

File in Modoc prop  
Strat Test 68-16

CHEMICAL ANALYSES AND NORMS OF  
MEDICINE LAKE STRAT TEST 68-16 VOLCANIC ROCKS

Sample	68-16-16	68-16-17	68-16-18	68-16-19A	68-16-19B	68-16-20	68-16-22	68-16-23	68-16-24
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
SiO <sub>2</sub>	73.79	58.25	58.99	57.49	57.42	58.27	70.26	75.31	74.85
TiO <sub>2</sub>	0.18	0.75	0.75	0.73	0.72	0.69	0.15	0.14	0.13
Al <sub>2</sub> O <sub>3</sub>	12.71	17.97	17.91	18.13	17.98	17.84	13.93	13.23	13.26
Fe <sub>2</sub> O <sub>3</sub>	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
FeO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MnO	0.03	0.10	0.10	0.10	0.10	0.10	0.06	0.04	0.03
MgO	0.15	3.81	3.80	4.01	3.96	3.97	0.88	0.06	0.07
CaO	0.81	6.97	6.71	6.99	6.96	6.83	1.13	0.84	0.81
Na <sub>2</sub> O	3.11	3.02	3.02	2.81	2.85	2.91	2.96	3.69	3.48
K <sub>2</sub> O	4.42	1.17	1.40	1.34	1.33	1.33	3.64	3.74	3.88
P <sub>2</sub> O <sub>5</sub>	0.01	0.13	0.16	0.16	0.16	0.16	0.02	0.01	0.01
H <sub>2</sub> O <sup>+</sup>	1.47	1.73	0.99	1.05	1.05	0.98	3.63	0.28	0.60
H <sub>2</sub> O <sup>-</sup>	<u>0.11</u>	<u>0.25</u>	<u>0.21</u>	<u>0.30</u>	<u>0.30</u>	<u>0.24</u>	<u>2.71</u>	<u>0.06</u>	<u>0.05</u>
Total	98.01	100.92	101.00	99.79	99.75	100.08	100.98	98.93	98.71
q	36.84	16.32	16.36	15.67	15.63	16.40	35.43	37.67	37.94
c	1.36	0.0	0.0	0.0	0.0	0.0	3.11	1.61	1.89
or	26.12	6.91	8.27	7.92	7.86	7.86	21.51	22.10	22.93
ab	26.32	25.55	25.55	23.78	24.12	24.62	25.05	31.22	29.45
an	3.97	32.02	31.18	32.90	32.34	31.69	5.48	4.10	3.95
wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-en	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hy-en	0.37	9.49	9.46	9.99	9.86	9.89	2.19	0.15	0.17
hy-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
il	0.06	0.21	0.21	0.21	0.21	0.21	0.13	0.09	0.06
hm	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
tn	0.0	1.20	0.75	0.52	0.81	0.81	0.0	0.0	0.0
ru	0.15	0.15	0.33	0.41	0.28	0.25	0.08	0.09	0.10
ap	<u>0.02</u>	<u>0.31</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.05</u>	<u>0.02</u>	<u>0.01</u>
Total	96.42	98.94	99.81	98.45	98.41	98.87	94.64	98.59	98.01
Femic	1.82	18.13	17.40	18.18	18.46	18.30	4.06	1.88	1.91
Salic	94.60	80.81	82.41	80.26	79.95	80.57	90.58	96.70	96.10

