

## APPENDIX A

Mineral compositional data used for thermobarometric calculations and estimations of equilibria.

## Garnet

	Np7	Np7	Np7	Np7	Np7	Np7	Np7	Np7	Np7	Np7	Np6	Np6
Analysis #	5	7	10	15	19	20	23	25	27	30	15	16
SiO2	37.20	37.12	37.41	38.10	37.91	37.49	37.77	37.70	37.37	38.49	37.22	38.34
Al2O3	22.17	22.04	22.11	22.05	21.50	22.04	21.76	22.07	22.02	22.27	20.32	20.41
TiO2	0.06	0.07	0.01	0.10	0.07	0.06	0.03	0.05	0.23	0.02	0.05	0.08
FeO	34.39	34.73	37.77	33.96	33.89	37.96	37.90	37.69	37.65	37.04	34.94	35.60
MnO	2.92	2.96	0.71	4.18	4.28	0.46	0.89	0.56	0.80	0.58	2.78	2.92
MgO	1.63	1.65	2.21	1.64	1.62	2.54	2.19	2.36	2.09	2.40	2.24	2.26
CaO	3.93	3.74	2.70	3.73	3.73	2.14	2.07	2.43	2.82	2.87	3.30	3.31
Total	102.31	102.31	102.91	103.74	103.00	102.69	102.61	102.85	102.97	103.67	100.85	102.92

Formulas on the basis of 12 oxygens

Si	2.945	2.943	2.948	2.975	2.987	2.955	2.982	2.965	2.944	2.989	3.000	3.026
Al	2.068	2.060	2.053	2.029	1.997	2.047	2.024	2.045	2.044	2.038	1.930	1.899
Ti	0.004	0.004	0.000	0.006	0.004	0.003	0.002	0.003	0.014	0.001	0.003	0.005
Fe	2.277	2.303	2.489	2.217	2.233	2.502	2.502	2.479	2.481	2.406	2.355	2.349
Mn	0.196	0.199	0.047	0.276	0.286	0.031	0.060	0.037	0.053	0.038	0.190	0.195
Mg	0.193	0.196	0.259	0.190	0.190	0.299	0.258	0.276	0.245	0.278	0.269	0.266
Ca	0.333	0.318	0.228	0.312	0.315	0.181	0.175	0.205	0.238	0.239	0.285	0.280
Total cations	8.017	8.023	8.025	8.005	8.011	8.018	8.003	8.010	8.020	7.990	8.032	8.020
Almandine	75.9	76.4	82.3	74.0	73.9	83.1	83.6	82.7	82.2	81.2	76.0	76.0
Grossular	11.1	10.5	7.5	10.4	10.4	6.0	5.8	6.8	7.9	8.1	9.2	9.1
Pyrope	6.4	6.5	8.6	6.4	6.3	9.9	8.6	9.2	8.1	9.4	8.7	8.6
Spessartine	6.5	6.6	1.6	9.2	9.5	1.0	2.0	1.2	1.8	1.3	6.1	6.3
Fe/(Fe+Mg)	0.92	0.92	0.91	0.92	0.92	0.89	0.91	0.90	0.91	0.90	0.90	0.90

## Garnet

	Np6	Np6	Np6	Np6	Np6	Np6	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B
Analysis #	36	37	38	1	2	3	29	30	33	34	35	42
SiO2	38.26	37.72	37.96	37.65	38.01	37.74	39.26	38.63	39.16	38.27	38.89	38.46
Al2O3	21.16	20.96	21.09	20.50	20.84	20.64	21.31	20.73	20.76	20.89	20.42	21.11
TiO2	0.06	0.08	0.07	0.04	0.04	0.09	0.01	0.07	0.07	0.04	0.07	0.02
FeO	34.66	33.55	33.59	34.30	33.97	31.65	35.02	36.05	35.72	36.14	35.53	35.92
MnO	3.88	5.73	4.54	3.06	6.41	7.65	0.35	0.56	0.59	0.60	0.66	0.34
MgO	2.12	1.97	2.03	2.35	2.26	1.84	2.80	2.62	2.74	2.88	2.75	2.65
CaO	3.10	3.00	3.78	3.30	0.84	2.09	4.68	4.58	5.04	3.94	4.03	4.41
Total	103.25	103.01	103.05	101.20	102.37	101.70	103.43	103.24	104.08	102.76	102.35	102.91

Formulas on the basis of 12 oxygens

Si	3.005	2.984	2.991	3.014	3.020	3.019	3.040	3.021	3.032	3.006	3.057	3.011
Al	1.958	1.954	1.958	1.934	1.952	1.946	1.945	1.911	1.894	1.934	1.892	1.948
Ti	0.004	0.005	0.004	0.002	0.002	0.005	0.001	0.004	0.004	0.002	0.004	0.001
Fe	2.277	2.220	2.213	2.296	2.257	2.117	2.268	2.358	2.313	2.374	2.335	2.352
Mn	0.258	0.384	0.303	0.207	0.431	0.518	0.023	0.037	0.039	0.040	0.044	0.023
Mg	0.248	0.233	0.238	0.280	0.268	0.219	0.323	0.305	0.316	0.337	0.322	0.309
Ca	0.261	0.254	0.319	0.283	0.072	0.179	0.388	0.384	0.418	0.332	0.339	0.370
Total cations	8.012	8.034	8.026	8.017	8.002	8.003	7.987	8.020	8.017	8.025	7.993	8.014
Almandine	74.8	71.8	72.0	74.9	74.5	69.8	75.5	76.4	74.9	77.0	76.8	77.0
Grossular	8.6	8.2	10.4	9.2	2.4	5.9	12.9	12.4	13.5	10.8	11.2	12.1
Pyrope	8.2	7.5	7.7	9.1	8.8	7.2	10.8	9.9	10.2	10.9	10.6	10.1
Spessartine	8.5	12.4	9.8	6.8	14.2	17.1	0.8	1.2	1.3	1.3	1.4	0.7
Fe/(Fe+Mg)	0.90	0.91	0.90	0.89	0.89	0.91	0.88	0.89	0.88	0.88	0.88	0.88

## Garnet

	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111A	Np111A
Analysis #	43	45	63	64	65	66	67	76	77	87	108	109	
SiO <sub>2</sub>	38.46	38.10	38.74	38.00	39.10	38.50	38.73	38.02	38.46	39.00	38.08	38.54	
Al <sub>2</sub> O <sub>3</sub>	21.09	21.27	21.28	21.40	20.84	20.75	20.94	20.83	20.97	20.81	21.01	20.84	
TiO <sub>2</sub>	0.03	0.08	0.02	0.02	0.07	0.15	0.11	0.04	0.08	0.08	0.03	0.01	
FeO	35.94	36.19	35.28	34.40	35.32	36.15	35.65	33.37	35.66	36.22	32.69	32.70	
MnO	0.30	0.54	0.64	0.29	0.26	0.27	0.49	2.14	1.64	0.00	4.88	5.61	
MgO	2.44	2.71	3.22	3.15	2.29	2.42	2.64	2.27	2.55	3.17	3.93	3.72	
CaO	4.24	4.17	3.71	4.67	4.72	4.95	4.83	4.94	4.13	1.74	1.92	1.77	
Total	102.50	103.06	102.89	101.93	102.60	103.19	103.39	101.61	103.49	101.02	102.54	103.19	

Formulas on the basis of 12 oxygens

Si	3.022	2.985	3.020	2.989	3.059	3.014	3.018	3.015	3.006	3.083	2.992	3.013
Al	1.953	1.964	1.955	1.984	1.922	1.915	1.923	1.947	1.931	1.939	1.945	1.920
Ti	0.002	0.005	0.001	0.001	0.004	0.009	0.006	0.002	0.005	0.005	0.002	0.001
Fe	2.361	2.371	2.300	2.263	2.311	2.367	2.323	2.213	2.331	2.395	2.148	2.138
Mn	0.020	0.036	0.042	0.019	0.017	0.018	0.032	0.144	0.109	0.000	0.325	0.372
Mg	0.286	0.317	0.374	0.369	0.267	0.282	0.307	0.268	0.297	0.374	0.460	0.434
Ca	0.357	0.350	0.310	0.394	0.396	0.415	0.403	0.420	0.346	0.147	0.162	0.148
Total cations	8.000	8.028	8.002	8.018	7.976	8.020	8.014	8.009	8.024	7.943	8.034	8.026
Almandine	78.1	77.1	76.0	74.3	77.3	76.8	75.8	72.7	75.6	82.1	69.4	69.2
Grossular	11.8	11.4	10.2	12.9	13.2	13.5	13.2	13.8	11.2	5.1	5.2	4.8
Pyrope	9.5	10.3	12.4	12.1	8.9	9.2	10.0	8.8	9.6	12.8	14.9	14.0
Spessartine	0.7	1.2	1.4	0.6	0.6	0.6	1.1	4.7	3.5	0.0	10.5	12.0
Fe/(Fe+Mg)	0.89	0.88	0.86	0.86	0.90	0.89	0.88	0.89	0.89	0.87	0.82	0.83

## Garnet

	Np111A	Np111A	Np111A	Np111A	Np111A	Np111A	Np111A	Np106	Np106	Np105	Np103	Np103
Analysis #	110	113	114	122	94	95	96	104	105	29	94	95
SiO <sub>2</sub>	38.39	37.96	38.48	37.25	37.71	37.58	37.97	37.87	37.64	39.26	37.71	37.58
Al <sub>2</sub> O <sub>3</sub>	20.35	21.24	21.22	20.82	21.03	20.95	20.81	20.09	20.86	21.31	21.03	20.95
TiO <sub>2</sub>	0.07	0.07	0.06	0.09	0.07	0.00	0.02	0.00	0.03	0.01	0.07	0.00
FeO	29.41	27.03	29.83	31.93	38.24	38.93	36.47	27.86	26.42	35.02	38.24	38.93
MnO	9.14	9.68	8.45	7.39	1.79	1.85	1.75	10.51	11.65	0.35	1.79	1.85
MgO	2.56	2.83	3.20	3.09	2.17	2.07	2.88	2.96	2.86	2.80	2.17	2.07
CaO	3.32	3.90	2.59	0.80	1.68	1.89	1.65	2.81	2.31	4.68	1.68	1.89
Total	103.24	102.71	103.83	101.37	102.69	103.27	101.55	102.10	101.77	103.43	102.69	103.27

Formulas on the basis of 12 oxygens

Si	3.019	2.982	2.994	2.983	2.992	2.978	3.021	3.012	2.993	3.040	2.992	2.978
Al	1.886	1.966	1.946	1.965	1.967	1.957	1.952	1.883	1.955	1.945	1.967	1.957
Ti	0.004	0.004	0.004	0.005	0.004	0.000	0.001	0.000	0.002	0.001	0.004	0.000
Fe	1.934	1.776	1.941	2.138	2.538	2.580	2.427	1.853	1.757	2.268	2.538	2.580
Mn	0.609	0.644	0.557	0.501	0.120	0.124	0.118	0.708	0.785	0.023	0.120	0.124
Mg	0.300	0.331	0.371	0.369	0.257	0.245	0.342	0.351	0.339	0.323	0.257	0.245
Ca	0.280	0.328	0.216	0.069	0.143	0.160	0.141	0.239	0.197	0.388	0.143	0.160
Total cations	8.033	8.031	8.029	8.030	8.020	8.044	8.002	8.047	8.028	7.987	8.020	8.044
Almandine	61.9	57.7	62.9	69.5	83.0	83.0	80.2	58.8	57.1	75.5	83.0	83.0
Grossular	9.0	10.7	7.0	2.2	4.7	5.2	4.6	7.6	6.4	12.9	4.7	5.2
Pyrope	9.6	10.8	12.0	12.0	8.4	7.9	11.3	11.1	11.0	10.8	8.4	7.9
Spessartine	19.5	20.9	18.1	16.3	3.9	4.0	3.9	22.5	25.5	0.8	3.9	4.0
Fe/(Fe+Mg)	0.87	0.84	0.84	0.85	0.91	0.91	0.88	0.84	0.84	0.88	0.91	0.91

## Garnet

	Np102	Np102	Np102	Np102	Np102	Np102	Np102	Np102	Np102
Analysis #	96	77	78	79	80	81	89	102	103
SiO <sub>2</sub>	37.97	38.15	37.44	38.27	38.06	37.69	37.78	38.22	38.32
Al <sub>2</sub> O <sub>3</sub>	20.81	21.12	20.81	21.03	21.23	21.07	21.11	20.88	20.78
TiO <sub>2</sub>	0.02	0.02	0.11	0.04	0.05	0.04	0.05	0.14	0.14
FeO	36.47	35.76	38.02	36.52	36.63	36.99	36.48	28.65	28.50
MnO	1.75	0.46	0.22	0.18	0.19	0.20	0.46	7.55	7.83
MgO	2.88	2.82	2.46	2.02	2.52	2.13	2.68	0.73	0.77
CaO	1.64	3.49	3.46	4.08	3.59	3.79	3.46	6.86	6.61
Total	101.54	101.82	102.52	102.14	102.27	101.91	102.02	103.03	102.95

Formulas on the basis of 12 oxygens

Si	3.022	3.014	2.972	3.024	3.002	2.995	2.991	3.010	3.020
Al	1.952	1.966	1.947	1.959	1.974	1.973	1.970	1.938	1.930
Ti	0.001	0.001	0.007	0.002	0.003	0.002	0.003	0.008	0.008
Fe	2.427	2.362	2.524	2.413	2.416	2.458	2.416	1.887	1.878
Mn	0.118	0.031	0.015	0.012	0.013	0.013	0.031	0.504	0.523
Mg	0.342	0.332	0.291	0.238	0.296	0.252	0.316	0.086	0.090
Ca	0.140	0.295	0.294	0.345	0.303	0.323	0.294	0.579	0.558
Total cations	8.001	8.002	8.049	7.994	8.008	8.016	8.021	8.012	8.007
Almandine	80.2	78.2	80.8	80.2	79.8	80.7	79.0	61.8	61.6
Grossular	4.6	9.8	9.4	11.5	10.0	10.6	9.6	18.9	18.3
Pyrope	11.3	11.0	9.3	7.9	9.8	8.3	10.4	2.8	3.0
Spessartine	3.9	1.0	0.5	0.4	0.4	0.4	1.0	16.5	17.1
Fe/(Fe+Mg)	0.88	0.88	0.90	0.91	0.89	0.91	0.88	0.96	0.95

