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Chemical analyses and norms of 81 volcanic rocks from part of the Mogollon-Datil volcanic field, southwestern New Mexico

By

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The analyzed rocks (tables 1-3) were collected during mineral resource studies of the Gila Wilderness study area (Ratté and Gaskill, 1975) and subsequent geologic mapping, which is continuing in the Mogollon-Datil volcanic field. For this preliminary release of data, the rocks are divided into three groups:

Group I - Rocks of the early andesitic complexes that largely predate major ash-flow eruptions and related cauldron subsidence in the area considered here. These rocks range generally from 30 to 35 million years in age.

Group II - Quartz latitic or dacitic to rhyolitic ash-flow tuffs and associated intrusive and extrusive rocks. These rocks range mainly from 25 to 30 million years in age; they overlap in time with the early andesitic complexes on the one end and with the post ash-flow tuff andesites and associated rocks on the other.

Group III - Post ash-flow tuff andesites and associated rocks. Most of these rocks are between 20 and 25 million years in age, but rocks as young as 5-6 million years are included in this group.

For general characterization and classification, the rocks have been plotted on an alkali-silica diagram (fig. 1), an AFM diagram (fig. 2), and a normative-color-index vs. normative-plagioclase-composition diagram (fig. 3). The alkali-silica plot shows most of the rocks to be in the subalkaline field. Three ash-flow tuff analyses fall in the alkaline field, but are probably beyond the main discriminating part of the divider. Otherwise, a number of the andesitic rocks plot in the alkaline field close to the dividing line, but only two analyses, nos. 80 and 81, are clearly separated from the others. These analyses represent alkali olivine basalt flows interlayered in Gila Conglomerate.

The AFM diagram (fig. 2) shows nearly all of the subalkaline rocks to be in the calc-alkaline series as opposed to the tholeiitic series, and there is no clear separation of rocks of tholeiitic affinity.

Rock names applied to the analyzed rocks on the location and correlation chart were derived from figure 3.

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Analytical methods and analysts

Analytical methods:

Code

1. Two-solution method (Shapiro and Brannock, 1962). Supplemented by atomic absorption.
2. Single-solution method (Shapiro, 1975)
3. Single-solution method (Shapiro, 1967)

Analysts:

Artis, L.; Botts, S., Budinsky, J.; Chloe, G.; Elmore, P.; Glenn, J.; Kelsey, J.; Moore, R.; and Smith, H.

Table 1.--Rapid rock chemical analyses, adjusted oxides and CIPW norms for 81 volcanic rocks from part of Mogollon-Datil volcanic field, southwestern New Mexico.

EARLY ANDESITIC ROCKS

SYMBOL	1	2	3	4	5	6	7	8	9	10	11	12
SIO2	56.50	62.90	61.00	63.70	69.30	63.80	60.90	63.20	66.20	65.30	55.40	71.40
AL203	17.50	16.90	16.40	18.20	16.20	16.80	16.90	15.50	14.70	15.50	16.50	14.70
FE203	5.10	3.30	3.40	3.90	1.50	3.30	3.90	3.00	2.30	3.90	6.00	1.40
FEO	1.40	1.50	2.60	0.48	0.24	0.92	0.80	1.70	1.10	0.40	2.70	0.10
MGO	2.10	1.70	3.00	0.49	0.80	0.78	2.00	2.20	1.60	1.80	4.90	0.27
CAO	5.90	4.00	5.30	3.00	1.30	2.70	1.00	4.00	2.70	1.20	6.60	0.14
NA2O	4.40	3.80	3.80	4.10	4.40	4.30	4.40	4.40	3.10	3.30	3.50	3.20
K2O	2.90	2.40	2.30	3.20	3.60	3.80	4.20	2.20	4.20	5.30	1.70	5.50
H2O	1.50	1.82	2.05	1.80	1.90	2.14	3.20	2.49	3.26	2.25	1.00	2.41
TIO2	1.00	0.56	0.87	0.54	0.41	0.82	0.73	0.92	0.68	0.85	1.20	0.54
P2O5	0.42	0.21	0.23	0.34	0.16	0.28	0.23	0.22	0.16	0.18	0.32	0.08
MNO	0.08	0.08	0.09	0.08	0.02	0.06	0.08	0.07	0.05	0.06	0.11	0.13
CO2	0.35	0.04	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05
CL	----	.035	----	----	0.01	0.01	----	0.01	0.04	----	0.09	----
F	0.06	0.02	0.02	0.05	0.01	0.08	0.09	0.04	0.08	0.06	0.04	0.06
TOTAL(-O)	99.18	99.22	101.06	99.91	99.89	99.80	98.44	99.98	100.18	100.12	100.08	99.95
ADJUSTED OXIDES - H2O FREE												
SIO2	57.84	64.58	61.61	64.93	70.72	65.33	63.94	64.83	68.31	66.72	55.91	73.20
AL203	17.91	17.35	16.56	18.55	16.53	17.20	17.74	15.90	15.17	15.84	16.65	15.07
FE203	5.22	3.39	3.43	3.98	1.53	3.38	4.09	3.08	2.37	3.98	6.06	1.44
FEO	1.43	1.54	2.63	0.49	0.24	0.94	0.84	1.74	1.13	0.41	2.73	0.10
MGO	2.15	1.75	3.03	0.50	0.82	0.80	2.10	2.26	1.65	1.84	4.95	0.28
CAO	6.04	4.11	5.35	3.06	1.33	2.76	1.05	4.10	2.79	1.23	6.66	0.14
NA2O	4.50	3.90	3.84	4.18	4.49	4.40	4.62	4.51	3.20	3.37	3.53	3.28
K2O	2.97	2.46	2.32	3.26	3.67	3.89	4.41	2.26	4.33	5.42	1.72	5.64
TIO2	1.02	0.57	0.88	0.55	0.42	0.84	0.77	0.94	0.70	0.87	1.21	0.55
P2O5	0.43	0.22	0.23	0.35	0.16	0.29	0.24	0.23	0.17	0.18	0.32	0.08
MNO	0.09	0.08	0.09	0.08	0.02	0.06	0.08	0.07	0.05	0.06	0.11	0.13
CO2	0.36	0.04	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05
CL					0.01	0.01		0.01	0.04		0.09	
F	0.06	0.02	0.02	0.05	0.01	0.08	0.09	0.04	0.08	0.06	0.04	0.06
NORMATIVE MINERALS - H2O FREE												
Q	7.438	21.779	15.607	22.021	27.135	18.891	15.870	19.090	25.717	21.815	9.939	32.195
C		1.414		3.588	3.281	1.692	4.358		0.906	2.879		3.570
OR	17.543	14.561	13.727	19.274	21.709	22.992	26.059	13.335	25.608	31.999	10.139	33.336
AB	38.114	33.032	32.476	35.362	37.918	37.180	39.091	38.114	26.760	28.530	29.218	27.759
AN	19.896	18.696	21.108	12.437	5.192	11.106	2.765	16.498	11.920	4.229	24.872	
HL					0.017	0.017		0.017	0.068		0.150	
WO	2.015		1.615					0.795			2.337	
EN	5.354	4.347	7.546	1.244	2.033	1.989	5.230	5.620	4.112	4.580	12.317	0.572
FS			0.703									
MT	1.919	5.565	4.979	0.248		0.803	0.760	3.119	1.793		5.635	
HM	3.897	0.929		3.804	1.531	2.825	3.571	0.926	1.137	3.985	2.169	1.435
IL	1.944	1.092	1.669	1.045	0.561	1.595	1.456	1.792	1.333	0.994	2.300	0.502
RU					0.123					0.345		0.289
AP	1.018	0.511	0.550	0.821	0.387	0.679	0.572	0.535	0.391	0.436	0.765	0.194
FR	0.047	0.003		0.041		0.116	0.150	0.043	0.139	0.092	0.024	0.049
CC	0.815	0.093	0.023	0.116	0.116	0.116	0.119	0.117	0.117	0.116	0.138	
MG												0.096
TOTAL	100.001	100.001	100.001	100.001	100.003	100.001	100.001	100.001	100.001	100.001	100.002	99.984
SALIC	82.991	89.461	82.917	92.682	95.252	91.878	88.143	87.054	90.979	89.452	74.318	96.844
FEMIC	17.010	10.540	17.085	7.319	4.751	8.123	11.857	12.947	9.021	10.548	25.684	3.141

EARLY ANDESITIC ROCKS

SYMBOL	13 *	14 *	15 *	16 *	17 *
SIO2	63.70	58.60	62.70	60.60	69.40
AL203	15.50	16.00	14.90	15.80	13.00
FE203	4.90	5.00	3.40	3.70	0.73
FEO	0.24	2.00	2.00	2.20	0.88
MGO	1.20	3.60	2.70	2.80	0.68
CAO	3.30	5.20	4.40	4.50	2.10
NA2O	3.50	3.50	3.20	3.20	3.90
K2O	4.10	3.00	3.50	3.60	2.40
H2O	2.50	1.40	1.92	2.50	6.60
TIO2	0.76	0.94	0.76	0.83	0.24
P2O5	0.19	0.29	0.22	0.20	0.06
MNO	0.02	0.12	0.08	0.09	0.04
CO2	0.05	0.28	0.08	0.05	0.05
CL	0.01	0.01	0.05		
F	0.11	0.07	0.08	0.09	0.03
TOTAL(-O)	100.03	99.98	99.94	100.12	100.10
ADJUSTED OXIDES - H2O FREE					
SIO2	65.31	59.45	63.96	62.08	74.23
AL203	15.89	16.23	15.20	16.18	13.90
FE203	5.02	5.07	3.47	3.79	0.78
FEO	0.25	2.03	2.04	2.25	0.94
MGO	1.23	3.65	2.75	2.87	0.73
CAO	3.38	5.27	4.49	4.61	2.25
NA2O	3.59	3.55	3.26	3.28	4.17
K2O	4.20	3.04	3.57	3.69	2.57
TIO2	0.78	0.95	0.78	0.85	0.26
P2O5	0.19	0.29	0.22	0.20	0.06
MNO	0.02	0.12	0.08	0.09	0.04
CO2	0.05	0.28	0.08	0.05	0.05
CL	0.01	0.01	0.05		
F	0.11	0.07	0.08	0.09	0.03
NORMATIVE MINERALS - H2O FREE					
Q	20.311	12.787	19.623	16.151	34.318
C	0.143				0.528
OR	24.841	17.983	21.099	21.792	15.169
AB	30.290	29.968	27.246	27.737	35.296
AN	14.490	19.402	16.477	18.557	10.192
HL	0.017	0.017	0.084		
WO		1.137	1.402	0.880	
EN	3.064	9.095	6.860	7.143	1.811
FS					0.739
MT		4.172	4.595	5.100	1.132
HM	5.024	2.194	0.299	0.273	
IL	0.564	1.811	1.472	1.615	0.488
RU	0.482				
AP	0.461	0.697	0.532	0.485	0.152
FR	0.196	0.092	0.127	0.152	0.054
CC	0.117	0.644	0.186	0.116	0.122
MG					
TOTAL	100.000	100.002	100.001	100.001	100.000
SALIC	90.092	80.157	84.529	84.237	95.503
FEMIC	9.908	19.844	15.473	15.764	4.498