All values are in weight percent

CHEMICAL ANALYSES AND NORMS OF  
MEDICINE LAKE STRAT TEST 68-16 VOLCANIC ROCKS

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
SiO <sub>2</sub>	73.79	58.25	58.99	57.49	57.42	58.27	70.26	75.31	74.85
TiO <sub>2</sub>	0.18	0.75	0.75	0.73	0.72	0.69	0.15	0.14	0.13
Al <sub>2</sub> O <sub>3</sub>	12.71	17.97	17.91	18.13	17.98	17.84	13.93	13.23	13.26
Fe <sub>2</sub> O <sub>3</sub>	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
FeO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MnO	0.03	0.10	0.10	0.10	0.10	0.10	0.06	0.04	0.03
MgO	0.15	3.81	3.80	4.01	3.96	3.97	0.88	0.06	0.07
CaO	0.81	6.97	6.71	6.99	6.96	6.83	1.13	0.84	0.81
Na <sub>2</sub> O	3.11	3.02	3.02	2.81	2.85	2.91	2.96	3.69	3.48
K <sub>2</sub> O	4.42	1.17	1.40	1.34	1.33	1.33	3.64	3.74	3.88
P <sub>2</sub> O <sub>5</sub>	0.01	0.13	0.16	0.16	0.16	0.16	0.02	0.01	0.01
H <sub>2</sub> O <sup>+</sup>	1.47	1.73	0.99	1.05	1.05	0.98	3.63	0.28	0.60
H <sub>2</sub> O <sup>-</sup>	<u>0.11</u>	<u>0.25</u>	<u>0.21</u>	<u>0.30</u>	<u>0.30</u>	<u>0.24</u>	<u>2.71</u>	<u>0.06</u>	<u>0.05</u>
Total	98.01	100.92	101.00	99.79	99.75	100.08	100.98	98.93	98.71
q	36.84	16.32	16.36	15.67	15.63	16.40	35.43	37.67	37.94
c	1.36	0.0	0.0	0.0	0.0	0.0	3.11	1.61	1.80
or	26.12	6.91	8.27	7.92	7.86	7.86	21.51	22.10	22.93
ab	26.32	25.55	25.55	23.78	24.12	24.62	25.05	31.22	29.45
an	3.97	32.02	31.18	32.90	32.34	31.69	5.48	4.10	3.95
wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-en	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hy-en	0.37	9.49	9.46	9.99	9.86	9.89	2.19	0.15	0.17
hy-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
il	0.06	0.21	0.21	0.21	0.21	0.21	0.13	0.09	0.06
hm	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
tn	0.0	1.20	0.75	0.52	0.81	0.81	0.0	0.0	0.0
ru	0.15	0.15	0.33	0.41	0.28	0.25	0.08	0.09	0.10
ap	<u>0.02</u>	<u>0.31</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.05</u>	<u>0.02</u>	<u>0.02</u>
Total	96.42	98.94	99.81	98.45	98.41	98.87	94.64	98.59	98.06
Femic	1.82	18.13	17.40	18.18	18.46	18.30	4.06	1.88	1.90
Salic	94.60	80.81	82.41	80.26	79.95	80.57	90.58	96.70	96.16

All values are in weight percent

CHEMICAL ANALYSES AND NORMS OF  
MEDICINE LAKE STRAT TEST 68-16 VOLCANIC ROCKS

Sample	68-16-16	68-16-17	68-16-18	68-16-19A	68-16-19B	68-16-20	68-16-22	68-16-23	68-16-24
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
SiO <sub>2</sub>	73.79	58.25	58.99	57.49	57.42	58.27	70.26	75.31	74.85
TiO <sub>2</sub>	0.18	0.75	0.75	0.73	0.72	0.69	0.15	0.14	0.13
Al <sub>2</sub> O <sub>3</sub>	12.71	17.97	17.91	18.13	17.98	17.84	13.93	13.23	13.26
Fe <sub>2</sub> O <sub>3</sub>	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
FeO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MnO	0.03	0.10	0.10	0.10	0.10	0.10	0.06	0.04	0.03
MgO	0.15	3.81	3.80	4.01	3.96	3.97	0.88	0.06	0.07
CaO	0.81	6.97	6.71	6.99	6.96	6.83	1.13	0.84	0.81
Na <sub>2</sub> O	3.11	3.02	3.02	2.81	2.85	2.91	2.96	3.69	3.48
K <sub>2</sub> O	4.42	1.17	1.40	1.34	1.33	1.33	3.64	3.74	3.88
P <sub>2</sub> O <sub>5</sub>	0.01	0.13	0.16	0.16	0.16	0.16	0.02	0.01	0.01
H <sub>2</sub> O+	1.47	1.73	0.99	1.05	1.05	0.98	3.63	0.28	0.68
H <sub>2</sub> O-	<u>0.11</u>	<u>0.25</u>	<u>0.21</u>	<u>0.30</u>	<u>0.30</u>	<u>0.24</u>	<u>2.71</u>	<u>0.06</u>	<u>0.05</u>
Total	98.01	100.92	101.00	99.79	99.75	100.08	100.98	98.93	98.71
q	36.84	16.32	16.36	15.67	15.63	16.40	35.43	37.67	37.91
c	1.36	0.0	0.0	0.0	0.0	0.0	3.11	1.61	1.81
or	26.12	6.91	8.27	7.92	7.86	7.86	21.51	22.10	22.91
ab	26.32	25.55	25.55	23.78	24.12	24.62	25.05	31.22	29.45
an	3.97	32.02	31.18	32.90	32.34	31.69	5.48	4.10	3.95
wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-en	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hy-en	0.37	9.49	9.46	9.99	9.86	9.89	2.19	0.15	0.17
hy-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
il	0.06	0.21	0.21	0.21	0.21	0.21	0.13	0.09	0.06
hm	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
tn	0.0	1.20	0.75	0.52	0.81	0.81	0.0	0.0	0.0
ru	0.15	0.15	0.33	0.41	0.28	0.25	0.08	0.09	0.10
ap	<u>0.02</u>	<u>0.31</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.05</u>	<u>0.02</u>	<u>0.02</u>
Total	96.42	98.94	99.81	98.45	98.41	98.87	94.64	98.59	98.06
Femic	1.82	18.13	17.40	18.18	18.46	18.30	4.06	1.88	1.90
Salic	94.60	80.81	82.41	80.26	79.95	80.57	90.58	96.70	96.16