## Biotite

Analysis #	Np7 4	Np7 6	Np7 11	Np7 12	Np7 14	Np7 21	Np7 22	Np7 26	Np7 28	Np6 17	Np6 18	Np6 19
SiO2	35.94	35.13	34.93	33.94	35.41	35.74	35.97	35.92	34.82	36.27	36.11	35.45
Al2O3	20.22	19.77	19.94	19.90	19.66	20.02	19.61	19.95	19.67	17.95	18.18	18.12
TiO2	1.43	1.72	1.32	1.55	1.78	1.28	1.61	1.62	1.57	1.70	1.71	1.78
FeO	22.34	22.92	22.14	23.72	25.41	21.96	22.50	22.25	22.78	21.86	22.01	21.71
MnO	0.05	0.12	0.00	0.03	0.21	0.00	0.02	0.02	0.00	0.07	0.03	0.09
MgO	7.81	7.51	8.00	8.90	5.65	8.15	7.93	8.13	7.78	8.97	9.00	8.89
CaO	0.05	0.03	0.02	0.11	0.08	0.01	0.03	0.03	0.03	0.00	0.00	0.00
Na2O	0.10	0.16	0.26	0.13	0.13	0.23	0.19	0.22	0.18	0.07	0.09	0.10
K2O	8.44	8.50	8.66	7.03	8.52	8.57	8.41	8.48	8.37	9.02	8.88	8.84
F	0.15	0.18	0.25	0.12	0.18	0.12	0.12	0.19	0.16	0.27	0.23	0.20
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01
Total	96.52	96.05	95.52	95.43	97.03	96.08	96.38	96.81	95.36	96.19	96.26	95.20

Formulas on the basis of 22 oxygens

Si	5.428	5.371	5.361	5.212	5.419	5.422	5.448	5.415	5.358	5.528	5.496	5.460
Al	3.599	3.564	3.607	3.601	3.545	3.580	3.500	3.544	3.567	3.224	3.261	3.289
Ti	0.162	0.197	0.152	0.179	0.205	0.146	0.183	0.183	0.182	0.195	0.196	0.206
Fe	2.821	2.931	2.842	3.046	3.252	2.786	2.849	2.805	2.932	2.786	2.801	2.796
Mn	0.007	0.016	0.000	0.004	0.027	0.000	0.003	0.003	0.000	0.008	0.004	0.012
Mg	1.758	1.711	1.830	2.038	1.289	1.843	1.791	1.827	1.785	2.037	2.043	2.042
Ca	0.007	0.006	0.003	0.018	0.013	0.002	0.005	0.005	0.005	0.000	0.000	0.000
Na	0.028	0.049	0.078	0.037	0.039	0.066	0.055	0.063	0.053	0.022	0.027	0.030
K	1.627	1.658	1.696	1.378	1.664	1.659	1.624	1.632	1.644	1.753	1.723	1.737
Total cations	13.783	13.796	13.796	14.100	13.752	13.779	13.779	13.782	13.829	13.778	13.802	13.805
Fe/(Fe+Mg)	0.62	0.63	0.61	0.60	0.72	0.60	0.61	0.61	0.62	0.58	0.58	0.58
Mg/(Mg+Fe)	0.38	0.37	0.39	0.40	0.28	0.40	0.39	0.39	0.38	0.42	0.42	0.42

## Biotite

Analysis #	Np6 20	Np6 31	Np6 32	Np6 40	Np6 42	Np6 31	Np111B 32	Np111B 39	Np111B 40	Np111B 41	Np111B 47	Np111B 54
SiO2	35.72	36.31	36.22	36.42	35.89	35.95	36.53	35.53	34.10	35.88	36.70	37.28
Al2O3	18.13	18.40	18.63	18.06	17.95	18.51	18.23	18.39	18.61	18.43	18.58	18.26
TiO2	1.62	1.77	1.82	1.73	1.95	1.50	1.61	1.46	1.34	1.54	1.80	1.56
FeO	21.86	21.68	21.75	21.67	21.82	20.53	20.33	21.19	22.32	21.29	20.79	20.26
MnO	0.10	0.20	0.18	0.17	0.22	0.06	0.14	0.11	0.08	0.13	0.09	0.06
MgO	9.04	8.80	8.95	9.12	9.04	10.15	10.17	10.40	11.25	10.49	10.34	10.46
CaO	0.00	0.04	0.04	0.03	0.03	0.07	0.05	0.05	0.06	0.04	0.02	0.03
Na2O	0.10	0.12	0.10	0.11	0.07	0.36	0.37	0.30	0.25	0.33	0.42	0.37
K2O	8.91	8.77	9.12	8.91	8.88	7.88	7.92	7.28	5.85	7.04	7.95	7.87
F	0.29	0.34	0.28	0.27	0.29	0.26	0.23	0.25	0.17	0.26	0.25	0.29
Cl	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	95.80	96.44	97.08	96.47	96.16	95.27	95.58	94.96	94.03	95.43	96.94	96.44

Formulas on the basis of 22 oxygens

Si	5.474	5.509	5.467	5.524	5.478	5.467	5.525	5.425	5.259	5.441	5.480	5.572
Al	3.275	3.291	3.314	3.229	3.229	3.317	3.250	3.310	3.382	3.294	3.270	3.217
Ti	0.187	0.202	0.207	0.197	0.224	0.172	0.183	0.168	0.155	0.176	0.202	0.175
Fe	2.801	2.751	2.746	2.748	2.786	2.611	2.572	2.706	2.879	2.700	2.596	2.533
Mn	0.013	0.026	0.024	0.021	0.029	0.008	0.018	0.014	0.010	0.017	0.011	0.008
Mg	2.064	1.990	2.013	2.062	2.057	2.301	2.293	2.367	2.586	2.372	2.302	2.331
Ca	0.000	0.007	0.007	0.004	0.005	0.011	0.008	0.008	0.010	0.006	0.003	0.005
cat Na	0.031	0.035	0.029	0.031	0.021	0.106	0.109	0.089	0.075	0.097	0.122	0.107
cat K	1.742	1.697	1.756	1.724	1.729	1.529	1.528	1.418	1.151	1.362	1.514	1.501
Total cations	13.815	13.777	13.777	13.786	13.808	13.886	13.849	13.999	14.282	14.006	13.865	13.840
Fe/(Fe+Mg)	0.58	0.58	0.58	0.57	0.58	0.53	0.53	0.53	0.53	0.53	0.53	0.52
Mg/(Mg+Fe)	0.42	0.42	0.42	0.43	0.42	0.47	0.47	0.47	0.47	0.47	0.47	0.48



## Biotite

Analysis #	Np111B 55	Np111B 70	Np111B 79	Np111B 80	Np111A 92	Np111A 93	Np111A 101	Np111A 103	Np106 109	Np106 110	Np105 60	Np103 92
SiO2	37.47	37.11	36.47	34.52	35.08	35.43	36.32	35.72	36.58	37.91	35.18	35.08
Al2O3	18.27	19.00	18.66	18.56	18.60	18.79	18.72	18.88	16.72	17.23	26.96	18.60
TiO2	1.48	1.68	1.73	1.87	1.31	1.66	1.72	1.55	1.38	1.51	0.13	1.31
FeO	20.30	19.87	21.81	22.39	24.05	24.32	19.65	23.73	17.83	16.18	14.35	24.05
MnO	0.06	0.11	0.09	0.11	0.19	0.16	0.13	0.14	0.27	0.31	0.22	0.19
MgO	10.49	9.81	9.94	10.86	6.73	6.75	9.70	7.14	13.32	12.10	9.10	6.73
CaO	0.02	0.02	0.03	0.04	0.05	0.02	0.03	0.03	0.05	0.05	0.04	0.05
Na2O	0.40	0.41	0.37	0.24	0.05	0.03	0.10	0.07	0.08	0.13	0.62	0.04
K2O	7.97	8.27	7.98	6.39	8.09	8.31	8.58	8.49	8.89	9.48	3.76	8.09
F	0.34	0.28	0.21	0.14	0.09	0.15	0.38	0.15	0.49	0.37	0.26	0.09
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	96.80	96.56	97.29	95.12	94.24	95.62	95.33	95.90	95.61	95.27	90.62	94.23

Formulas on the basis of 22 oxygens

Si	5.584	5.540	5.453	5.273	5.490	5.471	5.513	5.485	5.527	5.689	5.265	5.490
Al	3.209	3.343	3.288	3.341	3.431	3.420	3.349	3.417	2.978	3.047	4.755	3.431
Ti	0.166	0.189	0.195	0.215	0.154	0.193	0.196	0.179	0.157	0.170	0.015	0.154
Fe	2.530	2.481	2.727	2.860	3.148	3.141	2.495	3.047	2.253	2.030	1.796	3.148
Mn	0.008	0.014	0.011	0.014	0.025	0.021	0.017	0.018	0.035	0.039	0.028	0.025
Mg	2.331	2.183	2.216	2.473	1.570	1.554	2.195	1.634	3.001	2.707	2.030	1.570
Ca	0.003	0.003	0.005	0.007	0.008	0.003	0.005	0.005	0.008	0.008	0.006	0.008
Na	0.116	0.119	0.107	0.071	0.015	0.009	0.029	0.021	0.023	0.038	0.180	0.012
K	1.515	1.575	1.522	1.245	1.615	1.637	1.662	1.663	1.714	1.815	0.718	1.615
Total cations	13.830	13.753	13.894	14.183	13.826	13.803	13.770	13.786	13.958	13.691	13.894	13.827
Fe/(Fe+Mg)	0.52	0.53	0.55	0.54	0.67	0.67	0.53	0.65	0.43	0.43	0.47	0.67
Mg/(Mg+Fe)	0.48	0.47	0.45	0.46	0.33	0.33	0.47	0.35	0.57	0.57	0.53	0.33

## Biotite

Analysis #	Np103 93	Np103 101	Np103 103	Np102 82	Np102 83	Np102 84	Np102 90	Np102 91	Np102 100	Np102 101
SiO2	35.43	36.32	35.72	35.31	36.28	35.84	36.61	36.40	35.99	35.83
Al2O3	18.79	18.72	18.88	18.34	19.14	18.52	18.66	18.72	18.21	18.73
TiO2	1.66	1.72	1.55	1.76	1.16	1.33	1.63	1.37	1.84	1.91
FeO	24.32	19.65	23.73	21.00	20.47	21.52	21.18	22.09	20.74	20.61
MnO	0.16	0.13	0.14	0.11	0.09	0.08	0.12	0.06	0.12	0.12
MgO	6.75	9.70	7.14	9.30	9.18	9.31	9.14	9.05	9.44	9.30
CaO	0.02	0.03	0.03	0.05	0.05	0.05	0.06	0.05	0.04	0.04
Na2O	0.03	0.10	0.07	0.17	0.28	0.17	0.36	0.37	0.25	0.30
K2O	8.31	8.58	8.49	8.27	8.83	8.74	8.64	8.58	8.81	8.90
F	0.15	0.38	0.15	0.29	0.32	0.34	0.27	0.23	0.20	0.36
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	95.62	95.33	95.90	94.60	95.80	95.90	96.67	96.92	95.64	96.10

Formulas on the basis of 22 oxygens

Si	5.471	5.513	5.485	5.444	5.505	5.470	5.516	5.490	5.485	5.442
Al	3.420	3.349	3.417	3.332	3.423	3.331	3.313	3.328	3.271	3.353
Ti	0.193	0.196	0.179	0.204	0.132	0.153	0.185	0.155	0.211	0.218
Fe	3.141	2.495	3.047	2.707	2.598	2.747	2.669	2.786	2.643	2.618
Mn	0.021	0.017	0.018	0.014	0.012	0.010	0.015	0.008	0.015	0.015
Mg	1.554	2.195	1.634	2.137	2.077	2.118	2.053	2.035	2.145	2.106
Ca	0.003	0.005	0.005	0.008	0.008	0.008	0.010	0.008	0.007	0.007
Na	0.009	0.029	0.021	0.051	0.082	0.050	0.105	0.108	0.074	0.088
K	1.637	1.662	1.663	1.627	1.709	1.702	1.661	1.651	1.713	1.724
Total cations	13.803	13.770	13.786	13.848	13.755	13.836	13.760	13.811	13.776	13.758
Fe/(Fe+Mg)	0.67	0.53	0.65	0.56	0.56	0.56	0.57	0.58	0.55	0.55
Mg/(Mg+Fe)	0.33	0.47	0.35	0.44	0.44	0.44	0.43	0.42	0.45	0.45

## Muscovite

Analysis #	Np7 21	Np7 22	Np6 21	Np6 22	Np6 33	Np6 34	Np111B 56	Np111B 46	Np111B 50	Np111B 58	Np111B 59	Np111B 62
SiO2	46.62	46.73	46.62	46.73	46.68	46.68	46.21	46.49	46.54	47.76	46.96	46.75
Al2O3	34.92	34.57	34.92	34.57	34.30	34.23	33.13	34.41	34.60	33.89	34.20	34.25
TiO2	0.51	0.55	0.51	0.55	0.41	0.37	0.48	0.44	0.41	0.40	0.57	0.32
FeO	1.62	1.59	1.62	1.59	1.78	1.88	2.80	2.20	0.00	2.06	2.07	2.26
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.02	0.00
MgO	0.55	0.60	0.55	0.60	0.78	0.78	0.98	0.63	0.66	0.67	0.74	0.59
CaO	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.03	0.00	0.02	0.03
Na2O	1.18	1.30	1.18	1.30	1.19	1.13	1.46	1.64	1.69	1.67	1.64	1.60
K2O	8.89	9.07	8.89	9.07	9.08	9.19	7.84	7.87	7.84	7.66	7.44	7.82
F	0.06	0.00	0.06	0.00	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Cl	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	94.35	94.42	94.36	94.42	94.26	94.33	92.91	93.71	91.82	94.14	93.66	93.62

Formulas on the basis of 22 oxygens

Si	6.226	6.243	6.226	6.243	6.253	6.257	6.278	6.240	6.298	6.357	6.282	6.276
Al	5.497	5.443	5.497	5.443	5.416	5.408	5.304	5.444	5.519	5.316	5.392	5.419
Ti	0.051	0.055	0.051	0.055	0.041	0.037	0.049	0.044	0.042	0.040	0.057	0.032
Fe	0.181	0.178	0.181	0.178	0.199	0.211	0.318	0.247	0.000	0.229	0.232	0.254
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.003	0.002	0.000
Mg	0.109	0.120	0.109	0.120	0.157	0.155	0.198	0.126	0.133	0.133	0.148	0.118
Ca	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.004	0.004	0.000	0.003	0.004
Na	0.306	0.336	0.307	0.336	0.308	0.294	0.385	0.427	0.443	0.431	0.425	0.416
K	1.514	1.547	1.514	1.547	1.551	1.571	1.359	1.348	1.354	1.301	1.270	1.339
Total cations	12.06	12.04	12.06	12.04	12.07	12.07	12.15	12.11	12.00	12.08	12.12	12.10
Pg	16.8	17.9	16.8	17.9	16.6	15.7	22.0	24.0	24.6	24.9	25.1	23.7
Ms	83.2	82.1	83.2	82.1	83.3	84.2	77.9	75.8	75.1	75.1	74.8	76.1