ASH-FLOW TUFFS AND ASSOCIATED ROCKS

SYMBOL	18 *	19 *	20 *	21 *	22 *	23 *	24 *	25 *	26 *	27 *	28 *	29 *
SIO2	64.20	73.80	63.50	75.80	74.80	76.00	78.70	71.40	69.80	72.90	55.90	63.30
AL2O3	16.80	13.30	16.70	12.70	12.70	12.50	10.60	14.70	14.90	13.50	17.30	14.60
FE2O3	3.90	1.30	2.40	0.48	1.60	1.00	0.76	1.30	2.00	1.90	4.30	4.80
FEO	0.24	0.04	1.60	0.84		0.44	0.04	0.36	0.32	0.08	2.10	0.24
MGO	1.30	0.45	1.60	0.24	0.32	0.10		0.27	0.39	0.36	4.90	0.84
CAO	2.80	0.44	3.20	0.44	0.39	0.34	0.42	0.98	1.90	1.20	7.50	2.80
NA2O	4.90	2.40	4.60	3.00	2.90	3.30	1.70	4.50	4.00	3.60	3.20	4.50
K2O	2.80	5.80	3.70	5.10	4.50	5.10	5.90	5.10	4.80	4.60	1.80	3.60
H2O	1.00	1.50	1.30	1.10	1.30	0.93	0.90	0.85	1.10	0.85	1.50	1.89
TIO2	0.74	0.21	0.72	0.08		0.11		0.37	0.43	0.37	0.84	0.81
P2O5	0.20	0.08	0.17		0.13		0.08	0.07	0.18	0.10	0.22	0.30
MNO	0.04	0.02	0.09	0.13		0.10		0.06	0.04	0.04	0.10	0.13
CO2	0.05	0.06	0.36	0.05	0.07	0.05	0.02	0.05	0.05	0.01	0.05	0.12
CL												
F	0.07	0.02	0.03	0.03	0.03	0.02	0.01	0.08	0.03	0.02	0.08	0.07
TOTAL(-O)	99.01	99.41	99.96	99.98	98.73	99.98	99.13	100.06	99.93	99.52	99.76	99.97
ADJUSTED OXIDES - H2O FREE												
SIO2	65.50	75.37	64.36	76.66	76.78	76.73	80.12	71.97	70.63	73.88	56.89	64.54
AL2O3	17.14	13.58	16.93	12.84	13.04	12.62	10.79	14.82	15.08	13.68	17.61	16.92
FE2O3	3.98	1.33	2.43	0.49	1.64	1.01	0.77	1.31	2.02	1.93	4.38	4.89
FEO	0.24	0.04	1.62	0.85		0.44	0.04	0.36	0.32	0.08	2.14	0.24
MGO	1.33	0.46	1.62	0.24	0.33	0.10		0.27	0.39	0.36	4.99	0.86
CAO	2.86	0.45	3.24	0.44	0.40	0.34	0.43	0.99	1.92	1.22	7.63	2.85
NA2O	5.00	2.45	4.66	3.03	2.98	3.33	1.73	4.54	4.05	3.65	3.26	4.59
K2O	2.86	5.92	3.75	5.16	4.62	5.15	6.01	5.14	4.86	4.66	1.83	3.67
TIO2	0.76	0.21	0.73	0.08		0.11		0.37	0.44	0.37	0.85	0.83
P2O5	0.20	0.08	0.17		0.13		0.08	0.07	0.18	0.10	0.22	0.31
MNO	0.04	0.02	0.09	0.13		0.10		0.06	0.04	0.04	0.10	0.13
CO2	0.05	0.06	0.36	0.05	0.07	0.05	0.02	0.05	0.05	0.01	0.05	0.12
CL												
F	0.07	0.02	0.03	0.03	0.03	0.02	0.01	0.08	0.03	0.02	0.08	0.07
NORMATIVE MINERALS - H2O FREE												
Q	18.275	37.238	15.054	37.614	41.071	36.961	46.446	23.963	24.487	32.018	9.759	17.749
C	1.380	2.696	0.599	1.660	2.948	1.113	0.916	0.480	0.257	0.719		1.348
OR	16.882	35.005	22.162	30.429	27.294	30.426	35.494	30.378	28.701	27.549	10.825	21.690
AB	42.304	20.741	39.454	25.673	25.187	28.191	14.645	38.382	34.248	30.872	27.558	38.823
AN	12.127	1.212	12.549	1.666	0.522	1.236	1.439	3.577	7.925	5.225	28.013	11.069
HL												
WO											3.182	
EN	3.303	1.145	4.039	0.605	0.818	0.251		0.678	0.983	0.909	12.420	2.133
FS				1.270								
MT			3.409	0.704		1.439	0.131	0.286			4.742	
HM	3.979	1.328	0.081		1.642	0.017	0.683	1.113	2.024	1.926	1.105	4.894
IL	0.604	0.130	1.386	0.154		0.211		0.708	0.770	0.258	1.624	0.900
TN												
RU	0.437	0.146							0.029	0.239		0.404
AP	0.483	0.194	0.408		0.316		0.193	0.167	0.431	0.240	0.530	0.724
FR	0.109	0.027	0.031	0.062	0.039	0.041	0.006	0.153	0.029	0.023	0.126	0.091
CC	0.116	0.139	0.830	0.115	0.163	0.115	0.046	0.115	0.115	0.023	0.116	0.278
NG												
TOTAL	100.000	100.000	100.001	100.002	100.000	100.001	100.000	100.001	100.000	100.000	100.001	100.002
SALIC	90.968	96.892	89.817	97.092	97.021	97.926	98.940	96.781	95.619	96.383	76.155	90.677

FEMIC	9.032	3.108	10.185	2.909	2.979	2.075	1.060	3.220	4.382	3.618	23.846	9.325

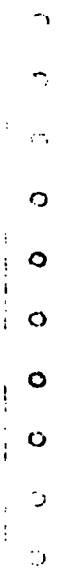
SYMBOL	30 *	31 *	32 *	33 *	34 *	35 *	36 *	37 *	38 *	39 *	40 *	41 *
SIO2	74.90	76.50	76.10	75.70	75.50	65.00	68.70	64.30	66.30	75.20	71.80	71.90
AL203	13.00	12.10	11.70	12.90	12.60	17.10	14.70	17.20	16.70	12.70	13.80	13.60
FE203	1.00	0.74	1.30	0.90	0.87	2.80	2.20	2.60	2.10	1.00	2.00	2.00
FEO	0.20	0.24	0.02	0.36	0.12	0.36	0.48	0.24	0.24	0.28	0.28	0.28
MGO	0.23	0.11	0.24	0.10	0.07	0.59	0.57	0.62	0.47	0.16	0.18	0.42
CAO	0.48	0.30	0.32	0.29	0.20	1.20	1.70	1.50	2.00	0.18	0.40	0.71
NA20	3.30	3.50	1.30	3.00	1.30	4.20	3.80	5.20	4.60	3.80	2.60	3.20
K20	5.10	4.60	6.00	5.20	6.90	5.60	4.80	6.00	5.50	5.30	7.40	5.70
H20	0.70	0.69	2.60	0.73	1.10	2.07	2.30	0.54	0.98	0.42	0.64	0.95
TIO2	0.22	0.14	0.21	0.27		0.75	0.57	0.73	0.49	0.13	0.48	0.49
P205	0.05	0.03	0.02	0.02	0.07	0.14	0.16	0.19	0.10	0.02	0.13	0.11
MNO	0.06	0.05	0.07	0.03		0.07	0.04	0.09	0.12	0.05	0.03	0.06
C02	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.05	0.35	0.05	0.05	0.10
CL	0.01	0.01				0.01	0.03	0.01				
F	0.25	0.13	0.05	0.03	0.02	0.13	0.09	0.13	0.07	0.03	0.08	0.08
TOTAL(-O)	99.44	99.13	99.96	99.57	98.76	100.01	100.15	99.34	99.99	99.51	99.84	99.77
ADJUSTED OXIDES - H20 FREE												
SIO2	75.85	77.71	78.16	76.59	77.31	66.37	70.21	65.08	66.96	76.05	72.38	72.76
AL203	13.17	12.29	12.02	13.05	12.90	17.46	15.02	17.41	16.87	12.84	13.91	13.97
FE203	1.01	0.75	1.34	0.91	0.89	2.86	2.25	2.63	2.12	1.01	2.02	2.02
FEO	0.20	0.24	0.02	0.36	0.12	0.37	0.49	0.24	0.24	0.28	0.28	0.28
MGO	0.23	0.11	0.25	0.10	0.07	0.60	0.58	0.63	0.47	0.16	0.18	0.43
CAO	0.49	0.30	0.33	0.29	0.20	1.23	1.74	1.52	2.02	0.18	0.40	0.72
NA20	3.34	3.56	1.34	3.04	1.33	4.29	3.88	5.26	4.65	3.84	2.62	3.24
K20	5.16	4.67	6.16	5.26	7.07	5.72	4.91	6.07	5.55	5.36	7.46	5.77
TIO2	0.22	0.14	0.22	0.27		0.77	0.58	0.74	0.49	0.13	0.48	0.50
P205	0.05	0.03	0.02	0.02	0.07	0.14	0.16	0.19	0.10	0.02	0.13	0.11
MNO	0.06	0.05	0.07	0.03		0.07	0.04	0.09	0.12	0.05	0.03	0.06
C02	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.05	0.35	0.05	0.05	0.10
CL	0.01	0.01				0.01	0.03	0.01				
F	0.25	0.13	0.05	0.03	0.02	0.13	0.09	0.13	0.07	0.03	0.08	0.08
NORMATIVE MINERALS - H20 FREE												
Q	36.366	39.013	46.096	38.307	42.284	16.992	25.259	8.132	15.090	32.837	28.178	30.492
C	2.092	1.383	2.854	2.073	2.949	2.786	0.928	0.316	0.765	0.631	1.408	1.780
OR	30.521	27.613	36.417	31.090	41.750	33.787	28.989	35.885	32.826	31.672	44.083	34.086
AB	28.204	30.009	11.299	25.684	11.264	36.210	32.636	44.459	39.313	32.516	22.179	27.402
AN		0.045	0.809	0.795	0.315	3.943	6.661	5.118	6.675	0.242	0.321	1.677
NL	0.017	0.017				0.017	0.051	0.017				
WO												
EN	0.558	0.278	0.614	0.252	0.179	1.500	1.451	1.563	1.182	0.403	0.452	1.059
FS												
MT	0.205	0.539		0.481	0.396		0.026			0.697		
HM	0.971	0.380	1.335	0.579	0.618	2.859	2.230	2.631	2.121	0.551	2.016	2.024
IL	0.423	0.270	0.197	0.519		0.929	1.106	0.708	0.771	0.250	0.661	0.778
TN												
RU			0.112			0.276		0.366	0.089		0.136	0.112
AP	0.120	0.072	0.049	0.048	0.170	0.339	0.387	0.455	0.239	0.048	0.310	0.264
FR	0.511	0.266	0.102	0.059	0.029	0.247	0.159	0.235	0.127	0.059	0.142	0.146
CC	0.094	0.116	0.117	0.115	0.047	0.116	0.116	0.115	0.804	0.115	0.115	0.230
MG	0.018											
TOTAL	100.001	100.001	100.001	100.000	100.000	100.001	100.001	100.001	100.001	100.001	100.000	100.001
SALIC	97.200	98.080	97.475	97.948	98.562	93.735	94.524	93.927	94.668	97.899	96.169	95.438