All values are in weight percent

CHEMICAL ANALYSES AND NORMS OF  
MEDICINE LAKE STRAT TEST 68-16 VOLCANIC ROCKS

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
SiO <sub>2</sub>	73.79	58.25	58.99	57.49	57.42	58.27	70.26	75.31	74.85
TiO <sub>2</sub>	0.18	0.75	0.75	0.73	0.72	0.69	0.15	0.14	0.13
Al <sub>2</sub> O <sub>3</sub>	12.71	17.97	17.91	18.13	17.98	17.84	13.93	13.23	13.26
Fe <sub>2</sub> O <sub>3</sub>	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
FeO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MnO	0.03	0.10	0.10	0.10	0.10	0.10	0.06	0.04	0.03
MgO	0.15	3.81	3.80	4.01	3.96	3.97	0.88	0.06	0.07
CaO	0.81	6.97	6.71	6.99	6.96	6.83	1.13	0.84	0.81
Na <sub>2</sub> O	3.11	3.02	3.02	2.81	2.85	2.91	2.96	3.69	3.48
K <sub>2</sub> O	4.42	1.17	1.40	1.34	1.33	1.33	3.64	3.74	3.88
P <sub>2</sub> O <sub>5</sub>	0.01	0.13	0.16	0.16	0.16	0.16	0.02	0.01	0.01
H <sub>2</sub> O <sup>+</sup>	1.47	1.73	0.99	1.05	1.05	0.98	3.63	0.28	0.60
H <sub>2</sub> O <sup>-</sup>	<u>0.11</u>	<u>0.25</u>	<u>0.21</u>	<u>0.30</u>	<u>0.30</u>	<u>0.24</u>	<u>2.71</u>	<u>0.06</u>	<u>0.05</u>
Total	98.01	100.92	101.00	99.79	99.75	100.08	100.98	98.93	98.71

q	36.84	16.32	16.36	15.67	15.63	16.40	35.43	37.67	37.94
c	1.36	0.0	0.0	0.0	0.0	0.0	3.11	1.61	1.89
or	26.12	6.91	8.27	7.92	7.86	7.86	21.51	22.10	22.93
ab	26.32	25.55	25.55	23.78	24.12	24.62	25.05	31.22	29.45
an	3.97	32.02	31.18	32.90	32.34	31.69	5.48	4.10	3.95
wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-wo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-en	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
di-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hy-en	0.37	9.49	9.46	9.99	9.86	9.89	2.19	0.15	0.17
hy-fs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
il	0.06	0.21	0.21	0.21	0.21	0.21	0.13	0.09	0.06
hm	1.22	6.77	6.26	6.68	6.92	6.76	1.61	1.53	1.54
tn	0.0	1.20	0.75	0.52	0.81	0.81	0.0	0.0	0.0
ru	0.15	0.15	0.33	0.41	0.28	0.25	0.08	0.09	0.10
ap	<u>0.02</u>	<u>0.31</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.05</u>	<u>0.02</u>	<u>0.02</u>
Total	96.42	98.94	99.81	98.45	98.41	98.87	94.64	98.59	98.06
Femic	1.82	18.13	17.40	18.18	18.46	18.30	4.06	1.88	1.90
Salic	94.60	80.81	82.41	80.26	79.95	80.57	90.58	96.70	96.16

