U. S. Geological Survey.

REPORTS-OPEN FILE SERIES, no. 900: 1967.

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY.

[Reports - open file series, no. 900]

NEW CHEMICAL DATA ON ALKALINE DIABASE-PICRITE INTRUSIONS FROM SCOTLAND, NEW ZEALAND, AND UTAH

By

H. G. Wilshire

Howard Gordon, 1926-

Open-file report

1967

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

Weld - Int. 2905

GEOLOGIC DIVISION
U. S. GEOLOGICAL SURVEY
Washington, D. C.
20242

For release MAY 15, 1967

The U. S. Geological Survey is releasing in open files the following reports. Copies are available for inspection in the Geological Survey Libraries, 1033 GSA Bldg., Washington, D. C., 20242; Bldg. 25, Federal Center, Denver, Colo. 80225; 345 Middlefield Rd., Menlo Park, Calif. 94025; and in other offices as listed:

1. Profiles showing configuration and probable bottom deposits as interpreted from fathometer traverses across and along parts of Gastineau Channel, near Juneau, Alaska, by Robert D. Miller. 1 sheet. Brooks Bldg., College, Alaska 99735; 203 Simpson Bldg., 222 Seward St., Juneau, Alaska 99801; Alaska Div. Mines and Minerals, 5th Floor, Goldstein Bldg., Juneau 99801, and 3001 Porcupine Dr., Anchorage, Alaska 99504; 108 Skyline Bldg., 508 2nd Ave., Anchorage, Alaska 99501; South 157 Howard St., Spokane, Wash. 99204; 504 Custom House, San Francisco, Calif. 94111; 7638 Federal Bldg., Los Angeles, Calif. 90012; 602 Thomas Bldg., Dallas, Texas 75202. Material from which copy can be made at private expense is available at 108 Skyline Bldg., Anchorage, and 203 Simpson Bldg., Juneau.

2. Investigation of in situ physical properties of surface and subsurface site materials by engineering geophysical techniques, edited by Joel S. Watkins. 317 p., 1 pl., 44 figs., 53 photographs, 17 tables. 601 East Cedar Ave., Flagstaff, Ariz. 86001.

✓ 3. New chemical data on alkaline diabase-picrite intrusions, by H. G. Wilshire. 6 p. text, plus 6 figs. and 16 p. tabular material (2 tables).

* * * * *

The following report is also released in open file and is available for consultation at the USGS Library, 1033 GSA Bldg., Washington, D. C., 20242:

4. Phosphate rock in Colombia: a preliminary report, by James B. Cathcart and Francisco Zambrano O., with a section on The phosphate occurrence at Turmeque, by Pedro E. Mojica G. 123 p., 11 figs., 3 tables.

* * * * *

Sample Locations

Lugar sill, Ayrshire, Scotland. Mortonmuir borehole (Tyrrell, 1948).

1. Olivine theralite, 16'3" from top of sill
2. Picrite-theralite, 70'3" from top of sill
3. Picrite, 104'3" from top of sill

Inchcolm sill, Inchcolm island, Scotland (Campbell and Stenhouse, 1908).

4. Picrite

Coir' a' Ghreadaidh dike, Isle of Skye (Bowen, 1928, p. 154, anal. I).

5. Picrite dike

Sgurr na Banachdich dike, Isle of Skye (Bowen, 1928, p. 154, anal. II).

6. Olivine dolerite, apophysis from picrite dike

Bornaskitaigsiu sill, Isle of Skye (Simkin, 1965).

7. Chilled diabase, 4" above base; 19% olivine
8. Chilled diabase, 4" above base; 19% olivine
9. Chilled diabase, 4" above base; olivine removed
10. Picrite, 10' above base; 30% olivine
11. Picrite, 10.5' above base; 38% olivine
12. Picrite, 33' above base; 45% olivine
13. Picrite, 70' above base; about 55% olivine
14. Picrite, 106.5' above base; 55% olivine
15. Picrite, 110' above base; 40% olivine
16. Diabase, 110.2' above base; 12% olivine
17. Diabase, 126' above base; 14% olivine
18. Vein in upper picrite

Flodigarry sill, Isle of Skye (Simkin, 1965).

19. Picrite, 143' above base; 37% olivine
20. Chilled diabase, 330' above base; 12% olivine

Skudiburgh sill, Isle of Skye (Simkin, 1965).

21. Interior chilled diabase, 4' above base; 6% olivine

Balmacquien sill, Isle of Skye (Simkin, 1965).

22. Picrite, 28.5' above base; 41% olivine

23. Diabase, 30' above base; 13% olivine

24. Vein in upper center of sill

Kilmuir sill, Isle of Skye (Simkin, 1965).

25. Picrite, 148' above base, 67% olivine

26. Vein at picrite-diabase contact

Druim Fada, lowermost flow, Isle of Skye (Simkin, 1965).

27. Olivine basalt flow

Waihola sill, New Zealand (Benson, 1942).

28. Basanite, upper part of sill

29. Olivine theralite, upper part of sill

30. Olivine theralite, upper(?) part of sill

31. Olivine theralite, upper part of sill

32. Olivine theralite, lower part of sill

33. Olivine theralite, lower chilled phase

34. Mafic xenolith(?) in lower chilled phase

35. Peridotite xenolith in lower chilled phase

Flow, San Rafael Swell, Utah (Gilluly, 1927).

36. Basalt flow, 9 mi. S. Emery, Utah, HW 10

Dike, San Rafael Swell, Utah (Gilluly, 1927).

37. Basalt dike, sample from termination of en echelon segment, Hebes Mtn. area

Dike, San Rafael Swell, Utah (Gilluly, 1927).

38. Margin of basalt dike, Hebes Mtn. area

39. 6" from dike contact

40. 4" from contact opposite to 39

41. Center of dike

Hebes Mtn. sill, San Rafael Swell, Utah (Gilluly, 1927).

42. Lower chilled margin

43. Diabase chilled against inclusion near base

44. Diabase, 9' from base

45. Diabase, 13' from base

46. Diabase, 19' from base

47. Diabase, 30' from base

48. Diabase, 40' from base

49. Diabase, 51' from base

50. Diabase, 56' from base

51. Diabase, 61' from base

52. Diabase, 66' from base

53. Upper chilled margin, 67' above base

54. Upper chilled margin

55. Fine-grained vein in upper chilled margin

56. 4" thick syenite schliere, 6' below upper contact

57. Coarse syenite schliere, 12' below upper contact

Sill (10" thick), north end Cedar Mtn., San Rafael Swell, Utah (Gilluly, 1927)

58. Center of sill

Sill, 1 mi. east Cedar Mtn., San Rafael Swell, Utah (Gilluly, 1927).

59. Lower chilled margin

60. Diabase, 11" above base

61. Diabase, 4.5' above base

62. Diabase, 9.8' above base

63. Diabase, 15' above base

64. Diabase, 22' above base

65. Diabase, 27.6' above base

66. Diabase, 34.7' above base

67. Syenite schliere, 42.7' above base

68. Diabase at bottom of 67, 41.8' above base

69. Diabase at top of 67, 46.7' above base

70. Syenite vein in 69

71. Diabase, 50' above base

72. Upper chilled margin.

Analyst, nos. 1-4, 28-35: George O. Riddle, U.S. Geological Survey, Denver, Colorado.