FEMIC	2.801	1.921	2.525	2.052	1.437	6.266	5.476	6.074	5.333	2.102	3.832	4.563

ASH-FLOW TUFFS AND ASSOCIATED ROCKS

	42	43	44	45	46	47	48	49	50	51	52	53
SYMBOL	*	*	*	*	*	*	*	*	*	*	*	*
SIO2	65.00	72.10	74.40	76.60	77.20	75.90	77.80	73.40	75.70	73.90	75.50	76.30
AL2O3	15.30	12.70	12.40	12.60	12.10	12.30	11.80	13.20	13.00	12.00	12.80	11.50
FE2O3	3.90	2.00	1.30	0.75	0.77	0.63	0.77	1.70	0.62	1.10	0.27	0.82
FEO	0.32	0.48	0.04	0.32	0.48	0.52	0.08	0.12	0.20	0.60	0.44	0.04
MGO	1.20	0.41	0.08	0.09	0.08	0.15	0.14	0.50	0.11	0.77	0.06	0.22
CAO	1.70	0.38	0.49	0.18	0.23	0.21	0.42	0.85	0.24	1.70	0.47	0.67
NA2O	3.10	2.20	3.20	3.40	3.40	3.70	2.70	3.10	4.00	1.30	3.50	1.70
K2O	6.00	7.70	5.00	4.80	4.90	5.20	5.20	6.00	4.40	4.30	4.80	7.80
H2O	1.29	1.24	0.79	0.83	0.49	0.95	0.90	0.57	0.82	3.80	0.89	0.76
TIO2	1.10	0.51	2.10	0.18	0.11	0.21	0.16	0.34	0.10	0.18	0.11	0.17
P2O5	0.30	0.13						0.07		0.16		
MNO	0.11	0.04	0.07	0.06	0.09	0.07		0.04	0.08	0.04	0.03	0.04
CO2	0.62	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
CL									0.03		0.06	
F	0.10	0.03	0.10	0.01	0.02	0.03	0.02	0.04	0.03	0.03	0.01	0.01
TOTAL(-O)	100.00	99.96	99.98	99.87	99.91	99.91	100.03	99.96	99.36	99.92	99.07	100.08
ADJUSTED OXIDES - H2O FREE												
SIO2	65.85	73.04	75.01	77.35	77.65	76.70	78.48	73.85	76.82	76.89	76.90	76.93
AL2O3	15.50	12.87	12.50	12.72	12.17	12.43	11.90	13.28	13.19	12.48	13.04	11.58
FE2O3	3.95	2.03	1.31	0.76	0.77	0.64	0.78	1.71	0.63	1.14	0.27	0.83
FEO	0.32	0.49	0.04	0.32	0.48	0.53	0.08	0.12	0.20	0.62	0.45	0.04
MGO	1.22	0.42	0.08	0.09	0.08	0.15	0.14	0.50	0.11	0.80	0.06	0.22
CAO	1.72	0.38	0.49	0.18	0.23	0.21	0.42	0.86	0.24	1.77	0.48	0.67
NA2O	3.14	2.23	3.23	3.43	3.42	3.74	2.72	3.12	4.06	1.35	3.67	1.71
K2O	6.08	7.80	5.04	4.85	4.93	5.25	5.25	6.04	4.47	4.47	4.89	7.85
TIO2	1.11	0.52	2.12	0.18	0.11	0.21	0.16	0.34	0.10	0.19	0.11	0.17
P2O5	0.30	0.13						0.07		0.17		
MNO	0.11	0.04	0.07	0.06	0.09	0.07		0.04	0.08	0.04	0.03	0.04
CO2	0.63	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
CL									0.03		0.06	
F	0.10	0.03	0.10	0.01	0.02	0.03	0.02	0.04	0.03	0.03	0.01	0.01
NORMATIVE MINERALS - H2O FREE												
Q	21.626	29.349	36.230	38.473	38.376	34.295	41.648	30.466	35.824	47.577	36.013	35.690
C	3.005	0.539	1.227	1.643	0.960	0.404	1.146	0.437	1.482	2.765	1.076	
OR	35.920	46.093	29.788	28.641	29.124	31.052	30.997	35.672	26.386	26.436	28.890	46.410
AB	26.575	18.858	27.299	29.050	28.937	31.638	23.047	26.391	34.123	11.445	30.574	14.484
AN	2.045	0.593	1.394	0.509	0.682	0.511	1.635	3.216	0.665	7.238	1.978	0.717
HL									0.050		0.101	
WO												0.817
EN	3.028	1.034	0.201	0.226	0.200	0.378	0.352	1.253	0.278	1.995	0.152	0.552
FS					0.232	0.220					0.468	
MT		0.202		0.712	1.123	0.923			0.625	1.605	0.399	
HM	3.951	1.887	1.311	0.266			0.777	1.710	0.198	0.038		0.826
IL	0.923	0.981	0.236	0.345	0.210	0.403	0.170	0.341	0.193	0.356	0.213	0.171
TN												0.199
RU	0.628		1.993				0.072	0.162				
AP	0.720	0.312						0.167		0.394		
FR	0.152	0.038	0.207	0.021	0.041	0.062	0.041	0.070	0.063	0.034	0.021	0.021
CC	1.428	0.115	0.115	0.115	0.114	0.115	0.115	0.114	0.115	0.118	0.116	0.114
MG												
TOTAL	100.001	100.000	100.001	100.001	100.001	100.001	100.000	100.000	100.001	100.000	100.001	100.000
SALIC	89.170	95.431	95.938	98.315	98.080	97.900	98.473	96.183	98.529	95.461	98.633	97.301

FEMIC	10.831	4.570	4.062	1.685	1.922	2.101	1.527	3.818	1.472	4.539	1.368	2.699



ASH-FLOW TUFFS AND ASSOCIATED ROCKS

	S4
SYMBOL	*
SIO2	77.80
AL203	12.30
FE203	0.42
FEO	0.16
MGO	0.24
CAO	0.31
NA20	2.40
K20	4.30
H20	1.57
TIO2	0.13
P205	
MNO	
C02	0.05
CL	
F	0.02
TOTAL(-O)	99.69
ADJUSTED OXIDES - H20 FREE	
SIO2	79.29
AL203	12.54
FE203	0.43
FFO	0.16
MGO	0.24
CAO	0.32
NA20	2.45
K20	4.38
TIO2	0.13
P205	
MNO	
C02	0.05
CL	
F	0.02
NORMATIVE MINERALS - H20 FREE	
Q	47.453
C	3.367
OR	25.896
AB	20.697
AN	1.096
NL	
WO	
EN	0.609
FS	
MT	0.142
HM	0.330
IL	0.252
TN	
RU	
AP	
FR	0.042
CC	0.116
MG	
TOTAL	100.000
SALIC	98.509

