DEPARTMENT OF THE INTERIOR
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77-724
Table 8

Table 8.--Analyses of intracaldera specimens of Ammonia Tanks Member and tuff of Buttonhook Wash of Timber Mountain Tuff

[Major oxide analyses 1, 2, 4, 5, 8, 10, 12, 13, 16, 17, 19, and 21 by D. F. Powers; 3, 6, 9, 11, 15, and 25 by E. S. Daniels; 18 and 24 by E. L. Munson; 7, 14, 20, 22, and 23 by F. L. D. Elmore, S. D. Botts, G. W. Chloe, Lowell Artis, and H. Smith by rapid methods. Minor element analyses 2, 3, 5-17, 20-23, and 25 by J. C. Hamilton; 18 and 24 by Joseph Haffty by semiquantitative spectrographic methods; 1, 4, and 19 by F. R. Barnett by quantitative methods. Leaders, ---, no analyses made or constituent was absent.]

	Ammonia Tanks Member																					Tuff of Buttonhook Wash	
	Lower part													Upper part						Lower part(?) intruded by tuff dike zone			
	Densely welded crystallized tuff					Partially welded crystallized tuff	Densely welded crystallized tuff		Partially welded crystallized tuff	Vitrophyre	Partially welded crystallized tuff	Vitrophyre	Densely welded crystallized tuff	Partially welded crystallized tuff	Densely welded crystallized tuff			Vitrophyre	Densely welded crystallized tuff			Crystallized tuff		Densely welded crystallized tuff	Partially welded crystallized tuff
Sample localities (figure 2)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Field No.	WJC-176-62	WJC-104-62	WJC-48-62	WJC-181-62	WJC-100-62	WJC-60-62	SL 62 62	WJC-116-62	WJC-56-62	WJC-109-62	WJC-54-62	WJC-112-62	WJC-114-62	TM8338a	WJC-63-62	WJC-37-63	WJC-78-62	WJC-79-62	WJC-146-62	TM8338b	WJC-81-62	AGE-7	SL-62-61	WDQ-19-63	WJC-69-62
Chemical laboratory No.	D100007	I4076	I4038	D100006	I4077	I4041	160328	I4082	I4040	I4079	I4039	I4080	I4081	160522	I4042	D100335	I4074	I4073	D100008	160523	I4075	160521	160327	D100334	I4043
Spectrographic laboratory No.	D100007	I4076	I4038	D100006	I4077	I4041	300643	I4082	I4040	I4079	I4039	I4080	I4081	301784	I4042	D100335	I4074	I4073	D100008	301785	I4075	301783	300642	D100334	I4043
A. Major oxides (weight percent), recalculated without H_2O, F, Cl, and CO_2 as CaCO3																									
SiO_2	67.87	68.16	73.23	73.63	73.95	74.31	74.4	74.51	74.72	74.78	74.92	75.52	76.15	76.9	67.24	67.52	68.66	68.75	70.45	72.3	73.11	71.1	69.8	72.76	76.48
Al_2O_3	16.44	16.30	14.35	14.04	13.91	13.70	13.8	13.56	13.69	13.55	13.62	13.20	12.97	12.7	16.70	16.63	16.18	16.03	15.41	14.9	14.13	15.4	16.0	14.52	12.89
Fe_2O_3	2.43	2.65	1.52	1.42	1.48	1.29	1.4	1.27	1.28	1.07	1.31	1.04	1.10	.95	2.68	1.91	2.08	2.01	1.67	1.5	1.59	2.0	2.3	1.59	1.11
Sum as FeO	2.47	2.56	1.49	1.47	1.41	1.26	1.4	1.23	1.25	1.17	1.20	1.11	0.99	1.01	2.57	2.31	2.12	2.15	1.87	1.7	1.45	2.1	2.3	1.50	1.00
FeO	.28	.18	.12	.19	.08	.10	.12	.09	.10	.21	.02	.17	.00	.16	.16	.59	.27	.34	.37	.33	.02	.26	.23	.07	.00
MgO	.54	.56	.21	.33	.26	.20	.29	.19	.25	.26	.28	.29	.20	.20	.53	.54	.47	.54	.54	.44	.26	.50	.49	.28	.64