Analyst, nos. 5-27: Christel L. Parker, U.S. Geological Survey, Denver, Colorado.

Nos. 36-72 analyzed by Rapid Rock Analysis Laboratory, U.S. Geological Survey, Washington, D. C.

Triangular diagrams are plots of K_2O+Na_2O (A), $FeO+2Fe_2O_3+MnO$ (F), MgO (M).

References

Benson, W. N., 1942, The basic igneous rocks of eastern Otago and their tectonic environment, Pt. 3, The olivine theralite of Waihola, east Otago, a gravitationally-differentiated sill, with notes on related rocks: Royal Soc. New Zealand Trans., v. 71, p. 160-185.

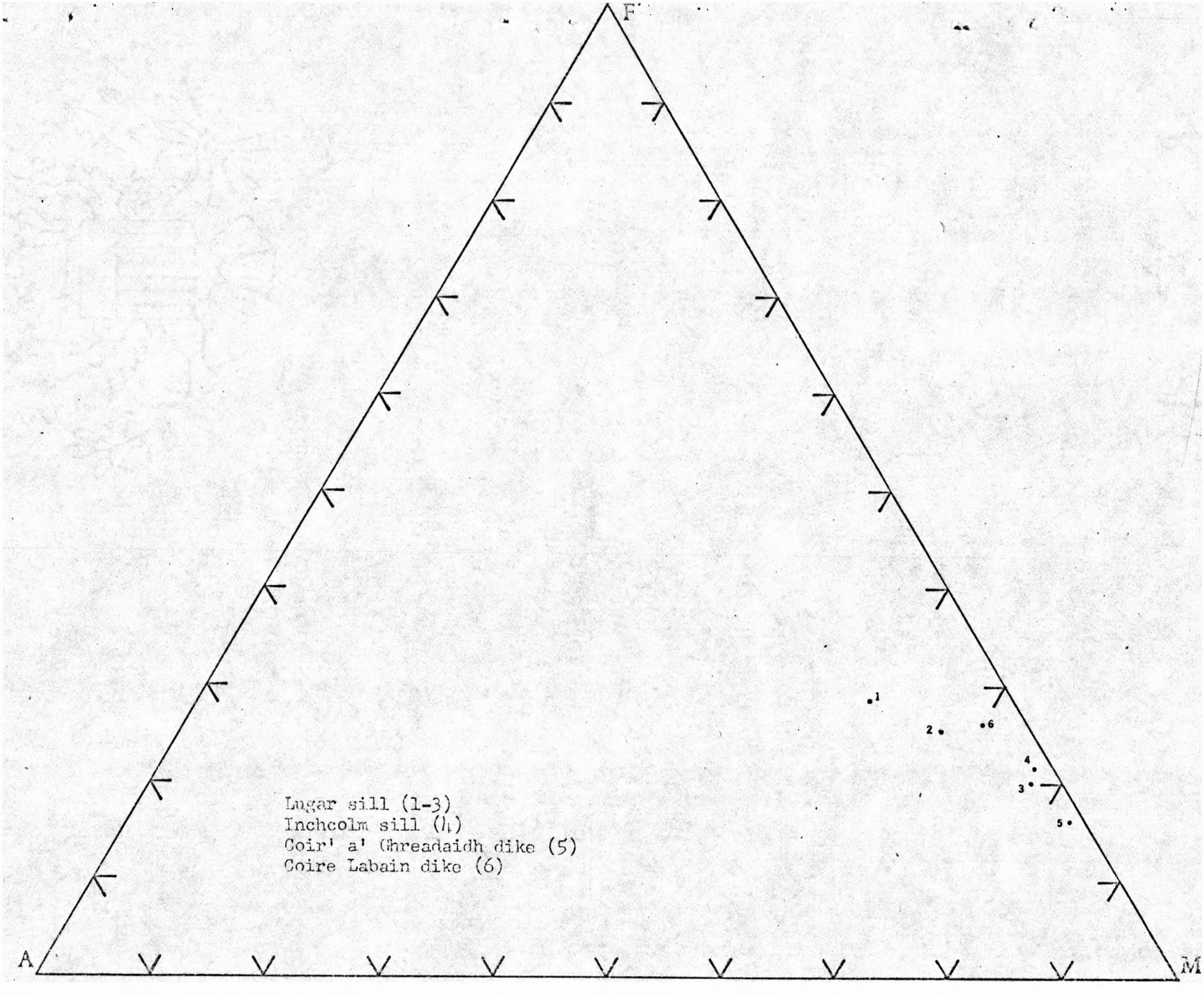
Bowen, N. L., 1928, The evolution of the igneous rocks: Princeton, N. J., Princeton University Press, 332 p.

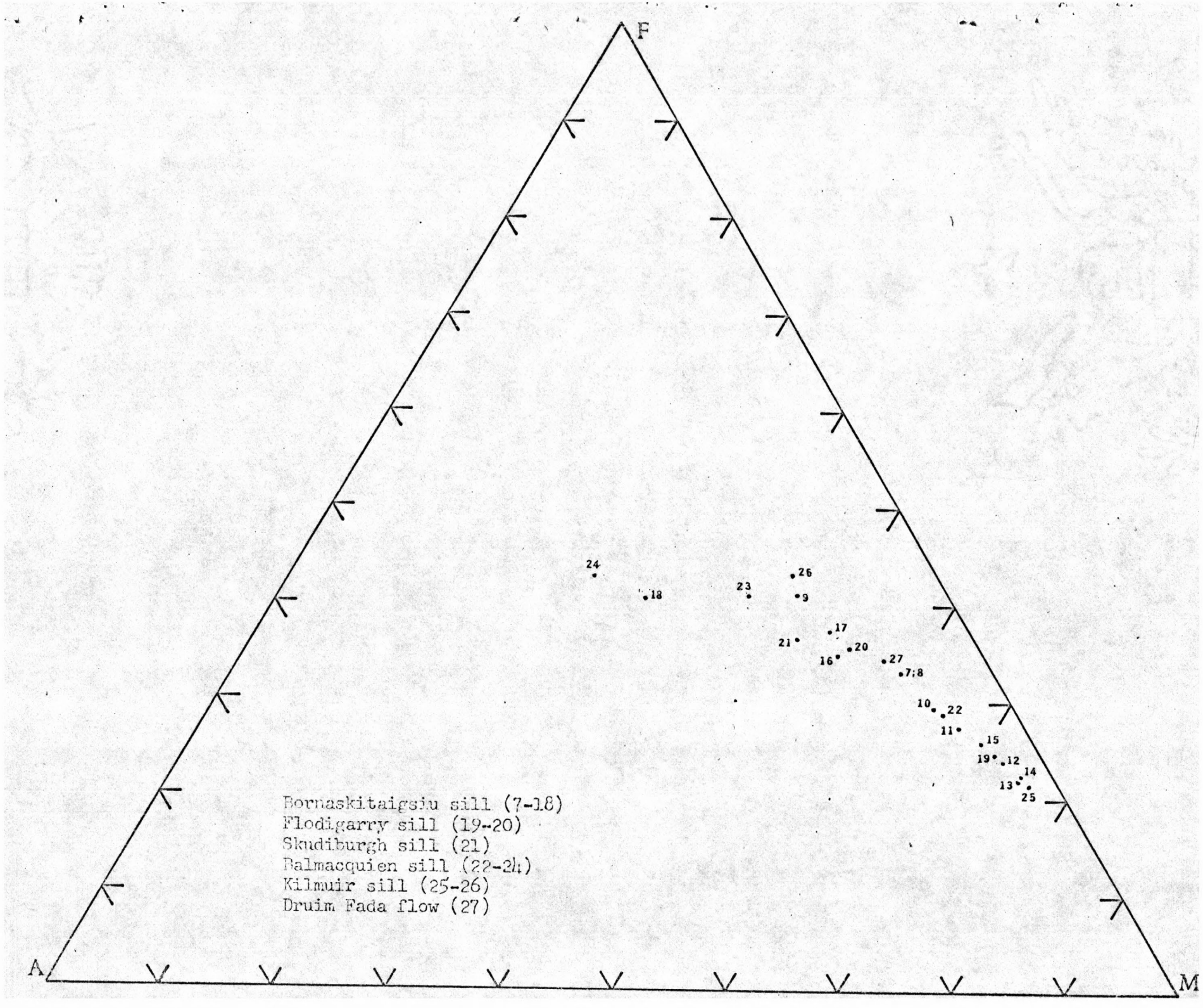
Campbell, R., and Stenhouse, A. G., 1908, The geology of Inchcolm: Geol. Soc. Edinburgh Trans., v. 9, pt. 2, p. 121-134.