FEMIC 1.491

POST ASH-FLOW TUFF ANDESITES AND ASSOCIATED ROCKS

SYMBOL	55 *	56 *	57 *	58 *	59 *	60 *	61 *	62 *	63 *	64 *	65 *	66 *
SIO2	57.10	52.90	57.20	57.30	59.80	52.10	54.10	49.30	58.30	51.90	50.00	48.10
AL2O3	13.70	16.30	15.80	16.40	15.60	16.60	16.10	17.60	16.80	14.70	14.90	14.90
FE2O3	5.50	6.30	3.20	5.80	3.00	8.30	9.00	7.40	2.70	9.30	8.70	10.00
FEO	0.88	1.90	4.20	1.60	3.30	0.80	0.92	3.50	3.80	1.00	1.70	1.50
MGO	4.70	4.90	3.60	2.90	2.80	4.50	4.10	4.50	3.30	4.10	6.40	6.00
CAO	5.60	7.00	5.90	5.80	5.10	6.60	6.70	9.50	5.50	6.70	7.90	7.90
NA2O	2.60	3.60	3.60	3.60	3.50	3.70	3.20	2.80	3.70	3.60	2.70	2.90
K2O	5.40	2.60	2.60	2.90	1.90	2.40	2.00	1.10	2.40	2.30	1.80	2.00
H2O	2.40	2.40	1.07	1.96	3.30	3.00	2.60	1.40	1.61	3.50	3.80	4.50
TIO2	1.10	1.00	0.89	1.00	0.72	1.70	1.80	2.00	1.30	1.80	1.40	1.60
P2O5	0.69	0.74	0.54	0.65	0.42	0.81	0.74	0.41	0.43	0.69	0.47	0.50
MNO	0.10					0.10	0.09	0.15	0.09	0.12	0.16	0.14
CO2	0.05	0.06	0.07	0.01	0.01	0.02	0.01	0.22	0.05	0.05	0.05	0.05
CL									0.01		0.01	
F	0.12	0.06	0.04	0.07	0.04	0.03	0.03	0.02	0.05	0.13	0.09	0.07
TOTAL(-O)	99.89	99.73	98.69	99.96	99.47	100.65	101.38	99.89	100.02	99.84	100.04	100.13
ADJUSTED OXIDES - H2O FREE												
SIO2	58.57	54.35	58.59	58.47	62.18	53.36	54.77	50.06	59.24	53.87	51.95	50.30
AL2O3	14.05	16.75	16.18	16.73	16.22	17.00	16.30	17.87	17.07	15.26	15.48	15.58
FE2O3	5.64	6.47	3.28	5.92	3.12	8.50	9.11	7.51	2.74	9.65	9.04	10.46
FEO	0.90	1.95	4.30	1.63	3.43	0.82	0.93	3.55	3.86	1.04	1.77	1.57
MGO	4.82	5.03	3.69	2.96	2.91	4.61	4.15	4.57	3.35	4.26	6.65	6.27
CAO	5.74	7.19	6.04	5.92	5.30	6.76	6.78	9.65	5.59	6.95	8.21	8.26
NA2O	2.67	3.70	3.69	3.67	3.64	3.79	3.24	2.84	3.76	3.74	2.81	3.03
K2O	5.54	2.67	2.66	2.96	1.98	2.46	2.02	1.12	2.44	2.39	1.87	2.09
TIO2	1.13	1.03	0.91	1.02	0.75	1.74	1.82	2.03	1.32	1.87	1.45	1.67
P2O5	0.71	0.76	0.55	0.66	0.44	0.83	0.75	0.42	0.44	0.72	0.49	0.52
MNO	0.10					0.10	0.09	0.15	0.09	0.12	0.17	0.15
CO2	0.05	0.06	0.07	0.01	0.01	0.02	0.01	0.22	0.05	0.05	0.05	0.05
CL									0.01		0.01	
F	0.12	0.06	0.04	0.07	0.04	0.03	0.03	0.02	0.05	0.13	0.09	0.07
NORMATIVE MINERALS - H2O FREE												
Q	7.521	3.982	9.914	11.582	18.161	4.220	10.621	5.931	11.661	6.553	5.443	2.396
C												
OR	32.732	15.785	15.738	17.487	11.674	14.524	11.965	6.600	14.412	14.108	11.052	12.359
AB	22.567	31.296	31.204	31.084	30.796	32.063	27.413	24.056	31.740	31.621	23.662	25.660
AN	10.014	21.203	19.743	20.433	22.089	22.119	23.952	32.699	22.542	17.811	24.168	22.725
NE												
HL									0.017		0.017	
WO	5.455	3.807	2.577	1.854	0.535	1.410	0.985	4.601	0.803	3.827	5.290	5.978
EN	12.007	12.538	9.184	7.370	7.251	11.477	10.338	11.379	8.352	10.600	16.562	15.626
FS			3.687		2.488				2.813			
FO												
FA												
MT		3.314	4.753	2.304	4.523			6.065	3.978		2.020	0.684
HM	5.642	4.187		4.329		8.500	9.111	3.331		9.654	7.647	9.985
IL	2.126	1.951	1.731	1.938	1.422	1.949	2.162	3.857	2.509	2.459	2.763	3.178
TN	0.022					1.753	1.678			1.408		
PF												
RU												
AP	1.676	1.801	1.310	1.571	1.034	1.965	1.774	0.986	1.035	1.696	1.157	1.238
FR	0.123			0.025	0.005				0.024	0.146	0.103	0.055

CC	0.117	0.140	0.163	0.023	0.024	0.047	0.023	0.508	0.116	0.118	0.118	0.119
TOTAL	100.001	100.004	100.005	100.000	100.000	100.026	100.022	100.012	100.001	100.001	100.002	100.002
SALIC	72.834	72.266	76.599	80.585	82.719	72.925	73.951	69.285	80.372	70.093	64.343	63.139
FEMIC	27.167	27.738	23.406	19.415	17.281	27.101	26.071	30.726	19.629	29.908	35.659	36.862

POST ASH-FLOW TUFF ANDESITES AND ASSOCIATED ROCKS

	67	68	69	70	71	72	73	74	75	76	77	78
SYMBOL	*	*	*	*	*	*	*	*	*	*	*	*
SIO2	48.00	52.30	55.10	58.20	55.10	62.80	48.80	53.60	53.40	59.40	49.80	62.90
AL203	16.50	15.00	16.90	16.10	17.40	17.70	17.70	15.80	16.00	17.40	15.30	15.40
FE203	11.70	9.00	4.20	2.90	5.00	2.10	5.20	6.90	3.90	4.40	5.70	4.90
FEO	0.84	1.50	2.70	3.90	0.60	2.40	6.00	1.60	4.80	0.86	7.50	0.44
MGO	4.90	3.70	3.80	3.40	3.50	1.80	4.90	3.90	5.20	2.60	3.40	2.30
CAO	7.30	6.90	6.00	3.50	6.20	5.10	9.20	6.20	6.90	5.90	7.10	4.60
NA2O	2.90	3.70	4.20	3.80	2.80	3.70	2.70	3.00	3.50	4.40	3.80	3.70
K2O	1.70	2.00	2.60	3.50	1.10	2.40	0.86	2.70	2.20	2.00	1.60	2.80
H2O	3.20	2.20	1.60	2.64	7.00	1.29	1.88	2.70	1.30	1.40	1.20	1.86
TIO2	2.10	1.90	1.30	0.89	0.72	0.65	2.00	1.50	1.40	0.58	2.60	0.80
P2O5	0.63	0.67	0.55	0.24	0.30	0.19	0.35	0.62	0.58	0.30	0.66	0.42
MNO	0.16	0.13	0.11	0.16	0.04	0.06	0.14	0.09	0.11	0.08	0.12	0.10
CO2	0.05	0.05	0.05	0.74	0.01	0.02	0.05	0.08	0.35	0.01	0.10	0.01
CL		0.02										
F	0.06	0.12	0.06	0.03		0.09	0.02	0.04	0.06	0.03	0.04	0.04
TOTAL(-O)	100.01	100.13	99.14	99.99	99.77	100.26	99.79	98.71	99.67	99.35	98.90	100.25
ADJUSTED OXIDES - H2O FREE												
SIO2	49.58	53.40	56.49	59.79	59.39	63.45	49.84	55.83	54.28	60.64	50.97	63.93
AL203	17.04	16.34	17.33	16.54	18.76	17.88	18.08	16.46	16.26	17.76	15.66	15.65
FE203	12.08	9.19	4.31	2.98	5.39	2.12	5.31	7.19	3.96	4.49	5.83	4.98
FEO	0.87	1.53	2.77	4.01	0.65	2.42	6.13	1.67	4.88	0.88	7.68	0.45
MGO	5.06	3.78	3.90	3.49	3.77	1.82	5.00	4.06	5.29	2.65	3.48	2.34
CAO	7.54	7.05	6.15	3.60	6.68	5.15	9.40	6.46	7.01	6.02	7.27	4.68
NA2O	3.00	3.78	4.31	3.90	3.02	3.74	2.76	3.12	3.56	4.49	3.89	3.76
K2O	1.76	2.04	2.67	3.60	1.19	2.42	0.88	2.81	2.24	2.04	1.64	2.85
TIO2	2.17	1.94	1.33	0.91	0.78	0.66	2.04	1.56	1.42	0.59	2.66	0.81
P2O5	0.65	0.68	0.56	0.25	0.32	0.19	0.36	0.65	0.59	0.31	0.68	0.43
MNO	0.17	0.13	0.11	0.16	0.04	0.06	0.14	0.09	0.11	0.08	0.12	0.10
CO2	0.05	0.05	0.05	0.76	0.01	0.02	0.05	0.08	0.36	0.01	0.10	0.01
CL		0.02										
F	0.06	0.12	0.06	0.03		0.09	0.02	0.04	0.06	0.03	0.04	0.04
NORMATIVE MINERALS - H2O FREE												
Q	4.789	6.989	5.393	11.529	18.298	18.738	4.356	10.067	4.644	11.931	3.460	19.528
C				2.064	1.156	0.445						
OR	10.376	12.068	15.751	21.246	7.007	14.330	5.190	16.618	13.215	12.066	9.677	16.816
AB	25.346	31.817	36.434	33.031	25.539	31.634	23.334	26.439	30.105	38.012	32.910	31.920
AN	27.871	21.668	20.075	11.356	30.974	23.642	34.354	22.571	21.804	22.277	20.434	17.422
NE												
HL		0.034										
WO	0.578	3.231	2.652				4.009	1.970	2.852	2.303	4.408	0.918
EN	12.605	9.409	9.702	8.698	9.396	4.529	12.464	10.116	13.165	6.611	8.667	5.822
FS				3.692		1.728	3.758		3.543		5.110	
FO												
FA												
MT			5.426	4.319		3.076	7.700	1.149	5.748	1.380	8.459	
HM	12.085	9.190	0.563		5.390			6.394		3.540		4.980
IL	2.186	3.519	2.531	1.736	1.458	1.247	3.879	2.967	2.703	1.125	5.056	1.162
TN	2.498	0.214										0.494
PF												
RU					0.008							
AP	1.541	1.620	1.336	0.584	0.766	0.455	0.847	1.530	1.396	0.725	1.600	1.011
FR	0.008	0.126	0.023	0.018		0.152			0.017	0.007		0.005