## Muscovite

Analysis #	Np111B 74	Np111B 75	Np111B 86	Np111A 70	Np111A 71	Np111A 74	Np111A 75	Np111A 115	Np111A 100	Np106 111	Np106 112	Np106 53
SiO2	46.56	47.69	46.88	47.26	47.50	46.57	46.88	46.94	47.29	46.37	47.67	46.79
Al2O3	33.30	34.37	35.19	34.43	34.69	34.23	33.95	38.69	35.36	32.19	32.72	33.38
TiO2	0.54	0.56	0.13	0.27	0.27	0.27	0.37	0.06	0.10	0.35	0.20	0.18
FeO	3.01	1.99	2.12	2.19	1.96	2.45	2.08	1.23	1.25	3.12	3.12	2.75
MnO	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.04	0.01	0.01
MgO	1.08	0.67	0.50	0.53	0.54	0.48	0.47	0.12	0.55	0.96	0.89	0.71
CaO	0.02	0.01	0.00	0.04	0.01	0.01	0.04	0.25	0.05	0.03	0.03	0.03
Na2O	1.36	1.53	1.68	2.49	2.43	2.20	2.23	6.09	1.68	1.35	1.53	1.71
K2O	8.27	8.06	7.85	7.43	7.49	7.53	7.56	2.13	7.92	8.70	8.74	8.60
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.07
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	94.14	94.88	94.39	94.64	94.89	93.74	93.62	95.51	94.20	93.17	94.93	94.23

Formulas on the basis of 22 oxygens

Si	6.263	6.310	6.237	6.278	6.283	6.256	6.295	6.035	6.273	6.331	6.375	6.300
Al	5.279	5.359	5.518	5.390	5.408	5.419	5.373	5.863	5.528	5.180	5.157	5.297
Ti	0.055	0.056	0.013	0.027	0.027	0.027	0.037	0.006	0.010	0.036	0.020	0.018
Fe	0.339	0.220	0.236	0.243	0.217	0.275	0.234	0.132	0.139	0.356	0.349	0.310
Mn	0.000	0.000	0.005	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.001	0.001
Mg	0.217	0.132	0.099	0.105	0.106	0.096	0.094	0.023	0.109	0.195	0.177	0.143
Ca	0.003	0.001	0.000	0.006	0.001	0.001	0.006	0.034	0.007	0.004	0.004	0.004
Na	0.355	0.392	0.433	0.641	0.623	0.573	0.581	1.518	0.432	0.357	0.397	0.446
K	1.419	1.360	1.332	1.259	1.264	1.290	1.295	0.349	1.340	1.515	1.491	1.477
Total cations	12.16	12.08	12.11	12.05	12.04	12.08	12.04	12.09	12.07	12.11	12.08	12.07
Pg	20.0	22.4	24.5	33.6	33.0	30.7	30.9	79.8	24.3	19.0	21.0	23.2
Ms	79.9	77.5	75.5	66.1	66.9	69.2	68.8	18.4	75.3	80.7	78.8	76.6

## Muscovite

Analysis #	Np105 54	Np105 55	Np105 56	Np105 65	Np105 66	Np103 100	Np102 86	Np102 95	Np102 96	Np102 99
SiO2	46.87	46.80	45.87	46.67	46.39	47.29	44.46	47.60	46.50	47.01
Al2O3	34.10	33.63	33.28	33.55	34.04	35.36	31.50	34.08	33.96	34.41
TiO2	0.02	0.30	0.41	0.30	0.36	0.10	0.68	0.41	0.63	0.59
FeO	2.74	2.50	2.42	3.26	3.35	1.25	6.26	1.90	1.73	1.71
MnO	0.03	0.02	0.04	0.00	0.03	0.00	0.04	0.03	0.00	0.03
MgO	0.60	0.65	0.69	0.57	0.60	0.55	2.28	0.73	0.76	0.63
CaO	0.01	0.03	0.02	0.01	0.01	0.05	0.03	0.00	0.00	0.00
Na2O	1.67	1.66	1.75	1.74	1.90	1.68	1.21	1.33	1.39	1.35
K2O	8.50	8.27	8.45	8.18	8.04	7.92	8.65	8.74	9.00	9.07
F	0.04	0.13	0.10	0.00	0.00	0.00	0.00	0.04	0.02	0.00
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	94.58	93.99	93.03	94.28	94.72	94.20	95.11	94.86	93.99	94.80

Formulas on the basis of 22 oxygens

Si	6.275	6.297	6.253	6.276	6.215	6.273	6.075	6.322	6.251	6.259
Al	5.381	5.333	5.347	5.317	5.375	5.528	5.072	5.335	5.380	5.400
Ti	0.002	0.030	0.042	0.030	0.036	0.010	0.070	0.041	0.064	0.059
Fe	0.307	0.281	0.276	0.367	0.375	0.139	0.715	0.211	0.194	0.190
Mn	0.003	0.002	0.005	0.000	0.003	0.000	0.005	0.003	0.000	0.003
Mg	0.120	0.130	0.140	0.114	0.120	0.109	0.464	0.145	0.152	0.125
Ca	0.001	0.004	0.003	0.001	0.001	0.007	0.004	0.000	0.000	0.000
Na	0.434	0.433	0.463	0.454	0.494	0.432	0.321	0.343	0.362	0.349
K	1.452	1.420	1.470	1.403	1.374	1.340	1.508	1.481	1.543	1.541
Total cations	12.09	12.08	12.07	12.11	12.13	12.07	12.41	12.06	12.04	12.04
Pg	23.0	23.3	23.9	24.4	26.4	24.3	17.5	18.8	19.0	18.4
Ms	76.9	76.4	75.9	75.5	73.5	75.3	82.3	81.2	81.0	81.6

## Plagioclase

Analysis #	Np7 8	Np7 9	Np7 13	Np7 16	Np7 17	Np7 24	Np6 11	Np6 12	Np6 14	Np6 27	Np6 29	Np6 39
SiO2	64.36	65.36	66.04	66.61	66.42	65.30	66.27	66.23	66.14	65.61	65.99	66.35
Al2O3	22.27	22.40	22.52	22.35	22.59	22.33	21.09	20.99	21.98	21.73	20.86	21.85
TiO2	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00
FeO	0.21	0.10	0.05	0.25	0.08	0.13	0.18	0.10	0.02	0.15	0.04	0.16
MnO	0.00	0.00	0.00	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.02	0.00
MgO	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Cr2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	2.42	2.48	2.86	2.55	2.71	2.47	2.73	2.67	2.85	2.90	2.75	2.72
Na2O	10.27	10.25	10.16	10.23	10.45	10.07	10.36	10.50	10.20	10.14	10.52	10.34
K2O	0.08	0.08	0.02	0.09	0.06	0.05	0.02	0.02	0.02	0.02	0.00	0.03
Total	99.62	100.67	101.66	102.11	102.39	100.37	100.66	100.51	101.21	100.59	100.18	101.45

Formulas on the basis of 8 oxygens

Si	2.846	2.856	2.858	2.870	2.857	2.860	2.898	2.900	2.874	2.872	2.900	2.878
Al	1.161	1.154	1.149	1.135	1.145	1.153	1.087	1.083	1.125	1.121	1.080	1.117
Ti	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Fe	0.008	0.004	0.002	0.009	0.003	0.005	0.006	0.004	0.001	0.006	0.002	0.006
Mn	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Mg	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.115	0.116	0.132	0.117	0.125	0.116	0.128	0.125	0.132	0.136	0.129	0.126
Na	0.881	0.869	0.852	0.854	0.872	0.855	0.879	0.892	0.860	0.861	0.897	0.869
K	0.004	0.005	0.001	0.005	0.004	0.003	0.001	0.001	0.001	0.001	0.000	0.002
Total cations	5.016	5.003	4.995	4.992	5.007	4.993	4.999	5.005	4.994	4.998	5.008	4.999
Ab	88.1	87.8	86.5	87.5	87.2	87.8	87.2	87.6	86.5	86.2	87.4	87.2
An	11.5	11.7	13.4	12.0	12.5	11.9	12.7	12.3	13.3	13.6	12.6	12.7
Or	0.4	0.5	0.1	0.5	0.4	0.3	0.1	0.1	0.1	0.1	0.0	0.2

## Plagioclase

	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111B	Np111A	Np111A
Analysis #	36	37	38	48	49	57	61	73	82	83	67	68
SiO2	64.61	65.03	64.39	64.05	64.56	64.10	64.11	64.55	63.97	63.25	65.33	66.01
Al2O3	23.20	23.20	23.27	23.37	23.29	23.55	23.25	23.34	23.07	23.44	22.45	21.58
TiO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.37	0.41	0.48	0.02	0.01	0.31	0.00	0.21	0.09	0.08	0.01	0.00
MnO	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	0.02	0.02	0.00	0.02	0.01	0.02	0.00	0.01	0.02	0.02	0.00	0.01
Cr2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	4.59	4.38	4.58	5.09	4.62	4.88	4.94	4.91	4.95	4.72	3.89	3.11
Na2O	9.29	9.32	9.32	8.88	9.10	9.11	9.27	8.97	9.09	9.08	9.71	9.79
K2O	0.04	0.03	0.04	0.06	0.06	0.05	0.07	0.05	0.06	0.07	0.04	0.05
Total	102.14	102.39	102.08	101.49	101.67	102.02	101.64	102.04	101.25	100.66	101.43	100.55

Formulas on the basis of 8 oxygens

Si	2.801	2.809	2.795	2.791	2.805	2.784	2.793	2.798	2.797	2.781	2.841	2.885
Al	1.185	1.181	1.191	1.200	1.192	1.205	1.194	1.192	1.189	1.215	1.151	1.112
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.013	0.015	0.017	0.001	0.000	0.011	0.000	0.008	0.003	0.003	0.000	0.000
Mn	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mg	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.213	0.203	0.213	0.238	0.215	0.227	0.231	0.228	0.232	0.222	0.181	0.146
Na	0.781	0.781	0.784	0.750	0.767	0.767	0.783	0.754	0.771	0.774	0.819	0.830
K	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.003	0.003	0.004	0.002	0.003
Total cations	4.998	4.991	5.003	4.985	4.984	4.999	5.004	4.984	4.996	5.001	4.994	4.975
Ab	78.4	79.3	78.5	75.7	77.8	76.9	77.0	76.6	76.6	77.4	81.7	84.8
An	21.4	20.6	21.3	24.0	21.8	22.8	22.7	23.2	23.1	22.2	18.1	14.9
Or	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.2	0.3

## Plagioclase

Analysis #	Np111A 69	Np111A 72	Np111A 73	Np111A 76	Np111A 117	Np111A 118	Np111A 119	Np111A 97	Np111A 105	Np111A 106	Np111A 107	Np106 106
SiO2	68.18	67.61	68.76	69.06	69.32	68.68	68.17	67.35	68.58	68.69	66.49	59.03
Al2O3	20.83	20.39	19.93	19.93	19.80	19.54	20.76	20.70	20.98	20.57	20.97	25.97
TiO2	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
FeO	0.00	0.00	0.00	0.01	0.01	0.11	0.19	0.07	0.00	0.02	0.00	1.28
MnO	0.00	0.00	0.00	0.02	0.05	0.01	0.05	0.00	0.00	0.00	0.00	0.01
MgO	0.01	0.01	0.01	0.02	0.01	0.04	0.04	0.03	0.02	0.01	0.01	0.41
Cr2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	1.99	1.39	1.39	0.97	0.70	0.48	1.40	1.99	2.26	2.18	2.18	2.46
Na2O	10.64	10.96	10.71	11.06	11.43	11.45	10.98	10.63	10.64	10.52	10.55	6.03
K2O	0.04	0.04	0.04	0.06	0.04	0.02	0.05	0.06	0.05	0.06	0.07	3.91
Total	101.69	100.40	100.84	101.15	101.36	100.33	101.64	100.83	102.53	102.05	100.27	99.11

Formulas on the basis of 8 oxygens

Si	2.938	2.949	2.979	2.983	2.988	2.991	2.940	2.930	2.933	2.949	2.912	2.673
Al	1.058	1.048	1.018	1.014	1.006	1.003	1.055	1.061	1.058	1.041	1.082	1.386
Ti	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.000	0.000	0.000	0.000	0.000	0.004	0.007	0.003	0.000	0.001	0.000	0.048
Mn	0.000	0.000	0.000	0.001	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Mg	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.002	0.001	0.001	0.001	0.028
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.092	0.065	0.065	0.045	0.032	0.022	0.065	0.093	0.104	0.100	0.102	0.119
Na	0.889	0.927	0.900	0.926	0.955	0.967	0.918	0.897	0.882	0.876	0.896	0.529
K	0.002	0.002	0.002	0.003	0.002	0.001	0.003	0.003	0.003	0.003	0.004	0.226
Total cations	4.979	4.992	4.963	4.974	4.987	4.991	4.993	4.989	4.981	4.970	4.997	5.011
Ab	90.4	93.2	93.1	95.1	96.5	97.6	93.2	90.3	89.2	89.4	89.4	60.5
An	9.3	6.5	6.7	4.6	3.3	2.3	6.6	9.3	10.5	10.2	10.2	13.6
Or	0.2	0.2	0.2	0.3	0.2	0.1	0.3	0.3	0.3	0.3	0.4	25.8



## Plagioclase

Analysis #	Np106 107	Np106 108	Np105 61	Np105 62	Np105 63	Np103 97	Np103 105	Np103 106	Np103 107	Np102 88	Np102 97	Np102 98
SiO2	65.18	65.06	62.81	62.20	62.73	67.35	68.58	68.69	66.49	63.11	62.54	63.53
Al2O3	22.76	21.94	23.45	23.89	23.55	20.70	20.98	20.57	20.97	24.07	23.82	23.88
TiO2	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.01	0.11	0.03	0.07	0.00	0.07	0.00	0.02	0.00	0.03	0.08	0.04
MnO	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01
MgO	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.01
Cr2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	4.16	4.23	5.81	5.69	5.56	1.99	2.26	2.18	2.18	5.67	5.68	5.67
Na2O	9.24	9.27	8.47	8.33	8.67	10.63	10.64	10.52	10.55	8.66	8.33	8.31
K2O	0.06	0.07	0.07	0.09	0.06	0.06	0.05	0.06	0.07	0.07	0.12	0.12
Total	101.43	100.70	100.68	100.31	100.59	100.83	102.53	102.05	100.27	101.68	100.58	101.57