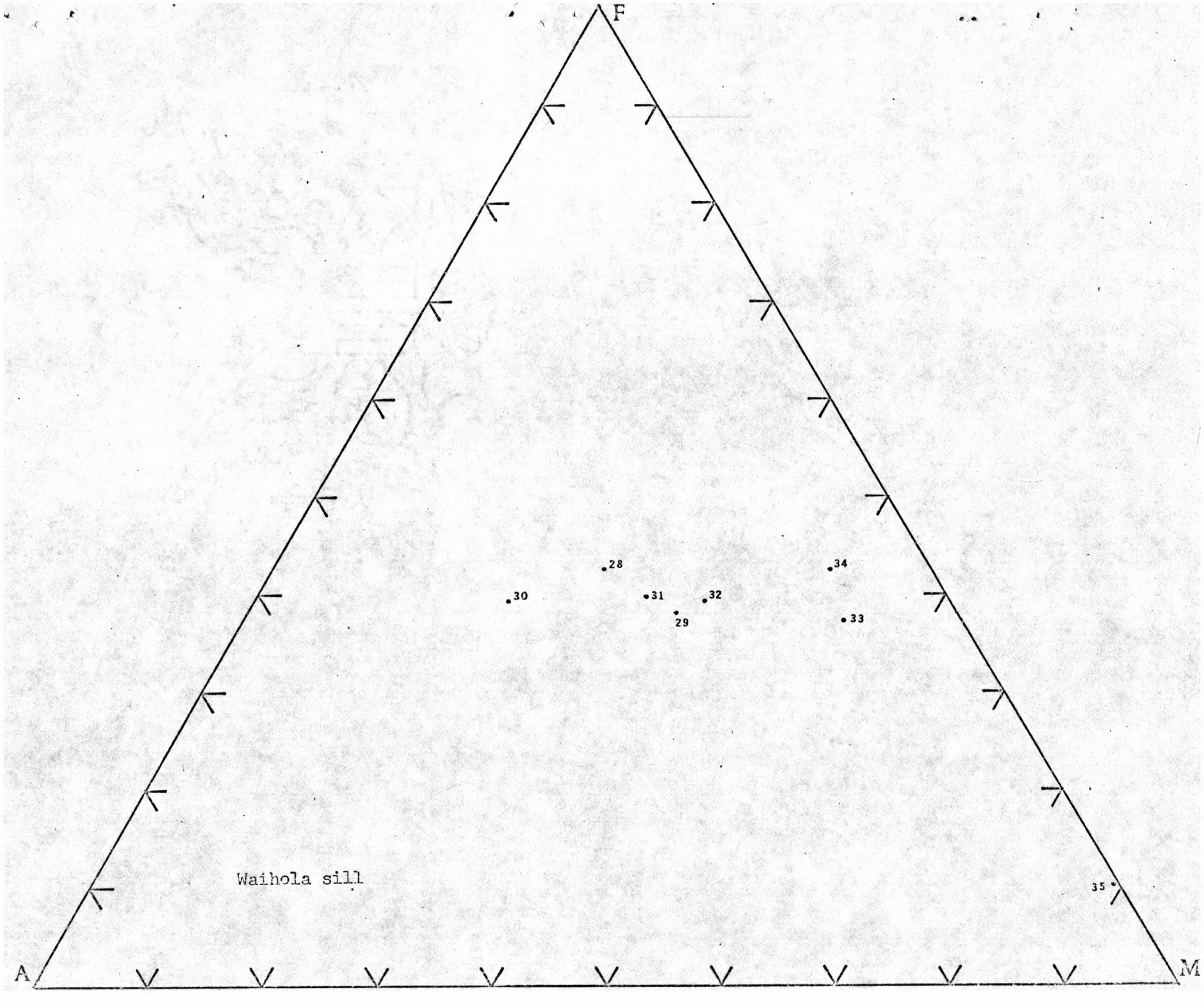
Gilluly, James, 1927, Analcite diabase and related alkaline syenite from Utah: Am. Jour. Sci., v. 14, p. 199-211.