CC	0.117	0.116	0.117	1.729	0.025	0.046	0.116	0.189	0.809	0.023	0.233	0.023
TOTAL	100.002	100.002	100.001	100.002	100.017	100.001	100.008	100.010	100.001	100.001	100.013	100.001
SALIC	68.383	72.576	77.652	79.225	82.974	88.767	67.234	75.695	69.768	84.286	66.482	85.586
FEMIC	31.619	27.426	22.350	20.777	17.043	11.234	32.774	24.316	30.233	15.715	33.531	14.415

POST ASH-FLOW TUFF ANDESITES AND ASSOCIATED ROCKS

	79	80	81
SYMBOL	*	*	*
SIO2	51.20	47.50	47.40
AL2O3	15.50	14.60	15.00
FE2O3	2.70	6.50	12.10
FEO	8.20	6.10	1.20
MGO	7.00	5.90	6.00
CAO	8.20	8.20	7.50
NA2O	3.30	4.40	4.20
K2O	1.00	2.20	2.10
H2O	0.79	1.00	1.30
TIO2	1.40	2.00	2.10
P2O5	0.38	0.69	0.75
MNO	0.10	0.20	0.21
CO2	0.02	0.32	0.05
CL		0.09	
F	0.03	0.07	
TOTAL(-O)	99.81	99.72	99.91
ADJUSTED OXIDES - H2O FREE			
SIO2	51.71	48.12	48.07
AL2O3	15.65	14.79	15.21
FE2O3	2.73	6.58	12.27
FEO	8.28	6.18	1.22
MGO	7.07	5.98	6.08
CAO	8.28	8.31	7.61
NA2O	3.33	4.46	4.26
K2O	1.01	2.23	2.13
TIO2	1.41	2.03	2.13
P2O5	0.38	0.70	0.76
MNO	0.10	0.20	0.21
CO2	0.02	0.32	0.05
CL		0.09	
F	0.03	0.07	
NORMATIVE MINERALS - H2O FREE			
Q			
C			
OR	5.968	13.169	12.584
AB	28.201	28.948	33.785
AN	24.770	14.123	16.098
NE		4.384	1.222
HL		0.150	
WO	5.711	8.520	6.045
EN	16.115	6.402	5.224
FS	9.892	1.264	
FO	1.045	5.944	6.958
FA	0.707	1.293	
MT	3.954	9.547	
HM			12.271
IL	2.685	3.848	3.026
TN			
PF			0.913
RU			
AP	0.909	1.656	1.801
FR		0.018	

CC	0.046	0.737	0.115
TOTAL	100.004	100.003	100.042
SALIC	58.939	60.774	63.689
FEMIC	41.065	39.228	36.353

Table 2.—Location and correlation of analyzed samples and key to analytical methods. [Informal geologic names used here are largely from Ratté and Gaskill, 1975; Ratté, 1977, or are related to geologic mapping in progress, except as otherwise noted.]

Sample no.	Field no.	Quadrangle	Latitude	Longitude	Rock name	Correlation	Analytical methods code
1	SP-33-75	Saliz Pass	33°33'55"N	108°53'50"W	andesite	Older andesitic complex north and west of Mogollon	1
2	SP-7E-76	Saliz Pass	33°34'06"N	108°53'05"W	andesite	"	1
3	DM-3-76	Dillon Mtn.	33°51'12"N	108°48'41"W	andesite	"	1
4	GR-88A	Canyon Hill	33°03'36"N	108°29'28"W	dacite	Volcanic complex of Brock Canyon	2
5	GR-79C	Canteen Canyon	33°04'06"N	108°31'05"W	rhyolite	"	2
6	GR-76A	Canteen Canyon	33°05'07"N	108°31'37"W	dacite	Andesitic flows of Muntocks Hole	2
7	GR-95A	Canteen Canyon	33°05'17"N	108°50'12"W	rhyolite	Volcanic complex of Brock Canyon	2
8	GR-47	Copperas Pk.	33°02'33"N	108°13'27"W	andesite	"	2
9	GR-41A	Granny Mtn.	33°02'05"N	108°16'56"W	dacite	Volcanic complex of Alum Mountain	2
10	GR-35B	Copperas Pk.	33°04'30"N	108°12'27"W	dacite	"	2
11	GR-33A	Copperas Pk.	33°05'29"N.	108°07'48"W	basalt	"	2
12	GR-21D	Copperas Pk.	33°03'01"N	108°12'44"W	rhyolite	"	2
13	GR-20H	Copperas Pk.	33°03'04"N	108°13'09"W	dacite	Andesitic flows of Gila Flat	2
14	GR-18F	Copperas Pk.	33°04'13"N	108°13'03"W	andesite	Volcanic complex of Alum Mountain	2
15	GR-14	Gila Hot Springs	33°08'38"N	108°11'32"W	andesite	"	2
16	GR-13B	Gila Hot Springs	33°08'12"N	108°12'41"W	andesite	"	2
17	GR-128C	L. Turkey Park	33°07'42"N	108°15'13"W	dacite	Andesitic lava flows of Gila Flat	2
18	GR-50C	Holt Mtn.	33°19'45"N	108°48'58"W	dacite	Cooney Tuff	2
19	MR-4A-76	Mogollon	33°22'35"N	108°49'29"W	rhyolite	"	1
20	GR-59A	Rice Ranch	33°10'55"N	108°40'06"W	dacite	"	2
21	GR-21G A	Shelley Peak	33°30'25"N	108°34'32"W	rhyolite	Tuff of Fall Canyon	2
22	MR-11b-74	Mogollon	33°23'35"N	108°49'38"W	rhyolite	"	3
23	GR-157H	Canyon Hill	33°01'17"N	108°26'20"W	rhyolite	Tuff of Davis Canyon	2
24	MR-31-74	Mogollon	33°24'12"N	108°49'15"W	rhyolite	"	2
25	GR-70B	Shelley Peak	33°11'06"N	108°33'57"W	rhyolite	Tuff of Shelley Peak	2
26	GR-142C	Canyon Hill	33°04'18"N	108°24'44"W	dacite	"	2
27	SP-5B-75	Saliz Pass	33°35'02"N	108°55'59"W	rhyolite	"	1
28	GR-70H	Shelley Peak	33°10'24"N	109°35'09"W	basalt	Andesitic flows of Gila Flat	2

Sample No.	Field No.	Quadrangle	Latitude	Longitude	Rock Name	Correlation (Analytical methods)	Coo
30	DG-155	Woodland Park	33°22'22"N	108°18'55"W	rhyolite	Bloodgood Canyon Rhyolite of Elston (1968)	2
31	DG-344	Lilley Mtn.	33°16'10"N	108°22'53"W	rhyolite	"	2
32	GR-8B	Gila Hot Spring	33°11'41"N	108°10'47"W	rhyolite	"	2
33	GR-129A	Granny Mtns.	33°06'00"N	108°18'58"W	rhyolite	"	2
34	MR-41-74	Mogollon	33°26'36"N	108°48'22"W	rhyolite	"	3
35	DG-176	Grouse Mtn.	33°22'12"N.	108°43'33"W	rhyolite	Tuff of Apache Spring	2
36	DG-347	Negrito Mtn.	33°28'30"N	108°36'14"W	dacite	"	2
37	DG-342	Lilley Mtn.	33°16'18"N	108°25'00"W	rhyolite	"	2
38	GR-99G	Grouse Mtn.	33°18'13"N	108°40'05"W	rhyolite	"	2
39	GR-107C	Grouse Mtn.	33°16'41"N	108°38'29"W	rhyolite	"	2
40	GR-71A	Shelley Peak	33°12'41"N	108°37'08"W	rhyolite	Rhyolite of Sacaton Mtn.	2
41	GR-84B	Shelley Peak	33°14'06"N	108°36'46"W	rhyolite	"	2
42	GR-62F	Grouse Mtn.	33°15'25"N	108°43'38"W	rhyolite	"	2
43	GR-101C	Grouse Mtn.	33°21'04"N	108°44'49"W	rhyolite	"	2
44	GR-34A	North Star Mesa	33°06'55"N	108°00'18"W	rhyolite	Rhyolite of Rocky Canyon	2
45	GR-74B	Canteen Canyon	33°07'18"N.	108°03'07"W	rhyolite	Rhyolite of Diablo Range	2
46	GR-200B	Wall Lake	33°21'54"N	108°06'39"W	rhyolite	Rhyolite of Beaver Creek	2
47	GR-125C	L. Turkey Park	33°09'25"N	108°21'41"W	rhyolite	Rhyolite of Diablo Range	2
48	GR-54B	Rice Ranch	33°11'02"N	108°40'12"W	rhyolite	"	2
49	GR-56B	Holt Mtn.	33°19'31"N	108°47'52"W	rhyolite	Quartz Latite of Nabours Mountain (Rhodes, 1976)	2
50	DG-161	Canyon Ck. Mtns.	33°25'11"N	108°17'00"W	rhyolite	Rhyolite of Indian Creek	2
51	GR-113B	Grouse Mtn.	33°21'58"N	108°44'55"W	?dacite	Deadwood Gulch member of Fanney Rhyolite (Ratté, 1978)	2
52	DG-175	Grouse Mtn.	33°22'20"N	108°41'09"W	rhyolite	Fanney Rhyolite	2
53	GR-54G	Holt Mtn.	33°21'29"N	108°45'37"W	rhyolite	"	2
54	GR-66B	Holt Mtn.	33°15'13"N	108°47'28"W	rhyolite	"	2
55	DG-10	Gila Hot Springs	33°13'40"N	108°13'46"W	Tholeiitic andesite	Post-ash-flow tuff andesitic flows	2
56	MR-7-74	Mogollon	33°27'44"N	108°45'12"W	andesite	"	2
57	MR-6-74	Mogollon	33°30'38"N	108°46'20"W	andesite	"	2