Formulas on the basis of 8 oxygens

Si	2.833	2.851	2.767	2.749	2.765	2.930	2.933	2.949	2.912	2.753	2.756	2.769
Al	1.166	1.133	1.217	1.245	1.223	1.061	1.058	1.041	1.082	1.238	1.237	1.227
Ti	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.000	0.004	0.001	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.003	0.001
Mn	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Mg	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Cr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.194	0.199	0.274	0.269	0.263	0.093	0.104	0.100	0.102	0.265	0.268	0.265
Na	0.779	0.787	0.723	0.714	0.741	0.897	0.882	0.876	0.896	0.732	0.712	0.702
K	0.003	0.004	0.004	0.005	0.003	0.003	0.003	0.003	0.004	0.004	0.007	0.007
Total cations	4.976	4.979	4.988	4.987	4.996	4.989	4.981	4.970	4.997	4.996	4.984	4.972
Ab	79.8	79.5	72.2	72.2	73.6	90.3	89.2	89.4	89.4	73.1	72.1	72.1
An	19.9	20.1	27.4	27.3	26.1	9.3	10.5	10.2	10.2	26.5	27.2	27.2
Or	0.3	0.4	0.4	0.5	0.3	0.3	0.3	0.3	0.4	0.4	0.7	0.7

## Staurolite

Analysis #	Np111B 88	Np111B 89	Np111B 91	Np102 92	Np102 93	Np102 94	Np105 48	Np105 49	Np105 51	Np105 52	Np111A 111	Np111A 112
SiO <sub>2</sub>	29.68	28.56	28.69	28.72	28.28	28.13	28.56	28.92	28.88	28.92	29.20	28.90
Al <sub>2</sub> O <sub>3</sub>	52.17	52.78	52.47	53.69	53.12	53.56	53.87	54.24	53.74	53.95	52.48	52.50
TiO <sub>2</sub>	0.52	0.50	0.54	0.68	0.52	0.64	0.38	0.35	0.36	0.44	0.49	0.56
FeO	13.23	14.38	15.37	12.80	13.69	14.02	11.33	11.40	9.73	9.70	14.82	14.31
MnO	0.12	0.10	0.09	0.11	0.09	0.11	0.63	0.62	0.50	0.59	0.36	0.39
MgO	1.29	1.76	2.00	1.17	1.58	1.51	1.51	1.56	1.04	1.07	2.46	2.43
ZnO	0.56	0.35	0.27	0.64	0.59	0.61	1.40	1.30	2.21	2.48	0.00	0.02
CaO	0.00	0.00	0.00	0.03	0.02	0.00	0.03	0.00	0.01	0.01	0.01	0.03
Total	97.57	98.43	99.43	97.84	97.89	98.58	97.71	98.39	96.47	97.16	99.82	99.14

Formulas on the basis of 23 oxygens

Si	4.115	3.953	3.950	3.968	3.927	3.887	3.950	3.967	4.022	4.006	3.991	3.970
Al	8.524	8.609	8.513	8.743	8.694	8.722	8.780	8.769	8.820	8.807	8.453	8.500
Ti	0.054	0.052	0.056	0.071	0.054	0.067	0.040	0.036	0.038	0.046	0.050	0.058
Fe	1.534	1.664	1.769	1.479	1.590	1.620	1.310	1.308	1.133	1.124	1.694	1.644
Mn	0.014	0.012	0.010	0.013	0.011	0.013	0.074	0.072	0.059	0.069	0.042	0.045
Mg	0.267	0.363	0.410	0.241	0.327	0.311	0.311	0.319	0.216	0.221	0.501	0.498
Zn	0.061	0.038	0.029	0.070	0.064	0.066	0.152	0.140	0.242	0.270	0.000	0.002
Ca	0.000	0.000	0.000	0.004	0.003	0.000	0.004	0.000	0.001	0.001	0.001	0.004
Total cations	14.569	14.691	14.738	14.589	14.671	14.686	14.621	14.612	14.531	14.545	14.732	14.722
Fe/(Fe+Mg)	0.85	0.82	0.81	0.86	0.83	0.84	0.81	0.80	0.84	0.84	0.77	0.77

## Chlorite

Analysis #	Np7 2	Np7 3	Np7 18	Np7 29	Np7 31	Np111B 53	Np111B 60	Np111B 69	Np111B 71	Np111B 84	Np111B 85	Np111A 116
SiO <sub>2</sub>	24.98	25.62	24.21	25.09	25.00	25.15	25.30	24.85	25.00	25.12	24.27	24.96
Al <sub>2</sub> O <sub>3</sub>	23.52	22.49	23.37	23.81	23.84	22.97	22.64	22.94	22.01	21.94	22.53	23.23
TiO <sub>2</sub>	0.08	0.11	0.07	0.07	0.06	0.10	0.03	0.08	0.13	0.09	0.03	0.00
FeO	29.27	29.29	32.04	28.66	29.22	26.10	25.78	26.58	26.18	26.56	27.83	23.94
MnO	0.10	0.09	0.26	0.04	0.07	0.11	0.08	0.07	0.09	0.04	0.11	0.05
MgO	11.65	11.90	10.35	12.38	12.33	14.80	15.47	14.73	14.65	14.68	14.27	15.80
CaO	0.00	0.02	0.04	0.01	0.02	0.04	0.01	0.01	0.03	0.02	0.05	0.05
Cl												
F												
Total	89.60	89.53	90.35	90.04	90.52	89.27	89.31	89.26	88.09	88.45	89.09	88.03

Formulas on the basis of 14 oxygens

Si	2.618	2.687	2.561	2.606	2.590	2.607	2.617	2.584	2.633	2.638	2.553	2.595
Al	2.905	2.779	2.914	2.913	2.911	2.806	2.760	2.811	2.732	2.715	2.793	2.846
Ti	0.007	0.009	0.006	0.005	0.004	0.008	0.002	0.006	0.010	0.007	0.002	0.000
Fe	2.565	2.569	2.835	2.488	2.532	2.262	2.230	2.311	2.306	2.333	2.448	2.082
Mn	0.009	0.008	0.023	0.003	0.006	0.010	0.007	0.006	0.008	0.004	0.010	0.004
Mg	1.819	1.860	1.632	1.916	1.905	2.287	2.385	2.283	2.300	2.298	2.237	2.449
Ca	0.000	0.002	0.005	0.001	0.002	0.004	0.001	0.001	0.003	0.002	0.006	0.006
Total cations	9.923	9.914	9.976	9.932	9.950	9.983	10.001	10.004	9.991	9.997	10.049	9.982
Fe/(Fe+Mg)	0.59	0.58	0.63	0.57	0.57	0.50	0.48	0.50	0.50	0.50	0.52	0.46

## Chlorite

Analysis #	Np111A 120	Np111A 123	Np106 113	Np106 114	Np106 115	Np105 57	Np105 59	Np105 64	Np103 98	Np103 104	Np102 85	Np102 87
SiO <sub>2</sub>	25.45	24.93	26.46	26.48	26.24	25.82	25.42	25.75	25.09	26.12	25.48	24.99
Al <sub>2</sub> O <sub>3</sub>	22.74	22.87	21.44	22.19	22.24	22.47	22.51	22.14	23.19	21.76	21.74	22.29
TiO <sub>2</sub>	0.00	0.14	0.04	0.05	0.07	0.13	0.01	0.02	0.16	0.09	0.14	0.13
FeO	24.42	24.29	21.98	20.43	22.17	22.86	22.32	23.01	26.11	32.99	27.34	27.46
MnO	0.41	0.51	0.49	0.51	0.52	0.30	0.29	0.32	0.11	0.23	0.10	0.10
MgO	16.79	16.20	17.99	18.78	17.88	17.07	17.17	17.36	14.14	9.00	14.11	13.81
CaO	0.04	0.05	0.03	0.01	0.01	0.02	0.02	0.01	0.03	0.04	0.03	0.02
Cl												
F												
Total	89.85	88.99	88.43	88.45	89.13	88.67	87.74	88.61	88.83	90.23	88.94	88.80

Formulas on the basis of 14 oxygens

Si	2.602	2.577	2.713	2.691	2.671	2.650	2.633	2.649	2.612	2.768	2.670	2.626
Al	2.740	2.786	2.591	2.657	2.668	2.718	2.748	2.685	2.846	2.718	2.685	2.760
Ti	0.000	0.011	0.003	0.004	0.005	0.010	0.001	0.002	0.013	0.007	0.011	0.010
Fe	2.088	2.100	1.885	1.736	1.887	1.962	1.933	1.980	2.274	2.924	2.396	2.413
Mn	0.036	0.045	0.043	0.044	0.045	0.026	0.025	0.028	0.010	0.021	0.009	0.009
Mg	2.559	2.496	2.750	2.845	2.713	2.612	2.651	2.663	2.195	1.422	2.204	2.163
Ca	0.004	0.006	0.003	0.001	0.001	0.002	0.002	0.001	0.003	0.005	0.003	0.002
Total cations	10.028	10.019	9.988	9.977	9.990	9.981	9.993	10.007	9.952	9.865	9.977	9.984
Fe/(Fe+Mg)	0.45	0.46	0.407	0.379	0.410	0.43	0.42	0.43	0.51	0.67	0.52	0.53

## **APPENDIX B**

Mineral compositional data used for  
Quantitative traverses.

## Np7

SiO2	Al2O3	MnO	FeO	MgO	CaO	Total	Sps	Alm	Prp	Grs
39.259	21.671	0.999	39.874	2.549	1.392	105.74	2.1	84.4	9.6	3.8
39.059	21.63	0.412	39.967	2.979	1.506	105.55	0.9	83.9	11.1	4.1
38.74	21.74	0.358	39.882	2.998	1.807	105.53	0.8	83.3	11.2	4.8
39.122	21.558	0.383	38.948	2.878	1.886	104.78	0.8	83.1	10.9	5.2
39.04	21.775	0.411	39.325	2.889	2.258	105.70	0.9	82.3	10.8	6.1
38.68	21.423	0.415	39.385	2.589	2.387	104.88	0.9	83.0	9.7	6.4
39.492	21.731	0.473	38.31	2.675	2.679	105.36	1.0	81.5	10.1	7.3
39.245	21.296	0.521	38.761	2.467	2.821	105.11	1.1	81.9	9.3	7.6
39.123	21.468	0.654	38.766	2.34	2.977	105.33	1.4	81.8	8.8	8.0
39.332	21.51	0.778	38.71	2.252	3.242	105.82	1.7	81.2	8.4	8.7
39.704	22.103	0.913	38.525	2.203	3.223	106.67	1.9	81.1	8.3	8.7
38.705	21.135	1.076	38.179	1.994	3.125	104.21	2.3	81.5	7.6	8.6
38.989	21.53	1.394	38.132	2.042	3.239	105.33	3.0	80.6	7.7	8.8
38.838	21.39	1.612	37.908	1.934	3.233	104.92	3.5	80.4	7.3	8.8
39.028	21.367	1.757	37.426	1.889	3.485	104.95	3.8	79.6	7.2	9.5
38.66	21.405	1.908	37.708	1.839	3.472	104.99	4.1	79.6	6.9	9.4
39.014	21.301	2.132	36.813	1.767	3.847	104.87	4.6	78.2	6.7	10.5
38.684	21.319	2.389	36.922	1.707	3.89	104.91	5.1	78.0	6.4	10.5
38.754	21.361	2.539	36.55	1.633	3.767	104.60	5.5	78.0	6.2	10.3
39.24	21.471	2.845	36.318	1.585	3.955	105.41	6.1	77.1	6.0	10.8
38.801	21.53	3.2	35.921	1.562	3.968	104.98	6.9	76.4	5.9	10.8
39.138	21.52	3.428	35.707	1.535	4.073	105.40	7.4	75.8	5.8	11.1
38.86	21.313	3.77	35.156	1.487	4.256	104.84	8.1	74.7	5.6	11.6
38.884	21.319	3.96	34.633	1.42	4.242	104.46	8.6	74.3	5.4	11.7
38.403	21.174	4.147	34.503	1.397	4.623	104.25	8.9	73.2	5.3	12.6
38.834	21.172	4.271	34.208	1.368	4.639	104.49	9.2	72.9	5.2	12.7
39.226	21.372	4.604	34.236	1.377	4.449	105.26	9.9	72.8	5.2	12.1
38.859	21.218	4.812	34.116	1.327	4.478	104.81	10.4	72.4	5.0	12.2
38.871	21.324	5.005	34.229	1.268	4.413	105.11	10.7	72.5	4.8	12.0

SiO2	Al2O3	MnO	FeO	MgO	CaO	Total	Sps	Alm	Prp	Grs
38.761	21.338	5.302	33.344	1.227	4.669	104.64	11.4	71.1	4.7	12.8
38.887	21.077	5.45	33.764	1.267	4.471	104.92	11.7	71.4	4.8	12.1
38.27	21.058	5.444	33.31	1.143	4.529	103.75	11.8	71.4	4.4	12.4
39.044	21.553	5.731	32.685	1.171	4.635	104.82	12.5	70.3	4.5	12.8
38.479	21.092	5.526	32.226	1.132	5.478	103.93	11.9	68.8	4.3	15.0
39.043	20.962	5.9	32.786	1.168	4.82	104.68	12.7	69.7	4.4	13.1
38.726	21.365	6.079	32.271	1.139	4.895	104.48	13.2	69.1	4.3	13.4
39.051	21.167	6.153	32.5	1.167	4.689	104.73	13.3	69.4	4.4	12.8
38.764	21.152	6.479	31.8	1.15	5.071	104.42	14.0	67.8	4.4	13.9
39.121	21.116	6.63	32.366	1.141	4.975	105.35	14.1	68.2	4.3	13.4
38.684	21.264	6.925	31.824	1.131	4.723	104.55	15.0	67.8	4.3	12.9
39.004	21.17	6.888	31.831	1.122	4.787	104.80	14.9	67.8	4.3	13.1
38.672	21.287	6.908	31.769	1.135	4.94	104.71	14.8	67.4	4.3	13.4
38.937	21.321	6.909	31.406	1.047	5.155	104.78	14.9	67.0	4.0	14.1
38.662	21.186	7.178	31.056	1.093	5.081	104.26	15.6	67.0	3.5	13.9
38.398	20.979	7.358	31.025	1.095	5.143	104.00	15.5	66.4	4.2	13.9
38.874	21.317	7.547	31.026	1.085	4.795	104.64	15.9	66.0	4.2	14.0
38.654	21.168	7.537	31.106	1.019	4.945	104.43	16.4	66.4	4.1	13.1
38.557	21.205	7.567	30.697	0.982	5.002	104.01	16.3	66.3	3.9	13.5
38.526	21.391	7.712	30.734	1.037	4.903	104.30	16.5	66.0	3.8	13.8
39.069	21.234	7.693	30.579	1.065	5.062	104.70	16.7	65.9	4.0	13.5
38.829	21.052	7.523	30.857	1.041	5.183	104.49	16.7	65.4	4.1	13.9
38.824	21.157	7.478	31.093	1.092	5.114	104.76	16.2	65.7	4.0	14.1
39.023	21.158	7.51	31.003	1.105	5.01	104.81	16.1	65.9	4.1	13.9
38.864	21.185	7.387	30.836	1.09	4.856	104.22	16.2	66.0	4.2	13.7
38.73	21.278	7.304	31.249	1.059	5.155	104.78	16.1	66.3	4.2	13.4
38.551	21.115	7.304	31.335	1.072	5.085	104.46	15.7	66.3	4.0	14.0
32.618	18.618	6.096	32.246	1.726	4.287	95.59	15.7	66.4	4.1	13.8
39.138	21.757	7.01	31.218	1.035	4.919	105.08	15.3	67.2	4.0	13.6
38.53	21.371	6.921	31.351	1.093	4.923	104.19	15.0	67.2	4.2	13.5
38.777	21.098	6.974	31.793	1.1	4.626	104.37	15.1	68.0	4.2	12.7
38.942	21.244	6.713	31.925	1.143	4.969	104.94	14.4	67.7	4.3	13.5