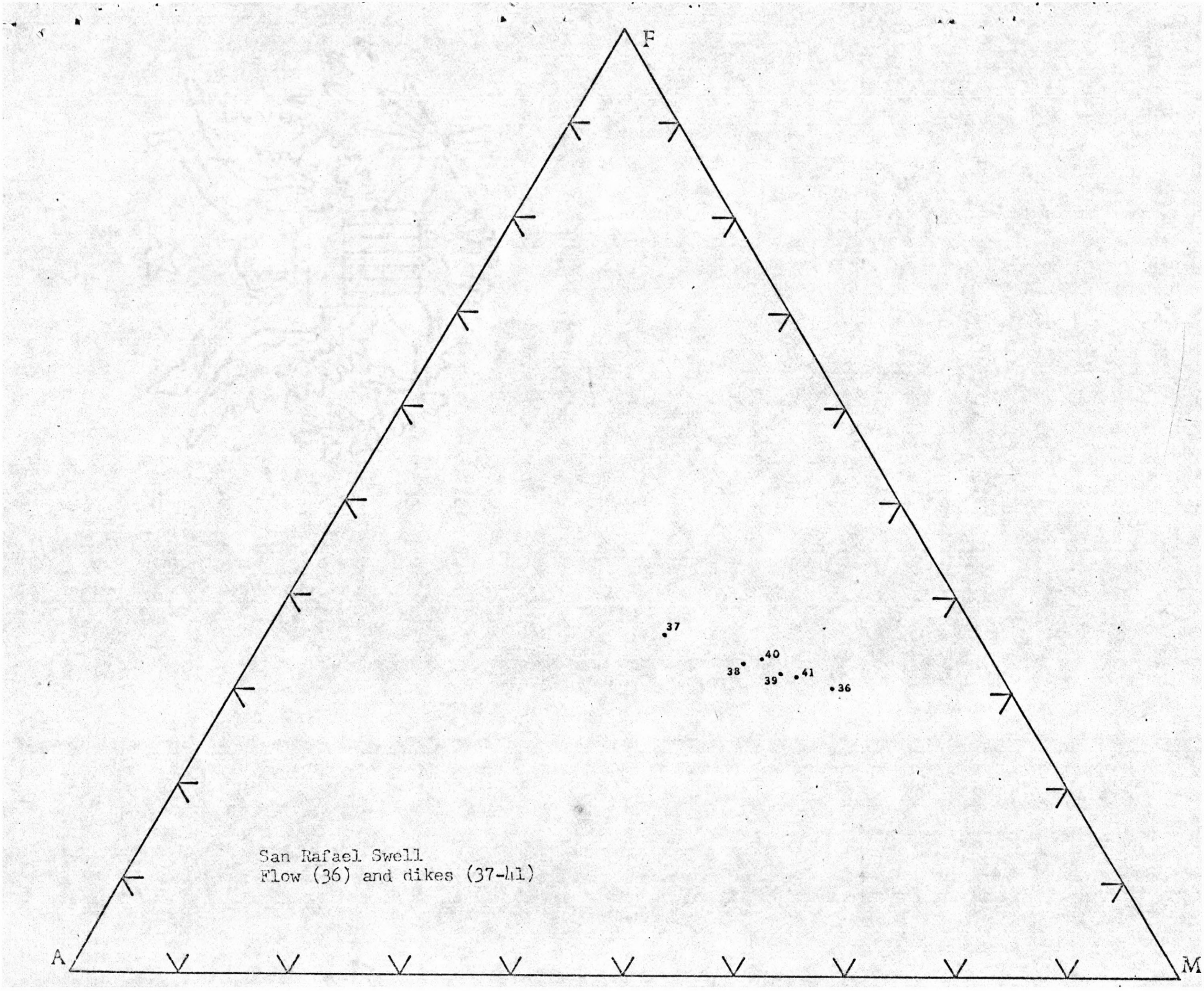
Simkin, Tom, 1965, The picritic sills of northwest Trotternish, Isle of Skye, Scotland: Unpub. Ph.D. thesis, Univ. of Princeton, 139 p.

Tyrrell, G. W., 1948, A boring through the Lugar sill: Geol. Soc. Glasgow Trans., v. 21, pt. 2, p. 157-202.

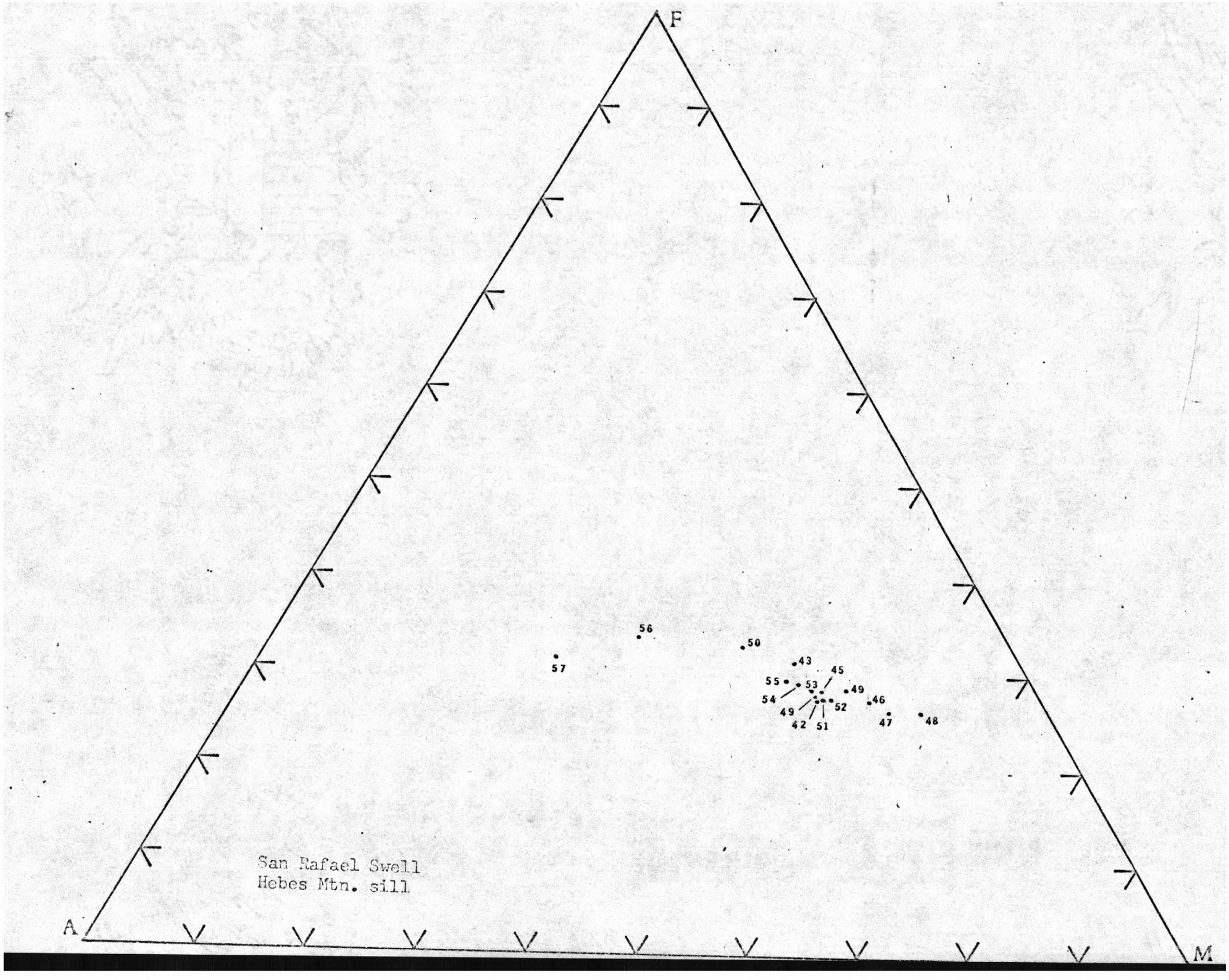

F
A
M
1
2
6
4
3
5
Lugar sill (1-3)
Inchcolm sill (4)
Coir' a' Ghreadaidh dike (5)
Coire Labain dike (6)


F
A
M
24
18
23
26
9
17
21
20
16
27
7;8
10
22
11
15
19
12
14
13
25
Bornaskitaigsiu sill (7-18)
Flodigarry sill (19-20)
Skudiburgh sill (21)
Balmacquien sill (22-24)
Kilmuir sill (25-26)
Druim Fada flow (27)


