	411	412	413
SiO_2	65.2	47.9	47.1	46.9	46.7	46.0	45.6
Al_2O_3	16.1	11.4	11.6	11.1	10.9	11.1	10.8
Fe_2O_3	2.2	7.7	6.4	7.9	9.5	4.5	7.1
FeO	1.8	2.6	3.4	3.1	1.8	1.3	4.0
MgO	1.7	6.9	8.3	6.3	6.8	4.1	8.9
CaO	2.8	9.0	9.4	10.6	8.6	10.8	9.8
Na_2O	5.1	2.2	2.3	2.1	2.1	1.1	2.3
K_2O	3.4	4.8	4.5	4.5	4.6	6.6	4.1
H_2O^-	0.21	1.4	1.3	0.37	2.0	2.9	0.90
H_2O^+	0.79	2.0	2.2	2.0	2.8	1.8	2.4
TiO_2	0.61	2.0	2.1	2.5	2.0	1.1	2.0
P_2O_5	0.33	1.8	1.4	2.1	1.8	0.44	1.7
MnO	0.08	0.13	0.16	0.09	0.16	0.28	0.19
CO_2	<0.05	<0.05	<0.05	<0.05	<0.05	7.8	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	414	415	416	417	418	419	420
SiO_2	45.1	63.7	59.5	59.4	59.3	59.2	57.5
Al_2O_3	11.4	16.3	17.9	16.9	17.8	17.9	15.6
Fe_2O_3	7.5	2.7	3.1	3.0	3.5	3.2	3.7
FeO	2.4	1.8	2.0	2.8	1.9	2.2	2.9
MgO	8.0	1.7	1.7	2.4	1.8	1.8	4.3
CaO	9.3	3.5	3.2	4.2	2.9	3.2	3.9
Na_2O	1.2	4.6	5.2	4.5	4.8	5.1	4.6
K_2O	4.7	3.9	3.9	3.3	4.1	3.9	3.1
H_2O^-	1.4	0.16	0.42	0.22	0.35	0.35	0.59
H_2O^+	2.7	0.97	1.5	1.6	1.9	1.4	2.1
TiO_2	1.8	0.73	1.1	1.0	1.1	1.2	1.3
P_2O_5	1.6	0.41	0.55	0.55	0.56	0.49	0.45
MnO	0.19	0.09	0.08	0.11	0.09	0.09	0.12
CO_2	2.0	<0.05	0.56	<0.05	<0.05	<0.05	0.20
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	421	422	423	424	425	426	427
SiO_2	57.0	56.0	54.3	53.6	53.5	53.2	52.4
Al_2O_3	14.8	17.5	15.5	15.3	15.8	15.3	16.7
Fe_2O_3	4.4	3.8	3.0	3.8	5.3	3.3	6.7
FeO	2.8	2.7	4.6	4.3	2.9	4.9	3.0
MgO	5.2	2.3	5.1	5.0	4.4	6.3	3.0
CaO	3.8	4.3	5.0	6.5	5.6	5.1	4.9
Na_2O	3.6	5.2	4.1	3.5	4.0	3.5	4.8
K_2O	2.8	3.2	2.6	2.4	2.9	2.1	2.8
H_2O^-	0.94	0.69	0.60	2.1	1.4	2.0	0.95
H_2O^+	2.3	2.5	2.7	1.5	1.3	2.4	2.2
TiO_2	1.2	1.3	1.4	1.3	1.8	1.4	1.2
P_2O_5	0.45	0.67	0.56	0.51	0.78	0.51	0.73
MnO	0.10	0.12	0.18	0.12	0.10	0.15	0.18
CO_2	0.16	0.08	0.55	<0.05	<0.05	0.11	0.27
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	428	429	430	431	432	433	434
SiO_2	51.6	51.5	50.0	48.5	48.0	47.4	47.1
Al_2O_3	16.6	17.7	14.0	17.2	16.1	16.3	11.5
Fe_2O_3	5.2	2.4	6.4	6.8	4.6	8.3	6.5
FeO	3.3	4.7	3.2	3.7	6.7	2.0	3.4
MgO	4.2	3.4	7.2	5.0	5.4	4.3	7.8
CaO	5.4	6.6	7.4	5.0	7.5	7.8	10.9
Na_2O	4.7	3.8	3.8	4.1	3.9	3.7	2.5
K_2O	2.8	2.3	1.9	1.5	2.0	1.5	3.8
H_2O^-	0.65	0.97	2.1	1.8	0.93	3.1	0.54
H_2O^+	1.9	2.7	1.3	3.0	1.6	1.8	2.3
TiO_2	1.6	1.2	1.8	2.2	2.2	2.1	1.8
P_2O_5	0.83	0.65	0.58	0.66	1.2	1.5	1.9
MnO	0.16	0.22	0.14	0.19	0.18	0.19	0.15
CO_2	0.46	2.2	<0.05	0.24	<0.05	<0.05	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	435	436	437	438	439	440	441
SiO_2	46.8	46.2	45.3	45.2	42.0	41.1	54.4
Al_2O_3	12.6	16.9	11.2	13.0	16.8	11.9	15.8
Fe_2O_3	5.4	6.6	8.6	5.7	2.0	7.2	3.6
FeO	3.8	4.8	3.6	2.5	7.5	2.9	3.7
MgO	9.4	4.4	7.0	6.1	3.4	10.6	4.6
CaO	7.8	7.9	9.6	6.9	10.2	9.7	6.8
Na_2O	2.9	3.5	2.6	3.2	3.3	2.3	2.9
K_2O	2.3	1.3	4.0	3.8	1.4	1.8	0.80
H_2O^-	2.6	1.3	0.90	2.5	1.2	3.4	0.99
H_2O^+	2.0	3.0	2.5	4.2	3.9	3.4	3.9
TiO_2	1.7	1.2	2.3	2.7	1.9	1.6	1.4
P_2O_5	1.1	1.2	2.3	2.0	0.79	1.69	0.56
MnO	0.14	0.22	0.15	0.05	0.20	0.1	0.18
CO_2	<0.05	1.8	<0.05	<0.05	5.8	1.3	<0.05
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	1.2	-	-	
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99	100	100	99	100	99	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	442	443	444	445	446	447	448
SiO_2	50.2	49.2	47.3	47.3	45.7	44.5	46.0
Al_2O_3	14.1	15.4	15.0	16.3	16.0	16.8	11.9
Fe_2O_3	6.1	5.3	3.5	5.3	5.4	7.4	6.0
FeO	3.2	4.6	7.9	5.6	5.5	5.6	4.4
MgO	7.1	6.4	7.9	5.1	6.3	4.1	9.2
CaO	6.9	6.4	8.9	7.4	9.0	8.0	8.7
Na_2O	3.8	4.3	2.9	4.0	3.4	3.0	1.6
K_2O	2.2	1.5	1.5	1.6	0.67	1.4	3.7
H_2O^-	2.5	1.2	0.91	2.1	1.7	1.6	2.5
H_2O^+	1.7	3.2	1.7	1.9	1.6	2.5	2.3
TiO_2	1.7	1.8	1.8	2.1	2.3	2.5	2.1
P_2O_5	0.72	0.79	0.70	1.5	0.83	0.71	0.88
MnO	0.18	0.16	0.17	0.13	0.29	0.46	0.19
CO_2	<0.05	<0.05	0.24	<0.05	0.38	1.8	0.11
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	449	450	451	452	453	454	455
SiO_2	45.6	45.5	43.8	43.7	43.5	44.8	44.0
Al_2O_3	15.6	11.7	12.2	12.5	12.3	15.1	13.7
Fe_2O_3	3.4	4.5	5.0	6.8	5.6	5.5	8.0
FeO	5.7	5.3	6.0	3.7	5.8	5.8	4.0
MgO	4.3	9.1	10.3	10.2	12.1	6.4	8.8
CaO	10.4	8.9	9.7	10.2	8.7	10.8	9.5
Na_2O	2.9	1.3	2.3	2.2	2.1	2.7	2.2
K_2O	1.3	4.0	2.2	2.2	2.4	1.0	1.2
H_2O^-	0.68	1.1	0.94	2.4	0.57	1.3	3.0
H_2O^+	2.5	2.8	3.1	3.5	2.8	1.9	2.4
TiO_2	1.6	2.6	2.0	1.4	2.2	2.2	1.7
P_2O_5	0.49	1.2	1.1	0.95	1.1	0.74	0.52
MnO	0.14	0.22	1.0	0.16	0.18	0.28	0.18
CO_2	5.2	1.6	<0.05	0.13	<0.05	1.8	0.86
BaO	-	-	-	-	-	-	-
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	99	100	100