SiO2	Al2O3	MnO	FeO	MgO	CaO	Total	Sps	Alm	Prp	Grs
38.667	21.064	6.785	31.62	1.064	4.933	104.13	14.7	67.7	4.1	13.5
38.624	21.195	5.972	32.356	1.163	4.88	104.19	14.3	68.4	4.1	13.2
39.001	21.334	5.88	32.46	1.175	4.823	104.67	12.9	69.2	4.4	13.4
38.743	21.265	5.692	32.988	1.247	4.605	104.54	12.8	69.5	4.5	13.2
38.683	21.126	5.465	33.396	1.232	4.75	104.65	12.3	70.4	4.7	12.6
38.818	21.183	5.399	33.754	1.226	4.626	105.01	11.7	70.7	4.7	12.9
38.638	21.285	5.317	33.445	1.309	4.378	104.37	11.6	71.3	4.6	12.5
38.71	21.307	4.954	34.148	1.227	4.37	104.72	11.5	71.5	5.0	12.0
38.776	21.323	4.809	34.357	1.306	4.299	104.87	10.7	72.7	4.7	11.9
39.071	21.253	4.668	34.581	1.389	4.527	105.49	10.4	73.0	4.9	11.7
38.831	21.283	4.221	34.986	1.382	4.195	104.90	9.9	72.7	5.2	12.2
39.095	21.545	4.026	35.011	1.408	4.299	105.38	9.1	74.3	5.2	11.4
39.012	21.487	3.668	35.674	1.445	4.108	105.39	8.7	74.3	5.3	11.7
38.893	21.464	3.287	36.098	1.506	4.155	105.40	7.9	75.5	5.5	11.1
38.541	21.104	3.085	36.445	1.495	3.938	104.61	7.0	76.1	5.7	11.2
38.732	21.341	2.855	36.338	1.54	3.973	104.78	6.6	77.1	5.6	10.7
38.672	21.287	2.69	36.256	1.682	3.837	104.42	6.1	77.2	5.8	10.8
39.104	21.387	2.418	37.301	1.725	3.681	105.62	5.8	77.3	6.4	10.5
39.046	21.349	2.155	37.342	1.747	3.654	105.29	5.2	78.5	6.5	9.9
38.848	21.199	1.877	37.623	1.786	3.596	104.93	4.6	78.9	6.6	9.9
38.781	21.371	1.662	38.097	1.842	3.424	105.18	4.0	79.5	6.7	9.7
38.998	21.395	1.33	37.962	2.033	3.447	105.17	3.6	80.3	6.9	9.2
39.085	21.498	1.257	37.622	1.979	3.545	104.99	2.9	80.2	7.7	9.3
38.947	21.428	0.908	38.61	2.172	3.01	105.08	2.7	80.1	7.5	9.7
38.718	21.341	0.858	38.694	2.187	3.007	104.81	2.0	81.7	8.2	8.2
38.674	21.29	0.718	38.456	2.3	3.036	104.47	1.8	81.8	8.2	8.1
39.151	21.332	0.581	37.984	2.421	2.997	104.47	1.5	81.5	8.7	8.2
39.163	21.466	0.433	38.451	2.506	2.937	104.96	1.3	81.3	9.2	8.2
39.153	21.229	0.483	38.665	2.691	2.581	104.80	0.9	81.6	9.5	8.0
38.948	21.635	0.445	39.104	2.817	2.31	105.26	1.0	81.8	10.1	7.0
39.238	21.913	0.353	39.109	2.812	2.206	105.63	0.9	82.3	10.6	6.2
39.187	21.61	0.293	39.19	2.926	2.102	105.31	0.8	82.7	10.6	6.0



SiO2	Al2O3	MnO	FeO	MgO	CaO	Total	Sps	Alm	Prp	Grs
38.955	21.632	0.355	39.36	2.981	1.751	105.03	0.7	83.3	10.9	5.1
38.963	21.605	0.741	39.603	2.761	1.439	105.11	0.8	83.3	11.2	4.7

**Wt %**

Y	P	Cr	Sc	Ti
0.006	0.034	0.022	0.009	0.028
0.009	0.026	0.015	0.022	0.043
0.027	0.034	0.014	0.032	0.027
0.140	0.017	0.013	0.02	0.023
0.083	0.026	0.006	0.006	0.026
0.129	0.028	0.03	0.01	0.032
0.129	0.024	0.018	0.028	0.062
0.060	0.015	0.008	0.023	0.073
0.026	0.028	0.015	0.016	0.074
0.035	0.021	0.027	0.015	0.072
0.035	0.048	0.021	0.032	0.093
0.029	0.023	0.018	0.03	0.077
0.030	0.024	0.023	0.037	0.075
0.041	0.031	0.023	0.029	0.085
0.034	0.032	0.022	0.023	0.097
0.036	0.039	0.028	0.025	0.082
0.036	0.030	0.026	0.037	0.106
0.053	0.025	0.023	0.032	0.091
0.057	0.038	0.03	0.04	0.082
0.050	0.010	0.03	0.036	0.094
0.048	0.023	0.029	0.048	0.08
0.048	0.035	0.017	0.043	0.09
0.050	0.023	0.021	0.03	0.091
0.065	0.021	0.032	0.031	0.091
0.055	0.029	0.026	0.037	0.086
0.059	0.028	0.026	0.052	0.089
0.033	0.028	0.017	0.038	0.108
0.047	0.033	0.019	0.045	0.106
0.038	0.018	0.015	0.043	0.096

**ppm**

Y	P	Cr	Sc	Ti
60	340	220	90	280
90	260	150	220	430
270	340	140	320	270
1400	170	130	200	230
830	260	60	60	260
1290	280	300	100	320
1290	240	180	280	620
600	150	80	230	730
260	280	150	160	740
350	210	270	150	720
350	480	210	320	930
290	230	180	300	770
300	240	230	370	750
410	310	230	290	850
340	320	220	230	970
360	390	280	250	820
360	300	260	370	1060
530	250	230	320	910
570	380	300	400	820
500	100	300	360	940
480	230	290	480	800
480	350	170	430	900
500	230	210	300	910
650	210	320	310	910
550	290	260	370	860
590	280	260	520	890
330	280	170	380	1080
470	330	190	450	1060
380	180	150	430	960

Y	P	Cr	Sc	Ti	Y	P	Cr	Sc	Ti
0.055	0.028	0.032	0.052	0.117	550	280	320	520	1170
0.027	0.020	0.036	0.048	0.092	270	200	360	480	920
0.051	0.011	0.021	0.059	0.126	510	110	210	590	1260
0.067	0.026	0.034	0.042	0.097	670	260	340	420	970
0.067	0.033	0.021	0.062	0.102	670	330	210	620	1020
0.057	0.027	0.016	0.049	0.125	570	270	160	490	1250
0.078	0.016	0.02	0.052	0.109	780	160	200	520	1090
0.084	0.024	0.023	0.042	0.11	840	240	230	420	1100
0.059	0.036	0.017	0.046	0.125	590	360	170	460	1250
0.055	0.030	0.024	0.041	0.125	550	300	240	410	1250
0.021	0.023	0.015	0.051	0.119	210	230	150	510	1190
0.109	0.019	0.033	0.05	0.295	1090	190	330	500	2950
0.055	0.025	0.027	0.057	0.316	550	250	270	570	3160
0.081	0.015	0.013	0.051	0.143	810	150	130	510	1430
0.066	0.025	0.019	0.055	0.087	660	250	190	550	870
0.062	0.032	0.013	0.054	0.102	620	320	130	540	1020
0.035	0.020	0.018	0.047	0.086	350	200	180	470	860
0.103	0.021	0.03	0.048	0.125	1030	210	300	480	1250
0.139	0.032	0.029	0.046	0.118	1390	320	290	460	1180
0.118	0.022	0.043	0.042	0.182	1180	220	430	420	1820
0.111	0.030	0.034	0.047	0.124	1110	300	340	470	1240
0.156	0.032	0.02	0.048	0.151	1560	320	200	480	1510
0.137	0.036	0.025	0.055	0.123	1370	360	250	550	1230
0.121	0.043	0.029	0.052	0.129	1210	430	290	520	1290
0.123	0.034	0.029	0.056	0.124	1230	340	290	560	1240
0.015	0.028	0.017	0.075	0.085	150	280	170	750	850
0.083	0.038	0.015	0.045	0.113	830	380	150	450	1130
0.069	0.049	0.017	0.04	4.227	690	490	170	400	42270
0.071	0.046	0.011	0.049	0.094	710	460	110	490	940
0.113	0.023	0.031	0.036	0.101	1130	230	310	360	1010
0.033	0.029	0.017	0.05	0.097	330	290	170	500	970
0.051	0.020	0.009	0.055	0.09	510	200	90	550	900

Y	P	Cr	Sc	Ti	Y	P	Cr	Sc	Ti
0.058	0.041	0.016	0.054	0.114	580	410	160	540	1140
0.071	0.021	0.014	0.042	0.105	710	210	140	420	1050
0.072	0.042	0.027	0.038	0.132	720	420	270	380	1320
0.039	0.025	0.031	0.053	0.149	390	250	310	530	1490
0.028	0.020	0.029	0.058	0.127	280	200	290	580	1270
0.026	0.029	0.017	0.055	0.133	260	290	170	550	1330
0.056	0.030	0.029	0.047	0.12	560	300	290	470	1200
0.055	0.028	0.012	0.05	0.124	550	280	120	500	1240
0.062	0.024	0.02	0.041	0.109	620	240	200	410	1090
0.050	0.026	0.035	0.037	0.12	500	260	350	370	1200
0.074	0.024	0.028	0.034	0.094	740	240	280	340	940
0.014	0.023	0.02	0.049	0.092	140	230	200	490	920
0.039	0.024	0.029	0.043	0.134	390	240	290	430	1340
0.029	0.011	0.023	0.047	0.084	290	110	230	470	840
0.041	0.040	0.011	0.039	0.119	410	400	110	390	1190
0.051	0.042	0.019	0.043	0.1	510	420	190	430	1000
0.061	0.045	0.03	0.023	0.1	610	450	300	230	1000
0.050	0.032	0.028	0.025	0.099	500	320	280	250	990
0.044	0.027	0.017	0.03	0.051	440	270	170	300	510
0.007	0.015	0.02	0.035	0.076	70	150	200	350	760
0.044	0.036	0.013	0.041	0.065	440	360	130	410	650
0.037	0.035	0.014	0.041	0.071	370	350	140	410	710
0.022	0.021	0.027	0.032	0.071	220	210	270	320	710
0.010	0.031	0.04	0.02	0.075	100	310	400	200	750
0.022	0.039	0.03	0.029	0.107	220	390	300	290	1070
0.026	0.022	0.032	0.036	0.068	260	220	320	360	680
0.096	0.032	0.022	0.028	0.055	960	320	220	280	550
0.131	0.018	0.018	0.025	0.041	1310	180	180	250	410
0.120	0.033	0.016	0.027	0.026	1200	330	160	270	260
0.085	0.025	0.016	0.024	0.043	850	250	160	240	430
0.217	0.030	0.008	0.017	0.035	2170	300	80	170	350
0.052	0.032	0.015	0.012	0.037	520	320	150	120	370

0.025	0.038	0.013	0.02	0.046	250	380	130	200	460
0.000	0.041	0.019	0.03	0.024	0	410	190	300	240

## Np7 short

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Pyp	Grs	Sps	Alm
38.075	21.365	2.334	1.625	0.069	0.871	39.215	9.0	4.5	1.9	84.6
38.208	21.548	2.518	1.705	0.067	0.503	39.222	9.7	4.7	1.1	84.5
37.978	22.005	2.767	1.780	0.035	0.423	39.717	10.4	4.8	0.9	83.9
38.190	22.012	2.911	1.792	0.072	0.308	39.096	11.1	4.9	0.7	83.4
38.211	21.790	2.901	1.807	0.060	0.309	38.901	11.1	5.0	0.7	83.3
38.453	21.648	2.896	1.895	0.043	0.354	38.771	11.0	5.2	0.8	83.0
38.498	21.691	2.930	1.867	0.108	0.377	38.692	11.2	5.1	0.8	82.9
38.580	21.600	2.867	1.862	0.093	0.395	39.357	10.8	5.0	0.8	83.3
38.476	21.875	2.870	1.955	0.089	0.400	39.071	10.9	5.3	0.9	83.0
38.236	21.726	2.857	1.926	0.059	0.372	39.023	10.8	5.2	0.8	83.1
38.260	22.161	2.972	1.986	0.062	0.370	38.726	11.3	5.4	0.8	82.5
38.304	21.933	2.713	1.968	0.029	0.388	38.263	10.5	5.5	0.9	83.2
37.977	22.113	2.807	2.061	0.053	0.397	38.555	10.7	5.7	0.9	82.7
39.125	21.885	2.757	1.979	0.032	0.387	38.068	10.7	5.5	0.9	82.9
38.943	21.919	2.826	2.058	0.067	0.440	38.264	10.9	5.7	1.0	82.5
38.311	21.690	2.684	2.170	0.049	0.361	38.428	10.3	6.0	0.8	82.9
38.328	21.992	2.845	2.252	0.060	0.382	38.440	10.8	6.2	0.8	82.2
38.283	21.943	2.779	2.219	0.042	0.358	38.439	10.6	6.1	0.8	82.5
37.989	22.012	2.783	2.129	0.057	0.379	38.491	10.6	5.9	0.8	82.7
38.477	22.106	2.846	2.179	0.073	0.362	38.876	10.8	5.9	0.8	82.5
38.129	21.776	2.737	2.276	0.051	0.319	38.411	10.5	6.3	0.7	82.6
38.386	21.895	2.800	2.245	0.061	0.337	38.620	10.7	6.1	0.7	82.5
38.452	21.947	2.723	2.342	0.067	0.279	38.010	10.5	6.5	0.6	82.4
38.514	22.048	2.760	2.339	0.056	0.415	38.083	10.6	6.4	0.9	82.1
38.494	21.501	2.825	2.368	0.042	0.331	37.983	10.9	6.5	0.7	81.9
38.407	22.037	2.766	2.492	0.076	0.372	38.254	10.5	6.8	0.8	81.8
38.339	21.963	2.706	2.355	0.049	0.386	38.319	10.4	6.5	0.8	82.3