F
A
M
28
30
31
32
29
34
33
35
Waihola sill



San Rafael Swell
Flow (36) and dikes (37-41)


F
A
M
56
50
57
43
45
55
53
49
54
46
49
52
42
51
47
48
San Rafael Swell
Hebes Mtn. sill

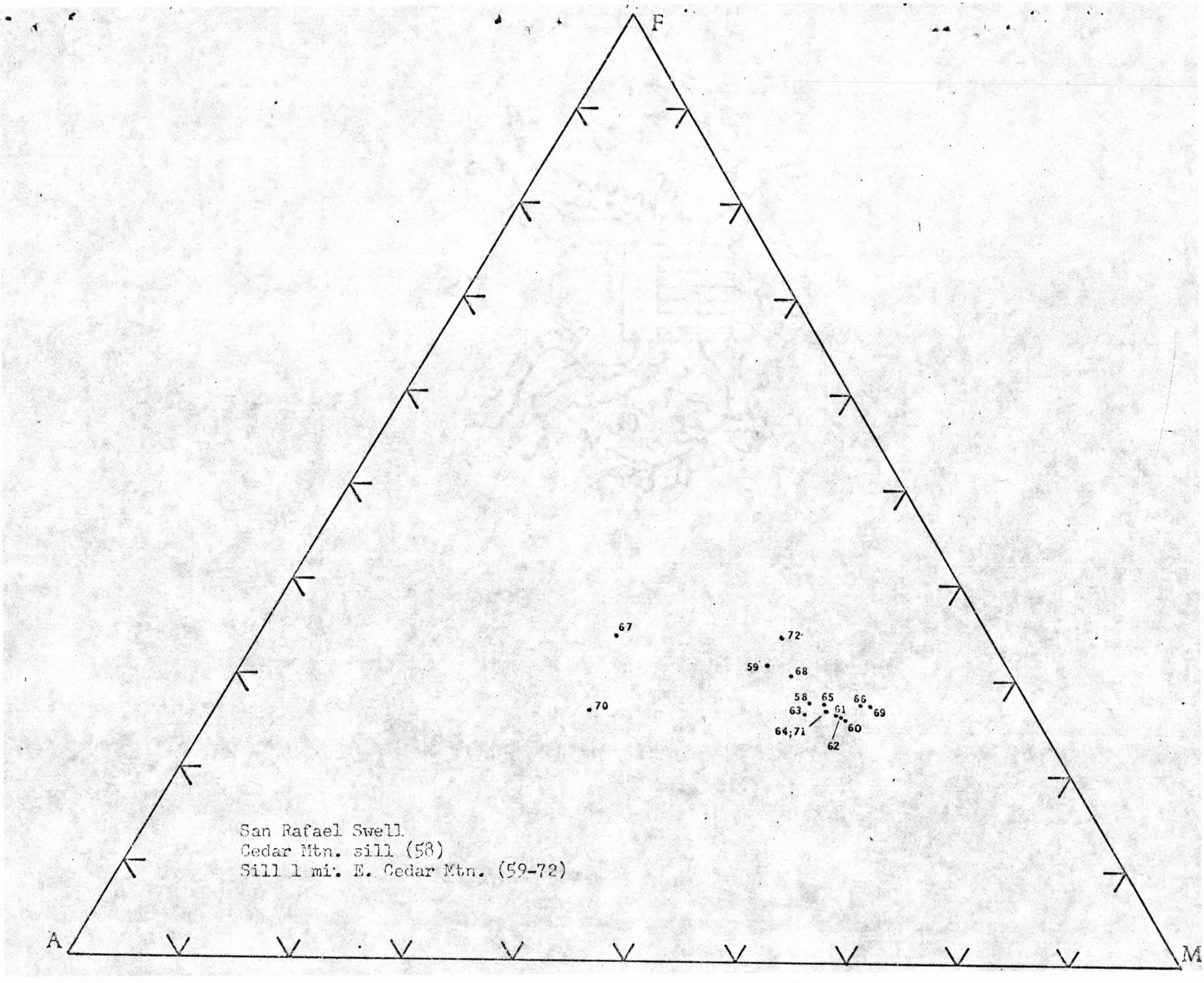

F
A
M
67
72
59
68
58
65
66
69
63
61
70
64;71
60
62
San Rafael Swell
Cedar Mtn. sill (58)
Sill 1 mi. E. Cedar Mtn. (59-72)

Table 1. CHEMICAL ANALYSES

	1	2	3	4	5	6	7	8	9	10
SiO_2	44.53	43.42	40.40	39.71	42.01	45.25	45.28	45.31	46.87	44.56
Al_2O_3	13.07	9.70	6.93	7.07	8.72	14.74	13.69	13.52	16.13	12.95
Fe_2O_3	1.79	2.40	3.15	3.64	2.62	3.19	2.82	2.87	2.88	1.49
FeO	8.55	8.33	8.95	9.19	7.22	6.98	9.56	9.52	8.28	10.76
MgO	11.91	15.63	25.60	25.38	27.63	15.06	12.26	12.34	6.88	14.76
CaO	9.98	10.52	5.27	4.48	6.14	10.81	9.36	9.27	11.52	8.93
Na_2O	2.57	2.20	.93	.56	.51	1.27	2.45	2.42	2.93	2.37
K_2O	1.91	.92	.62	.50	.08	.09	.27	.26	.33	.22
H_2O^+	2.28	3.50	5.85	6.79	3.95	1.64	1.49	1.50	1.42	1.67
H_2O-	.11	.63	.88	1.10	.28	.09	.72	.82	.58	.37
TiO_2	2.51	2.14	1.15	1.11	.41	.68	1.57	1.65	2.01	1.44
P_2O_5	.44	.32	.17	.21	.07	.08	.13	.15	.18	.12
MnO	.17	.18	.18	.19	.16	.17	.20	.20	.19	.19
CO_2	.02	.03	.04	.03	.16	.02	.04	.03	--	.03
Cl	.05	.02	.03	.02	.01	.01	.02	.01	.01	--
F	.09	.07	.04	.04	.01	.01	.01	.02	.02	.02
Total*	99.93	99.98	100.16	100.00	99.98	100.09	99.86	99.88	100.22	99.87