CaO	1.80	1.74	.68	.88	.79	.60	.59	.72	.71	.81	.70	.69	.46	.39	1.64	1.51	1.32	1.48	1.66	1.66	.99	1.2	1.2	.66	.57
Na_2O	4.64	4.42	4.35	4.14	4.07	4.46	4.0	4.19	3.91	4.09	3.86	3.69	3.83	4.8	5.53	5.73	5.66	5.53	4.87	4.1	4.24	3.9	4.1	3.18	2.83
K_2O	5.19	5.18	5.09	4.94	5.05	4.97	4.9	5.04	4.96	4.86	4.92	4.68	4.95	4.8	5.53	5.52	5.66	5.67	5.41	5.1	5.17	4.9	5.1	6.52	5.14
TiO_2	.57	.57	.33	.30	.29	.26	.26	.30	.26	.25	.25	.22	.19	.14	.58	.52	.48	.49	.42	.35	.31	.40	.46	.31	.21
P_2O_5	.17	.17	.07	.04	.06	.04	.07	.04	.05	.03	.04	.03	.02	.02	.16	.13	.12	.12	.09	.09	.10	.16	.18	.07	.04
MnO	.08	.05	.05	.08	.06	.06	.08	.08	.06	.09	.08	.03	.13	.06	.16	.11	.07	.09	.09	.09	.09	.08	.09	.03	.09
Total	100.01	99.99	100.00	99.99	100.00	99.99	99.91	99.99	99.99	100.00	100.00	99.98	100.00	100.12	99.98	100.01	100.00	99.99	99.98	100.05	100.01	99.90	99.95	99.99	100.00
B. Minor elements (weight percent)																									
B	<0.001	<0.002	<0.002	0.011	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.003	0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	0.0007	0.003
Ba	.22	.15	.07	.084	.07	.03	.07	.05	.05	.03	.03	.02	.02	.015	.2	.15	.15	.15	.11	.1	.05	.2	.2	.1	.015
Be	.0004	<.0001	.0003	.0005	.0005	.0002	.0003	.0003	.0003	.0005	.0003	.0003	.0003	.0005	.00015	.0001	.0003	.0002	.0005	.0005	.0005	.0003	.0003	.00007	.0003
Ce	.032	.02	<.02	.024	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	.02	.03	.02	.02	.024	.02	<.02	.015	.02	.015	<.02
Co	.0003	<.0005	<.0005	.0002	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	.0002	<.0005	<.0005	.0002	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Cr	.0002	.0002	.00015	.0002	.0002	.0001	.00015	.0001	.0002	.0002	.0001	.00015	.00015	.00015	.0001	.00015	.0002	.0002	.0001	.0002	.00015	.0002	.0002	.0002	<.0001
Cu	.0006	.0005	.0003	.0004	.0002	.0002	.001	.0005	.0002	.0003	.0003	.0007	.0005	.001	.0005	.0007	.0005	.0005	.0004	.0007	.0003	.0007	.0015	.0005	.0002
Ga	.0022	.002	.002	.0019	.002	.002	.003	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.0022	.002	.002	.003	.003	.002	.002
La	.016	.01	.007	.012	.007	.005	.007	.005	.007	.005	.005	.003	.005	.003	.01	.02	.01	.01	.012	.007	.007	.007	.01	.007	<.002
Mo	<.0002	<.0005	<.0005	.0002	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.001	<.001	.002	.002	.0002	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Nb	.003	.002	.002	.003	.002	.002	.003	.002	.002	.002	.002	.002	.002	.003	<.001	<.001	.002	.002	.003	.003	.002	.003	.003	<.001	.002
Nd	.016	.015	<.01	.012	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	.015	.015	.015	.015	.012	.015	<.01	.015	<.01	.01	<.01
Ni	<.0002	<.0003	<.0003	<.0002	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003	<.0002	<.0003	<.0003	<.0003	<.0003	<.0003	<.0003
Pb	.003	.002	.0005	.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	.0007	<.0005	<.0005	<.0005	.0007	.0007	.0005	.0005	.0005	.0005	<.0005	.0007	.0007	.002	.002