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Pyp	Grs	Sps	Alm
37.590	21.983	2.644	2.379	0.070	0.347	38.241	10.2	6.6	0.8	82.5
38.374	21.719	2.670	2.257	0.054	0.400	38.309	10.3	6.2	0.9	82.6
32.514	18.491	2.219	2.025	0.068	0.240	30.016	10.7	7.0	0.7	81.6
38.519	21.881	2.675	2.233	0.079	0.279	38.547	10.3	6.2	0.6	83.0
38.412	21.753	2.718	2.244	0.058	0.390	38.668	10.4	6.1	0.8	82.7
38.401	22.024	2.565	2.257	0.067	0.355	38.781	9.8	6.2	0.8	83.2
38.104	21.759	2.668	2.283	0.048	0.389	38.411	10.2	6.3	0.8	82.6
38.564	21.763	2.658	2.294	0.104	0.422	38.003	10.3	6.4	0.9	82.4
38.361	22.150	2.659	2.305	0.061	0.454	38.692	10.1	6.3	1.0	82.6
38.521	21.849	2.631	2.344	0.080	0.435	38.112	10.1	6.5	1.0	82.4
38.275	21.881	2.493	2.303	0.085	0.468	38.174	9.6	6.4	1.0	82.9
38.210	21.647	2.461	2.439	0.058	0.458	38.292	9.5	6.7	1.0	82.8
37.898	21.674	2.638	2.585	0.077	0.438	38.151	10.1	7.1	1.0	81.9
38.181	22.090	2.618	2.621	0.049	0.458	38.273	10.0	7.2	1.0	81.9
38.712	21.665	2.450	2.592	0.039	0.451	38.620	9.3	7.1	1.0	82.6
38.558	21.843	2.522	2.341	0.075	0.488	38.456	9.7	6.5	1.1	82.8
38.234	21.941	2.579	2.442	0.045	0.570	38.089	9.9	6.7	1.2	82.1
38.464	22.255	2.550	2.729	0.094	0.471	38.434	9.7	7.4	1.0	81.9
38.267	22.033	2.405	2.931	0.090	0.497	37.964	9.2	8.1	1.1	81.6
38.468	21.681	2.524	2.640	0.085	0.501	38.409	9.6	7.2	1.1	82.1
38.121	21.565	2.433	2.512	0.049	0.533	38.151	9.4	7.0	1.2	82.5
38.525	21.579	2.374	2.599	0.074	0.570	38.498	9.1	7.1	1.2	82.6
37.608	21.294	2.384	2.676	0.080	0.619	38.275	9.1	7.4	1.3	82.2
38.424	22.062	2.295	3.000	0.093	0.551	38.009	8.8	8.3	1.2	81.7
38.112	21.848	2.349	3.113	0.068	0.599	37.675	9.0	8.6	1.3	81.1
38.121	22.115	2.423	2.824	0.082	0.567	38.203	9.2	7.7	1.2	81.8
37.953	21.799	2.254	2.887	0.074	0.608	37.738	8.7	8.0	1.3	81.9
38.282	21.715	2.270	3.012	0.079	0.622	37.822	8.7	8.3	1.4	81.6
38.172	21.871	2.169	3.364	0.052	0.609	37.438	8.4	9.3	1.3	81.0
38.355	21.671	2.151	3.392	0.055	0.680	37.753	8.2	9.3	1.5	81.0
38.482	21.731	2.132	3.486	0.084	0.707	37.696	8.1	9.6	1.5	80.8
38.157	21.838	2.087	3.207	0.092	0.723	37.649	8.0	8.9	1.6	81.5

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Pyp	Grs	Sps	Alm
38.413	21.690	2.289	3.301	0.035	0.724	37.834	8.7	9.0	1.6	80.7
38.493	21.941	2.179	3.365	0.055	0.729	37.340	8.4	9.3	1.6	80.7
38.538	21.744	1.988	3.300	0.085	0.734	38.250	7.6	9.0	1.6	81.8
38.112	21.825	2.009	3.366	0.094	0.722	37.609	7.7	9.3	1.6	81.4
38.307	21.832	2.148	3.265	0.037	0.749	37.838	8.2	9.0	1.6	81.2
37.870	21.823	2.099	3.251	0.089	0.825	37.695	8.1	9.0	1.8	81.2
38.350	21.742	2.067	3.323	0.041	0.862	37.748	7.9	9.1	1.9	81.1
38.352	21.677	2.155	3.302	0.067	0.944	37.574	8.2	9.1	2.1	80.6
38.142	21.623	2.134	3.308	0.098	0.869	38.081	8.1	9.0	1.9	81.0
38.662	21.784	2.033	3.365	0.070	0.866	37.911	7.8	9.2	1.9	81.2
38.196	21.842	2.027	3.416	0.066	0.896	37.781	7.7	9.4	1.9	81.0
38.133	21.878	2.036	3.365	0.092	0.987	37.812	7.8	9.2	2.1	80.9
37.761	21.600	1.956	3.355	0.101	0.951	37.247	7.6	9.3	2.1	81.0
38.248	21.916	2.092	3.334	0.091	0.975	37.411	8.0	9.2	2.1	80.6
37.954	21.509	2.020	3.423	0.074	0.976	37.955	7.7	9.3	2.1	80.9
38.040	21.601	2.015	3.461	0.058	0.995	37.405	7.7	9.5	2.2	80.6
38.018	21.671	1.905	3.588	0.062	1.011	37.575	7.3	9.9	2.2	80.7
38.307	21.838	1.977	3.544	0.069	1.050	37.542	7.5	9.7	2.3	80.5
38.548	21.870	1.986	3.447	0.087	1.086	37.409	7.6	9.5	2.4	80.5
38.094	21.825	2.007	3.470	0.078	1.039	37.385	7.7	9.6	2.3	80.5
38.325	22.084	1.987	3.525	0.062	1.102	37.196	7.6	9.7	2.4	80.2
38.390	21.578	1.989	3.400	0.080	1.224	37.506	7.6	9.3	2.7	80.4
38.165	21.682	1.878	3.382	0.072	1.209	37.195	7.3	9.4	2.7	80.7
38.404	21.499	1.862	3.516	0.084	1.115	37.376	7.2	9.7	2.4	80.7
38.431	21.778	2.013	3.459	0.107	1.087	37.461	7.7	9.5	2.4	80.4
38.546	21.816	1.823	3.502	0.063	1.193	37.469	7.0	9.7	2.6	80.7
38.525	21.861	1.942	3.514	0.082	1.257	37.647	7.4	9.6	2.7	80.3
38.431	21.819	1.946	3.346	0.071	1.378	37.397	7.4	9.2	3.0	80.4
38.218	21.660	1.856	3.458	0.080	1.329	37.560	7.1	9.5	2.9	80.5
38.757	21.805	1.814	3.503	0.102	1.319	37.381	7.0	9.7	2.9	80.5
38.173	21.853	1.935	3.472	0.102	1.415	37.522	7.4	9.5	3.1	80.1
38.705	21.936	1.792	3.444	0.100	1.447	37.081	6.9	9.6	3.2	80.4



SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Pyp	Grs	Sps	Alm
37.728	21.461	1.836	3.487	0.150	1.355	36.793	7.1	9.7	3.0	80.2
38.036	21.869	1.865	3.570	0.115	1.492	36.900	7.2	9.9	3.3	79.7
37.896	21.584	1.916	3.781	0.122	1.425	36.882	7.3	10.4	3.1	79.2
38.599	21.964	1.864	3.889	0.128	1.521	37.098	7.1	10.6	3.3	79.0
36.982	21.391	1.711	4.011	0.083	1.480	35.690	6.7	11.3	3.3	78.7
34.066	18.993	1.492	3.848	0.087	1.485	36.478	5.8	10.8	3.3	80.1
38.350	21.587	1.832	4.059	0.105	1.532	36.419	7.0	11.2	3.3	78.4
38.322	21.706	1.719	3.968	0.131	1.553	36.750	6.6	10.9	3.4	79.1
38.228	21.721	1.723	3.997	0.111	1.580	36.906	6.6	11.0	3.4	79.0
38.313	21.712	1.863	4.027	0.074	1.613	36.822	7.1	11.0	3.5	78.5
38.550	21.734	1.708	4.084	0.089	1.676	36.686	6.5	11.2	3.6	78.6
38.371	21.660	1.771	3.965	0.104	1.692	36.543	6.8	10.9	3.7	78.6
38.359	21.664	1.658	4.016	0.119	1.710	36.754	6.3	11.0	3.7	78.9
38.225	21.620	1.732	4.010	0.086	1.653	36.462	6.7	11.1	3.6	78.7
37.279	21.315	1.395	6.508	1.201	1.369	31.427	6.4	11.4	3.9	78.2
38.057	21.828	1.683	4.151	0.098	1.803	36.453	6.2	11.5	4.1	78.1
38.051	21.672	1.631	4.191	0.074	1.901	36.332	6.7	11.4	3.9	78.0
37.985	21.788	1.738	4.139	0.077	1.777	36.198	6.3	11.4	3.9	78.4
38.323	21.594	1.656	4.144	0.103	1.799	36.506	6.4	11.4	4.3	77.9
38.406	21.829	1.686	4.140	0.125	1.983	36.272	6.3	11.3	4.3	78.0
38.630	21.750	1.652	4.103	0.069	1.987	36.242	6.3	11.4	4.4	77.8
38.192	21.874	1.631	4.124	0.097	2.028	35.934	6.3	11.1	4.7	77.9
37.866	21.784	1.612	3.986	0.103	2.110	35.647	6.4	10.5	4.7	78.4
38.059	21.716	1.681	3.830	0.093	2.153	36.534	5.7	10.8	5.0	78.5
38.067	21.662	1.479	3.901	0.091	2.263	36.229	6.2	10.8	4.9	78.2
38.218	21.721	1.606	3.900	0.106	2.248	36.293	6.5	10.1	4.9	78.5
38.142	21.495	1.701	3.662	0.066	2.224	36.452	6.7	10.0	5.0	78.3
37.931	21.442	1.740	3.632	0.083	2.288	36.369	6.5	10.0	5.2	78.2

## Np6

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Total	Pyp	Grs	Sps	Alm
37.990	20.480	2.200	3.410	0.150	2.650	34.560	101.450	8.6	9.6	5.9	75.9
38.140	20.300	2.320	3.440	0.080	2.310	34.940	101.530	9.0	9.6	5.1	76.3
37.960	20.760	2.290	3.700	0.120	2.630	34.740	102.190	8.8	10.2	5.8	75.2
38.550	20.530	2.250	4.170	0.050	2.580	33.970	102.100	8.7	11.6	5.7	74.0
37.950	20.170	2.220	4.050	0.120	3.020	33.740	101.270	8.6	11.3	6.7	73.4
38.110	20.510	2.180	3.590	0.010	3.260	33.280	100.940	8.6	10.2	7.3	73.9
37.720	20.590	2.040	4.280	0.080	3.570	33.080	101.360	7.9	12.0	7.9	72.2
37.970	20.540	2.040	3.920	0.170	3.770	33.820	102.240	7.9	10.8	8.2	73.1
37.660	20.680	2.020	3.480	0.120	4.060	33.200	101.210	7.9	9.8	9.1	73.2
37.310	20.740	2.000	3.360	0.020	4.320	32.950	100.700	7.9	9.5	9.7	72.9
37.620	20.610	1.960	3.810	0.090	4.320	33.350	101.750	7.6	10.6	9.5	72.4
38.130	20.370	1.970	3.170	0.000	4.760	33.080	101.490	7.7	8.9	10.6	72.8
38.110	20.830	1.830	4.330	0.120	4.780	32.230	102.220	7.1	12.1	10.6	70.3
37.660	20.640	1.760	3.610	0.070	5.140	31.980	100.850	7.0	10.3	11.6	71.2
37.370	20.870	1.840	3.030	0.030	5.530	32.380	101.040	7.3	8.6	12.4	71.7
37.690	20.880	1.700	3.450	0.040	5.370	32.690	101.820	6.6	9.7	11.9	71.7
37.630	20.600	1.760	2.750	0.050	5.590	33.080	101.470	6.9	7.8	12.5	72.9
37.560	20.710	1.840	3.160	0.100	5.570	32.920	101.860	7.1	8.8	12.3	71.7
37.600	20.920	1.730	3.860	0.030	5.560	32.160	101.860	6.7	10.8	12.3	70.2
38.060	20.490	1.790	4.090	0.040	5.050	32.280	101.800	7.0	11.4	11.2	70.5
37.550	20.520	1.730	4.140	0.070	4.960	32.700	101.670	6.7	11.5	10.9	70.9
37.870	20.630	1.740	4.030	0.080	5.080	31.920	101.350	6.8	11.4	11.4	70.4
37.970	20.800	1.670	4.870	0.070	4.530	32.200	102.100	6.5	13.6	10.0	70.0
38.130	20.940	1.890	4.120	0.020	4.490	33.160	102.750	7.3	11.4	9.8	71.5
37.850	20.730	1.850	4.850	0.070	3.960	32.550	101.860	7.2	13.5	8.7	70.7
37.770	20.820	1.930	4.720	0.060	3.510	32.630	101.450	7.5	13.2	7.8	71.5

