Study of Withers hydrous glass set Feb 09, 2008

NSL, N1, N3, N3.35, N4.6, N5

Analytical conditions: 40 degrees takeoff, 15 keV, 10nA, 20 um beam (see appendix A for details)

The following table shows the results corrected for intensity change over time (Na, K, Ti, Si and O) using MgO as the oxygen standard and correcting for peak shape changes using compound area-peak-shape factors (APFs) calculated from binary factors (from Bastin). Note that N4.6 is actually N4b as I misread the label.

	H20 (FTIR)	**Na VOL%**	**Si VOL%**	**O VOL%**	**H20 w/o blank**	**H20 w/ blank**	**Total w/ blank**
NSL	**0.01 (0.13)**	30.4	-0.26	-0.38	1.01	**0.11**	**99.52**
N1	**1.16 (1.16)**	43.5	-0.34	-0.75	2.44	**1.33**	**98.78**
N3	**3.28 (3.30)**	84.4	-0.51	-1.88	3.93	**2.81**	**99.76**
N3.35	**3.56 (3.51)**	76.3	-0.52	-2.24	4.73	**3.61**	**98.69**
N4.6 (b)	**4.11 (4.11)**	93.6	-0.78	-2.33	5.22	**4.10**	**99.80**
N5	**4.90 (5.06)**	107.2	-0.73	-2.92	6.39	**5.28**	**99.59**

H20 wt% are the FTIR H20 values from Tony Withers (original and revised)
VOL% are the percent volatile intensity corrections (intensity change over time) that were applied (K and Ti volatile correction not shown in table)
H20 w/o blank are the H20 from measured excess oxygen concentrations based on hydrogen stocihiometry (included in matrix correction)
H20 w blank are the H20 from measured excess oxygen based on hydrogen stocihiometry (included in matrix and with K-411 “blank” correction)

Note that the sodium volatile corrections were fairly large even with a 10 nA and 20 um beam. Also note that the oxygen intensity did increase even more significantly than the Si intensity. The last two glasses (N4.6 (b) and N5 had volatile corrections for Na about 100% which is pretty impressive considering.

The “H20 w/o blank” column shows the results with all of the corrections except for the “iterated blank” correction. The accuracy issues for H20 are clearly visible. Perhaps these are from adsorbed water or a slightly differing carbon coat thickness on the standard mount? I will perform further tests to try and determine these parameters.

The “H20 w/ blank” shows the results with the Donovan et. al. “iterated blank” correction applied to oxygen for all samples based on NBS K-411 glass oxygen concentration. The oxygen concentration of this glass had been previously adjusted for excess oxygen from

photometry by Taylor as shown below in appendix B for a total oxygen of 43.558 wt%. The analysis of NBS K-411 glass standard as an unknown is shown in appendix C.

Bsides the H20 values now looking quite respectable, the totals also look quite good (if that ever means anything)! This is just a first attempt, but I guess the best way to think of this is that technique might be described as a matrix corrected calibration curve for absolute accuracy based on a single standard. I would like to try this on some hydrous minerals and Ed is getting a set together for me. Let me know if you have any questions as I would be happy to have additional testing performed.

John Donovan

Complete Analyses of Withers glasses:

Probe for Windows Enterprise Edition for Electron Probe Micro Analysis
Database File: C:\UserData\Donovan\Withers\Withers_01-31-2008.MDB
Database File Type: PROBE
DataFile Version Number: 7.42
Program Version Number: 7.42
Database File User Name: John Donovan
Database File Description: NSL-N6

Database Created: 1/31/2008 10:24:36 AM
Last Updated: 1/31/2008 10:24:36 AM
Last Modified: 2/9/2008 4:07:53 PM
Current Date and Time: 2/9/2008 5:40:46 PM
Nominal Beam: 30 (nA)
Faraday/Absorbed Averages: 1

Un 12 Withers-NSL

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TakeOff = 40.0  KiloVolt = 15.0  Beam Current = 10.0  Beam Size =   20
(Magnification (analytical) =  20000),        Beam Mode = Analog  Spot
(Magnification (default) =      600, Magnification (imaging) =    600)
Number of Data Lines:  12            Number of 'Good' Data Lines:  12
First/Last Date-Time: 02/01/2008 03:41:54 PM to 02/01/2008 04:22:23 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:       47.670     Average Total Weight%:   99.517
Average Calculated Oxygen:  47.869     Average Atomic Number:   11.539
Average Excess Oxygen:       -.199     Average Atomic Weight:   20.822
Oxygen Equiv. from Halogen:   .088  Halogen Corrected Oxygen:   47.582
Average ZAF Iteration:       10.00     Average Quant Iterate:     4.75

Results in Elemental Weight Percents
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ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP	
ABS%:	-44.62	.00	.00	.00	.00	.00	-.03	.00	-4.88	-16.28	-20.97	-32.82	.00	

TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00		
ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
514	4.175	3.582	.212	-.042	.110	.097	3.196	.025	.109	34.862	5.517	.002	47.392	.000	99.239
515	3.654	3.618	.234	-.070	.108	.143	3.210	.085	.149	34.682	5.498	-.001	47.764	.032	99.106
516	3.957	3.430	.215	.048	.038	.136	3.203	.063	.148	34.779	5.531	.005	47.426	.000	98.979
517	3.786	3.624	.290	-.008	.164	.101	3.194	.095	.116	34.897	5.549	.002	47.585	.000	99.396
518	4.137	3.612	.234	.016	.069	.091	3.223	.089	.114	34.894	5.517	.002	47.433	.000	99.430
519	4.039	3.728	.153	.007	.091	.101	3.167	.063	.130	34.739	5.486	.002	47.517	.000	99.223
520	4.371	3.701	.209	.010	.097	.149	3.144	.068	.126	34.938	5.513	.001	47.751	.000	100.079
521	4.244	3.779	.209	.019	.085	.133	3.201	-.003	.121	34.900	5.515	.008	47.796	.000	100.007
522	4.174	3.714	.220	-.030	.056	.127	3.171	.054	.123	35.009	5.555	.003	47.804	.000	99.979
523	4.037	3.739	.287	-.041	.079	.130	3.114	.038	.130	34.603	5.508	.002	47.667	.017	99.310
524	4.213	3.721	.231	.027	.084	.156	3.168	.062	.130	34.757	5.511	.001	47.949	.017	100.027
525	3.864	3.785	.207	-.002	.075	.176	3.153	.073	.105	34.420	5.536	.004	47.956	.077	99.430
AVER:	4.054	3.669	.225	-.005	.088	.128	3.179	.059	.125	34.790	5.520	.003	47.670	.012	99.517
SDEV:	.208	.101	.036	.034	.032	.026	.032	.028	.014	.164	.020	.002	.198	.023	
SERR:	.060	.029	.011	.010	.009	.008	.009	.008	.004	.047	.006	.001	.057	.007	
%RSD:	5.1	2.8	16.2	-623.4	35.8	20.5	1.0	47.1	10.9	.5	.4	82.2	.4	193.2	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2449.9	2421.8	838.1	8514.1	2399.7	6084.4	14139.5	13633.6	2253.4	34413.8	23230.4	24409.9	8344.6	.0	
UNKF:	.0218	.0320	.0018	.0000	.0002	.0011	.0267	.0005	.0011	.2859	.0426	.0000	.2141	.0000	
UNCT:	725.1	683.9	25.2	-.5	3.1	11.9	555.9	9.1	15.0	48757.3	7440.3	.9	7678.0	.0	
UNBG:	10.2	13.6	5.3	30.5	3.9	6.0	23.8	18.9	4.4	133.6	103.5	15.5	49.0	.0	
ZCOR:	1.8632	1.1480	1.2468	1.3624	3.9736	1.1876	1.1926	1.2120	1.1123	1.2168	1.2946	1.4917	2.2263	.0000	
KRAW:	.2960	.2824	.0300	-.0001	.0013	.0019	.0393	.0007	.0066	1.4168	.3203	.0000	.9201	.0000	
PKBG:	72.38	52.48	6.02	.99	1.88	3.18	24.34	1.52	4.42	366.04	72.91	1.06	158.50	.00	
INT%:	----	----	----	-9.19	----	-.01	----	----	----	----	----	----	----	----	
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.032	----	
VOL%:	30.469	-.862	----	----	----	----	----	----	----	-.266	----	----	-.373	----	
DEV%:	1.8	2.1	----	----	----	----	----	----	----	.3	----	----	.3	----	
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----	
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----	
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----	
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----	

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
514	5.627	4.315	.212	-.046	.110	.163	4.112	.033	.152	74.583	10.425	.003	-.450	.000	99.239
515	4.926	4.358	.234	-.079	.108	.239	4.130	.109	.209	74.197	10.388	-.001	.000	.288	99.106
516	5.333	4.132	.215	.053	.038	.227	4.121	.082	.207	74.404	10.451	.008	-.293	.000	98.979