Sample No.	Field No.	Quadrangle	Latitude	Longitude	Rock Name	Correlation	Analytical methods Coc
58	MR-43A-74	Mogollon	33° 29' 07" N	108° 46' 34" W	andesite	Post-ash-flow tuff andesitic flows	3
59	MR-51A-74	Mogollon	33° 25' 37" N	108° 46' 19" W	andesite	"	3
60	MR-81B-75	Mogollon	33° 25' 13" N	108° 47' 14" W	andesite	"	1
61	MR-81A-75	Mogollon	33° 25' 08" N	108° 47' 23" W	andesite	"	1
62	OB-4E-76	O-Block Canyon	33° 33' 52" N	108° 50' 35" W	basalt	"	1
63	GR-54A	Holt Mtn.	33° 22' 04" N	108° 45' 29" W	andesite	Last Chance Andesite	2
64	GR-6B	Gila Hot Springs	33° 11' 40" N	108° 09' 20" W	andesite	Post-ash-flow tuff andesitic flows	2
65	GR-6A	Gila Hot Springs	33° 11' 40" N	108° 09' 20" W	basalt	"	2
66	DG-6	Gila Hot Springs	33° 11' 49" N	108° 11' 37" W	basalt	"	2
67	DG-5	Gila Hot Springs	33° 11' 48" N	108° 12' 12" W	basalt	"	2
68	DG-3	Gila Hot Springs	33° 11' 43" N	108° 10' 35" W	andesite	"	2
69	GR-110A	Grouse Mtn.	33° 19' 19" N	108° 40' 47" W	andesite	"	2
70	GR-176A	Holt Mtn.	33° 17' 35" N	108° 49' 17" W	Tholeiitic andesite	Dacitic intrusive rock of Holt Gulch	2
71	MR-49D-74	Mogollon	33° 29' 36" N	108° 45' 31" W	basalt	Hypabyssal andesitic intrusive rock (Ratté, 1977)	
72	EP-3-75	Eagle Peak	33° 42' 18" N	108° 34' 30" W	andesite	Andesite of Eagle Peak	1
73	SP-50A-75	Saliz Pass	33° 06' 35" N	108° 56' 52" W	basalt	Basalt of Pueblo Park	1
74	OB-7E-76	O-Block Canyon	33° 32' 50" N	108° 52' 17" W	andesite	Post-ash-flow tuff andesitic flows	1
75	SP-42-75	Saliz Pass	33° 36' 18" N	108° 53' 30" W	basalt	Basalt of Saliz Hill	1
76	SP-27B-75	Saliz Pass	33° 34' 19" N	108° 53' 13" W	andesite	Hypabyssal andesite intrusive at Saliz Canyon	
77	BR-10-74	Bearwallow Mtn.	33° 24' 55" N	108° 44' 45" W	basalt	Basalt of Cooney Peak	3
78	BB-16E-76	Bull Basin	33° 42' 00" N	108° 53' 40" W	andesite	Hypabyssal intrusive of Leggett Spring	1
79	GL-2-74	Glenwood	33° 21' 10" N	108° 54' 13" W	basalt	Basalt flow interlayered in Gila Conglomerate	3
80	GR-30C	North Star Mesa	33° 02' 34" N	108° 03' 55" W	olivine basalt	Basalt of North Star Mesa	2
81	GR-26D	North Star Mesa	33° 03' 22" N	108° 02' 38" W	olivine basalt	"	2

Table 3.--Description of analyzed rocks

Group I - Early andesitic rocks

Sample no.	Field no.	
1	SP-33-75	Gray, porphyritic lava flow in upper part of early andesitic complex. Contains microphenocrysts of olivine and pyroxene as well as plagioclase.
2	SP-7E-76	Gray, porphyritic, glassy monomictic vent(?) breccia with abundant plagioclase (andesine) and biotite phenocrysts, and amphibole and orthopyroxene microphenocrysts.
3	DM-3-76	Highly porphyritic, dull black glassy plug rock with abundant phenocrysts of plagioclase, pyroxene, and opaque oxide.
4	GR-88A	Blue-gray, porphyritic flow rock with about 15 percent 1-3 mm plagioclase and oxidized mafic phenocrysts.
5	GR-79C	Red, porphyritic flow rock with about 25 percent 1-4 mm plagioclase and minor biotite crystals from area of steep flow layering that may mark a plug.
6	GR-76A	Red, porphyritic flow rock with about 10-15 percent plagioclase and sparse green pyroxene phenocrysts.
7	GR-95A	Light-gray porphyritic flow rock with 1-3 mm altered feldspar phenocrysts in a pyritized and argillically altered matrix. Mafic phenocrysts, probably biotite, almost completely sericitized.
8	GR-47	Black rock with vitreous appearance has scattered pink feldspar crystals and glomeroporphyritic groups of plagioclase, pyroxene, and opaque oxide crystals in an aphanitic but holocrystalline matrix of flow-alined plagioclase microlites.
9	GR-41A	Gray vitrophyre with about 20-25 percent 1-5 mm white plagioclase (andesine) and 1 mm biotite books in a colorless glass. Minor pyroxene, xenocrystic(?) quartz, opaque oxide, and zircon. Another sample has K-Ar ages of 29.6±1.0 (sanidine) and 29.3±1.0 (biotite) m.y.
10	GR-35B	Fine-grained, light-gray, granitic rock with some 1-4 mm plagioclase phenocrysts, sparse altered biotite, and disseminated pyrite. The potassic feldspar has a K-Ar age of 29.7±1.0 m.y.

Table 3.--cont.

Sample no.	Field no.	
11	GR-33A	Fine-grained, dark-gray, vesicular flow rock with scattered olivine and pyroxene grains in a microlitic matrix of plagioclase (labradorite). Flows may correlate with andesitic flows that are younger than the volcanic complex of Alum Mountain.
12	GR-21D	Light-gray, fluidal, aphanitic rhyolite dike with sparse sodic plagioclase phenocrysts <1 mm long. Veinlets of quartz and magnetite commonly parallel the fluidal structure.
13	GR-20H	Light-gray, porphyritic flow rock with 10-15 percent 1-4 mm white plagioclase phenocrysts, partly sericitized biotite, greenish-yellow pyroxene, and rare quartz grains in an aphanitic matrix.
14	GR-18F	Dark-greenish-gray, porphyritic flow rock with abundant plagioclase (andesine) phenocrysts and biotite, altered pyroxene, and sparse amphibole microphenocrysts. Some granophyric quartz and feldspar in matrix.
15	GR-14	Dark-gray to black flow with with 4-5 mm plagioclase phenocrysts (andesine) in an aphanitic matrix of microphenocrysts and microlitic plagioclase. Microphenocrysts are biotite, pyroxene, and brown hornblende; rock also contains sparse rounded quartz xenocrysts.
16	GR-13B	Dark-gray, sparsely porphyritic rock from small stock or dike. Phenocrysts (10-15 percent) include plagioclase (oligoclase-andesine), biotite, and pyroxene. Rare quartz and sanidine xenocrysts(?).
17	GR-128C	Black vitrophyre with about 5 percent plagioclase (oligoclase-andesine), biotite, and pyroxene phenocrysts. Perlitic glass matrix is crowded with flow-alined microlites.
		Group II - Ash-flow tuffs and associated rocks
18	GR-50C	Reddish-brown, densely welded tuff with about 40 percent small phenocrysts, mainly plagioclase (andesine), minor biotite and opaque oxide, and rare pyroxene, zircon, and brown hornblende; from upper part of Cooney Tuff sequence of ash flows.
19	MR-4A-76	Pink to red, densely welded phenocryst-poor ash-flow tuff with 5-10 percent sanidine, partly argillized sodic plagioclase, and rare quartz phenocrysts from lithophyssal zone in bottom of Whitewater Canyon.

Table 3.--cont.

Sample no.	Field no.	
20	GR-59A	Greenish-gray, propylitically altered, densely welded ash-flow tuff with 30-40 percent altered plagioclase, biotite, and pyroxene phenocrysts.
21	GR-216A	Light-lavender-gray, densely welded ash-flow tuff with 25-30 percent 1-3 mm quartz and sanidine and minor plagioclase phenocrysts; practically no mafic minerals other than rare oxidized biotite and opaque oxide.
22	MR-11B-74	Light-lavender-gray, moderately welded, ash-flow tuff with 20-30 percent quartz, plagioclase, and sanidine phenocrysts and accessory biotite, opaque oxide, zircon, and apatite in a devitrified vitroclastic matrix. Irregular, angular quartz phenocrysts as large as 1/2 cm.
23	GR-157H	Light brown, pumice-rich, moderately welded ash-flow tuff with less than 5 percent tiny quartz, plagioclase, and sanidine (moonstone) phenocrysts. Compacted dark-brown to creamy-white pumice fragments are as much as several centimeters long.
24	MR-31-74	Light gray to nearly white, partially welded, porous vaporphase ash-flow tuff with rare tiny quartz, sanidine, and plagioclase phenocrysts, and small gray eutaxitic pumice generally <1 cm long in a devitrified microcrystalline matrix.
25	GR-70B	Pinkish-brown, finely eutaxitic to fluidal, phenocryst-poor, densely welded ash-flow tuff near base of unit. Five to ten percent phenocrysts are mostly sanidine and plagioclase plus accessory biotite, brown hornblende, pyroxene, sphene, zircon, and apatite.
26	GR-142C	Pinkish-gray, densely welded tuff with abundant small white feldspar phenocrysts and scattered bronze biotite 1-2 mm in diameter, from near top of ash-flow tuff sheet.
27	SP-5B-75	Red, densely welded ash-flow tuff with 20-25 percent phenocrysts of alined glassy plagioclase, and rare sanidine, scattered brown biotite, and sparse green pyroxene in a devitrified matrix. Sample is from 10-20 meters below top of ash-flow tuff sheet.
28	GR-70H	Light- to medium-gray, fine-grained flow rock with small plagioclase laths and dark-green pyroxene grains 1 mm or less in a fairly coarse microlitic matrix.

Table 3.--cont.