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Total	Pyp	Grs	Sps	Alm
37.640	20.650	2.300	3.770	0.080	2.800	34.670	101.900	8.8	10.4	6.1	74.7
38.120	20.500	2.320	3.720	0.080	2.460	34.630	101.830	9.0	10.3	5.4	75.3
37.670	20.660	2.430	3.330	0.120	2.570	35.360	102.130	9.3	9.2	5.6	76.0
38.780	20.510	2.370	3.370	0.030	2.480	34.350	101.900	9.3	9.5	5.5	75.7
38.300	20.750	2.360	3.690	0.070	2.500	34.640	102.300	9.1	10.2	5.5	75.1
37.770	20.440	2.260	3.120	0.080	2.990	34.490	101.150	8.8	8.8	6.6	75.7
38.160	20.400	2.160	2.930	0.080	3.520	34.560	101.800	8.4	8.2	7.8	75.6
37.960	20.390	2.220	2.160	0.070	4.150	34.370	101.300	8.7	6.1	9.3	75.9
37.320	20.330	2.190	1.470	0.010	5.570	34.210	101.090	8.6	4.1	12.4	75.0
38.210	20.850	2.100	0.820	0.060	6.330	34.680	103.050	8.2	2.3	14.0	75.6
37.630	20.420	2.020	0.970	0.080	7.190	32.670	100.980	8.0	2.8	16.3	72.9
38.470	20.600	1.840	1.650	0.080	7.740	32.040	102.410	7.2	4.7	17.3	70.8
37.870	20.500	1.770	1.820	0.080	7.890	31.640	101.560	7.0	5.2	17.7	70.1
37.910	20.340	1.710	1.870	0.060	8.210	32.500	102.610	6.6	5.2	18.0	70.3
37.150	20.490	1.760	1.900	0.020	8.770	31.460	101.550	6.8	5.3	19.3	68.5
37.650	20.260	1.630	1.920	0.120	9.380	30.450	101.410	6.4	5.4	21.0	67.2
37.750	20.340	1.640	2.010	0.140	9.820	30.890	102.590	6.3	5.6	21.5	66.7
37.430	20.630	1.540	1.990	0.060	10.190	30.320	102.170	6.0	5.5	22.5	66.0
37.960	20.300	1.460	2.000	0.140	10.500	29.830	102.180	5.7	5.6	23.3	65.4
37.850	20.520	1.410	2.050	0.190	10.720	29.360	102.100	5.5	5.8	23.9	64.7
37.400	20.290	1.360	2.180	0.400	10.990	29.220	101.850	5.3	6.1	24.4	64.1
37.910	20.140	1.390	2.080	0.600	11.150	28.620	101.890	5.5	5.9	25.1	63.5
37.930	20.300	1.410	1.950	0.140	11.550	28.860	102.140	5.5	5.5	25.7	63.3
37.470	20.170	1.390	2.100	0.230	11.670	28.370	101.390	5.5	5.9	26.1	62.6
37.350	20.330	1.300	2.050	0.320	11.890	28.330	101.590	5.1	5.8	26.6	62.5
37.570	20.320	1.340	2.090	0.280	12.080	28.410	102.100	5.2	5.9	26.8	62.2
37.840	20.190	1.360	2.060	0.190	11.860	28.530	102.030	5.3	5.8	26.3	62.6
37.470	20.240	1.450	2.210	0.030	11.460	28.750	101.610	5.6	6.2	25.4	62.8
37.580	20.190	1.430	2.070	0.030	11.410	28.560	101.270	5.6	5.8	25.5	63.0
37.380	20.310	1.380	2.010	0.120	11.560	29.150	101.930	5.4	5.6	25.5	63.5
37.690	20.150	1.340	2.170	0.210	11.610	28.500	101.660	5.3	6.1	25.9	62.7
38.490	20.500	1.510	2.110	0.080	10.970	29.000	102.660	5.9	5.9	24.4	63.7

SiO2	Al2O3	MgO	CaO	TiO2	MnO	FeO	Total	Pyp	Grs	Sps	Alm
37.410	20.260	1.480	1.930	0.190	11.150	29.250	101.680	5.8	5.4	24.7	64.1
37.820	19.770	1.510	2.140	0.230	11.100	28.570	101.150	5.9	6.1	24.8	63.2
37.310	19.800	1.430	2.150	0.500	10.930	28.560	100.680	5.7	6.1	24.6	63.6
37.460	20.050	1.480	2.010	0.170	10.630	29.500	101.310	5.8	5.7	23.7	64.9
37.520	20.140	1.570	2.140	0.110	10.640	29.290	101.400	6.1	6.0	23.6	64.2
37.690	20.160	1.530	2.160	0.140	10.490	29.720	101.890	5.9	6.0	23.2	64.8
36.940	20.500	1.610	2.020	0.090	9.850	30.180	101.180	6.3	5.7	21.9	66.2
37.350	20.640	1.680	2.040	0.240	9.430	30.250	101.630	6.6	5.8	21.0	66.6
37.860	20.330	1.830	2.060	0.130	8.910	31.120	102.250	7.1	5.7	19.6	67.6
37.270	20.800	1.790	2.030	0.100	8.340	30.610	100.940	7.1	5.8	18.8	68.3
37.190	20.500	1.920	2.100	0.150	8.220	31.150	101.230	7.5	5.9	18.3	68.3
37.740	20.640	1.840	2.090	0.090	7.650	31.650	101.700	7.2	5.9	17.1	69.8
37.720	20.610	1.980	1.970	0.100	7.390	31.820	101.590	7.8	5.6	16.5	70.2
37.350	20.540	2.050	1.910	0.070	6.800	33.210	101.930	7.9	5.3	14.9	71.9
38.020	20.440	2.070	1.800	0.120	6.560	32.540	101.540	8.2	5.1	14.7	72.0
37.700	20.800	2.150	1.040	0.080	6.430	33.460	101.670	8.5	2.9	14.4	74.1
38.010	20.840	2.260	0.840	0.040	6.410	33.970	102.360	8.8	2.4	14.2	74.6
37.050	20.360	2.120	3.120	0.060	4.910	33.720	101.340	8.1	8.6	10.7	72.6
38.460	20.620	2.210	3.130	0.050	3.730	34.060	102.260	8.6	8.8	8.3	74.4
37.650	20.500	2.350	3.300	0.040	3.060	34.300	101.200	9.1	9.2	6.8	74.9

## Np111a

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
37.696	21.305	3.320	1.175	6.731	31.638	0.066	101.93	12.9	3.3	14.9	69.0
37.723	21.307	3.283	1.275	6.696	31.889	0.134	102.31	12.7	3.5	14.7	69.1
37.981	21.487	3.219	1.612	6.419	31.198	0.126	102.09	12.6	4.5	14.3	68.6
38.128	21.347	3.374	1.526	6.280	31.606	0.044	102.31	13.1	4.3	13.8	68.8
37.727	21.677	3.358	1.616	6.326	31.093	0.044	101.86	13.1	4.5	14.1	68.3
37.859	21.021	3.699	1.362	6.201	31.571	0.014	101.73	14.3	3.8	13.6	68.4
37.930	21.319	3.571	1.127	6.259	32.021	0.003	102.28	13.8	3.1	13.7	69.4
37.948	21.377	3.388	1.527	6.268	31.977	0.031	102.57	13.0	4.2	13.7	69.0
36.297	20.501	4.037	1.344	5.192	32.292	0.029	99.73	15.5	3.7	11.3	69.5
37.510	20.982	3.444	1.176	6.633	32.521	0.025	102.35	13.1	3.2	14.3	69.4
38.190	21.129	3.586	1.483	6.277	31.722	0.018	102.48	13.8	4.1	13.7	68.4
38.473	21.099	3.468	1.522	6.002	31.697	0.031	102.35	13.5	4.3	13.2	69.0
37.538	21.219	3.516	1.506	5.690	31.883	0.032	101.40	13.7	4.2	12.6	69.6
37.747	21.284	3.711	1.669	5.511	31.908	0.000	101.90	14.3	4.6	12.1	69.0
37.852	21.213	3.649	1.783	5.199	31.771	0.002	101.47	14.2	5.0	11.5	69.3
37.451	21.338	3.804	1.608	5.043	31.856	0.032	101.23	14.8	4.5	11.2	69.6
37.917	21.527	3.890	1.564	5.011	32.342	0.033	102.31	15.0	4.3	10.9	69.8
37.629	21.101	3.661	1.652	4.570	32.357	0.061	101.13	14.3	4.6	10.1	70.9
38.058	21.156	3.707	1.790	4.439	32.565	0.027	101.83	14.4	5.0	9.8	70.9
38.239	21.198	3.855	1.736	4.412	32.108	0.047	101.68	15.0	4.9	9.8	70.3
37.609	21.543	4.024	1.829	4.202	32.637	0.035	101.89	15.4	5.1	9.2	70.3
39.388	21.658	4.092	1.529	3.527	30.790	0.029	101.89	16.7	4.5	8.2	70.6
37.012	20.129	3.779	1.676	4.104	32.427	0.002	99.17	14.8	4.7	9.1	71.3
37.640	21.026	3.753	1.892	4.004	32.860	0.043	101.23	14.5	5.3	8.8	71.4
37.787	21.516	4.097	1.894	3.979	32.580	0.012	101.92	15.8	5.2	8.7	70.3
37.802	21.367	3.833	1.835	3.856	33.309	0.013	102.03	14.7	5.1	8.4	71.8

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
38.147	21.337	3.800	1.919	3.799	32.894	0.014	101.93	14.7	5.4	8.4	71.6
38.023	21.193	4.022	1.799	3.839	33.296	0.013	102.19	15.4	4.9	8.3	71.4
37.903	21.301	4.026	1.857	3.758	33.305	0.020	102.18	15.4	5.1	8.2	71.4
37.842	21.512	4.020	1.851	3.677	33.760	0.021	102.71	15.2	5.0	7.9	71.8
37.990	21.301	3.838	1.872	3.818	33.107	0.008	102.02	14.8	5.2	8.4	71.6
37.573	21.098	3.782	1.938	3.691	32.835	0.023	101.00	14.7	5.4	8.2	71.7
38.093	20.913	3.784	2.025	3.770	32.967	0.031	101.60	14.6	5.6	8.3	71.5
38.205	21.522	3.978	2.096	3.833	32.624	0.044	102.32	15.3	5.8	8.4	70.5
37.814	21.446	3.819	2.067	3.684	33.068	0.040	102.04	14.7	5.7	8.1	71.5
37.956	21.255	3.626	2.091	3.786	32.798	0.045	101.60	14.1	5.9	8.4	71.7
37.992	21.192	3.897	2.163	3.729	33.089	0.043	102.23	14.9	6.0	8.1	71.0
37.942	21.585	3.804	1.949	3.799	32.658	0.055	101.82	14.8	5.5	8.4	71.3
37.866	21.221	3.936	1.917	3.875	32.798	0.035	101.71	15.2	5.3	8.5	71.0
37.873	21.356	3.772	2.103	3.764	33.254	0.007	102.15	14.5	5.8	8.2	71.5
37.979	21.587	3.978	2.021	3.821	33.164	0.013	102.57	15.2	5.5	8.3	71.0
38.029	21.380	3.964	1.935	3.810	33.224	0.007	102.41	15.1	5.3	8.3	71.3
38.093	21.188	3.797	1.808	3.776	33.284	0.008	102.07	14.6	5.0	8.3	72.1
37.618	21.316	3.854	1.532	3.751	33.119	0.003	101.27	15.0	4.3	8.3	72.4
37.922	21.552	3.808	1.836	3.966	33.177	0.000	102.36	14.6	5.1	8.7	71.6
37.950	21.381	3.897	1.863	3.711	33.075	0.039	101.94	15.0	5.2	8.1	71.6
37.807	21.182	3.934	1.638	3.660	33.360	0.000	101.61	15.2	4.5	8.0	72.2
37.749	21.564	3.744	1.844	3.861	32.988	0.019	101.84	14.5	5.1	8.5	71.8
38.191	21.447	3.834	1.958	3.740	33.553	0.027	102.76	14.6	5.4	8.1	71.9
37.505	21.251	3.861	2.037	3.504	33.331	0.005	101.53	14.8	5.6	7.7	71.9
38.165	21.153	3.790	1.921	3.651	33.113	0.042	101.87	14.7	5.4	8.0	71.9
38.180	21.130	3.841	1.899	3.866	32.954	0.000	101.89	14.8	5.3	8.5	71.4
37.880	21.148	3.900	1.962	3.816	33.010	0.041	101.80	15.0	5.4	8.3	71.2
37.561	20.651	3.749	1.858	3.909	32.862	0.016	100.62	14.6	5.2	8.6	71.6
38.042	21.207	3.854	1.915	3.788	32.972	0.036	101.85	14.9	5.3	8.3	71.5
38.078	21.201	3.872	1.919	3.883	32.934	0.039	101.97	14.9	5.3	8.5	71.2
37.622	21.311	3.929	1.979	3.805	33.476	0.016	102.16	14.9	5.4	8.2	71.4
38.001	21.216	3.664	2.012	3.833	32.931	0.034	101.70	14.2	5.6	8.5	71.7

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
37.593	21.128	3.897	2.155	3.704	32.381	0.013	100.89	15.1	6.0	8.2	70.6
38.456	21.579	3.753	2.287	3.922	32.376	0.013	102.39	14.5	6.4	8.6	70.4
37.910	21.164	3.810	2.117	3.894	32.667	0.044	101.62	14.7	5.9	8.6	70.8
37.504	21.208	3.590	2.065	3.812	32.860	0.042	101.12	14.0	5.8	8.4	71.8
37.809	21.255	3.760	2.267	3.678	33.073	0.018	101.87	14.4	6.3	8.0	71.3
37.735	21.258	3.769	2.164	3.738	32.496	0.018	101.19	14.7	6.1	8.3	71.0
37.931	21.256	3.711	2.053	3.815	32.748	0.018	101.64	14.4	5.7	8.4	71.4
38.074	21.243	3.735	2.105	3.766	32.757	0.053	101.77	14.5	5.9	8.3	71.3
37.753	21.574	3.687	2.216	3.771	33.004	0.028	102.11	14.2	6.1	8.3	71.4
37.942	21.484	3.714	2.136	3.776	32.650	0.044	101.90	14.4	6.0	8.3	71.2
38.131	21.359	3.961	1.972	3.672	32.780	0.000	101.90	15.3	5.5	8.1	71.1
37.542	21.355	3.627	2.145	3.724	32.826	0.041	101.38	14.1	6.0	8.2	71.7
37.743	21.342	3.784	2.122	3.812	32.856	0.000	101.74	14.6	5.9	8.4	71.1
37.496	21.466	3.595	2.125	3.829	33.314	0.000	101.84	13.8	5.9	8.4	71.9
37.558	21.290	3.794	1.834	3.778	33.464	0.038	101.76	14.6	5.1	8.2	72.1
37.959	21.653	3.750	2.035	3.796	32.957	0.023	102.18	14.5	5.7	8.3	71.5
39.848	22.653	4.129	2.308	3.689	31.952	0.034	104.69	16.0	6.4	8.1	69.5
37.248	20.989	3.806	2.033	3.813	33.124	0.005	101.03	14.6	5.6	8.3	71.4
37.527	21.473	3.920	1.901	3.928	32.545	0.048	101.36	15.2	5.3	8.7	70.8
37.860	21.083	3.620	2.210	3.813	33.001	0.034	101.62	14.0	6.1	8.4	71.5
38.005	21.249	3.624	2.113	3.888	32.520	0.018	101.46	14.2	5.9	8.6	71.3
37.721	21.455	3.722	2.071	3.793	32.385	0.026	101.28	14.6	5.8	8.4	71.2
37.540	21.088	3.577	2.073	3.899	32.696	0.018	100.95	14.0	5.8	8.6	71.6
37.799	21.507	3.781	2.145	3.802	32.369	0.057	101.48	14.7	6.0	8.4	70.8
37.832	21.161	3.853	2.223	3.761	32.195	0.030	101.14	15.0	6.2	8.3	70.4
37.588	21.526	3.730	1.997	3.769	32.860	0.029	101.50	14.5	5.6	8.3	71.6
37.589	21.587	3.932	2.026	4.022	32.564	0.027	101.78	15.2	5.6	8.8	70.4
37.680	21.448	3.769	2.297	3.802	32.821	0.022	101.85	14.5	6.4	8.3	70.8
37.638	21.335	3.806	2.204	3.764	32.401	0.039	101.22	14.8	6.2	8.3	70.7
37.828	21.591	3.657	2.233	4.040	32.612	0.042	102.05	14.1	6.2	8.9	70.8
37.579	21.510	3.830	2.014	3.985	32.616	0.040	101.58	14.8	5.6	8.8	70.8
37.920	21.521	3.822	2.093	3.947	32.643	0.072	102.02	14.8	5.8	8.7	70.8