517	5.103	4.366	.290	-.009	.164	.168	4.110	.122	.163	74.657	10.485	.003	-.226	.000	99.396
518	5.577	4.350	.234	.018	.069	.152	4.147	.114	.159	74.651	10.424	.004	-.468	.000	99.430
519	5.444	4.491	.153	.007	.091	.168	4.074	.082	.182	74.319	10.365	.004	-.158	.000	99.223
520	5.891	4.458	.209	.011	.097	.249	4.044	.088	.177	74.745	10.418	.002	-.311	.000	100.079
521	5.721	4.552	.209	.022	.085	.222	4.118	-.004	.170	74.664	10.420	.013	-.184	.000	100.007
522	5.627	4.474	.220	-.034	.056	.211	4.080	.069	.172	74.897	10.496	.006	-.294	.000	99.979
523	5.442	4.504	.287	-.046	.079	.217	4.006	.049	.182	74.028	10.407	.004	.000	.151	99.310
524	5.678	4.483	.231	.031	.084	.260	4.075	.080	.182	74.358	10.413	.001	.000	.151	100.027
525	5.208	4.559	.207	-.002	.075	.293	4.057	.094	.147	73.637	10.461	.007	.000	.687	99.430
AVER:	5.465	4.420	.225	-.006	.088	.214	4.089	.077	.175	74.428	10.429	.004	-.199	.106	99.517
SDEV:	.280	.122	.036	.038	.032	.044	.041	.036	.019	.351	.038	.004	.172	.205	
SERR:	.081	.035	.011	.011	.009	.013	.012	.010	.006	.101	.011	.001	.050	.059	
%RSD:	5.1	2.8	16.2	-623.4	35.8	20.5	1.0	47.1	10.9	.5	.4	82.2	-86.8	193.2	

Un 13 Withers-N1

TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot
(Magnification (default) = 600, Magnification (imaging) = 600)
Number of Data Lines: 12 Number of 'Good' Data Lines: 12
First/Last Date-Time: 02/01/2008 04:26:20 PM to 02/01/2008 05:07:03 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:	47.823	Average Total Weight%:	98.796
Average Calculated Oxygen:	47.823	Average Atomic Number:	11.517
Average Excess Oxygen:	.000	Average Atomic Weight:	20.222
Oxygen Equiv. from Halogen:	.080	Halogen Corrected Oxygen:	47.742
Average ZAF Iteration:	12.17	Average Quant Iterate:	4.58

Results in Elemental Weight Percents

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC	
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP		
ABS%:	-44.83	.00	.00	.00	.00	.00	-.02	.00	-4.81	-16.38	-21.06	-32.92	.00		
TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00		

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
526	3.943	3.644	.258	.060	.082	.140	3.287	.071	.138	33.789	5.543	.007	47.527	.108	98.597

527	4.217	3.519	.247	.013	.036	.166	3.206	.060	.147	33.960	5.524	.004	47.803	.113	99.015
528	4.274	3.960	.161	.081	.076	.127	3.266	.041	.124	33.718	5.526	.007	47.903	.148	99.411
529	3.734	3.851	.242	.048	.052	.127	3.194	.076	.139	33.793	5.510	.008	48.036	.184	98.994
530	4.097	3.776	.244	-.008	.092	.160	3.268	.036	.146	33.782	5.552	.004	48.123	.174	99.444
531	3.868	3.644	.239	.009	.064	.215	3.244	.036	.130	33.669	5.541	.003	47.916	.176	98.754
532	3.843	3.736	.185	-.003	.039	.150	3.235	.022	.142	33.727	5.536	.005	47.804	.159	98.580
533	3.777	3.694	.231	.012	.095	.133	3.192	.071	.147	33.724	5.572	.002	47.667	.143	98.459
534	3.831	3.657	.228	.005	.055	.176	3.184	.042	.133	33.752	5.548	.005	47.850	.161	98.628
535	3.600	3.510	.242	-.016	.108	.117	3.216	.079	.137	33.823	5.507	.003	47.695	.153	98.174
536	4.094	3.750	.169	-.019	.123	.169	3.241	.075	.161	33.864	5.526	.004	47.880	.134	99.169
537	3.747	3.629	.172	.008	.069	.156	3.206	.067	.132	33.831	5.502	.003	47.669	.137	98.328
AVER:	3.919	3.698	.218	.016	.074	.153	3.228	.056	.140	33.786	5.532	.005	47.823	.149	98.796
SDEV:	.209	.129	.035	.031	.027	.027	.034	.020	.010	.078	.020	.002	.167	.024	
SERR:	.060	.037	.010	.009	.008	.008	.010	.006	.003	.022	.006	.001	.048	.007	
%RSD:	5.3	3.5	16.2	195.3	36.2	17.7	1.0	34.8	6.9	.2	.4	43.6	.3	15.9	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2449.5	2422.2	838.4	8515.4	2399.5	6087.0	14138.9	13624.9	2252.2	34389.1	23229.1	24410.0	8342.9	.0	
UNKF:	.0209	.0322	.0018	.0001	.0002	.0013	.0270	.0005	.0013	.2768	.0426	.0000	.2161	.0000	
UNCT:	696.7	688.8	24.4	1.3	2.6	14.1	563.5	8.6	16.7	47171.0	7429.9	1.6	7745.8	.0	
UNBG:	10.1	13.9	6.2	29.9	3.9	4.6	23.8	17.2	4.4	133.6	103.3	15.5	51.1	.0	
ZCOR:	1.8741	1.1488	1.2465	1.3633	3.9957	1.1893	1.1948	1.2143	1.1135	1.2205	1.2993	1.4971	2.2134	.0000	
KRAW:	.2844	.2844	.0291	.0002	.0011	.0023	.0399	.0006	.0074	1.3717	.3199	.0001	.9284	.0000	
PKBG:	69.91	50.75	6.03	1.05	1.71	4.58	24.72	1.52	4.80	354.10	72.91	1.10	153.41	.00	
INT%:	----	----	----	4.43	----	-.02	----	----	----	----	----	----	----	----	
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.031	----	
VOL%:	43.532	1.039	----	----	----	----	----	----	----	-.344	----	----	-.750	----	
DEV%:	1.9	2.6	----	----	----	----	----	----	----	.2	----	----	.3	----	
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----	
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----	
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----	
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----	

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
526	5.315	4.389	.258	.067	.082	.233	4.229	.091	.193	72.287	10.473	.012	.000	.967	98.597
527	5.685	4.239	.247	.014	.036	.277	4.125	.077	.205	72.652	10.438	.006	.000	1.014	99.015
528	5.761	4.770	.161	.090	.076	.211	4.201	.053	.174	72.135	10.440	.012	.000	1.326	99.411
529	5.034	4.639	.242	.054	.052	.212	4.109	.098	.195	72.295	10.411	.014	.000	1.640	98.994
530	5.523	4.549	.244	-.009	.092	.266	4.204	.046	.204	72.271	10.490	.007	.000	1.559	99.444
531	5.215	4.389	.239	.010	.064	.358	4.173	.046	.183	72.030	10.469	.005	.000	1.573	98.754
532	5.180	4.501	.185	-.003	.039	.250	4.162	.029	.198	72.154	10.460	.008	.000	1.417	98.580

533	5.092	4.450	.231	.014	.095	.223	4.106	.091	.205	72.147	10.527	.003	.000	1.275	98.459
534	5.165	4.405	.228	.006	.055	.293	4.096	.054	.186	72.208	10.483	.008	.000	1.440	98.628
535	4.852	4.228	.242	-.017	.108	.195	4.137	.102	.191	72.360	10.406	.006	.000	1.364	98.174
536	5.518	4.518	.169	-.022	.123	.282	4.169	.096	.225	72.447	10.441	.006	.000	1.197	99.169
537	5.051	4.372	.172	.009	.069	.260	4.125	.087	.184	72.377	10.396	.005	.000	1.221	98.328
AVER:	5.282	4.454	.218	.018	.074	.255	4.153	.072	.195	72.280	10.453	.008	.000	1.333	98.796
SDEV:	.281	.155	.035	.035	.027	.045	.043	.025	.014	.167	.038	.003	.000	.212	
SERR:	.081	.045	.010	.010	.008	.013	.012	.007	.004	.048	.011	.001	.000	.061	
%RSD:	5.3	3.5	16.2	195.3	36.2	17.7	1.0	34.8	6.9	.2	.4	43.6	-1080.4	15.9	