Sc	.0007	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0003	.07	.03	.05	.05	.030	.03	.02	.07	.07	.0005	.0005
Sr	.054	.07	.02	.021	.02	.015	.02	.015	.02	.015	.015	.015	.001	<.001	.002	.003	.005	.005	.0024	.003	.0015	.002	.005	.03	.01
V	.0040	.005	.0015	.0017	.0015	.0015	.0015	.0015	.0015	.001	.001	<.001	.001	<.001	.002	.003	.002	.002	.003	.005	.0015	.002	.005	.003	.001
Y	.004	.002	.002	.002	.002	.002	.003	.003	.002	.002	.002	.002	.002	.005	.002	.003	.002	.002	.003	.005	.003	.003	.003	.005	.002
Yb	.0003	.0003	.0003	.0003	.0003	.0003	.0005	.0003	.0003	.0003	.0003	.0002	.0003	.0005	.0003	.0003	.0003	.0003	.0003	.0005	.0003	.0005	.0005	.0005	.0003
Zr	.055	.03	.02	.034	.015	.01	.03	.015	.02	.01	.015	.01	.01	.01	.02	.03	.03	.02	.035	.03	.015	.07	.05	.015	.01
C. Norms (weight percent), from recalculated analyses																									
Quartz	17.1	18.7	27.0	28.5	29.2	28.0	30.7	29.3	31.4	30.8	32.0	34.0	33.9	35.8	15.2	13.9	16.6	17.4	22.6	26.8	26.6	26.7	23.4	27.7	38.4
Orthoclase	30.6	30.6	30.9	29.2	29.8	29.4	29.1	29.8	29.3	28.7	29.1	27.7	29.2	28.1	32.7	33.8	33.5	32.6	28.8	30.1	30.6	29.1	30.4	38.5	30.4
Albite	39.2	37.3	36.7	35.0	34.4	37.7	34.0	35.3	33.0	34.1	32.6	30.8	32.3	31.7	39.8	40.7	39.7	38.7	37.1	34.5	35.8	32.9	34.8	26.9	23.9
Anorthite	7.4	7.1	2.7	3.8	3.2	2.4	2.5	3.0	2.8	3.3	2.8	4.3	1.7	1.8	6.2	6.7	5.3	6.2	6.5	3.6	3.8	5.0	4.9	2.8	2.2
Corundum	.5	.8	.7	.5	.6	.1	.9	.1	.9	.4	.9	.5	.7	.7	.7	.1	.4	.2	.5	1.3	.2	1.8	1.9	1.2	1.9
Enstatite	1.3	1.4	.5	.8	.7	.5	.7	.5	.6	.6	.7	.5	.5	.5	1.3	1.3	1.2	1.4	1.4	1.1	.7	1.3	1.3	1.2	.7
Ferrosilite	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.6
Magnetite	2.4	2.7	1.5	1.4	1.5	1.3	1.4	1.3	1.3	.9	1.3	.9	1.1	.7	2.7	1.4	2.1	2.0	1.5	1.3	1.6	2.1	2.3	1.6	1.1
Hematite	.8	.5	.4	.6	.3	.3	.4	.4	.3	.5	.2	.4	.3	.3	.5	1.0	.7	.9	.8	.7	.2	.7	.7	.2	.2
Ilmenite	.2	.3	.1	.0	.1	.1	.03	.1	.1	.1	.1	.0	.04	.0	.3	.0	.1	.0	.0	.0	.2	.0	.1	.2	.1
Rutile	.2	.3	.2	.1	.1	.1	.2	.1	.1	.1	.1	.1	.05	.05	.4	.3	.3	.3	.2	.2	.2	.3	.4	.2	.1
Apatite	.4	.4	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.3	.3	.3	.2	.2	.2	.2	.3	.2	.2	.1
Total	99.9	99.8	100.7	99.9	99.9	99.9	99.93	99.9	99.8	99.4	99.8	99.4	99.79	99.65	99.8	100.0	99.9	99.7	99.4	99.6	99.9	99.9	100.1	100.0	99.9
D. Minerals (volume percent)																									
Quartz	3.3	0.4	4.9	6.2	4.5	4.8	4.5	4.6	4.9	2.5	3.2	3.1	5.2	5.0	1.4	1.7	1.3	1.4	1.7	2.2	5.1	1.8	1.3	3.0	4.2
Alkali feldspar	15.6	13.4	17.9	14.4	12.2	12.7	11.8	19.3	17.2	12.1	12.6	12.8	10.7	10.0	22.7	33.6	25.6	25.6	17.5	16.1	14.7	13.4	11.9	3.9	13.4
Plagioclase	9.6	9.0	4.4	6.3	2.7	4.9	2.2	2.8	2.6	2.1	2.3	1.7	1.3	1.3	14.0	10.8	8.7	8.7	6.6	6.2	3.7	8.9	10.5	11.2	altered
Biotite	1.7	.8	.6	.7	.7	1.0	.5	.4	.6	.6	.3	.4	.2	.2	1.5	1.7	2.1	1.6	1.0	1.5	0.4	.9	1.9	.3	.2
Clinopyroxene	.2	.3	tr	.1	--	tr	--	--	tr(?)	.1	tr(?)	.2	tr	--	.3	1.3	.4	.7	1.0	.1	.2	--	.4	.4	tr(?)