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
37.207	21.295	3.639	2.176	4.109	32.860	0.036	101.33	14.0	6.0	9.0	71.0
37.524	21.197	3.585	2.163	4.064	31.939	0.020	100.49	14.1	6.1	9.1	70.6
37.892	21.044	3.823	2.076	4.166	32.578	0.038	101.62	14.7	5.8	9.1	70.4
37.473	21.452	3.728	2.114	4.348	32.298	0.068	101.49	14.4	5.9	9.6	70.1
37.338	21.172	3.749	2.060	4.246	32.569	0.058	101.20	14.5	5.7	9.3	70.5
37.904	21.318	3.866	1.921	4.413	32.151	0.035	101.61	15.0	5.4	9.7	69.9
37.296	21.242	3.788	2.059	4.607	31.997	0.058	101.07	14.7	5.7	10.1	69.5
37.454	21.257	3.650	1.977	4.632	32.255	0.048	101.29	14.1	5.5	10.2	70.1
37.599	21.000	3.536	1.957	4.862	31.664	0.065	100.74	13.9	5.5	10.8	69.7
37.408	20.608	3.567	1.652	5.122	32.548	0.088	101.00	13.8	4.6	11.2	70.4
37.735	21.000	3.695	1.451	5.240	32.134	0.215	101.57	14.3	4.1	11.6	70.0
37.540	21.191	3.470	1.472	5.506	32.145	0.219	101.56	13.5	4.1	12.2	70.2
37.602	20.991	3.565	2.128	5.078	31.924	0.154	101.55	13.8	5.9	11.1	69.2
37.980	21.253	3.546	2.037	4.981	31.748	0.109	101.68	13.8	5.7	11.0	69.4
37.654	21.357	3.650	1.884	4.825	32.328	0.053	101.77	14.1	5.2	10.6	70.1
37.302	21.209	3.732	1.850	4.747	32.057	0.050	100.96	14.5	5.2	10.5	69.9
37.816	21.119	3.705	1.963	4.759	32.188	0.022	102.07	14.3	5.5	10.4	69.8
37.534	21.275	3.726	2.343	4.071	29.688	0.045	99.52	15.3	6.9	9.5	68.3
37.854	21.034	3.945	1.865	4.484	32.263	0.038	101.54	15.2	5.2	9.8	69.8
37.912	21.077	3.875	2.089	4.413	32.051	0.022	101.56	15.0	5.8	9.7	69.5
37.700	21.292	3.904	1.970	4.444	31.975	0.019	101.40	15.1	5.5	9.8	69.6
37.748	20.686	3.777	1.915	4.735	32.279	0.048	101.20	14.5	5.3	10.4	69.8
37.848	21.252	3.709	1.919	4.786	31.994	0.028	101.57	14.4	5.4	10.6	69.7
38.047	21.354	3.860	2.156	4.717	31.604	0.027	101.81	14.9	6.0	10.4	68.7
38.197	21.127	3.494	2.201	5.086	31.412	0.036	101.60	13.6	6.2	11.3	68.9
37.759	20.800	3.562	2.161	5.034	31.052	0.028	100.40	14.0	6.1	11.3	68.6
37.962	21.186	3.620	2.135	5.356	31.270	0.046	101.59	14.1	6.0	11.8	68.2
37.549	21.019	3.454	1.994	5.662	30.866	0.052	100.70	13.6	5.6	12.7	68.1
37.929	20.966	3.422	2.073	5.552	31.299	0.076	101.33	13.3	5.8	12.3	68.5



## Np111b

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
37.704	21.492	2.737	4.406	0.138	34.533	0.087	101.10	10.8	12.5	0.3	76.4
37.543	21.605	2.962	3.998	0.011	35.191	0.038	101.35	11.6	11.2	0.0	77.2
37.226	21.492	2.621	5.028	0.006	34.064	0.085	100.53	10.3	14.3	0.0	75.4
37.334	21.474	2.761	3.886	0.076	35.733	0.058	101.33	10.8	10.9	0.2	78.2
37.131	21.58	2.475	4.19	0.014	35.192	0.061	100.65	9.8	11.9	0.0	78.2
37.152	21.559	2.601	4.658	0.051	34.579	0.039	100.68	10.2	13.2	0.1	76.4
36.968	21.256	2.433	4.339	0.042	35.138	0.098	100.29	9.6	12.3	0.1	77.9
38.034	21.528	2.055	4.448	0.029	35.186	0.005	101.30	8.2	12.8	0.1	78.9
37.219	21.422	1.991	4.536	0.117	35.181	0.047	100.52	7.9	13.0	0.3	78.8
36.975	21.215	2.145	4.624	0.061	35.081	0.108	100.21	8.5	13.2	0.1	78.1
36.551	21.573	2.032	4.411	0.139	35.219	0.045	99.98	8.1	12.7	0.3	78.9
36.964	21.61	2.093	4.361	0.122	35.659	0.052	100.87	8.3	12.4	0.3	79.1
37.029	21.481	2.106	4.323	0.148	34.866	0.026	99.98	8.5	12.5	0.3	78.7
36.929	21.38	1.917	4.422	0.149	35.01	0.042	99.86	7.7	12.8	0.3	79.1
36.738	21.227	1.856	4.557	0.207	35.199	0.074	100.00	7.4	13.1	0.5	79.0
36.702	21.569	1.876	4.494	0.251	35.434	0.028	100.41	7.5	12.9	0.6	79.1
37.234	21.332	1.749	4.708	0.279	35.022	0.109	100.45	7.0	13.6	0.6	78.8
37.381	21.482	1.797	4.501	0.377	35.369	0.058	100.99	7.2	12.9	0.9	79.1
36.42	21.261	1.898	4.402	0.365	35.242	0.06	99.65	7.6	12.6	0.8	79.0
36.735	21.648	1.697	4.366	0.491	35.692	0.053	100.75	6.7	12.5	1.1	79.7
36.509	21.61	1.741	4.369	0.458	35.566	0.062	100.32	6.9	12.5	1.0	79.5
36.677	21.002	1.655	5.088	0.676	35.007	0.067	100.25	6.5	14.4	1.5	77.5
36.81	21.275	1.646	4.464	0.854	35.343	0.077	100.55	6.5	12.8	1.9	78.8
36.701	20.949	1.393	4.893	0.88	34.942	0.044	99.81	5.6	14.1	2.0	78.4
36.877	21.136	1.581	4.712	0.922	34.844	0.05	100.13	6.3	13.5	2.1	78.1
37.165	21.46	1.514	5.043	0.895	34.471	0.054	100.61	6.1	14.5	2.0	77.4

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
37.088	21.107	1.561	4.775	1.037	34.578	0.056	100.21	6.2	13.7	2.4	77.6
36.527	21.396	1.458	5.13	1.035	34.594	0.062	100.26	5.8	14.7	2.3	77.2
36.9	21.231	1.675	5.113	1.156	34.148	0.009	100.26	6.7	14.6	2.6	76.1
37.131	21.184	1.632	4.831	1.15	34.67	0.051	100.67	6.5	13.8	2.6	77.2
36.774	21.296	1.554	5.143	1.143	33.677	0.068	99.67	6.3	14.9	2.6	76.2
36.926	21.378	1.529	4.91	1.327	33.832	0.065	99.98	6.2	14.2	3.0	76.6
36.651	21.123	1.441	4.932	1.23	34.584	0.042	100.01	5.7	14.1	2.8	77.3
36.833	21.243	1.529	4.935	1.281	34.133	0.063	100.06	6.1	14.2	2.9	76.7
36.886	20.993	1.632	4.519	1.24	34.361	0.072	99.76	6.6	13.1	2.8	77.5
37.131	21.457	1.755	4.748	1.195	34.218	0.064	100.61	7.0	13.6	2.7	76.6
36.987	21.302	1.956	4.583	1.263	33.943	0.084	100.12	7.8	13.2	2.9	76.1
37.02	21.238	2.279	3.599	1.002	34.744	0.294	100.22	9.1	10.4	2.3	78.2
37.317	21.454	2.735	3.25	0.978	35.274	0.032	101.09	10.8	9.2	2.2	77.9
37.434	21.256	2.841	2.969	0.912	35.214	0.016	100.66	11.2	8.5	2.1	78.2
36.332	20.797	2.766	2.373	0.94	36.078	0.01	99.31	11.0	6.8	2.1	80.2
37.272	21.312	2.951	2.021	1.033	35.692	0.034	100.33	11.8	5.8	2.3	80.1
37.481	21.469	2.755	2.74	1.241	35.325	0.031	101.06	10.9	7.8	2.8	78.5
37.654	21.442	2.365	3.877	2.085	33.369	0.033	100.84	9.4	11.1	4.7	74.7
37.144	21.206	2.394	3.138	2.118	33.801	0.021	99.84	9.6	9.1	4.8	76.4
36.747	21.142	1.509	4.873	4.132	32.179	0.076	100.69	5.9	13.8	9.2	71.0
36.726	21.495	1.158	5.292	4.979	30.895	0.092	100.75	4.6	15.2	11.3	69.0
36.816	21.333	1.153	5.514	5.164	30.095	0.307	100.39	4.6	15.9	11.8	67.7
36.682	21.385	1.071	5.41	5.546	30.04	0.144	100.30	4.3	15.6	12.6	67.5
37.524	21.979	1.047	5.373	5.809	29.661	0.075	101.54	4.2	15.6	13.3	67.0
36.347	21.297	1.121	5.358	5.924	29.915	0.094	100.07	4.5	15.3	13.4	66.8
36.858	21.214	1.052	4.934	6.205	30.012	0.083	100.42	4.2	14.2	14.1	67.4
36.915	21.176	1.268	3.881	6.328	30.701	0.079	100.35	5.1	11.2	14.5	69.2
36.599	21.13	1.239	3.749	6.371	30.974	0.046	100.12	5.0	10.8	14.5	69.7
36.96	21.166	1.308	3.381	6.996	30.92	0.121	100.90	5.2	9.7	15.9	69.2
36.66	21.263	0.933	5.541	7.466	28.231	0.111	100.30	3.7	15.9	17.0	63.4
36.676	20.971	0.919	5.78	7.552	27.772	0.095	99.82	3.7	16.7	17.2	62.5
36.557	21.484	0.836	5.668	8.02	27.538	0.119	100.27	3.4	16.4	18.3	62.0

SiO2	Al2O3	MgO	CaO	MnO	FeO	TiO2	Total	Prp	Grs	Sps	Alm
36.955	21.517	0.866	5.632	8.107	28.318	0.077	101.50	3.4	15.9	18.1	62.5
36.794	20.973	0.866	5.688	7.971	27.226	0.515	100.06	3.5	16.5	18.3	61.7
36.917	21.166	0.97	5.477	8.116	27.327	0.077	100.15	3.9	15.9	18.6	61.7
36.569	20.982	0.872	6.084	7.655	27.594	0.126	99.93	3.5	17.5	17.3	61.7
37.01	21.453	0.918	5.654	7.811	27.857	0.092	100.82	3.7	16.2	17.7	62.4
36.837	21.216	0.913	5.852	7.748	27.79	0.126	100.51	3.6	16.8	17.5	62.1
37.215	21.141	0.94	5.765	7.561	28.074	0.166	100.92	3.7	16.5	17.1	62.7
36.508	21.175	0.884	5.801	7.44	28.158	0.096	100.19	3.5	16.6	16.9	63.0
37.136	21.284	0.888	5.741	7.077	27.773	0.101	100.05	3.6	16.8	16.3	63.3
36.527	20.977	0.897	5.655	7.033	28.558	0.107	99.75	3.6	16.3	16.0	64.1
36.483	21.271	1.074	5.161	6.043	29.544	0.069	99.78	4.3	15.0	13.8	66.9
36.705	21.214	0.942	5.517	5.192	30.382	0.109	100.08	3.8	15.9	11.8	68.4
36.74	20.946	1.153	5.182	4.598	30.977	0.104	99.74	4.6	15.0	10.5	69.9
36.73	21.006	1.192	5.189	4.145	31.398	0.078	99.74	4.8	15.0	9.5	70.8
36.724	21.124	1.166	5.417	3.743	31.725	0.063	99.98	4.7	15.6	8.5	71.2
36.51	21.208	1.226	5.101	3.608	31.787	0.056	99.54	4.9	14.8	8.3	72.0
36.906	21.328	1.109	5.18	3.241	32.041	0.065	99.94	4.5	15.1	7.5	72.9
36.55	21.268	1.253	5.036	2.879	33.075	0.037	100.18	5.0	14.5	6.5	74.0
36.923	21.103	1.251	5.012	2.355	33.16	0.089	100.00	5.0	14.5	5.4	75.0
37.178	20.9	1.611	4.756	1.269	34.331	0.07	100.23	6.4	13.7	2.9	77.0
39.378	21.05	1.554	4.517	0.687	34.996	0.024	102.22	6.3	13.1	1.6	79.1
37.399	20.759	1.686	4.521	0.547	35.286	0.111	100.33	6.7	13.0	1.2	79.0
37.248	21.556	1.898	4.174	0.438	36.138	0.033	101.53	7.5	11.8	1.0	79.7
37.373	21.395	1.852	4.532	0.317	35.175	0.057	100.71	7.4	13.0	0.7	78.9
36.946	20.931	1.907	4.412	0.195	35.874	0.097	100.38	7.5	12.5	0.4	79.5
37.694	20.885	2.213	4.201	0.091	36.408	0.056	101.55	8.6	11.8	0.2	79.4
37.244	21.174	2.22	4.639	0.052	35.031	0.118	100.49	8.8	13.2	0.1	77.9
37.436	20.997	2.319	4.882	0.01	34.502	0.056	100.20	9.2	13.9	0.0	76.8
38.001	21.197	2.806	3.72	0.062	36.261	0.037	102.10	10.8	10.3	0.1	78.7