Un 14 Withers-N3

TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot
(Magnification (default) = 600, Magnification (imaging) = 600)
Number of Data Lines: 12 Number of 'Good' Data Lines: 12
First/Last Date-Time: 02/01/2008 05:11:04 PM to 02/01/2008 05:51:38 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:	48.927	Average Total Weight%:	99.756
Average Calculated Oxygen:	48.926	Average Atomic Number:	11.431
Average Excess Oxygen:	.000	Average Atomic Weight:	19.514
Oxygen Equiv. from Halogen:	.081	Halogen Corrected Oxygen:	48.845
Average ZAF Iteration:	12.00	Average Quant Iterate:	4.17

Results in Elemental Weight Percents

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP	
ABS%:	-44.81	.00	.00	.00	.00	.00	.01	.00	-4.69	-16.29	-21.10	-32.97	.00	
TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00	

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
538	3.892	3.581	.269	.003	.117	.157	3.128	.069	.128	33.672	5.443	.005	49.030	.335	99.829
539	3.997	3.324	.213	.004	.096	.153	3.145	.081	.126	33.564	5.418	.008	48.882	.336	99.348
540	3.877	3.557	.212	.027	.029	.117	3.092	.071	.147	33.793	5.435	.010	49.020	.322	99.711
541	4.405	3.633	.215	.044	.027	.150	3.187	.046	.151	33.603	5.406	.006	48.895	.306	100.073
542	3.836	3.765	.210	.075	.092	.140	3.129	.034	.125	33.892	5.446	.009	49.158	.319	100.229

543	4.580	3.435	.188	.042	.045	.150	3.193	.082	.132	33.684	5.428	.004	48.730	.268	99.960
544	3.937	3.701	.247	.003	.116	.065	3.086	.068	.141	33.589	5.416	.005	48.912	.339	99.625
545	3.971	3.405	.164	-.003	.066	.121	3.193	.010	.154	33.742	5.420	.006	48.687	.287	99.222
546	3.870	3.433	.223	.026	.055	.104	3.175	.058	.131	33.879	5.419	.006	49.009	.313	99.702
547	4.118	3.668	.212	-.025	.059	.121	3.130	.018	.127	33.611	5.407	.001	48.951	.332	99.730
548	3.959	3.634	.261	.032	.100	.147	3.143	.077	.132	33.798	5.420	.009	48.911	.300	99.920
549	4.071	3.485	.237	-.044	.089	.078	3.185	.104	.157	33.694	5.410	.007	48.933	.320	99.727
AVER:	4.043	3.552	.221	.015	.074	.125	3.149	.060	.138	33.710	5.422	.006	48.927	.315	99.756
SDEV:	.229	.135	.029	.032	.032	.030	.038	.028	.012	.111	.013	.003	.128	.021	
SERR:	.066	.039	.008	.009	.009	.009	.011	.008	.003	.032	.004	.001	.037	.006	
%RSD:	5.7	3.8	13.3	211.7	42.7	24.1	1.2	46.6	8.6	.3	.2	40.3	.3	6.8	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2449.1	2422.6	838.6	8516.7	2399.3	6089.7	14138.4	13616.2	2251.1	34364.5	23227.7	24410.0	8341.1	.0	
UNKF:	.0215	.0309	.0018	.0001	.0002	.0011	.0263	.0005	.0012	.2757	.0416	.0000	.2239	.0000	
UNCT:	716.7	660.5	24.7	1.3	2.6	11.5	548.1	9.1	16.4	46943.5	7255.9	2.2	8024.7	.0	
UNBG:	10.1	13.9	4.8	28.5	4.1	5.7	23.6	17.5	4.4	133.4	103.0	15.3	49.9	.0	
ZCOR:	1.8790	1.1511	1.2479	1.3665	4.0145	1.1921	1.1981	1.2175	1.1155	1.2228	1.3039	1.5027	2.1854	.0000	
KRAW:	.2926	.2726	.0294	.0002	.0011	.0019	.0388	.0007	.0073	1.3660	.3124	.0001	.9621	.0000	
PKBG:	72.30	49.07	6.33	1.05	1.69	3.38	24.23	1.54	4.76	352.95	71.47	1.14	162.04	.00	
INT%:	----	----	----	-41.60	----	-.03	----	----	----	----	----	----	----	----	
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.031	----	
VOL%:	84.446	-.038	----	----	----	----	----	----	----	-.508	----	----	-1.886	----	
DEV%:	2.1	2.7	----	----	----	----	----	----	----	.3	----	----	.3	----	
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----	
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----	
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----	
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----	

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
538	5.246	4.314	.269	.003	.117	.261	4.024	.089	.180	72.037	10.285	.008	.000	2.997	99.829
539	5.388	4.004	.213	.005	.096	.256	4.046	.105	.176	71.806	10.237	.014	.000	3.002	99.348
540	5.226	4.285	.212	.031	.029	.196	3.978	.092	.206	72.294	10.270	.017	.000	2.874	99.711
541	5.938	4.376	.215	.049	.027	.250	4.100	.060	.211	71.889	10.214	.010	.000	2.734	100.073
542	5.170	4.535	.210	.084	.092	.234	4.025	.044	.174	72.507	10.290	.014	.000	2.849	100.229
543	6.174	4.138	.188	.047	.045	.250	4.107	.106	.185	72.062	10.256	.006	.000	2.397	99.960
544	5.307	4.458	.247	.003	.116	.109	3.970	.088	.198	71.859	10.233	.009	.000	3.029	99.625
545	5.353	4.102	.164	-.004	.066	.201	4.108	.013	.215	72.186	10.240	.010	.000	2.567	99.222
546	5.216	4.136	.223	.029	.055	.174	4.085	.075	.183	72.479	10.240	.010	.000	2.797	99.702
547	5.551	4.419	.212	-.027	.059	.201	4.026	.023	.178	71.905	10.217	.001	.000	2.964	99.730
548	5.336	4.377	.261	.035	.100	.245	4.044	.100	.185	72.306	10.241	.014	.000	2.678	99.920

549	5.488	4.198	.237	-.050	.089	.131	4.097	.134	.220	72.084	10.222	.012	.000	2.864	99.727
AVER:	5.449	4.278	.221	.017	.074	.209	4.051	.077	.193	72.118	10.245	.011	.000	2.813	99.756
SDEV:	.308	.163	.029	.036	.032	.050	.049	.036	.017	.238	.025	.004	.000	.192	
SERR:	.089	.047	.008	.010	.009	.015	.014	.010	.005	.069	.007	.001	.000	.055	
%RSD:	5.7	3.8	13.3	211.7	42.7	24.1	1.2	46.6	8.6	.3	.2	40.3	-301.5	6.8	

Un 15 Withers-N3.35

TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot
(Magnification (default) = 600, Magnification (imaging) = 600)
Number of Data Lines: 12 Number of 'Good' Data Lines: 12
First/Last Date-Time: 02/01/2008 05:55:35 PM to 02/01/2008 06:36:11 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:	48.694	Average Total Weight%:	98.690
Average Calculated Oxygen:	48.694	Average Atomic Number:	11.425
Average Excess Oxygen:	.000	Average Atomic Weight:	19.165
Oxygen Equiv. from Halogen:	.079	Halogen Corrected Oxygen:	48.615
Average ZAF Iteration:	11.75	Average Quant Iterate:	4.75

Results in Elemental Weight Percents

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC	
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP		
ABS%:	-45.03	.00	.00	.00	.00	.00	.01	.00	-4.65	-16.33	-21.10	-32.98	.00		
TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00		

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
550	3.942	3.594	.228	-.070	.095	.170	3.315	.072	.147	32.861	5.418	.002	48.774	.412	98.961
551	3.497	3.364	.169	-.008	.108	.150	3.287	.066	.129	32.898	5.367	.002	48.531	.410	97.971
552	3.840	3.590	.212	-.045	.108	.127	3.262	.058	.126	33.061	5.407	.003	48.680	.384	98.815
553	3.549	3.578	.218	.042	.084	.124	3.221	.067	.141	32.926	5.411	.003	49.147	.474	98.985
554	3.870	3.599	.212	-.008	.033	.104	3.292	.035	.127	33.052	5.453	.003	48.581	.367	98.721
555	4.256	3.714	.228	.028	.086	.186	3.252	.096	.160	33.174	5.430	.001	48.940	.368	99.918
556	3.676	3.454	.212	.017	.063	.166	3.238	.082	.121	32.923	5.479	.004	48.556	.387	98.378
557	3.547	3.539	.239	.019	.046	.157	3.290	.110	.152	32.966	5.399	.007	48.716	.409	98.596
558	4.112	3.525	.156	-.033	.078	.157	3.224	.072	.121	32.668	5.427	.005	48.595	.415	98.523
559	3.286	3.215	.207	-.004	.066	.046	3.327	.115	.150	32.864	5.398	.001	48.260	.395	97.326
560	3.771	3.783	.215	.012	.092	.108	3.352	.075	.137	32.818	5.440	.011	48.770	.420	99.003