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	456	457	458	459	460	461	462
SiO_2	43.6	43.4	42.2	41.3	73.47	59.18	54.46
Al_2O_3	16.6	12.9	12.1	12.2	13.74	15.95	17.47
Fe_2O_3	4.5	5.7	6.9	6.2	1.15	3.00	4.25
FeO	6.6	4.0	4.5	4.9	0.70	3.88	2.83
MgO	4.7	9.9	10.6	7.5	0.35	2.74	2.90
CaO	8.7	11.9	10.2	12.5	1.24	4.73	5.91
Na_2O	3.6	1.2	2.3	2.0	4.39	4.42	4.37
K_2O	0.56	2.8	2.1	1.1	4.52	3.63	3.06
H_2O^-	1.4	1.8	2.1	2.4	0.22	0.13	0.53
H_2O^+	3.2	3.9	3.3	2.8	0.18	0.56	1.61
TiO_2	2.0	1.5	2.1	1.2	0.34	1.36	1.48
P_2O_5	0.57	0.91	1.1	0.59	0.08	0.52	0.69
MnO	0.22	0.21	0.14	0.28	0.06	0.10	0.08
CO_2	3.8	<0.05	0.15	5.0	none	0.16	0.37
BaO	-	-	-	-	0.09	0.12	0.15
SrO	-	-	-	-	-	-	-
SO_3	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	100	100	100	100	100.53	100.48	100.16