Sample no.	Field no.	
29	GR-180J	Reddish-brown, porphyritic flow rock with about 10 percent 1-4 mm plagioclase (andesine) laths and sparse pyroxene and opaque oxide microphenocrysts in a felted microlitic matrix. Mafics are highly oxidized.
30	DG-155	Light-gray, densely welded ash-flow tuff with abundant quartz and sanidine phenocrysts and accessory brown hornblende, opaque oxides, sphene, biotite, and zircon in a microeutaxitic to granophyric matrix.
31	DG-344	Light-gray, densely welded ash-flow tuff with abundant quartz and sanidine phenocrysts and minor accessory biotite, sphene, and opaque oxides in a devitrified matrix.
32	GR-8B	Light-gray, moderately to densely welded ash-flow tuff with 10-20 percent quartz and sanidine phenocrysts and eutaxitic pumice several cm long in a granophyric to cryptocrystalline matrix.
33	GR-129A	Light-gray, densely welded ash-flow tuff with eutaxitic white pumice several cm long and 10-15 percent 1-3 mm phenocrysts of sanidine and amoebic quartz grains, and smaller, yellow, euhedral sphene grains, opaque oxide, and rare brown hornblende and biotite in an aphanitic devitrified matrix.
34	MR-41-74	Pink, densely welded ash-flow tuff with 20-25 percent 1-3 mm quartz and sanidine phenocrysts in a devitrified eutaxitic matrix. Rare accessory minerals include sodic plagioclase, opaque oxide, sphene, biotite, and zircon.
35	DG-176	Pink, densely welded ash-flow tuff with abundant quartz and sanidine phenocrysts in a devitrified cryptocrystalline matrix.
36	DG-347	Reddish-brown, densely welded ash-flow tuff with 25-30 percent feldspar and scattered biotite phenocrysts. Quartz, sphene, and opaque oxides common in a devitrified matrix.
37	DG-342	Reddish-gray, densely welded ash-flow tuff with abundant feldspar, quartz, and biotite phenocrysts in an aphanitic, devitrified matrix.
38	GR-99G	Reddish-gray, densely welded ash-flow tuff with 55 percent 1-3 mm phenocrysts, which include white, somewhat skeletal sanidine, glassy plagioclase, quartz, rare black biotite and accessory opaque oxide, sphene, zircon, and apatite in a devitrified microeutaxitic, cryptocrystalline to granophyric matrix.

Table 3.--cont.

Sample no.	Field no.	
39	GR-107C	Reddish-brown, densely welded ash-flow tuff that contains abundant phenocrysts of sanidine with a sericitic sheen, and quartz in a devitrified cryptocrystalline matrix with granophyric eutaxitic pumice. Rock looks similar to tuff of Apache Spring, but rare plagioclase and foreign lithic fragments support its chemical similarity to Bloodgood Canyon Tuff, and thus sample is apparently from a block of Bloodgood Canyon Tuff enclosed in the younger tuff of Apache Spring.
40	GR-71A	Gray, porphyritic flow rock with 15-20 percent 1-3 mm quartz and feldspar phenocrysts in an aphanitic granophyric to micropegmatitic matrix. Rare biotite is largely altered to sericite.
41	GR-84B	Pink, porphyritic flow rock with 1-4 mm perthitically altered pink sanidine and quartz phenocrysts. Sparse plagioclase and accessory biotite, opaque oxide, apatite, sphene, and zircon are present in a micropegmatitic matrix.
42	GR-62F	Reddish-gray, porphyritic flow rock with 10-15 percent argillized feldspar and altered mafic phenocrysts in an aphanitic granophyric to micropegmatitic matrix.
43	GR-101C	Gray, porphyritic flow rock with about 30 percent quartz and feldspar phenocrysts in an aphanitic matrix that contains sparse opaque oxide, biotite, apatite, and zircon, and has a granophyric to micropegmatitic texture.
44	GR-34A	Light-gray, aphanitic rhyolite with <1 percent very sparsely scattered 1-2 mm quartz and sanidine phenocrysts and a rare flake of biotite . White lenticular lithophysae commonly have a medial lens of tridymite.
45	GR-74B	Light-gray, rhyolite porphyry with <5 percent inconspicuous quartz and sanidine phenocrysts in an aphanitic micropegmatitic to aplitic matrix containing numerous plumose spherulites.
46	GR-200B	White, friable, lithophysal rhyolite with 5-10 percent sanidine and amethystine quartz phenocrysts as much as 1/2 cm in diameter. Crystalline hematite or other metallic oxides project into some lithophysal cavities.
47	GR-125C	Light-gray to nearly white, strongly flow-banded porphyritic rhyolite with about 5 percent quartz and sanidine phenocrysts as much as 1/2 cm in diameter in an aphanitic granophyric to micropegmatitic matrix. Wisps of fine muscovite, rare oxidized biotite, and sphene in thin sections. Vugs 1-2 cm long are alined with amethystine quartz.

Table 3.—cont.

Sample no.	Field no.	
48	GR-59B	Light-pinkish-gray rhyolite porphyry dike with about 1-2 percent, 1-2 mm quartz phenocrysts and rare 1-3 mm pink sanidine phenocrysts, and a rare flake of biotite in an aphanitic granophyric to spherulitic matrix.
49	GR-56B	Light-pinkish-gray, porphyritic flow rock with about 20 percent 1-4 mm phenocrysts and microphenocrysts that are predominantly sodic plagioclase, and some quartz plus biotite, brown amphibole, pyroxene and opaque oxide, sphene, and zircon in a spherulitic to glassy matrix.
50	DG-161	Light-gray rhyolite flow rock with about one or two percent scattered quartz phenocrysts in an aphanitic matrix.
51	GR-113B	Light-pink, pumiceous, poorly welded ash-flow tuff with about 20 percent quartz, feldspar, and biotite phenocrysts mostly <1 mm, and a few lithic lapilli in a devitrified cryptocrystalline matrix.
52	DG-175	Light-brown to white flowbanded rhyolite with about 1 percent quartz, sanidine, and plagioclase microphenocrysts in a spherulitic to cryptocrystalline matrix.
53	GR-54G	Light-lavender-gray, irregularly fluidal rhyolite with about 1 percent 1-2 mm pinkish-white plagioclase crystals in an aphanitic cryptocrystalline to granophyric matrix.
54	GR-66B	Massive, white, aphanitic rhyolite with less than 1 percent tiny quartz and feldspar crystals in a microgranular matrix much clouded with fine clay.
	Group III	Post-ash-flow tuff andesites and associated rocks
55	DG-10	Gray, amygdaloidal, aphanitic flow rock with rare yellow-green pyroxene crystals <1 mm long and sparse but conspicuous small quartz xenocrysts.
56	MR-7-74	Dark-gray, aphanitic flow rock with small white amygdules, and scattered brown, oxidized mafic phenocrysts generally <1 mm long. Rock is about 98 percent flow-alined plagioclase microlites with scattered red-orange iddingsite after olivine.
57	MR-6-74	Gray-black, subvitreous, amygdaloidal flow rock with sparse tiny glassy-brown olivine grains in an aphanitic matrix. Microphenocrysts (<5 percent) of plagioclase, pyroxene, and olivine are in a flow-alined microlitic plagioclase matrix.
58	MR-43A-74	Zebra-striped (flow-banded) purplish-gray rock with sparse tiny oxidized mafic crystals in a matrix of microlitic plagioclase.

Table 3.—cont.

Sample no.	Field no.	
59	MR-51A-74	Black, glassy flow rock with small white amygdules and sparse glomeroporphyritic clots. About 1 percent plagioclase (andesine-labradorite) and pyroxene microphenocrysts in a matrix of fine-grained plagioclase and mafic granules with an intersertal texture.
60	MR-81B-75	Gray, aphanitic, vesicular flow rock with a flow-alined microlitic texture of andesine-labradorite microlites and opaque oxide and pyroxene granules. Sample is from flows above 20-meter purplish-gray sandstone lens within flow sequence.
61	MR-81A-75	Reddish-brown, aphanitic, vesicular flow rock with a dictytaxitic, microlitic matrix which contains abundant small subhedral opaque grains and local areas of ophitic-textured pyroxene and plagioclase.
62	OB-4E.-76	Gray, massive, aphanitic flow rock with tiny (<1 mm) rare olivine phenocrysts. Flow-alined microlitic plagioclase matrix contains sparse iddingsitic olivine and pyroxene microphenocrysts.
63	GR-54A	Black, subvitreous, massive flow rock with a few scattered 1-2 mm plagioclase phenocrysts. Sparse andesine and both clinopyroxene and orthopyroxene in a microlitic plagioclase and cryptocrystalline matrix. Rare but conspicuous quartz xenocrysts have reaction borders of pyroxene.
64	GR-6B	Gray, finely vesicular flow rock with andesine and clinopyroxene in dichtytaxitic, microlitic texture with sparse scattered opaque oxide and pyroxene microphenocrysts.
65	GR-6A	Dark-gray, blotchy, massive flow rock with a diabasic texture of clinopyroxene, altered olivine, andesine, and opaque oxide.
66	DG-6	Brownish-gray, dichtytaxitic to diabasic, amygdaloidal flow rock with common opaque oxide and minor plagioclase and clinopyroxene phenocrysts.
67	DG-5	Dark-gray, aphanitic flow rock with clinopyroxene and opaque oxide grains in a dichtytaxitic microlitic plagioclase matrix.
68	DG-3	Brownish-gray, aphanitic flow rock of clinopyroxene grains and trachytoid plagioclase.
69	GR-110A	Gray, aphanitic flow rock with a few small vesicles and microphenocrysts of plagioclase, and rare pyroxene in a flow-alined matrix of microlitic plagioclase.

Table 3.--cont.