561	3.922	3.845	.153	.014	.075	.085	3.267	.093	.144	32.844	5.448	.005	48.774	.412	99.082
AVER:	3.772	3.567	.204	-.003	.078	.132	3.277	.078	.138	32.921	5.423	.004	48.694	.405	98.690
SDEV:	.276	.173	.029	.032	.023	.041	.041	.022	.013	.132	.030	.003	.222	.029	
SERR:	.080	.050	.008	.009	.007	.012	.012	.006	.004	.038	.009	.001	.064	.008	
%RSD:	7.3	4.8	14.0	-1073.7	29.5	30.9	1.3	28.7	9.5	.4	.6	75.4	.5	7.0	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2448.7	2423.0	838.8	8518.0	2399.1	6092.3	14137.9	13607.5	2249.9	34339.8	23226.4	24410.1	8339.4	.0	
UNKF:	.0200	.0310	.0016	.0000	.0002	.0011	.0273	.0006	.0012	.2688	.0415	.0000	.2236	.0000	
UNCT:	665.2	663.1	22.8	-.2	2.7	12.1	569.8	11.9	16.4	45734.5	7244.8	1.3	8013.0	.0	
UNBG:	10.0	13.0	5.6	29.7	3.6	5.5	23.6	15.9	4.4	133.6	103.0	15.3	51.2	.0	
ZCOR:	1.8890	1.1516	1.2478	1.3691	4.0283	1.1930	1.1995	1.2189	1.1163	1.2249	1.3061	1.5049	2.1777	.0000	
KRAW:	.2716	.2737	.0272	.0000	.0011	.0020	.0403	.0009	.0073	1.3318	.3119	.0001	.9609	.0000	
PKBG:	67.42	52.27	5.32	1.00	1.80	3.71	25.18	1.77	4.75	343.31	71.35	1.09	158.91	.00	
INT%:	----	----	----	39.81	----	-.01	----	----	----	----	----	----	----	----	
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.031	----	
VOL%:	76.294	.179	----	----	----	----	----	----	----	-.516	----	----	-2.238	----	
DEV%:	2.0	2.2	----	----	----	----	----	----	----	.3	----	----	.3	----	
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----	
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----	
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----	
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----	

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
550	5.313	4.329	.228	-.078	.095	.283	4.265	.093	.206	70.302	10.237	.003	.000	3.683	98.961
551	4.714	4.053	.169	-.009	.108	.250	4.228	.085	.180	70.382	10.141	.004	.000	3.666	97.971
552	5.176	4.325	.212	-.050	.108	.212	4.197	.075	.176	70.730	10.217	.005	.000	3.432	98.815
553	4.784	4.311	.218	.046	.084	.207	4.144	.087	.198	70.441	10.223	.004	.000	4.238	98.984
554	5.217	4.336	.212	-.009	.033	.174	4.236	.045	.178	70.709	10.303	.004	.000	3.283	98.721
555	5.738	4.473	.228	.032	.086	.310	4.184	.124	.224	70.972	10.259	.001	.000	3.288	99.918
556	4.956	4.160	.212	.018	.063	.277	4.166	.106	.169	70.435	10.353	.006	.000	3.456	98.378
557	4.781	4.263	.239	.021	.046	.261	4.233	.142	.213	70.526	10.201	.012	.000	3.659	98.596
558	5.543	4.246	.156	-.037	.078	.261	4.147	.094	.169	69.889	10.255	.009	.000	3.712	98.523
559	4.430	3.872	.207	-.004	.066	.076	4.280	.149	.210	70.307	10.199	.001	.000	3.533	97.326
560	5.083	4.557	.215	.013	.092	.180	4.312	.096	.192	70.210	10.279	.018	.000	3.756	99.002
561	5.286	4.632	.153	.016	.075	.141	4.203	.120	.201	70.266	10.294	.008	.000	3.686	99.082
AVER:	5.085	4.296	.204	-.003	.078	.219	4.216	.101	.193	70.431	10.247	.006	.000	3.616	98.690
SDEV:	.372	.208	.029	.036	.023	.068	.053	.029	.018	.282	.056	.005	.000	.255	
SERR:	.107	.060	.008	.010	.007	.020	.015	.008	.005	.081	.016	.001	.000	.074	
%RSD:	7.3	4.8	14.0	-1073.7	29.5	30.9	1.3	28.7	9.5	.4	.6	75.4	321.9	7.0	

Un 16 Withers-N4.6

TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot
(Magnification (default) = 600, Magnification (imaging) = 600)
Number of Data Lines: 12 Number of 'Good' Data Lines: 12
First/Last Date-Time: 02/01/2008 06:40:09 PM to 02/01/2008 07:20:38 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:	49.545	Average Total Weight%:	99.804
Average Calculated Oxygen:	49.545	Average Atomic Number:	11.368
Average Excess Oxygen:	.000	Average Atomic Weight:	18.944
Oxygen Equiv. from Halogen:	.081	Halogen Corrected Oxygen:	49.464
Average ZAF Iteration:	11.33	Average Quant Iterate:	4.25

Results in Elemental Weight Percents

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC	
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP		
ABS%:	-44.88	.00	.00	.00	.00	.00	.02	.00	-4.62	-16.21	-21.00	-32.85	.00		
TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00		
ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
562	3.671	3.541	.234	-.024	-.009	.202	3.112	.077	.131	33.472	5.419	.004	49.820	.474	100.125
563	3.809	3.605	.180	.010	.115	.144	3.076	.082	.140	33.481	5.430	.007	49.562	.436	100.077
564	4.504	3.428	.215	.037	.107	.137	3.078	.112	.147	33.491	5.417	.006	49.537	.406	100.622
565	3.553	3.717	.223	.022	.064	.114	3.194	.070	.150	33.288	5.400	.006	49.925	.519	100.246
566	4.053	3.580	.156	.045	.082	.163	3.057	.073	.161	33.200	5.439	.009	49.454	.449	99.924
567	3.681	3.501	.234	.000	.048	.098	3.079	.046	.139	33.419	5.468	.006	49.341	.426	99.486
568	3.838	3.440	.218	.017	.037	.114	3.028	.053	.141	33.156	5.454	.007	49.442	.473	99.418
569	3.717	3.286	.258	-.017	.080	.147	3.016	.075	.141	33.172	5.407	.008	49.468	.486	99.244
570	4.126	3.550	.250	-.044	.066	.069	3.016	.060	.144	33.380	5.418	.004	49.342	.422	99.803
571	3.679	3.427	.256	-.016	.151	.091	2.970	.065	.153	33.387	5.380	.004	49.493	.466	99.504
572	3.432	3.436	.250	.026	.033	.167	2.998	.074	.125	33.260	5.395	.005	49.436	.478	99.116
573	3.837	3.517	.231	.028	.078	.104	3.055	.058	.158	33.389	5.422	.008	49.722	.475	100.083
AVER:	3.825	3.502	.225	.007	.071	.129	3.057	.070	.144	33.341	5.421	.006	49.545	.459	99.804
SDEV:	.288	.110	.031	.027	.042	.038	.059	.017	.010	.122	.025	.002	.184	.032	
SERR:	.083	.032	.009	.008	.012	.011	.017	.005	.003	.035	.007	.001	.053	.009	