Hornblende	--	--	--	--	--	tr	--	tr	tr	--	--	--	tr	--	tr	tr	tr	tr	tr	--	--	--	--	altered	--
Sphene	.1	--	--	.1	.3	.2	.4	.1	.5	.3	.3	.1	.3	.2	.9	.6	.9	.3	.6	.6	.5	.5	.6	.1	tr
Opaques	.7	.5	.8	.1	.3	.2	.4	.1	.5	.3	.3	.1	.3	.2	.9	.6	.9	.3	.6	.6	.5	.5	.6	.4	.1
Groundmass	68.8	75.6	71.4	72.1	79.6	76.1	80.4	72.4	74.3	82.5	81.0	81.5	82.2	83.4	59.2	50.0	60.7	61.6	72.6	73.0	75.2	74.5	73.4	80.8	82.1
Modal points counted	1286	1510	1401	1394	1963	1668	5000	1793	1557	2291	2663	2160	2243	2419	1224	1000	1021	1041	2110	2601	1615	1964	5000	2090	2229
E. Major oxides (weight percent), original analyses																									
SiO_2	67.09	67.02	72.59	72.47	75.04	73.77	74.0	73.89	73.86	72.04	73.93	72.56	75.40	75.9	66.54	66.86	68.06	68.11	68.55	70.9	72.61	69.4	67.9	71.69	74.47
Al_2O_3	16.24	16.02	14.22	13.81	13.73	13.60	13.7	13.45	13.52	13.10	13.44	12.64	12.83	12.5	16.52	16.47	16.03	15.88	15.00	14.6	14.03	15.0	15.6	14.31	12.55
Fe_2O_3	2.40	2.61	1.51	1.40	1.46	1.28	1.4	1.26	1.27	1.04	1.29	1.00	1.09	.94	2.66	1.89	2.04	1.99	1.63	1.5	1.58	2.0	2.2	1.57	1.08
FeO	.28	.18	.12	.19	.08	.10	.12	.09	.10	.20	.02	.16	.00	.16	.53	.53	.47	.54	.53	.43	.26	.49	.48	.28	.00
MgO	.53	.55	.21	.32	.26	.20	.29	.19	.25	.25	.28	.28	.20	.20	.53	1.66	1.32	1.53	1.63	.84	.98	1.2	1.2	.71	.62
CaO	1.81	1.72	.67	1.36	.89	.60	.59	.83	.70	.85	.69	1.01	.46	.38	1.63	1.66	1.32	1.53	1.63	4.0	4.21	3.8	4.0	3.13	.66
Na_2O	4.59	4.35	4.31	4.08	4.02	4.63	4.0	4.16	3.87	3.96	3.81	3.54	3.79	3.7	4.66	4.77	4.67	4.57	4.30	4.0	4.21	3.8	4.0	3.13	2.76
K_2O	5.13	5.10	5.05	4.86	4.99	4.94	4.9	5.00	4.91	4.71	4.86	4.49	4.90	4.7	5.48	5.67	5.62	5.48	4.75	5.0	5.14	4.8	5.0	6.42	5.01
H_2O^+	.20	.68	.38	.20	.42	.29	.26	.21	.47	2.68	.55	2.90	.32	.20	.48	.23	.31	.23	.23	.55	.32	.82	.77	.58	1.12
H_2O^-	.38	.79	.42	.22	.34	.26	.26	.26	.30	.24	.25	.21	.19	.14	.57	.51	.48	.49	.41	.35	.31	.39	.45	.42	1.33
TiO_2	.56	.56	.33	.30	.29	.26	.26	.30	.26	.24	.25	.21	.19	.14	.57	.51	.48	.49	.41	.35	.31	.39	.45	.42	1.33
P_2O_5	.17	.17	.07	.04	.06	.04	.07	.04	.05	.03	.04	.03	.02	.02	.16	.13	.12	.12	.09	.09	.10	.16	.18	.07	.04
MnO	.08	.06	.05	.08	.06	.06	.08	.08	.06	.09	.08	.11	.13	.06	.06	.11	.07	.09	.09	.09	.09	.08	.09	.03	.09
CO_2	.03	.01	.01	.00	.00	.00	--	.00	.01	.06	.01	.02	.00	<.05	.02	.13	.01	.06	.01	<.05	.00	<.05	<.05	.10	.20
Cl	.01	.01	.01	.00	.00	.00	--	.00	.01	.06	.01	.05	.00	--	.00	.08	.01	.07	.03	--	.00	--	--	.11	.01
F	.06	.06	.03	.04	.04	.05	--	.04	.06	.07	.05	.08	.06	--	.02	.13	.01	.07	.03	--	.06	--	--	.02	.05
Subtotal	99.56	99.89	99.98	99.76	101.79	99.88		99.82	99.95	99.85	100.08	99.84	99.88		99.89	99.85	99.85	99.75	99.78					99.88	
Less oxygen	.03	.03	.01	.02	.02	.02		.02	.03	.04	.02	.04	.03		.05	.03	.03	.04	.07					.03	
Total	99.53	99.86	99.97	99.74	99.77	99.86	100.50	99.80	99.92	99.81	100.06	99.80	99.85	99.63	99.84	99.82	99.82	99.71	99.71	99.39	99.85	99.34	99.54	99.72	100.07
Powder density	--	--	--	--	--	--	2.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

tr = trace