All values are in weight percent

TRACE ELEMENT ANALYSES  
 MEDICINE LAKE STRAT TEST 68-16

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
S*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cl	702.27	<50.00	<50.00	167.68	127.43	163.18	345.63	<50.00	<50.00
V	<20.00	149.34	126.73	164.75	151.20	156.11	23.60	<20.00	<20.00
Ni	<20.00	60.15	43.30	57.52	45.41	64.04	<20.00	<20.00	<20.00
Cu	<20.00	73.39	55.09	50.59	41.30	60.90	<20.00	<20.00	<20.00
Zn	48.92	82.79	78.90	82.08	77.83	78.36	50.02	47.80	44.91
Rb	134.15	22.97	29.45	23.56	<20.00	<20.00	104.08	106.08	95.34
Sr	57.75	595.69	585.04	617.36	588.62	516.43	129.22	92.46	84.35
Zr	207.13	140.08	162.12	135.92	150.53	97.79	159.71	149.26	153.73
Ba	829.37	322.70	379.70	339.27	323.59	351.07	1000.81	932.49	934.23
Pb	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.00	<40.0

All trace elements except S are in ppm

\*Weight percent

TRACE ELEMENT ANALYSES  
 MEDICINE LAKE STRAT TEST 68-16

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
S*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cl	702.27	<50.00	<50.00	167.68	127.43	163.18	345.63	<50.00	<50.00
V	<20.00	149.34	126.73	164.75	151.20	156.11	23.60	<20.00	<20.00
Ni	<20.00	60.15	43.30	57.52	45.41	64.04	<20.00	<20.00	<20.00
Cu	<20.00	73.39	55.09	50.59	41.30	60.90	<20.00	<20.00	<20.00
Zn	48.92	82.79	78.90	82.08	77.83	78.36	50.02	47.80	44.91
Rb	134.15	22.97	29.45	23.56	<20.00	<20.00	104.08	106.08	95.34
Sr	57.75	595.69	585.04	617.36	588.62	516.43	129.22	92.46	84.35
Zr	207.13	140.08	162.12	135.92	150.53	97.79	159.71	149.26	153.73
Ba	829.37	322.70	379.70	339.27	323.59	351.07	1000.81	932.49	934.23
Pb	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.00	<40.0

All trace elements except S are in ppm

\*Weight percent

TRACE ELEMENT ANALYSES  
MEDICINE LAKE STRAT TEST 68-16

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
S*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cl	702.27	<50.00	<50.00	167.68	127.43	163.18	345.63	<50.00	<50.00
V	<20.00	149.34	126.73	164.75	151.20	156.11	23.60	<20.00	<20.00
Ni	<20.00	60.15	43.30	57.52	45.41	64.04	<20.00	<20.00	<20.00
Cu	<20.00	73.39	55.09	50.59	41.30	60.90	<20.00	<20.00	<20.00
Zn	48.92	82.79	78.90	82.08	77.83	78.36	50.02	47.80	44.91
Rb	134.15	22.97	29.45	23.56	<20.00	<20.00	104.08	106.08	95.34
Sr	57.75	595.69	585.04	617.36	588.62	516.43	129.22	92.46	84.35
Zr	207.13	140.08	162.12	135.92	150.53	97.79	159.71	149.26	153.73
Ba	829.37	322.70	379.70	339.27	323.59	351.07	1000.81	932.49	934.23
Pb	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.00	<40.0

All trace elements except S are in ppm

\*Weight percent



TRACE ELEMENT ANALYSES  
 MEDICINE LAKE STRAT TEST 68-16

Sample	<u>68-16-16</u>	<u>68-16-17</u>	<u>68-16-18</u>	<u>68-16-19A</u>	<u>68-16-19B</u>	<u>68-16-20</u>	<u>68-16-22</u>	<u>68-16-23</u>	<u>68-16-24</u>
Depth (ft)	1,855	2,010	2,056	2,081	2,081	2,169	2,420	2,581	2,935
Elevation (ft)	4,545	4,390	4,344	4,319	4,319	4,231	3,980	3,819	3,465
S*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cl	702.27	<50.00	<50.00	167.68	127.43	163.18	345.63	<50.00	<50.00
V	<20.00	149.34	126.73	164.75	151.20	156.11	23.60	<20.00	<20.00
Ni	<20.00	60.15	43.30	57.52	45.41	64.04	<20.00	<20.00	<20.00
Cu	<20.00	73.39	55.09	50.59	41.30	60.90	<20.00	<20.00	<20.00
Zn	48.92	82.79	78.90	82.08	77.83	78.36	50.02	47.80	44.91
Rb	134.15	22.97	29.45	23.56	<20.00	<20.00	104.08	106.08	95.34
Sr	57.75	595.69	585.04	617.36	588.62	516.43	129.22	92.46	84.35
Zr	207.13	140.08	162.12	135.92	150.53	97.79	159.71	149.26	153.73
Ba	829.37	322.70	379.70	339.27	323.59	351.07	1000.81	932.49	934.23
Pb	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.00	<40.0

All trace elements except S are in ppm

\*Weight percent