%RSD:	7.5	3.1	13.7	392.3	59.2	29.2	1.9	24.2	7.2	.4	.5	28.9	.4	7.0
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000
STCT:	2448.3	2423.4	839.1	8519.3	2398.9	6095.0	14137.3	13598.9	2248.8	34315.2	23225.0	24410.2	8337.7	.0
UNKF:	.0203	.0304	.0018	.0001	.0002	.0011	.0255	.0006	.0013	.2723	.0415	.0000	.2283	.0000
UNCT:	675.5	650.5	25.2	.6	2.5	11.9	530.8	10.7	17.2	46297.0	7243.6	2.1	8178.6	.0
UNBG:	10.0	13.4	5.2	29.4	4.1	5.4	23.5	16.3	4.4	133.7	102.9	15.2	52.5	.0
ZCOR:	1.8858	1.1529	1.2489	1.3699	4.0405	1.1946	1.2010	1.2203	1.1174	1.2246	1.3057	1.5038	2.1704	.0000
KRAW:	.2759	.2684	.0300	.0001	.0010	.0020	.0375	.0008	.0076	1.3492	.3119	.0001	.9809	.0000
PKBG:	68.51	50.09	6.35	1.02	1.66	4.16	23.63	1.68	4.92	347.33	71.37	1.14	157.23	.00
INT%:	----	----	----	-8.60	----	-.02	----	----	----	----	----	----	----	----
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.031	----
VOL%:	93.629	.798	----	----	----	----	----	----	----	-.784	----	----	-2.338	----
DEV%:	2.5	2.6	----	----	----	----	----	----	----	.3	----	----	.3	----
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
562	4.949	4.265	.234	-.027	-.009	.338	4.004	.100	.184	71.609	10.240	.007	.000	4.232	100.125
563	5.134	4.343	.180	.011	.115	.240	3.957	.107	.196	71.628	10.260	.011	.000	3.896	100.077
564	6.071	4.129	.215	.042	.107	.228	3.960	.145	.206	71.649	10.235	.010	.000	3.624	100.622
565	4.790	4.478	.223	.025	.064	.191	4.109	.090	.210	71.215	10.203	.010	.000	4.639	100.246
566	5.463	4.312	.156	.051	.082	.272	3.933	.095	.226	71.027	10.278	.015	.000	4.014	99.924
567	4.962	4.217	.234	.000	.048	.163	3.962	.060	.194	71.496	10.331	.010	.000	3.809	99.486
568	5.173	4.143	.218	.019	.037	.191	3.896	.068	.198	70.933	10.306	.011	.000	4.225	99.418
569	5.010	3.959	.258	-.019	.080	.245	3.880	.097	.198	70.967	10.216	.013	.000	4.339	99.244
570	5.561	4.276	.250	-.049	.066	.114	3.881	.078	.201	71.412	10.238	.006	.000	3.768	99.803
571	4.959	4.128	.256	-.018	.151	.153	3.821	.083	.214	71.426	10.165	.006	.000	4.160	99.504
572	4.626	4.139	.250	.029	.033	.278	3.857	.096	.175	71.155	10.195	.009	.000	4.275	99.116
573	5.172	4.237	.231	.031	.078	.174	3.931	.075	.221	71.432	10.244	.013	.000	4.244	100.083
AVER:	5.156	4.219	.225	.008	.071	.216	3.932	.091	.202	71.329	10.242	.010	.000	4.102	99.804
SDEV:	.388	.132	.031	.031	.042	.063	.076	.022	.015	.261	.047	.003	.000	.287	
SERR:	.112	.038	.009	.009	.012	.018	.022	.006	.004	.075	.013	.001	.000	.083	
%RSD:	7.5	3.1	13.7	392.3	59.2	29.2	1.9	24.2	7.2	.4	.5	28.9	216.1	7.0	

Un 17 Withers-N5
TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot

(Magnification (default) = 600, Magnification (imaging) = 600)
Number of Data Lines: 12 Number of 'Good' Data Lines: 12
First/Last Date-Time: 02/01/2008 07:24:35 PM to 02/01/2008 08:05:10 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Blank Trace Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen: 50.003 Average Total Weight%: 99.592
Average Calculated Oxygen: 50.003 Average Atomic Number: 11.335
Average Excess Oxygen: .000 Average Atomic Weight: 18.461
Oxygen Equiv. from Halogen: .083 Halogen Corrected Oxygen: 49.920
Average ZAF Iteration: 11.00 Average Quant Iterate: 4.42

Results in Elemental Weight Percents

ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	
TYPE:	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	ANAL	SPEC	
BGDS:	MAN	LIN	LIN	LIN	LIN	LOW	MAN	LIN	MAN	MAN	MAN	MAN	EXP		
ABS%:	-45.09	.00	.00	.00	.00	.00	.03	.00	-4.56	-16.10	-20.87	-32.69	.00		
TIME:	60.00	20.00	10.00	20.00	40.00	10.00	40.00	10.00	20.00	20.00	20.00	60.00	120.00		
ELEM:	Na	K	Cl	Ba	F	Ti	Fe	Mn	Ca	Si	Al	Mg	O	H	SUM
574	3.006	3.537	.205	.030	.086	.108	3.135	.060	.162	32.774	5.410	.012	50.153	.651	99.327
575	3.713	3.553	.207	.017	.084	.124	3.117	.079	.148	33.049	5.382	.007	49.951	.558	99.987
576	3.146	3.326	.180	.032	.100	.137	3.130	.083	.129	32.959	5.324	.001	49.981	.611	99.139
577	3.562	3.536	.258	.041	.110	.098	3.162	.058	.118	32.955	5.453	.000	49.997	.579	99.927
578	3.418	3.501	.258	-.014	.083	.072	3.171	.081	.116	32.805	5.374	.009	49.860	.601	99.335
579	3.495	3.553	.239	-.079	.070	.124	3.189	.082	.130	32.888	5.439	.006	50.047	.596	99.781
580	3.251	3.529	.223	.016	.088	.101	3.123	.055	.132	32.882	5.345	-.001	50.024	.620	99.388
581	3.793	3.449	.247	-.019	.120	.118	3.097	.050	.152	33.101	5.377	.006	50.065	.567	100.123
582	3.299	3.497	.164	-.025	.080	.134	3.196	.050	.120	33.172	5.384	.009	49.828	.543	99.451
583	3.488	3.441	.218	-.062	.033	.147	3.163	.031	.143	33.019	5.403	.004	49.955	.573	99.556
584	3.452	3.386	.213	.004	.033	.124	3.122	.064	.133	33.152	5.337	.004	49.899	.559	99.482
585	2.876	3.589	.191	.029	.071	.121	3.149	.061	.161	33.066	5.384	.006	50.277	.631	99.612
AVER:	3.375	3.491	.217	-.003	.080	.117	3.146	.063	.137	32.985	5.384	.005	50.003	.591	99.592
SDEV:	.273	.077	.030	.038	.026	.020	.030	.016	.016	.130	.038	.004	.125	.033	
SERR:	.079	.022	.009	.011	.008	.006	.009	.005	.005	.038	.011	.001	.036	.010	
%RSD:	8.1	2.2	13.9	-1524.6	33.1	17.2	1.0	25.5	11.7	.4	.7	77.5	.2	5.6	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2447.9	2423.7	839.3	8520.5	2398.7	6097.6	14136.8	13590.2	2247.6	34290.6	23223.7	24410.3	8335.9	.0	

UNKF:	.0178	.0302	.0017	.0000	.0002	.0010	.0261	.0005	.0012	.2692	.0412	.0000	.2318	.0000
UNCT:	592.4	647.7	24.2	-.2	2.7	10.8	545.2	9.5	16.2	45736.9	7190.4	1.7	8302.1	.0
UNBG:	9.9	12.6	5.0	29.0	3.8	5.8	23.4	16.1	4.4	133.9	103.0	15.2	53.7	.0
ZCOR:	1.8973	1.1543	1.2496	1.3716	4.0640	1.1965	1.2034	1.2227	1.1190	1.2254	1.3064	1.5035	2.1575	.0000
KRAW:	.2420	.2672	.0289	.0000	.0011	.0018	.0386	.0007	.0072	1.3338	.3096	.0001	.9959	.0000
PKBG:	60.54	52.53	6.39	1.00	1.77	3.03	24.32	1.61	4.71	342.50	70.80	1.11	156.39	.00
INT%:	----	----	----	-3.81	----	-.02	----	----	----	----	----	----	----	----
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.031	----
VOL%:	107.190	.397	----	----	----	----	----	----	----	-.734	----	----	-2.916	----
DEV%:	2.7	2.4	----	----	----	----	----	----	----	.3	----	----	.3	----
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	19	----
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	43.5580	----
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	44.9650	----

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
574	4.052	4.261	.205	.033	.086	.180	4.033	.078	.227	70.115	10.221	.019	.000	5.818	99.327
575	5.005	4.279	.207	.018	.084	.207	4.010	.102	.207	70.703	10.169	.011	.000	4.985	99.987
576	4.241	4.006	.180	.036	.100	.229	4.027	.108	.180	70.511	10.060	.001	.000	5.460	99.139
577	4.802	4.259	.258	.046	.110	.164	4.068	.075	.164	70.503	10.303	-.001	.000	5.175	99.927
578	4.607	4.217	.258	-.015	.083	.120	4.080	.104	.163	70.182	10.154	.015	.000	5.367	99.335
579	4.712	4.280	.239	-.088	.070	.207	4.103	.106	.182	70.359	10.278	.010	.000	5.323	99.781
580	4.383	4.251	.223	.017	.088	.169	4.018	.070	.184	70.347	10.099	-.001	.000	5.539	99.388
581	5.114	4.154	.247	-.021	.120	.196	3.985	.064	.212	70.816	10.160	.010	.000	5.066	100.123
582	4.447	4.213	.164	-.028	.080	.224	4.112	.065	.168	70.966	10.173	.015	.000	4.853	99.451
583	4.702	4.145	.218	-.069	.033	.245	4.069	.040	.200	70.639	10.209	.006	.000	5.118	99.556
584	4.654	4.079	.213	.004	.033	.207	4.017	.083	.186	70.923	10.085	.006	.000	4.992	99.482
585	3.877	4.323	.191	.033	.071	.202	4.051	.079	.225	70.741	10.172	.010	.000	5.637	99.612
AVER:	4.549	4.206	.217	-.003	.080	.196	4.048	.081	.192	70.567	10.174	.008	.000	5.278	99.592
SDEV:	.368	.093	.030	.043	.026	.034	.039	.021	.022	.279	.073	.007	.000	.296	
SERR:	.106	.027	.009	.012	.008	.010	.011	.006	.006	.080	.021	.002	.000	.085	
%RSD:	8.1	2.2	13.9	-1524.6	33.1	17.2	1.0	25.5	11.7	.4	.7	77.5	154.3	5.6	