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	463	464	465[82/]	466	467	468	469
SiO_2	53.49	52.90	47.63	46.78	46.73	46.51	46.37
Al_2O_3	16.67	10.20	12.01	13.87	13.04	13.81	11.98
Fe_2O_3	6.04	3.61	4.20	3.00	3.62	2.79	5.05
FeO	2.83	4.44	4.99	8.40	7.35	8.55	5.16
MgO	2.71	9.06	8.31	9.55	9.66	9.63	8.38
CaO	5.97	6.91	7.28	9.53	10.22	9.63	9.33
Na_2O	4.17	2.20	1.98	3.23	3.06	3.23	2.84
K_2O	3.74	6.36	5.40	1.74	1.93	1.73	4.34
H_2O^-	0.46	0.14	0.94	0.05	0.33	0.11	0.71
H_2O^+	1.43	1.73	1.83	0.91	1.50	1.19	2.17
TiO_2	1.26	1.17	2.22	1.70	1.76	1.70	1.80
P_2O_5	0.79	0.63	1.08	0.91	0.76	0.88	1.34
MnO	0.13	0.11	0.17	0.19	0.16	0.18	0.10
CO_2	-	none	0.74	-	tr	-	0.24
BaO	0.18	0.07	0.56	0.10	0.14	0.10	0.31
SrO	0.09	-	0.10	0.11	-	0.10	-
SO_3	-	0.07	0.19	-	-	-	-
S	-	-	0.06	-	-	-	-
Cl	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-
	99.96	99.60	99.67	100.07	100.26	100.14	100.12

82/ Includes less O for S = 0.02.

1-degree quadrangle No. 26

Table of chemically analyzed intrusive rocks

Chemical analyses

Sample No.	470[83]	471[84]	472	473[85]	474[86]
SiO_2	45.18	44.76	44.66	44.26	43.13
Al_2O_3	12.36	12.82	13.38	14.06	12.18
Fe_2O_3	4.44	4.94	4.12	4.15	4.88
FeO	5.72	6.03	5.64	6.13	6.40
MgO	10.25	10.10	10.49	8.28	10.22
CaO	10.37	9.55	10.44	10.80	10.46
Na_2O	2.64	3.02	3.24	3.07	2.22
K_2O	3.08	2.28	2.67	2.44	2.59
H_2O^-	1.27	0.39	0.12	0.23	0.49
H_2O^+	2.89	2.51	2.05	2.24	2.95
TiO_2	1.63	1.89	1.53	1.82	2.41
P_2O_5	1.02	0.93	1.00	1.07	1.18
MnO	0.11	0.18	0.18	0.18	0.18
CO_2	tr	0.18	-	0.36	-
BaO	0.17	0.13	0.13	0.19	0.26
SrO	-	0.12	0.19	0.20	0.18
SO_3	0.25	0.06	0.18	0.46	0.10
S	-	0.08	-	0.06	0.08
Cl	0.10	-	0.02	-	-
F	-	-	-	-	-
	100.45	99.94	100.04	99.98	99.88

[83] Includes less O for Cl = 0.03.

[84] Includes less O for S = 0.03.

[85] Includes less O for S = 0.02.

[86] Includes less O for S = 0.03.

1-degree quadrangle No. 28

Table of chemically-analyzed intrusive rocks

Sample number for this report (location identified on map with this number)	475	476	
Original author's identifying number	F	I	
Location and rock form (dike, etc.)	Two Buttes laccolith	Two Buttes laccolith	
Analyst	W. F. Hillebrand	W. F. Hillebrand	
Partial normative or modal information: M-modal; N-normative; Q-quartz; Ne-nepheline; Ol-olivine	-	N Ol - 8.7% N Ne - 2.4%	
Texture: P-porphyritic; C->1 cm; M-1-10 mm; F-<1 mm	-	F	
Original author's rock name	tinguaite?	syenitic lamprophyre (prowersose)	
Felsic-mafic index	2.88	2.40	
Rock name according to felsic-mafic index	andesite	andesite	
Specific gravity	2.79	2.88	
Reference	Clarke (1904, p. 186)	Clarke (1904, p. 186)	

Chemical analyses

Sample No.	475[87]	476[88]
SiO_2	47.61	50.41
Al_2O_3	14.26	12.27
Fe_2O_3	4.90	5.71
FeO	4.07	3.06
MgO	2.62	8.60
CaO	8.71	7.08
Na_2O	6.70	0.97
K_2O	4.08	7.53
H_2O^-	0.26	0.46
H_2O^+	1.89	1.80
TiO_2	1.38	1.47
P_2O_5	1.38	0.46
MnO	0.30	0.15
CO_2	-	-
BaO	0.41	0.23
SrO	0.36	0.06
SO_3	1.17	none
S	0.03	none
Cl	0.37	tr.
F	tr.	tr?
	100.68	100.42

87/ Also includes ZrO_2 = 0.18, NiO tr, Li_2O tr, and Cr_2O_3 tr?.

88/ Also includes V_2O_3 = 0.03, NiO - 0.04, Li_2O tr, and Cr_2O_3 tr.