*Less O for F, Cl

11	12	13	14	15	16	17	18	19	20	
44.03	42.46	41.86	42.07	43.58	47.20	46.01	48.27	44.38	45.75	SiO_2
11.60	9.47	9.21	8.56	10.63	16.67	15.49	14.19	11.60	14.98	Al_2O_3
1.45	1.54	1.49	1.53	1.58	2.07	2.89	4.98	2.44	2.96	Fe_2O_3
11.41	11.75	11.75	12.11	11.30	7.38	8.44	5.58	9.54	7.36	FeO
17.48	22.41	25.17	25.48	19.25	7.89	8.42	4.55	19.33	8.45	MgO
8.01	6.34	5.10	5.30	7.23	11.84	10.61	7.16	7.11	10.96	CaO
2.22	1.76	1.50	1.31	1.88	2.75	2.86	5.04	1.59	2.46	Na_2O
.20	.17	.19	.24	.24	.36	.48	1.23	.26	.46	K_2O
1.48	2.19	1.94	1.59	2.15	1.87	1.99	3.00	1.67	1.64	H_2O^+
.31	.46	.39	.53	.57	.49	.61	1.13	.74	1.12	H_2O-
1.38	1.08	.83	.82	1.20	1.35	1.79	3.91	.88	1.45	TiO_2
.12	.10	.08	.08	.11	.10	.15	.64	.09	.14	P_2O_5
.19	.20	.19	.20	.19	.15	.18	.16	.19	.16	MnO
.04	.03	.15	.01	.04	.01	.01	.01	--	.01	CO_2
.01	--	.01	.01	--	--	--	.01	.01	--	Cl
.02	.02	.02	.01	.02	.02	.02	.06	.02	.03	F
99.94	99.97	99.87	99.85	99.96	100.14	99.94	99.89	99.84	99.92	Total*

21	22	23	24	25	26	27	28	29	30	
49.39	43.11	45.72	48.11	41.49	43.77	44.33	40.74	42.65	43.14	SiO_2
16.87	11.89	17.31	15.61	7.74	12.46	13.50	17.14	14.61	18.66	Al_2O_3
1.58	1.97	2.66	3.81	1.21	4.26	3.05	3.13	3.38	2.55	Fe_2O_3
8.30	12.13	8.73	7.43	12.94	9.02	10.47	8.44	7.18	7.30	FeO
7.24	17.56	6.37	3.87	27.65	7.47	12.25	4.35	5.67	3.07	MgO
9.94	6.28	9.06	7.38	4.78	11.65	8.42	10.93	13.18	8.37	CaO
3.13	2.47	3.93	5.82	1.23	3.12	2.69	5.44	4.60	7.30	Na_2O
.72	.25	.43	1.27	.14	.35	.48	1.65	1.82	1.47	K_2O
.59	2.16	3.10	3.51	1.32	2.92	1.39	2.53	1.20	3.64	H_2O^+
.40	.55	.80	.65	.29	.89	.59	.99	.65	.90	H_2O-
1.52	1.02	1.40	1.93	.80	3.57	2.11	2.47	2.49	1.83	TiO_2
.14	.13	.20	.35	.06	.14	.24	1.80	2.24	1.20	P_2O_5
.15	.19	.17	.17	.21	.19	.19	.18	.16	.18	MnO
.03	.02	.04	.02	.02	.15	.03	.01	.01	.04	CO_2
.01	.01	--	.01	--	--	--	.02	.04	.01	Cl
.02	.02	.03	.05	.02	.03	.04	.16	.19	.11	F
100.02	99.75	99.94	99.97	99.89	99.98	99.86	99.91	99.98	99.72	Total*

31	32	33	34	35	36	37	38	29	40	
40.22	41.66	40.88	41.02	44.53	46.2	56.2	40.9	44.6	43.6	SiO_2
17.52	15.21	12.83	12.67	3.12	14.8	16.1	14.0	15.0	14.8	Al_2O_3
3.39	3.81	3.61	5.09	1.07	4.2	2.7	3.8	4.6	4.6	Fe_2O_3
7.48	8.26	10.62	8.20	6.93	4.4	5.1	3.6	3.4	3.5	FeO
5.09	6.56	10.92	8.24	39.43	8.2	4.3	5.4	6.5	6.0	MgO
11.79	11.88	11.46	16.29	3.03	9.2	6.7	13.0	11.2	13.1	CaO
4.81	4.39	2.71	1.88	.33	1.9	3.2	2.1	1.9	1.9	Na_2O
1.84	1.67	.81	.59	.09	2.8	3.0	3.3	3.4	3.4	K_2O
1.68	1.85	1.84	.80	.38	2.1	.34	2.6	2.2	2.0	H_2O^+
1.30	1.04	.94	.67	.29	2.4	.76	2.6	2.0	1.4	H_2O-
2.52	2.37	2.42	3.72	.06	1.2	.97	1.2	.88	1.2	TiO_2
1.75	1.00	.63	.34	--	.75	.39	.48	.51	.49	P_2O_5
.17	.19	.21	.15	.12	.20	.16	.18	.18	.18	MnO
.19	.01	.03	.01	--	1.3	< .05	6.7	3.4	3.8	CO_2
.04	.02	.02	.01	.01						Cl
.16	.11	.07	.05	.01						F
99.87	99.98	99.97	99.71	100.07*	99.65	99.97	99.86	99.77	99.97	Total*

* Includes .42 Cr_2O_3 and .25 NiO

41	42	43	44	45	46	47	48	49	50	
45.4	46.2	44.4	45.7	46.2	45.5	45.4	44.0	44.6	44.3	SiO_2
14.9	14.9	15.3	15.0	14.9	14.2	13.6	13.3	14.7	15.1	Al_2O_3
4.3	5.2	5.4	3.9	2.9	3.4	3.6	3.8	4.4	4.9	Fe_2O_3
3.7	3.2	3.0	4.6	5.8	5.7	5.5	5.2	5.3	3.7	FeO
6.8	8.6	7.0	8.7	9.0	10.6	11.4	11.7	9.0	6.1	MgO
11.2	7.4	10.2	8.1	8.0	8.4	9.8	9.2	8.9	11.0	CaO
1.7	3.4	2.8	3.4	3.5	3.0	2.9	2.2	3.1	3.9	Na_2O
3.3	2.6	2.8	2.8	2.6	2.3	2.1	1.8	1.9	2.3	K_2O
2.0	2.1	2.1	1.3	.63	.75	.59	1.5	1.4	.92	H_2O^+
1.8	3.7	1.9	3.5	3.7	3.0	2.8	4.2	4.8	3.6	H_2O-
1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.4	TiO_2
.49	.79	.82	.79	.73	.79	.71	.60	.79	.73	P_2O_5
.18	.20	.20	.23	.21	.21	.20	.22	.21	.20	MnO
3.0	.20	2.5	.61	.08	.31	.19	.36	.11	1.7	CO_2
99.97	99.69	99.72	99.83	99.45	99.36	99.99	99.28	99.41	99.85	Total*

51	52	53	54	55	56	57	58	59	60	
45.9	46.2	46.3	46.2	46.2	47.8	49.4	45.4	45.4	45.4	SiO_2
15.2	14.8	14.8	15.3	16.0	17.6	17.5	14.5	15.2	13.9	Al_2O_3
3.6	4.0	4.3	4.5	4.5	3.9	3.7	4.2	6.3	4.0	Fe_2O_3
4.9	4.8	4.5	4.1	4.1	3.8	3.0	3.9	2.2	4.8	FeO
9.1	9.5	8.7	8.1	7.8	4.1	3.1	8.4	6.7	10.6	MgO
8.3	7.7	7.4	7.4	8.6	8.5	7.4	8.7	9.7	8.2	CaO
3.7	3.8	3.6	3.6	3.8	4.9	5.2	2.2	2.7	3.2	Na_2O
2.4	2.1	2.6	2.5	2.5	2.3	3.6	4.0	3.0	2.6	K_2O
.76	.84	.73	.80	.78	.46	.51	1.6	1.4	.89	H_2O^+
3.8	3.9	4.0	4.5	3.2	3.4	3.1	2.3	1.8	3.6	H_2O-
1.3	1.3	1.3	1.3	1.4	1.4	1.3	1.4	1.2	1.2	TiO_2
.67	.67	.77	.79	.86	1.1	1.2	.52	.88	.83	P_2O_5
.21	.20	.21	.21	.20	.20	.18	.21	.18	.22	MnO
.08	.05	.10	.11	.10	.42	.40	2.5	3.2	.14	CO_2
99.92	99.86	99.31	99.41	100.04	99.88	99.59	99.83	99.86	99.58	Total*