Appendix A (Analytical condition details)

Correction Method:
ZAF or Phi-Rho-Z calculations
LINEMU Henke (1985) < 10KeV / CITZMU > 10KeV

Current ZAF or Phi-Rho-Z Selection:
Armstrong/Love Scott (default)

Correction Selections:
Phi(pz) Absorption of Armstrong/Packwood-Brown 1981 MAS
Stopping Power of Love-Scott
Backscatter Coefficient of Love-Scott
Backscatter of Love-Scott
Mean Ionization of Berger-Seltzer
Phi(pz) Equation of Love-Scott
Reed/JTA w/ M-Line Correction and JTA Intensity Mod.

Un 12 Withers-NSL
TakeOff = 40.0 KiloVolt = 15.0 Beam Current = 10.0 Beam Size = 20
(Magnification (analytical) = 20000), Beam Mode = Analog Spot
(Magnification (default) = 600, Magnification (imaging) = 600)

Compositional analyses were acquired on an electron microprobe equipped with 5 tunable wavelength dispersive spectrometers. Operating conditions were 40 degrees takeoff angle, and a beam energy of 15 keV. The beam current was 10 nA, and the beam diameter was 20 microns.

Elements were acquired using analyzing crystals LLIF for Ti ka, Fe ka, Mn ka, Ca ka, PET for Cl ka, Ba la, K ka, TAP for Na ka, Mg ka, LTAP for F ka, Si ka, Al ka, TAP for Na ka, Mg ka, and PC1 for O ka.

The standards were MgO synthetic for Mg ka, O ka, TiO2 synthetic for Ti ka, MnO synthetic for Mn ka, NBS K-411 mineral glass for Si ka, Ca10(PO4)6Cl2 (halogen corrected) for Cl ka, Nepheline (partial anal.) for Na ka, Al ka, Diopside (Chesterman) for Ca ka, Orthoclase MAD-10 for K ka, Magnetite U.C. #3380 for Fe ka, and BaF2 (barium fluoride) for Ba la, F ka.

The counting time was 10 seconds for Cl ka, Ti ka, Mn ka, 20 seconds for K ka, Ba la, Ca ka, Si ka, Al ka, 40 seconds for F ka, Fe ka, 60 seconds for Na ka, Mg ka, and 120 seconds for O ka.

The intensity data was corrected for volatile loss (or gain) using a self calibrated correction for na ka, k ka, ti ka, si ka, o ka.

The off peak counting time was 10 seconds for Cl ka, Mn ka, Ti ka, and 20 seconds for Ba la, F ka, K ka, O ka. Off Peak correction method was LINEAR for Mn ka, Cl ka, Ba la, F ka, K ka, LOW SIDE ONLY for Ti ka, and EXPONENTIAL for O ka.

The MAN background intensity data was calibrated and absorption corrected for na ka, fe ka, ca ka, si ka, al ka, mg ka.

See J.J. Donovan and T.N. Tingle, An Improved Mean Atomic Number Correction for Quantitative Microanalysis in Journal of Microscopy, v. 2, 1, p. 1-7, 1996

Unknown and standard intensities were corrected for deadtime. Standard intensities were corrected for standard drift over time.

Interference corrections were applied to Ba for interference by Ti, and to Ti for interference by Ba.

See J.J. Donovan, D.A. Snyder and M.L. Rivers, An Improved Interference Correction for Trace Element Analysis in Microbeam Analyis, 2: 23-28, 1993

Empirical Mass Absorption Coefficients were utilized to correct x-ray intensities for matrix corrections.

See Bastin, G.F. and Heijligers, H.J.M (1991) Quantitative electron probe microanalysis of ultra-light elements (boron - oxygen), in Electron Probe Quantitation, ed K.F.J. Heinrich and D.E. Newbury, Plenum Press, NY, 145-161

Also Bastin, G.F. and Heijligers, H.J.M. (1992) Present and future of light element analysis with electron beam instruments, Microbeam Analysis, 1, 61-73.

Current Mass Absorption Coefficients From:
LINEMU Henke (1985) < 10KeV / CITZMU > 10KeV

Z-LINE	X-RAY	Z-ABSOR	MAC
Na	ka	Na	5.6089e+02
Na	ka	K	3.8110e+03
Na	ka	Cl	2.5391e+03
Na	ka	Ba	7.6213e+03
Na	ka	F	5.1229e+03
Na	ka	Ti	5.2439e+03
Na	ka	Fe	8.1986e+03
Na	ka	Mn	7.2518e+03
Na	ka	Ca	4.3573e+03
Na	ka	Si	1.4049e+03
Na	ka	Al	1.0667e+03
Na	ka	Mg	8.1441e+02

Na	ka	O	4.1515e+03
Na	ka	H	5.9317e+00
K	ka	Na	3.7714e+02
K	ka	K	1.7109e+02
K	ka	Cl	1.1539e+03
K	ka	Ba	7.2049e+02
K	ka	F	2.1534e+02
K	ka	Ti	2.4971e+02
K	ka	Fe	4.1167e+02
K	ka	Mn	3.5594e+02
K	ka	Ca	1.9889e+02
K	ka	Si	7.4506e+02
K	ka	Al	5.9083e+02
K	ka	Mg	5.0887e+02
K	ka	O	1.6416e+02
K	ka	H	1.1806e-01
Cl	ka	Na	7.3634e+02
Cl	ka	K	3.2806e+02
Cl	ka	Cl	2.1561e+02
Cl	ka	Ba	1.2824e+03
Cl	ka	F	4.2282e+02
Cl	ka	Ti	4.7326e+02
Cl	ka	Fe	7.8172e+02
Cl	ka	Mn	6.7972e+02
Cl	ka	Ca	3.7594e+02
Cl	ka	Si	1.4010e+03
Cl	ka	Al	1.1255e+03
Cl	ka	Mg	9.8203e+02
Cl	ka	O	3.2567e+02
Cl	ka	H	2.6576e-01
Ba	la	Na	1.6022e+02
Ba	la	K	7.2502e+02
Ba	la	Cl	5.2953e+02
Ba	la	Ba	3.3617e+02
Ba	la	F	9.0427e+01
Ba	la	Ti	1.1151e+02
Ba	la	Fe	1.8314e+02
Ba	la	Mn	1.5795e+02

Ba	la	Ca	8.3453e+02
Ba	la	Si	3.2826e+02
Ba	la	Al	2.5758e+02
Ba	la	Mg	2.1898e+02
Ba	la	O	6.7822e+01
Ba	la	H	4.2840e-02
F	ka	Na	1.8327e+03
F	ka	K	1.0658e+04
F	ka	Cl	7.5904e+03
F	ka	Ba	3.1554e+03
F	ka	F	9.2209e+02
F	ka	Ti	1.4588e+04
F	ka	Fe	2.3374e+03
F	ka	Mn	1.6117e+04
F	ka	Ca	1.2415e+04
F	ka	Si	4.2952e+03
F	ka	Al	3.4208e+03
F	ka	Mg	2.6263e+03
F	ka	O	1.2440e+04
F	ka	H	2.4805e+01
Ti	ka	Na	1.5590e+02
Ti	ka	K	7.0770e+02
Ti	ka	Cl	5.1645e+02
Ti	ka	Ba	3.2787e+02
Ti	ka	F	8.7938e+01
Ti	ka	Ti	1.0869e+02
Ti	ka	Fe	1.7855e+02
Ti	ka	Mn	1.5394e+02
Ti	ka	Ca	8.1470e+02
Ti	ka	Si	3.1977e+02
Ti	ka	Al	2.5083e+02
Ti	ka	Mg	2.1325e+02
Ti	ka	O	6.5919e+01
Ti	ka	H	4.1490e-02
Fe	ka	Na	5.5397e+01
Fe	ka	K	2.7665e+02
Fe	ka	Cl	1.9695e+02
Fe	ka	Ba	6.1414e+02