Sample no.	Field no.	
70	GR-176A	Greenish-gray, fine-grained, intrusive rock consisting largely of altered subhedral plagioclase crystals with interstitial microlitic to micropegmatitic quartz and feldspar.
71	MR-48D-74	Gray, fine-grained, hypabyssal intrusive rock with small 1-4 mm plagioclase (andesine) and hornblende phenocrysts in a fine-grained matrix.
72	EP-3-75	Gray, fine-grained hypabyssal intrusive rock with abundant 1 mm and smaller plagioclase and pyroxene phenocrysts in a cryptocrystalline to glassy matrix. Orthopyroxene is more abundant than augitic pyroxene.
73	SP-50A-75	Mottled gray flow rock with labradorite phenocrysts several cm long locally, and augitic pyroxene phenocrysts as much as 1-2 cm long. Plagioclase, olivine, and pyroxene intergrown in a subophitic texture.
74	OB-7E-76	Dark-gray, fine-grained amygdaloidal flow rock. Felted microlitic labradorite forms polygonal to radial mosaic pattern with interstitial olivine, pyroxene, and opaque oxide grains.
75	SP-42-75	Black, vesicular, subvitreous flow rock with sparse small (1 mm) olivine and plagioclase phenocrysts in a very fine grained microlitic matrix of flow-alined andesine and interstitial pyroxene.
76	SP-27B-75	Gray, fine-grained hypabyssal intrusive rock with abundant andesine, hornblende, and pyroxene phenocrysts 1-2 mm or smaller in a microgranular matrix.
77	BR-10-74	Dark-gray, aphanitic flow rock with about 10 percent small phenocrysts and microphenocrysts of andesine-labradorite, olivine, and opaque oxide in a microlitic plagioclase matrix.
78	BB-16E-76	Gray, porphyritic hypabyssal intrusive rock with about 15 percent phenocrysts including pink plagioclase and amethystine quartz as much as 1 cm long, and smaller mafic phenocrysts of biotite, greenish-yellow hornblende, sphene, and pyroxene. Some of quartz phenocrysts (or xenocrysts) have reaction rims with pyroxene; others show only corroded borders.
79	GL-2-74	Dark-gray, finely vesicular aphanitic flow rock with sparse green olivine crystals. Microscopically, rock has a diabasic texture of calcic plagioclase laths, olivine, and pyroxene.

Table 3.--cont.

Sample no.	Field no.	
80	GR-30C	Dark-gray to black, massive to vesicular, aphanitic flow rock with sparsely scattered olivine and pyroxene microphenocrysts in a poorly alined microlitic plagioclase matrix.
81	GR-26D	Dark-gray, flow-banded, aphanitic flow rock with rare small (<1 cm) ultramafic inclusions. Less than 1 percent olivine phenocrysts in a well-alined microlitic plagioclase matrix with interstitial olivine and pyroxene and opaque oxide grains.

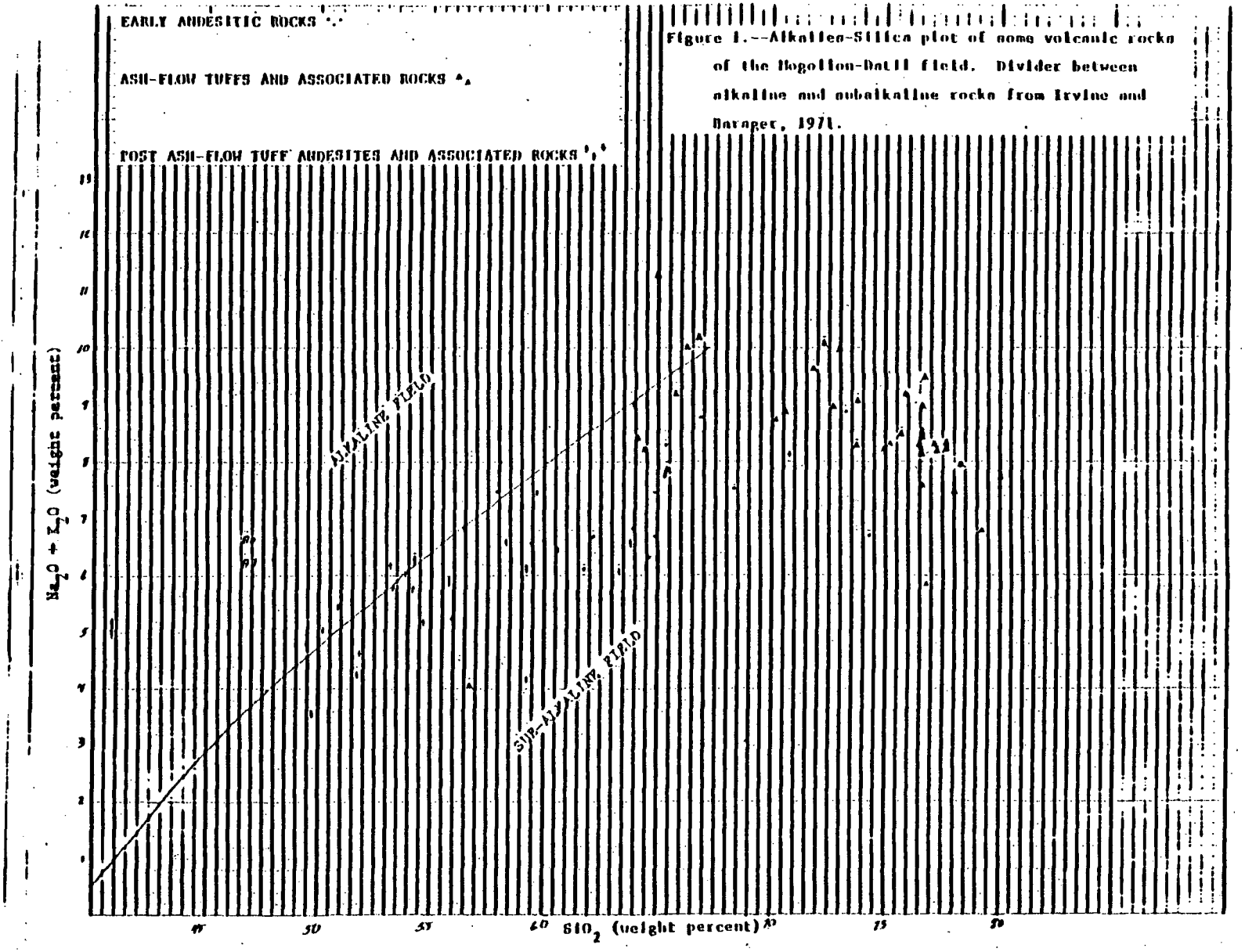


Figure 1.--Alkalies-Silica plot of some volcanic rocks of the Bogoslof-Datil field. Divider between alkaline and subalkaline rocks from Irvine and Baragar, 1971.

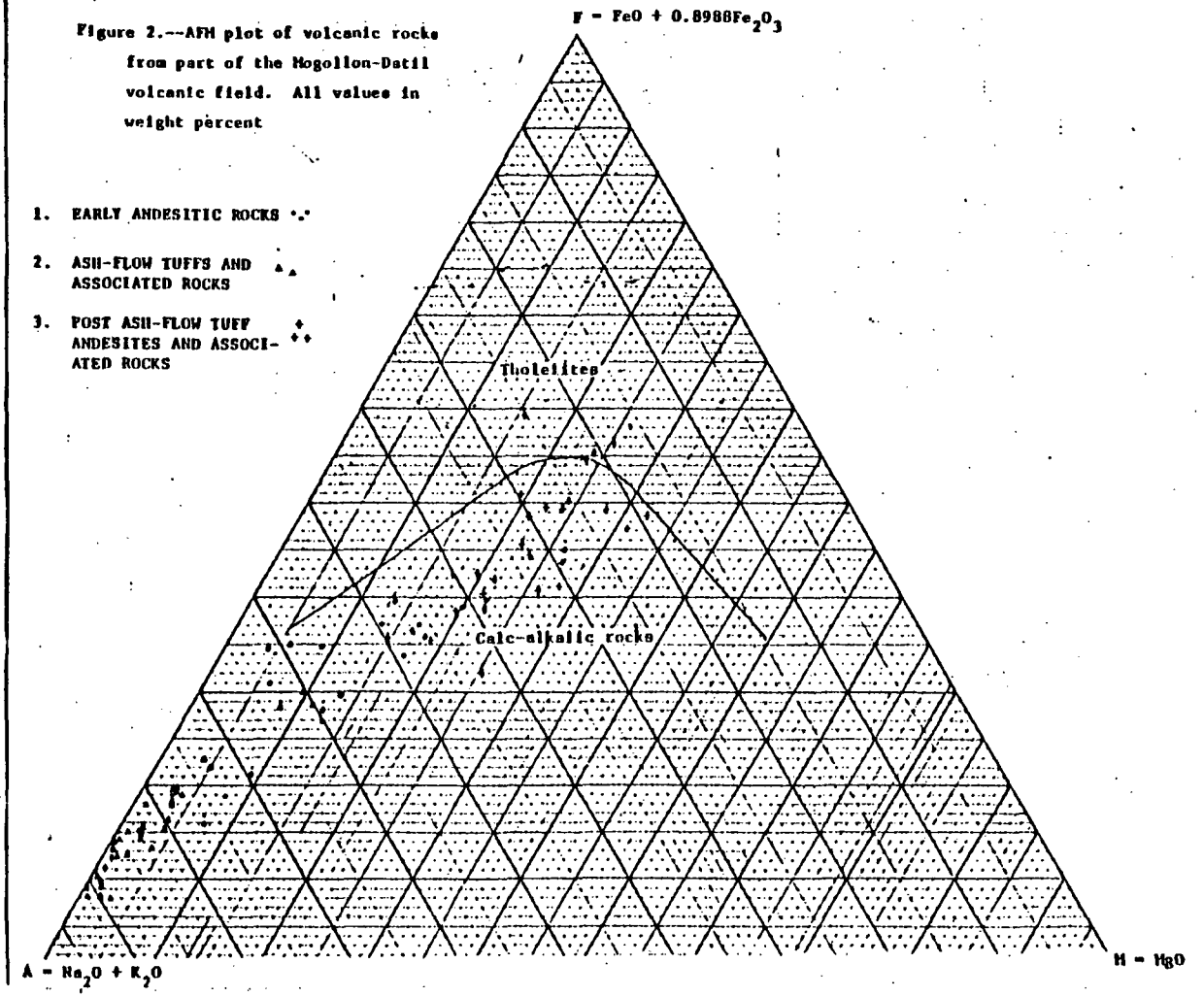


Figure 2.--AFM plot of volcanic rocks from part of the Mogollon-Datil volcanic field. All values in weight percent

Figure 3.--Classification diagram for subalkaline volcanic rocks,

from Irvine and Baragar, 1971.