61	62	63	64	65	66	67	68	69	70	
46.0	46.0	46.2	46.7	46.1	45.7	47.4	45.5	45.4	50.6	SiO_2
14.4	14.1	15.3	15.0	15.3	13.5	17.5	14.9	13.9	18.5	Al_2O_3
4.3	3.7	3.6	3.4	3.7	4.2	4.0	4.7	4.2	3.1	Fe_2O_3
4.4	5.1	4.7	5.1	4.9	4.4	3.5	3.9	4.7	2.6	FeO
10.1	10.4	9.2	9.6	9.3	9.8	3.8	7.6	10.4	4.2	MgO
7.9	8.2	7.5	7.8	8.5	9.3	8.4	9.9	9.7	5.2	CaO
3.2	3.5	3.6	3.0	2.9	2.4	3.7	3.0	2.4	4.5	Na_2O
2.7	2.4	3.0	2.9	2.9	2.4	3.8	2.6	2.5	4.6	K_2O
1.2	.68	.70	.67	.63	1.2	.67	1.1	.76	.74	H_2O^+
3.4	3.5	3.7	2.9	3.1	4.1	3.2	3.6	3.0	3.0	H_2O-
1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.3	1.3	1.0	TiO_2
.80	.86	.81	.79	.88	.80	1.3	1.1	.90	.64	P_2O_5
.21	.21	.21	.21	.21	.21	.19	.19	.21	.18	MnO
.14	.12	.15	.10	.11	.30	.65	.34	.08	.55	CO_2
99.95	99.97	99.87	99.37	99.83	99.51	99.31	99.73	99.45	99.41	Total*

71	72	
45.6	43.7	SiO_2
14.7	14.1	Al_2O_3
4.3	5.4	Fe_2O_3
4.3	3.0	FeO
9.8	6.2	MgO
8.3	14.0	CaO
3.5	2.2	Na_2O
2.6	2.5	K_2O
.75	1.2	H_2O^+
3.7	1.6	H_2O-
1.2	1.2	TiO_2
.83	.83	P_2O_5
.21	.21	MnO
.08	3.8	CO_2
99.87	99.94	Total*

Table 2. C.I.P.W. Norms

		1	2	3	4	5	6	7	8	9	10
Q											
OR		11.29	5.44	3.66	2.95	.47	.53	1.60	1.54	1.95	1.30
AB		9.08	9.11	7.63	4.59	4.24	10.66	20.61	20.43	24.46	16.97
AN		18.69	13.95	13.00	15.38	21.31	34.26	25.67	25.33	29.86	24.08
LC											
NE		6.66	5.07							.11	1.69
HL		.08	.03	.05	.03	.02	.02	.03	.02	.02	
DI	WO	11.41	14.84	4.80	2.11	3.19	7.78	8.22	8.12	10.82	8.02
	EN	7.78	10.71	3.62	1.59	2.46	5.65	5.37	5.33	6.50	5.16
	FS	2.73	2.78	.70	.31	.38	1.41	2.29	2.21	3.74	2.32
HY	EN			4.48	13.44	12.10	9.43	1.40	2.46		
	FS			.86	2.63	1.90	2.36	.60	1.02		
OL	FO	15.34	19.77	38.92	33.75	37.96	15.70	16.68	16.10	7.42	22.17
	FA	5.92	5.66	8.25	7.29	6.51	4.32	7.83	7.37	4.71	10.97
MT		2.60	3.48	4.56	5.28	3.80	4.62	4.09	4.17	4.17	2.16
HM											
IL		4.77	4.06	2.18	2.11	.78	1.29	2.99	3.14	3.81	2.74
AP		1.04	.76	.40	.50	.17	.19	.31	.36	.43	.29
FR		.15	.11	.07	.06	.01	.01	.01	.03	.03	.03
CC		.05	.07	.09	.07	.36	.05	.09	.07		.07

11	12	13	14	15	16	17	18	19	20	
										Q
1.18	1.01	1.12	1.42	1.42	2.12	2.84	7.27	1.54	2.72	OR
15.51	12.29	11.95	10.84	15.72	22.08	22.39	41.51	13.40	20.83	AB
21.15	17.44	17.90	16.83	19.86	32.03	28.02	12.51	23.82	28.49	AN
										LC
1.74	1.41	.37	.10	.11	.63	.99	.59			NE
.02		.02	.02				.02	.02		HL
7.29	5.45	2.44	3.70	6.24	10.77	9.81	7.75	4.51	10.34	DI WO
4.81	3.75	1.71	2.58	4.20	6.73	6.14	6.70	3.17	6.75	DI EN
1.97	1.27	.53	.81	1.56	3.39	3.07		.95	2.88	DI FS
								7.46	7.64	HY EN
								2.23	3.26	HY FS
27.16	36.49	42.78	42.73	30.66	9.03	10.40	3.25	26.34	4.68	OL FO
12.26	13.61	14.54	14.83	12.56	5.01	5.73		8.68	2.20	OL FA
2.10	2.23	2.16	2.22	2.92	3.00	4.19	7.18	3.54	4.30	MT
							.03			HM
2.62	2.05	1.58	1.56	2.28	2.56	3.40	7.43	1.67	2.76	IL
.28	.24	.19	.19	.26	.24	.36	1.52	.21	.33	AP
.03	.03	.03	.01	.03	.03	.03	.07	.03	.05	FR
.09	.07	.34	.02	.09	.02	.02	.02		.02	CC

21	22	23	24	25	26	27	28	29	30	
										Q
4.25	1.48	2.54	7.51	.83	2.07	2.84	9.75	10.75	8.71	OR
26.40	17.33	26.09	32.71	8.47	19.63	20.98	6.85	7.40	15.17	AB
29.89	20.71	28.34	12.76	15.20	18.96	23.37	17.56	13.99	13.88	AN
										LC
	1.92	3.89	8.92	1.05	3.67	.98	21.15	16.91	25.28	NE
.02	.02		.02				.03	.07	.02	HL
7.60	3.94	6.23	8.85	3.30	15.37	6.88	10.13	15.03	8.02	DI WO
4.40	2.55	3.43	4.77	2.29	10.16	4.43	5.33	9.59	3.73	DI EN
2.86	1.13	2.56	3.78	.73	4.10	2.00	4.51	4.47	4.21	DI FS
3.59										HY EN
2.33										HY FS
7.03	28.93	8.72	3.41	46.70	5.92	18.30	3.86	3.17	2.75	OL FO
5.03	14.08	7.17	2.97	16.32	2.63	9.10	3.60	1.63	3.42	OL FA
2.29	2.86	3.86	5.53	1.76	6.18	4.43	4.54	4.90	3.71	MT
										HM
2.89	1.94	2.66	3.67	1.52	6.78	4.01	4.69	4.73	3.48	IL
.33	.31	.47	.83	.14	.33	.57	4.26	5.30	2.85	AP
.03	.03	.04	.07	.04	.05	.06	.16	.19	.12	FR
.07	.05	.09	.05	.05	.34	.07	.02	.02	.09	CC