Fe	ka	F	3.0620e+01
Fe	ka	Ti	3.7689e+02
Fe	ka	Fe	6.8270e+01
Fe	ka	Mn	5.9704e+01
Fe	ka	Ca	3.2161e+02
Fe	ka	Si	1.1782e+02
Fe	ka	Al	9.1605e+01
Fe	ka	Mg	7.6877e+01
Fe	ka	O	2.2548e+01
Fe	ka	H	1.2590e-02
Mn	ka	Na	6.8522e+01
Mn	ka	K	3.3731e+02
Mn	ka	Cl	2.4097e+02
Mn	ka	Ba	6.5921e+02
Mn	ka	F	3.8047e+01
Mn	ka	Ti	4.5531e+02
Mn	ka	Fe	8.3286e+01
Mn	ka	Mn	7.2508e+01
Mn	ka	Ca	3.9062e+02
Mn	ka	Si	1.4510e+02
Mn	ka	Al	1.1272e+02
Mn	ka	Mg	9.4808e+01
Mn	ka	O	2.8131e+01
Mn	ka	H	1.6010e-02
Ca	ka	Na	2.7733e+02
Ca	ka	K	1.1737e+03
Ca	ka	Cl	8.7515e+02
Ca	ka	Ba	5.5026e+02
Ca	ka	F	1.5790e+02
Ca	ka	Ti	1.8677e+02
Ca	ka	Fe	3.0742e+02
Ca	ka	Mn	2.6528e+02
Ca	ka	Ca	1.4983e+02
Ca	ka	Si	5.5579e+02
Ca	ka	Al	4.3892e+02
Ca	ka	Mg	3.7616e+02
Ca	ka	O	1.1972e+02
Ca	ka	H	8.1770e-02

Si	ka	Na	2.2375e+03
Si	ka	K	9.7768e+02
Si	ka	Cl	6.5835e+02
Si	ka	Ba	3.3056e+03
Si	ka	F	1.3201e+03
Si	ka	Ti	1.4132e+03
Si	ka	Fe	2.3053e+03
Si	ka	Mn	2.0250e+03
Si	ka	Ca	1.1465e+03
Si	ka	Si	3.5048e+02
Si	ka	Al	3.2132e+03
Si	ka	Mg	2.9015e+03
Si	ka	O	1.0337e+03
Si	ka	H	1.0618e+00
Al	ka	Na	3.3597e+03
Al	ka	K	1.4794e+03
Al	ka	Cl	9.9433e+02
Al	ka	Ba	4.6512e+03
Al	ka	F	2.0277e+03
Al	ka	Ti	2.1374e+03
Al	ka	Fe	3.4392e+03
Al	ka	Mn	3.0278e+03
Al	ka	Ca	1.7548e+03
Al	ka	Si	5.4409e+02
Al	ka	Al	4.0218e+02
Al	ka	Mg	4.2884e+03
Al	ka	O	1.5979e+03
Al	ka	H	1.8043e+00
Mg	ka	Na	5.2018e+03
Mg	ka	K	2.3234e+03
Mg	ka	Cl	1.5604e+03
Mg	ka	Ba	6.3391e+03
Mg	ka	F	3.1803e+03
Mg	ka	Ti	3.2972e+03
Mg	ka	Fe	5.2394e+03
Mg	ka	Mn	4.6163e+03
Mg	ka	Ca	2.7124e+03
Mg	ka	Si	8.5871e+02

Mg	ka	Al	6.3956e+02	
Mg	ka	Mg	4.8748e+02	
Mg	ka	O	2.5312e+03	
Mg	ka	H	3.1956e+00	
O	ka	Na	3.6300e+03	*
O	ka	K	1.9369e+04	
O	ka	Cl	1.4300e+04	*
O	ka	Ba	4.5194e+03	
O	ka	F	1.8500e+03	*
O	ka	Ti	1.9900e+04	*
O	ka	Fe	4.0000e+03	*
O	ka	Mn	3.4700e+03	*
O	ka	Ca	2.4600e+04	*
O	ka	Si	8.7900e+03	*
O	ka	Al	6.7200e+03	*
O	ka	Mg	5.1700e+03	*
O	ka	O	1.1998e+03	
O	ka	H	5.7430e+01	

* indicates empirical MAC

Empirical Mass Absorption Coefficients From:
C:\SOURCE\Probewin32-E\EMPMAC.DAT

Z-LINE	X-RAY	Z-ABSOR	MAC	
O	ka	Na	3.6300e+03	Love et al. (1974)
O	ka	Cl	1.4300e+04	Love et al. (1974)
O	ka	F	1.8500e+03	Love et al. (1974)
O	ka	Ti	1.9900e+04	Bastin (1992)
O	ka	Fe	4.0000e+03	Bastin (1992)
O	ka	Mn	3.4700e+03	Bastin (1992)
O	ka	Ca	2.4600e+04	Love et al. (1974)
O	ka	Si	8.7900e+03	Bastin (1992)
O	ka	Al	6.7200e+03	Bastin (1992)
O	ka	Mg	5.1700e+03	Bastin (1992)

Area Peak Factors were utilized to correct x-ray intensities for wavelength peak shift and/or shape changes for compound compositions by summing binary APF values.

See G. F. Bastin and H. J. M. Heijligers, Quantitative Electron Probe Microanalysis of Carbon in Binary Carbides, Parts I and II, X-Ray Spectr. 15: 135-150, 1986

Empirical Area peak Factors From:
C:\SOURCE\Probewin32-E\EMPAPF.DAT

Z-LINE	X-RAY	Z-ABSOR	APF	
O	ka	Ti	.9796	TiO2/Fe2O3/WSi/59.8
O	ka	Fe	.9962	Fe3O4/Fe2O3/WSi/59.8
O	ka	Ca	.9700	----/Fe2O3/WSi/59.8
O	ka	Si	1.0444	SiO2/Fe2O3/WSi/59.8, Bastin
O	ka	Al	1.0213	Al2O3/Fe2O3/WSi/59.8, Bastin

Results are the average of 12 points and detection limits ranged from .008 weight percent for Mg ka to .010 weight percent for Si ka to .023 weight percent for Fe ka to .050 weight percent for O ka to .076 weight percent for Ba la.

Analytical sensitivity (at the 99% confidence level) ranged from .176 percent relative for Si ka to .455 percent relative for Al ka to 1.504 percent relative for K ka to 26.236 percent relative for Ti ka to 94.686 percent relative for Mg ka.

Oxygen equivalent from halogens (F/Cl/Br/I), was not subtracted in the matrix correction.

The matrix correction method was ZAF or Phi-Rho-Z calculations and the mass absorption coefficients dataset was LINEMU Henke (1985) < 10KeV / CITZMU > 10KeV.

The ZAF or Phi-Rho-Z algorithm utilized was Armstrong/Love Scott (default).

See J. T. Armstrong, Quantitative analysis of silicates and oxide minerals: Comparison of Monte-Carlo, ZAF and Phi-Rho-Z procedures, Microbeam Analysis--1988, p 239-246

Appendix B (NBS K-411 glass published composition)

St 162 NBS K-411 mineral glass
TakeOff = 40.0 KiloVolt = 15.0

SRM 470, NIST
C.M. Taylor (Photometry?) FeO 4.39, Fe2O3 11.23
Total as FeO 14.49, Excess O 1.12
Oxide and Elemental Composition

Average Total Oxygen:	43.558	Average Total Weight%:	100.183
Average Calculated Oxygen:	42.438	Average Atomic Number:	13.227
Average Excess Oxygen:	1.120	Average Atomic Weight:	22.412

ELEM:	SiO2	FeO	MgO	CaO	Al2O3	MnO	O
XRAY:	ka	ka	ka	ka	ka	ka	ka
OXWT:	54.301	14.420	14.671	15.471	.100	.099	1.120
ELWT:	25.382	11.209	8.847	11.057	.053	.077	43.558
KFAC:	.2018	.0950	.0568	.1027	.0004	.0006	.1735
ZCOR:	1.2577	1.1793	1.5585	1.0769	1.4586	1.2001	2.5106
AT% :	20.217	4.490	8.143	6.172	.044	.031	60.903
24 O:	7.967	1.769	3.209	2.432	.017	.012	24.000

Appendix C (analysis of NBS K-411 glass, SRM 470, as unknown). Note that the primary oxygen standard is MgO and corrected for APF and empirical MACs.