31	32	33	34	35	36	37	38	39	40		
						6.0				Q	
10.88	9.87	4.79	2.85	.53	16.6	17.7	19.5	20.1	20.1	OR	
3.47	2.94	5.11		2.72	16.1	27.1	17.8	16.1	16.1	AB	
20.95	16.94	20.53	24.50	6.80	23.7	20.7	19.0	22.4	21.8	AN	
			.50							LC	
20.02	18.45	9.58	8.60							NE	
.07	.03	.03	.02	.02						HL	
10.16	14.58	13.24	22.54	3.40	3.7	4.0		3.5	6.7	DI	WO
6.16	9.04	8.41	16.44	2.69	2.9	2.5		2.9	5.5	DI	EN
3.45	4.68	3.99	4.00	.33	.4	1.3		.2	.4	DI	FS
				14.08	13.7	8.2	10.3	9.5	.8	HY	EN
				1.73	2.0	4.5	1.4	.8	.1	HY	FS
4.57	5.11	13.17	2.90	57.02	2.7		2.2	2.7	6.1	OL	FO
2.82	2.92	6.89	.78	7.71	.4		.3	.2	.4	OL	FA
4.92	5.52	5.23	7.40	1.55	6.1	3.9	5.5	6.7	6.7	MT	
										HM	
4.79	4.50	4.60	7.08	.11	2.3	1.8	2.3	1.7	2.3	IL	
4.15	2.37	1.49	.81		1.8	.9	1.1	1.2	1.2	AP	
.17	.13	.09	.07	.02						FR	
.43	.02	.07	.02		3.0	.1	15.3	7.8	8.6	CC	

↓
.62 CM

41	42	43	44	45	46	47	48	49	50	
										Q
19.5	15.4	16.6	16.6	15.4	13.7	12.4	10.7	11.3	13.6	OR
14.4	25.2	23.8	19.9	18.1	18.5	13.5	17.5	20.6	19.1	AB
23.3	17.8	21.0	17.4	17.4	18.6	17.9	21.3	20.7	16.9	AN
										LC
	2.0		4.8	6.4	3.8	6.0	.7	3.1	7.6	NE
										HL
4.2	5.3	3.6	5.8	7.2	6.8	10.4	7.7	7.4	9.3	DI WO
3.4	4.6	3.1	4.4	5.1	5.0	7.8	5.9	5.9	7.7	DI EN
.3			.7	1.5	1.1	1.5	1.0	.7	.4	DI FS
12.8		1.3								HY EN
1.2										HY FS
.5	11.9	9.2	12.1	12.2	15.1	14.4	16.4	11.7	5.3	OL FO
.1			2.3	4.0	3.8	3.1	3.0	1.5	.3	OL FA
6.2	7.5	6.6	5.7	4.2	5.0	5.2	5.6	6.4	7.1	MT
		.9								HM
2.3	2.3	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.7	IL
1.2	1.9	1.9	1.9	1.7	1.9	1.7	1.4	1.9	1.7	AP
										FR
6.8	.5	5.7	1.4	.2	.7	.4	.8	.3	3.9	CC

51	52	53	54	55	56	57	58	59	60	
										Q
14.2	12.4	15.5	14.9	14.8	13.6	21.4	23.7	17.8	15.4	OR
17.7	22.2	22.8	24.6	20.0	29.4	28.6	18.6	22.9	16.7	AB
17.8	17.1	16.7	18.3	19.2	19.2	13.8	17.9	20.5	16.0	AN
										LC
7.4	5.4	4.3	3.3	6.6	6.5	8.4			5.7	NE
										HL
7.7	6.9	6.1	5.3	7.2	5.5	5.3	2.5	.7	7.8	DI WO
5.8	5.3	4.8	4.3	5.8	4.2	4.3	2.1	.6	6.0	DI EN
1.1	.8	.7	.4	.6	.7	.4	.2		.9	DI FS
							3.0	12.8		HY EN
							.3			HY FS
11.8	12.9	11.9	11.2	9.6	4.2	2.4	11.2	2.3	14.4	OL FO
2.4	2.2	1.8	1.3	1.0	.8	.2	1.0		2.4	OL FA
5.2	5.8	6.3	6.6	6.5	5.7	5.4	6.1	4.2	5.8	MT
								3.4		HM
2.5	2.5	2.5	2.5	2.7	2.7	2.5	2.7	2.3	2.3	IL
1.6	1.6	1.8	1.9	2.0	2.6	2.9	1.2	2.1	2.0	AP
										FR
.2	.1	.2	.3	.2	1.0	.9	5.7	7.3	.3	CC

61	62	63	64	65	66	67	68	69	70	
										Q
16.0	14.2	17.8	17.2	17.2	14.3	22.6	15.4	14.9	27.3	OR
19.0	18.3	17.7	19.3	16.9	20.1	24.0	19.1	15.4	29.1	AB
17.0	15.7	16.8	19.0	20.2	19.1	20.1	19.6	19.9	16.8	AN
										LC
4.4	6.1	6.9	3.4	4.1	.1	4.1	3.4	2.7	5.0	NE
										HL
6.7	7.8	6.0	5.9	6.5	8.4	3.8	8.5	9.2	.6	DI WO
5.3	5.9	4.5	4.4	4.9	6.6	3.0	6.9	7.2	.5	DI EN
.6	1.1	.8	.9	.9	.8	.5	.5	1.0		DI FS
										HY EN
										HY FS
13.9	14.0	12.9	13.8	12.8	12.5	4.6	8.5	13.2	7.0	OL FO
1.8	2.8	2.5	3.2	2.5	1.7	.8	.7	1.9	.7	OL FA
6.2	5.4	5.2	5.0	5.4	6.1	5.8	6.8	6.1	4.5	MT
										HM
2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.5	2.5	1.9	IL
1.9	2.0	1.9	1.9	2.1	1.9	3.1	2.6	2.1	1.5	AP
										FR
.3	.3	.3	.2	.3	.7	1.5	.8	.2	1.3	CC

71	72		
		Q	
15.4	14.8	OR	
16.8	18.6	AB	
16.7	21.2	AN	
		LC	
6.9		NE	
		HL	
7.7	7.9	DI	WO
6.2	6.8	DI	EN
.7		DI	FS
	4.9	HY	EN
		HY	FS
12.8	2.6	OL	FO
1.6		OL	FA
6.2	6.9	MT	
	.7	HM	
2.3	2.3	IL	
2.0	2.0	AP	
		FR	
.2	8.6	CC	