The “published” oxygen concentration of this standard is 43.558 but the measured value was 44.965 which is about 3.2% high relative. Hence the need for a “blank” correction.

```
Un   19 NBS K-411 mineral glass
TakeOff = 40.0  KiloVolt = 15.0  Beam Current = 10.0  Beam Size =   20
(Magnification (analytical) =  20000),        Beam Mode = Analog  Spot
(Magnification (default) =      600, Magnification (imaging) =    600)

SRM 470, NIST
C.M. Taylor (Photometry?) FeO 4.39, Fe2O3 11.23
Total as FeO 14.49, Excess O 1.12

Number of Data Lines:  12            Number of 'Good' Data Lines:  12
First/Last Date-Time: 02/01/2008 08:53:32 PM to 02/01/2008 09:33:54 PM
WARNING- Using Low Counts Only Off-Peak correction for ti ka
WARNING- Using Exponential Off-Peak correction for o ka
WARNING- Using Volatile Element Correction
WARNING- Using Empirical Mass Absorption Coefficients
WARNING- Using Empirical Area Peak Factor Corrections

Average Total Oxygen:       44.965     Average Total Weight%:  101.142
Average Calculated Oxygen:  42.061     Average Atomic Number:   13.151
Average Excess Oxygen:       2.904     Average Atomic Weight:   22.269
Oxygen Equiv. from Halogen:   .000  Halogen Corrected Oxygen:   44.965
Average ZAF Iteration:       7.50     Average Quant Iterate:     4.00

Results in Elemental Weight Percents

ELEM:       Na       K      Cl      Ba       F      Ti      Fe      Mn      Ca      Si      Al      Mg       O       H
TYPE:     ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    ANAL    SPEC
BGDS:      MAN     LIN     LIN     LIN     LIN     LOW     MAN     LIN     MAN     MAN     MAN     MAN     EXP
ABS%:   -51.48     .00     .00     .00     .00     .00    -.35     .00   -3.21  -19.88  -29.99  -36.22     .00
TIME:    60.00   20.00   10.00   20.00   40.00   10.00   40.00   10.00   20.00   20.00   20.00   60.00  120.00

ELEM:       Na       K      Cl      Ba       F      Ti      Fe      Mn      Ca      Si      Al      Mg       O       H   SUM
   598    .026    .013   -.018    .021    .003    .000  11.343    .119  10.975  25.175    .018   8.665  45.172    .000 101.513
   599   -.009    .001    .013    .016    .017   -.010  11.195    .100  10.849  25.375    .021   8.633  45.253    .000 101.455
   600    .022   -.002   -.039    .014   -.022   -.061  11.312    .101  10.748  25.120    .016   8.680  44.606    .000 100.496
   601    .007    .014    .013   -.045   -.015    .016  11.441    .102  10.780  25.145    .025   8.687  44.680    .000 100.849
   602   -.004    .013   -.042   -.002   -.030   -.032  11.185    .066  10.805  25.258    .019   8.729  44.977    .000 100.941
```

603	.069	.027	.031	-.030	.017	.035	11.322	.073	10.863	25.330	.021	8.720	45.427	.000	101.907
604	-.002	.005	-.003	-.011	.017	.010	11.238	.072	11.113	25.316	.018	8.658	45.299	.000	101.730
605	.056	-.002	-.010	.005	.022	.000	11.224	.124	10.883	25.117	.013	8.702	44.713	.000	100.846
606	-.015	-.001	.023	.024	.011	.016	11.248	.125	10.893	24.924	.015	8.668	44.841	.000	100.773
607	-.003	.013	.018	.000	-.011	-.006	11.212	.096	11.090	25.231	.019	8.687	44.756	.000	101.102
608	-.002	.001	.008	-.065	.016	-.003	11.251	.104	10.910	25.098	.019	8.762	44.978	.000	101.075
609	.017	-.007	-.005	.014	-.008	-.045	11.232	.086	10.781	25.398	.025	8.653	44.878	.000	101.020
AVER:	.014	.006	-.001	-.005	.001	-.007	11.267	.097	10.891	25.207	.019	8.687	44.965	.000	101.142
SDEV:	.026	.010	.023	.028	.018	.027	.074	.020	.117	.137	.004	.036	.268	.000	
SERR:	.008	.003	.007	.008	.005	.008	.021	.006	.034	.040	.001	.010	.077	.000	
%RSD:	193.4	152.8	-2690.0	-583.6	1199.6	-408.3	.7	20.6	1.1	.5	18.7	.4	.6	.0	
STDS:	336	374	285	835	835	22	395	25	358	162	336	12	12	0	
STKF:	.0735	.1132	.0601	.7430	.1715	.5547	.6779	.7341	.1693	.2018	.1331	.4736	.2327	.0000	
STCT:	2447.1	2424.5	839.8	8523.1	2398.3	6102.9	14135.7	13572.9	2245.3	34241.5	23221.0	24410.5	8332.5	.0	
UNKF:	.0001	.0001	.0000	.0000	.0000	-.0001	.0955	.0008	.1011	.2004	.0001	.0555	.1699	.0000	
UNCT:	2.1	1.3	-.1	-.4	.1	-.6	1990.9	15.0	1340.8	34006.1	22.9	2863.0	6083.6	.0	
UNBG:	10.0	14.6	6.7	34.3	4.5	6.9	26.5	19.9	5.0	143.8	99.2	16.6	64.0	.0	
ZCOR:	2.1041	1.0917	1.2060	1.3446	4.0027	1.1745	1.1800	1.2006	1.0770	1.2577	1.4592	1.5639	2.6465	.0000	
KRAW:	.0009	.0005	-.0001	.0000	.0000	-.0001	.1408	.0011	.5972	.9931	.0010	.1173	.7301	.0000	
PKBG:	1.21	1.09	1.04	.99	1.02	.98	76.26	1.78	267.83	237.50	1.23	173.85	96.65	.00	
INT%:	----	----	----	.63	----	.01	----	----	----	----	----	----	----	----	
APF:	----	----	----	----	----	----	----	----	----	----	----	----	1.013	----	
VOL%:	5.277	3.890	----	----	----	----	----	----	----	.137	----	----	.079	----	
DEV%:	10.0	12.5	----	----	----	----	----	----	----	.4	----	----	.4	----	
VOLF:	QUADRA	LINEAR	----	----	----	----	----	----	----	LINEAR	----	----	LINEAR	----	
BLNK#:	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BLNKL:	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
BLNKV:	----	----	----	----	----	----	----	----	----	----	----	----	----	----	

Results in Oxide Weight Percents

ELEM:	Na2O	K2O	Cl	BaO	F	TiO2	FeO	MnO	CaO	SiO2	Al2O3	MgO	O	H2O	SUM
598	.035	.016	-.018	.024	.003	.000	14.593	.154	15.357	53.858	.035	14.369	3.088	.000	101.513
599	-.012	.002	.013	.018	.017	-.016	14.402	.130	15.181	54.287	.039	14.317	3.079	.000	101.455
600	.030	-.002	-.039	.016	-.022	-.102	14.553	.131	15.039	53.740	.031	14.395	2.727	.000	100.496
601	.009	.017	.013	-.050	-.015	.027	14.719	.131	15.083	53.793	.048	14.405	2.668	.000	100.849
602	-.005	.016	-.042	-.002	-.030	-.054	14.389	.085	15.118	54.035	.035	14.475	2.920	.000	100.941
603	.093	.033	.031	-.033	.017	.059	14.566	.094	15.200	54.190	.040	14.461	3.157	.000	101.907
604	-.003	.006	-.003	-.012	.017	.016	14.457	.094	15.549	54.160	.033	14.357	3.058	.000	101.730
605	.076	-.003	-.010	.006	.022	.000	14.439	.160	15.227	53.733	.025	14.431	2.740	.000	100.846
606	-.020	-.001	.023	.027	.011	.027	14.470	.162	15.241	53.322	.028	14.373	3.108	.000	100.773
607	-.004	.016	.018	.000	-.011	-.011	14.425	.124	15.517	53.978	.036	14.406	2.608	.000	101.102
608	-.003	.002	.008	-.073	.016	-.005	14.474	.134	15.265	53.693	.036	14.530	3.000	.000	101.075

609	.024	-.008	-.005	.016	-.008	-.075	14.450	.111	15.085	54.335	.047	14.349	2.700	.000	101.020
AVER:	.018	.008	-.001	-.005	.001	-.011	14.495	.126	15.238	53.927	.036	14.406	2.904	.000	101.142
SDEV:	.035	.012	.023	.031	.018	.046	.096	.026	.164	.294	.007	.060	.201	.000	
SERR:	.010	.003	.007	.009	.005	.013	.028	.007	.047	.085	.002	.017	.058	.000	
%RSD:	193.4	152.8	-2690.0	-583.6	1199.6	-408.3	.7	20.6	1.1	.5	18.7	.4	6.9	.0	